

NDC INVESTMENT PLAN 2022



Investment Planning in Fiji
for the Transport and Energy-
efficiency Sectors



FOREWORD



When it comes to carbon emissions, Fiji's share of emissions is a negligible sliver of the global total. But as a people who suffer some of the most severe climate impacts, we know that no nation, company, or community is too small to make a difference for climate action. Driven by that belief, in December 2020, we submitted our updated Nationally Determined Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC), which reaffirmed our commitment to a 30% emissions reduction in the energy sector by 2030. While adapting and becoming resilient to the impacts of climate change remain a chief concern, we are steadfast in pursuing climate change mitigation. As we have continually reminded the world at every opportunity we have been afforded: Achieving net-zero carbon emissions by 2050 is the most important mission of our lifetimes.

The impact of tropical cyclones and the on-going COVID-19 pandemic has placed significant financial and fiscal constraints on our domestic response to climate change. Severe weather events and the unforeseen COVID-19 pandemic has driven home the vital importance of exploring innovative financing mechanisms that reduce the cost of implementing NDCs and engrain the broader Sustainable Development Goals within our climate plans. The journey from ambition to action is one that requires resources, and our success is contingent on how quickly and effectively we mobilise those resources. The NDC Investment Plan and Program Pipelines break down and localises the nation's high-level commitments - an effort that involved close cooperation with Ministries, statutory bodies, sector-based experts and financial institutions. As a remote island nation, our transport sector is our most significant source of emissions - and that is where our NDC is most focused and ambitious.

The NDC Investment Plan and Program Pipelines seek to leverage greater support for the implementation of mitigation actions in the land transport, maritime, aviation, and energy-efficiency sectors. Its pipeline of projects is described in great detail to provide potential development partners with clear, contextualized and consolidated information about our goals and development and financing needs across every relevant sector of our economy.

Realising our climate ambition rests on identifying actions, creating attractive investment opportunities, raising finance, and attracting technical support. This plan is our bridge between climate policy-makers and investors, and we are confident that it will provide all multilateral and bilateral partners and private sector stakeholders the clear, confidence-boosting signal they need to invest in Fiji in support of our transition towards a low-carbon economy consistent with the Paris Agreement's 1.5-degree guardrail.

Our hope is that investors, financial institutions, multilateral and bilateral donors can use this roadmap to arrive at sustainably-minded and planet-saving investment opportunities in our islands. Securing our children's future is Fiji's greatest national priority and we are open to partners from around the world who share our vision of a better, bluer, and greener future for humankind. Our mission is to decarbonise the Fijian economy, continually build climate resilience, and help spark the change we all seek from today's leaders by delivering scalable climate action that can inspire the world to follow suit.

A handwritten signature in black ink, appearing to read 'Aiyaz Sayed-Khaiyum'.

Hon. Aiyaz Sayed-Khaiyum
Attorney General and Minister
Responsible for Climate Change

TECHNICAL OVERSIGHT AND GUIDANCE

We would like to recognise the contributions of Global Green Growth Institute (GGGI). We thank the Climate Change and International Cooperation Division of the Ministry of Economy for their consistent input, technical guidance and stakeholder facilitation that were fundamental to the successful development of this document.

ACKNOWLEDGEMENTS

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The Fijian Ministry of Economy, the Regional Pacific NDC Hub, GGGI and the authors would like to acknowledge and show appreciation for the active participation of national and international stakeholders in the activities for the consultation and preparation of the content of this NDC Investment Plan.

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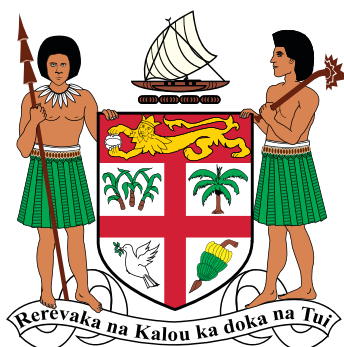
Sailing for Sustainability (Fiji), and GH Sustainability.

DISCLAIMER

This NDC Investment Plan is prepared for the Fijian Government based on best available information and results of stakeholder consultations gained between November 2019 and December 2020, and it is noted that underlying information used to prepare the NDC Investment Plan and final results presented are subject to change.

Information and conclusions presented in this NDC Investment Plan may not necessarily represent those of the Regional Pacific NDC Hub and its implementing partners, including the implementing partners member states.





Investment Planning in Fiji for the Transport and Energy Efficiency Sectors

IMPLEMENTING PARTNERS



REGIONAL
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ABBREVIATIONS

ADB	Asian Development Bank
ANR	Air Navigation Regulations
ANZ	Australia and New Zealand Bank
ATS	Air Terminal Services Limited
AU-DFAT	Australian Department of Foreign Affairs and Trade
BAU	Business as Usual
BPD	Budget & Planning Division
BRT	Bus Rapid Transit
BRED	Banque régionale d'escompte et de dépôts
BSP	Bank of South Pacific
CCA	Climate Change Act 2021
CCICD	Climate Change & International Cooperation Division
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CIDCA	China International Development Cooperation Agency
CRM	Congestion Reduction Measures
CTCN	Climate Technology Centre and Network
CROP	The Council of Regional Organisations of the Pacific
DCFC	Direct Current Fast Charge
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
DOE	Department of Energy
DSM	Demand Side Management
EE	Energy-efficiency
EEAS	European Union External Action
EFL	Energy Fiji Limited
EIB	European Investment Bank
EV	Electric Vehicles
FAL	Fiji Airports Limited

FBOA	Fiji Bus Operators' Association
FBOS	Fiji Bureau of Statistics
FCEF	Fiji Commerce & Employers Federation
FCCI	Fiji Chamber of Commerce and Industry
FCCC	Fijian Competition & Consumer Commission
FD/FJ\$	Fiji Dollar
FDB	Fiji Development Bank
FHTA	Fiji Hotel and Tourism Association
FIR	Flight Information Region
FMTA	Fiji Motor Traders Association
FNU	Fiji National University
FRA	Fiji Roads Authority
FSC	Fiji Sugar Corporation
FPCL	Fiji Ports Corporation Limited
FRCS	Fiji Revenue and Customs Service
GCF	Green Climate Fund
GEF	Green Environment Facility
GGGI	Global Green Growth Institute
GHG	Greenhouse Gases
GGFF	The Green Growth Framework for Fiji
GMN-MTCC	Global Maritime Technology Cooperation Centre Network
GSS	Government Shipping Service
HFC	Home Finance Company
ICE	Internal combustion engine
IFC	International Finance Corporation
IMO	International Maritime Organisation
IOT	Internet of Things
JICA	Japan International Cooperation Agency

km	Kilometres
KOICA	Korea International Cooperation Agency
KPI	Key Performance Indicator
LEDS	Fiji Low Emission Development Strategy 2018 – 2050
LTA	Land Transport Authority
MCST	Micronesian Centre for Sustainable Transport
MEPLS	Minimum Energy Performance Labelling Standards
MGHCD	Ministry of Local Government, Housing, and Community Development
MHMS	Ministry of Health and Medical Services
MITT/ MCTTT	Ministry of Industry Trade and Tourism (restructured as Ministry of Commerce, Trade, Tourism and Transport in April 2020)
MOE	Ministry of Economy
MOIT/ MIMS	Ministry of Infrastructure & Transport (restructured as Ministry of Infrastructure and Meteorological Services in April 2020)
NCCP	The Republic of Fiji National Climate Change Policy 2018 – 2030
NDC	Nationally Determined Contribution
NDP	5-Year and 20-Year National Development Plan
NGO	Non-Governmental Organisation
NZ-MFAT	New Zealand Ministry of Foreign Affairs and Trade
PASO	Pacific Aviation Safety Office
PBSP	Pacific Blue Shipping Partnership
PECREE	Pacific Centre for Renewable Energy and Energy-efficiency (part of SPC)
PICs	Pacific Island Countries
PPA	Pacific Power Association

RBF	Reserve Bank of Fiji
RHA	Road Haulage Association
SIDA	Swedish International Development Cooperation Agency
SOE	State Owned Enterprise
SPC	Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
TNA	Draft Fiji Technology Needs Assessment Report: Mitigation
TOR	Terms of Reference
TPD	Transport Planning Division
tCO₂/tCO_{2e}	Metric tons of carbon dioxide (equivalents)
WAF	Water Authority of Fiji
UK-FCDO	United Kingdom Foreign, Commonwealth & Development Office (former DFID)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNIDO	United Nations Industrial Development Organization
USD/US\$	United States Dollar
USP	University of the South Pacific
WB	World Bank



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EXECUTIVE SUMMARY

INTRODUCTION

This NDC Investment Plan, and included Programme Pipeline, have the purpose of providing essential information on potential opportunities for GHG mitigation in the transport (land, maritime, and aviation) and energy-efficiency sectors and the potential means for financing these opportunities. This information is directed towards the Fijian Government, private companies and private investors, State-Owned Enterprises, Non-Governmental Organisations in Fiji, and international partners for development and finance. This NDC Investment Plan includes the national level background information on the presented mitigation opportunities, which is based on information gained from published documentation and through consultations with key national sectoral stakeholders.

The process of stakeholder engagement during the development of this NDC Investment Plan included an initial workshop and parallel one-on-one meetings with key national stakeholders in the transport, energy-efficiency, and finance sectors. This initial workshop and the one-on-one meetings identified the potential mitigation opportunities in the sectors, information availability, and the use of existing financial instruments and sources of financing in Fiji. Initial results of this NDC Investment Plan were presented through a virtual consultation to over 150 applicable stakeholders in Fiji consisting of a broad representation of Government entities, education institutions, financial institutions, private sector, NGOs, and development partners. The outcomes of the initial results and the valued feedback from the consultation were used to strengthen information regarding the 31 identified mitigation opportunities and narrowed these down to 20 “primary mitigation opportunities”. The NDC Investment Plan was then validated through a final consultation including written feedback towards the draft version of the NDC Investment Plan and sub-sector consultation meetings attended by key national stakeholders in the transport, energy-efficiency, and finance sectors.

It is noted that from the context of reducing GHG emissions, the primary mitigation opportunities defined in this NDC Investment Plan fall within the existing boundary of both the unconditional and conditional mitigation targets of Fiji’s (Intended) NDC issued in 2015, and to a large extent are included in Fiji’s NDC Implementation Roadmap and Low Emission Development Strategy (LEDS) for the sectors. The mitigation opportunities also address the transformational strategic thrusts of the 5-Year and 20- Year National Development Plan. In this context this NDC Investment Plan, the NDC Implementation Roadmap, and the Low Emission Development Strategy (LEDS) can be used as tools to enhance the transparency of the physical implementation and financial pathways for Fiji to reach its NDC targets with support gained through the Means of Implementation (e.g. capacity building, technology transfer, and finance).

Fiji’s (Intended) NDC, issued in 2015, estimates that energy sector Business-as-Usual (BAU) scenario emissions will reach 2.5 MtCO₂ in 2030, taking into account 2013 as the baseline year. The (Intended) NDC has an unconditional commitment to reduce GHG emissions from this BAU scenario by approximately 10% in 2030 (250 ktCO₂), and a conditional commitment to reduce a further 20% (500 ktCO₂). This is a combined commitment to reduce 30% of GHG emissions from the energy sector BAU scenario, which is an estimated total mitigation of 0.75 MtCO₂ in 2030.¹ It is estimated that by approaching Fiji’s 100% renewable energy power generation goal, 0.5 MtCO₂ can be reduced in 2030, and the remainder through GHG mitigation from economy wide energy-efficiency which includes actions in transport and energy-efficiency.

The 20 primary mitigation opportunities presented in this NDC Investment Plan consist of 11 opportunities in the transport sector, and 9 opportunities in the energy-efficiency sector to be implemented from 2020 to the end of 2030. Information is also provided for 11 secondary mitigation opportunities. The consolidated temporal financing pathway of the primary mitigation opportunities in both transport and energy-efficiency lead to an estimated need for US\$1.98B in total investment in the sectors. This includes US\$29M in capacity building and technical assistance needs, and US\$1.95B in capital investments.²

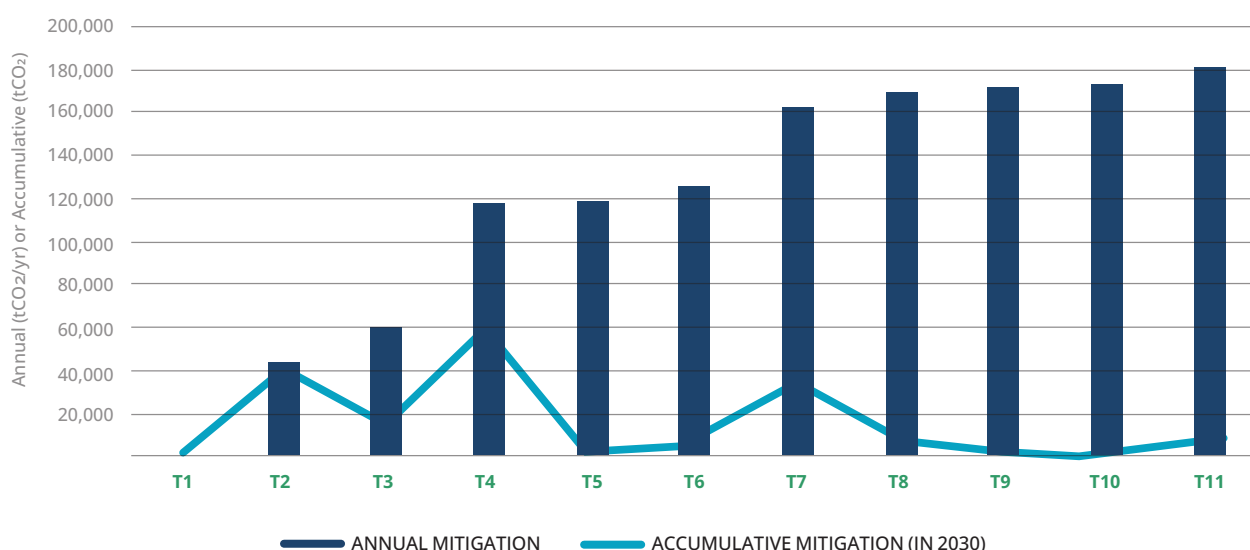
TRANSPORT SECTOR MITIGATION OPPORTUNITIES

The primary mitigation opportunities for the transport sector during the period of 2020 through 2030 have a total indicative cost of US\$0.88B, which includes a total indicative need for US\$12.2M in capacity building & technical assistance, and an indicative need for US\$0.86B in investment capital.³ These primary mitigation opportunities have the potential to reduce a total of 1,186,000 tCO₂ in the period of 2020 through 2030 period, and to reach a mitigation potential of 179,000 tCO₂/year in 2030. This is a mitigation potential of 7% of the estimated energy sector BAU baseline in 2030 as defined in the (Intended) NDC issued in 2015. This leads to a total indicative cost of carbon of 738 US\$/tCO₂ for the primary mitigation opportunities during the defined period.

The figure below indicates the:

Annual mitigation potential of each primary mitigation opportunity individually in 2030, and the Total mitigation potential in 2030 of all opportunities as accumulated from left to right.

PRIMARY OPPORTUNITIES MITIGATION POTENTIAL (TRANSPORT)



- | | |
|--|---|
| T1 National Maritime Action Plan | T7 Vehicle Replacement Program for Lorries and Buses |
| T2 Alternative Fuels in Land and Maritime Transport | T8 Sail-powered Cargo/Passenger Ferry |
| T3 Outboard Motor Transition | T9 End-of-Life Vehicle Programme |
| T4 Vehicle Replacement Program for Cars and Taxis | T10 Zero Carbon Passenger Ferry Trials |
| T5 Lautoka Zero Carbon Transport Challenge/Strategy | T11 Bicycle/E-Bike Financing Initiative |
| T6 Aviation Operational Training Programme | |

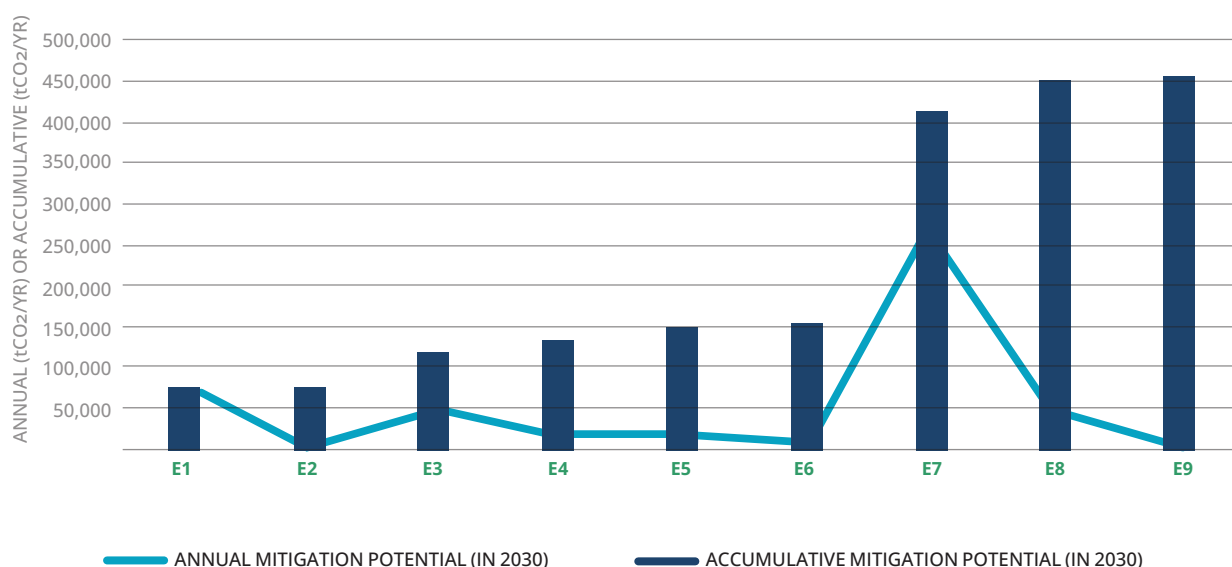
ENERGY-EFFICIENCY SECTOR MITIGATION OPPORTUNITIES

The primary mitigation opportunities for the energy-efficiency sector during the period of 2020 through 2030 have a total indicative cost of US\$1.11B, which includes a total indicative need for US\$16.9M in capacity building & technical assistance, and an indicative need for US\$1.09B in investment capital.⁴ These primary mitigation opportunities have the potential to reduce 1,586,000 tCO₂ in the period of 2020 through 2030 period, and to reach a mitigation potential of 456,000 tCO₂/year in 2030. This is a potential mitigation of 18% of the estimated energy sector BAU baseline in 2030 as defined in the (Intended) NDC from 2015. This leads to a total indicative cost of carbon of 697 US\$/tCO₂ for the primary mitigation opportunities during the period of 2020 through 2030.

The figure below indicates:

- The annual mitigation potential of each primary mitigation opportunity individually in 2030, and the
- Total mitigation potential in 2030 of all opportunities as accumulated from left to right.

PRIMARY OPPORTUNITIES MITIGATION POTENTIAL (ENERGY-EFFICIENCY)



- E1** Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji
- E2** Programme to Promote Enhanced Green Tourism
- E3** Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS)
- E4** Capacity Building in Energy Efficiency in Industry
- E5** Promotion of Lithium Ion Batteries for Renewable Energy Storage

- E6** Promotion of Sustainable Government Procurement
- E7** Programme to Manage Peak Demand and Energy Savings in Fiji
- E8** Efficient Operation and Maintenance of Water Supply Systems
- E9** Assessment, Design and Construction of Low Energy/Carbon Buildings

FINANCING THE MITIGATION OPPORTUNITIES

Fiji has the benefit of having the largest economy of the Pacific Island Countries (PICs), and accordingly the financial and development sectors operating in Fiji have the benefit of possessing the highest level of experience in the PICs with both structuring and operating financial instruments and in supporting economic sectors. This experience exists in both the public and private entities operating within the financial sector, and the private financial sector is strengthened in Fiji due to the depth of experience with commercial (e.g. business) and retail (e.g. household) lending. The public sector also has robust experience with using individual fiscal and monetary instruments to catalyse change, including changes in taxation, the strategic use of the state budget, and supporting currency and liquidity. The estimated US\$1.98B in investment needed to implement the primary mitigation opportunities in the NDC Investment Plan is equivalent to 38% of Fiji's Real GDP in 2018⁵, and 110% of the Fijian Government's State budget for 2020/2021.⁶ While the Fijian Government has a stable but lower-to-medium-grade credit rating (before the COVID-19 crisis), its financial standing severely limits the ability to directly finance mitigation actions.⁷

Due to past financial sector activities, stakeholders in Fiji have experience with the design and implementation of a significant portion of the types of financial instruments needed to finance the primary mitigation opportunities. However, additional capacity building and technical assistance will be needed to prepare individual financial instruments for each mitigation opportunity and scale them to the level needed to support significant GHG mitigation in the transport and energy-efficiency sectors. Many of these financial instruments will include equity, debt, and fiscal policy/regulation changes that need to work together as blended finance to ensure the level of transition needed to reach the mitigation potential highlighted in this NDC Investment Plan. **The table below indicates the financial instrument types needed to implement the primary mitigation opportunities and the potential sources for financing these financial instruments.**

FINANCIAL INSTRUMENT TYPES	POTENTIAL SOURCES OF FINANCE*
Private Equity from Households	Households
Private Equity from Businesses	Companies, SOEs, Communities
Grants for Capacity Building and Technical Assistance	GEF, AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, WB/IFC, KOICA, CIDCA, EEAS, EIB, PBSP, SIDA, UNDP, UNEP, UNIDO, UNESCAP, DE-GIZ, JICA, UK-FCDO
Non-Government Grants for Investment	GCF, GEF, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, EEAS, KOICA
Guarantees for Credit	ADB, WB, IFC, EIB, GCF
Guarantees for Export	Supplier Countries
Concessional Loans	ADB, WB, IFC, EIB, GCF
Commercial Loans**	ANZ, Westpac, BRED, HFC, BSP, FDB
Retail Loans**	ANZ, Westpac, BRED, HFC, BSP
State Budget & SOEs	MOE, MCTTT, MIMS
Taxation: Import Duties & Excise, Corporate, Personal	MOE (FRCS)
Insurance: Performance and Loss/Damage	ADB, WB, IFC, EIB

**This is a primary list of potential sources of finance that have been active in the recent past in the PICs/Fiji. The list is not exhaustive and does not include partners who provide funding for other organisations or additional finance sources that may be available in future.*

*** Includes the possibility of revolving loan programmes.*

RECOMMENDED SHORT-TERM ACTIVITIES

Each of the primary mitigation opportunities has an individual implementation timeline and financing pathway which can be found in the Concept Notes in *Annex A*. Included within the implementation timeline are the immediate activities to be undertaken to start the development and implementation of the primary mitigation opportunities.

In addition to these immediate activities, there are a set of broad short-term sectoral activities that can encourage the broader implementation of the NDC Investment Plan for the transport and energy-efficiency sectors. These six recommended broad short-term activities are shown in the table below.

BROAD SHORT-TERM ACTIVITIES	DESCRIPTION	POTENTIAL LEAD NATIONAL STAKEHOLDERS*
1. Organise and hold development partner forums for the development, financing, and implementation of the primary mitigation opportunities.	All primary mitigation opportunities require additional work to prepare development project proposals for capacity building, technical assistance, and financing support. The content and support needed to prepare these proposals will depend on the project/programme and funding criteria of each individual development partner. It is recommended to hold two development partner forums in Q3 of 2022 and Q1 of 2023. To match the activities within the primary mitigation opportunities to the individual support programming (e.g. current and future support mapping) of the numerous development partners operating in Fiji.	MOE (CCICD)
2. Build capacity for blended financing of mitigation actions.	The financial sector in Fiji has experience with implementing many individual financial instruments, but very limited experience in blended finance beyond grants (especially where there are different development partners involved). Further capacity building of government and private sector financial institutions is needed to facilitate the blended finance proposed in the primary mitigation opportunities.	MOE (CCICD), FDB, RBF
3. Monetary policy changes to increase domestic lending for energy-efficiency and low-carbon transport.	Fiji has experience with setting minimum lending requirements for commercial banks' lending portfolios to renewable energy. This model can be expanded to include energy-efficiency and low-carbon transport to support some of the primary mitigation opportunities. Further actions are needed to determine the potential viability and acceptance of this change in monetary policy.	MOE, RBF
4. Secure the technical assistance needed to implement the opportunities for (T1) National Maritime Action Plan and (E1) Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji.	The effectiveness of the primary mitigation opportunities in maritime transport and energy-efficiency are directly or indirectly dependent on the outcomes of T1 and E1. The outcomes of T1 and E1 will allow for building greater certainty into the support needs and supporting data for implementation and potential GHG reductions of the primary mitigation opportunities in the sectors. It is noted that E1 will also benefit from the expected results of the energy policy review.	MCTTT, (TPD, MSAF) MIMS, (DOE)

BROAD SHORT-TERM ACTIVITIES	DESCRIPTION	POTENTIAL LEAD NATIONAL STAKEHOLDERS*
5. Analysis for jumpstarting the opportunities for (T4) Vehicle Replacement Program for Cars and Taxis, (T7) Vehicle Replacement Program for Lorries and Buses, (T3) Outboard Motor Transition, (E2) Programme to Promote Enhanced Green Tourism through tax policy changes to fiscal year 2021/2022.	The primary mitigation opportunities T4, T7, T3, and E2 are all dependent on tax policy changes. The economic impacts and recommended taxation changes can be investigated in the short term (Q1 and Q2 2021), and some may be potentially enacted for fiscal year 2021/2022. It is noted that T7, T3, and E2 do require other financial instruments for full implementation, but some organic implementation is expected to happen with only the taxation changes.	MOE, (BPD, FRCS) MCTTT, (TPD) MIMS, (DOE)
6. Further quantify the investment needs for implementation of (E1) Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji, (E3) Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS), (E6) Promotion of Sustainable Government Procurement, and (T5) Lautoka Zero Carbon Transport Challenge/ Strategy.	The primary mitigation opportunities E1, E3, E6, and T5 have the potential for significant GHG mitigation. However, there is currently not enough adequate and reliable background information available to ascertain the full investment needs for the mitigation actions in these opportunities. Therefore, it is recommended to as soon as possible to start with the proposed technical assistance under these primary mitigation opportunities for feasibility studies and strengthening of information.	MCTTT (TPD), MIMS (DOE)
*Other organisations supporting these activities are not included in this list, but can be determined through information found in the Concept Notes in Annex A.		








01

INTRODUCTION

This **Nationally Determined Contribution (NDC) Investment Plan** is prepared under the joint Fijian Government and Regional Pacific NDC Hub technical assistance activity for the preparation of a Nationally Determined Contribution (NDC) Investment Plan and Programme Pipeline for the transport and energy-efficiency sectors in Fiji. The activity is implemented through the cooperation between the Fijian Ministry of Economy (MOE) and the Regional Pacific NDC Hub, and is implemented through a partnership between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Global Green Growth Institute (GGGI), the Pacific Community (SPC) and the Secretariat of the Pacific Regional Environment Programme (SPREP). The Regional Pacific NDC Hub has financial support from the governments of Germany, The United Kingdom, New Zealand, and Australia. This activity is being supported by the Regional Pacific NDC Hub through GGGI.

This NDC Investment Plan, and included Programme Pipeline, have the purpose of providing essential information on opportunities for GHG mitigation in the transport (land, maritime, and aviation) and energy-efficiency sectors and the potential means for financing these opportunities. This information is directed to the Fijian Government, private companies and private investors, SOEs, Non-Governmental Organisations (NGOs) in Fiji, and international partners for development and finance. This NDC Investment Plan includes the national level background information on the presented mitigation opportunities (also referred to as the 'opportunities') gained through published documentation and consultations with key national sectoral stakeholders.



CONTEXT OF FIJI AND GHG EMISSIONS

Fiji is one of the largest Pacific Island Countries (PICs) in terms of total land area and comprise 332 islands, of which approximately 110 are inhabited.⁸ The population of Fiji in 2017 was 884,887, with people living in 191,910 private households and 1,224 institutions. Approximately 57% of the population live in the urban areas of Fiji and reside predominantly in cities and towns on the islands of Viti Levu and Vanua Levu. The remainder of the population (approximately 43%) live in rural areas located in Viti Levu, Vanua Levu, and the other inhabited islands.⁹ In addition, Fiji's economy has an estimated Real GDP of US\$5.26B and a per capita Real GDP of US\$5,900 in 2018.¹⁰ It is worth noting that an estimated 894,389 tourists visited Fiji in 2019,¹¹ and tourism and remittances from Fijian's working abroad are the country's largest foreign exchange-earners.

Fiji's Third National Communication (TNC) on Climate Change indicated total national GHG emissions of approximately 2.5 MtCO₂e in 2011, 1.5 MtCO₂ of which is attributed to the energy sector (0.98 MtCO₂ from transport and 0.54 MtCO₂ from electricity production and other energy consumption).¹² Fiji's (Intended) NDC estimates the energy sector Business-as-Usual (BAU) scenario emissions to reach 2.5 MtCO₂ in 2030, taking into account 2013 as the baseline year, and has an unconditional commitment to reduce GHG emissions from this BAU scenario by approximately 10% in 2030 (250 ktCO₂), and a conditional commitment to reduce a further 20% (500 ktCO₂). This is a combined commitment to reduce 30% of GHG emissions from the energy sector BAU scenario, which is an estimated total mitigation of 0.75 MtCO₂ in 2030.¹³ It is estimated that by approaching Fiji's 100% renewable energy power generation goal, 0.5 MtCO₂ can be reduced in 2030, and the remainder through mitigation in economy-wide energy-efficiency may include transport and demand-side energy-efficiency. Fiji's unconditional commitment is based on implementing the Green Growth Framework for Fiji which includes actions addressing energy security, sustainable transport, technology and innovation, and greening the tourism & manufacturing industries.¹⁴ Figure 1 depicts Fiji's energy sector BAU emissions and (Intended) NDC commitment targets for 2030.

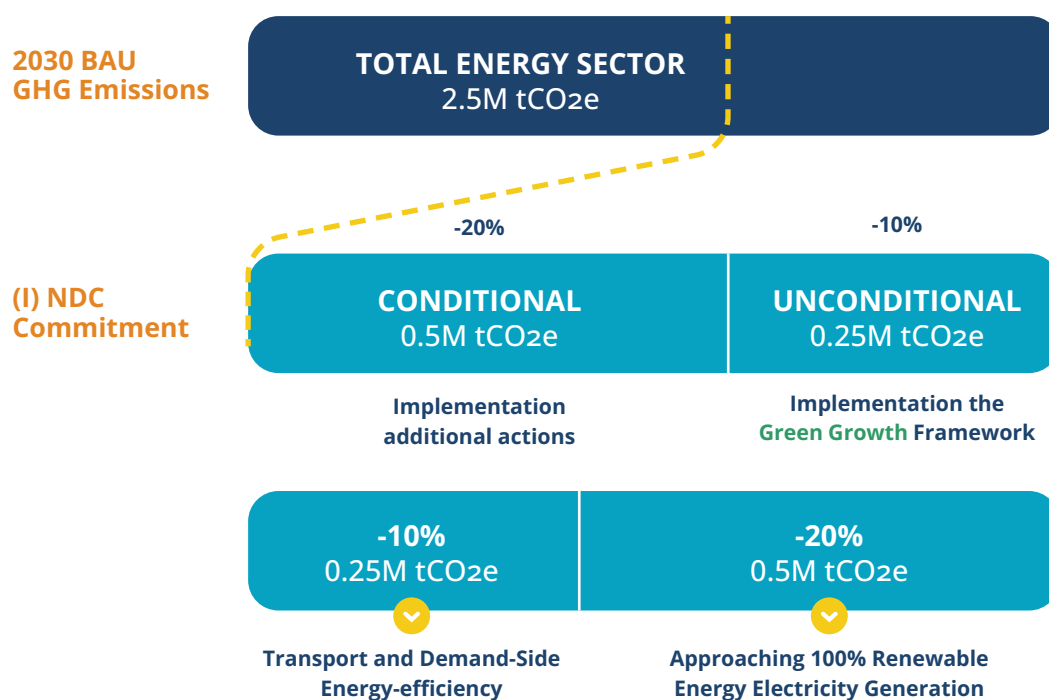


Figure 1: Fiji's energy sector BAU baseline and (Intended) NDC commitment for 2030

The above description provides the (Intended) NDC's national and sectoral context to mitigation opportunities for the transport (land, maritime, and aviation) and energy-efficiency sectors. Fiji is currently highly dependent on the import of energy in the form of fossil fuels but does have a large portion of on-grid renewable energy power generation which in 2019 is still far below the target for 2030. As seen in Figure 2, the demand for on-grid power generation has increased by 18% from the NDC baseline year of 2013 (at 857,000 MWh) to 2019 (at 1,012,000 MWh). During this same time, on-grid renewable-energy power generation has fluctuated between 46% and 66%, and was 56% in 2019. It is noted that the most on-grid renewable energy power generation in Fiji is based on hydro power, hence the fluctuations.

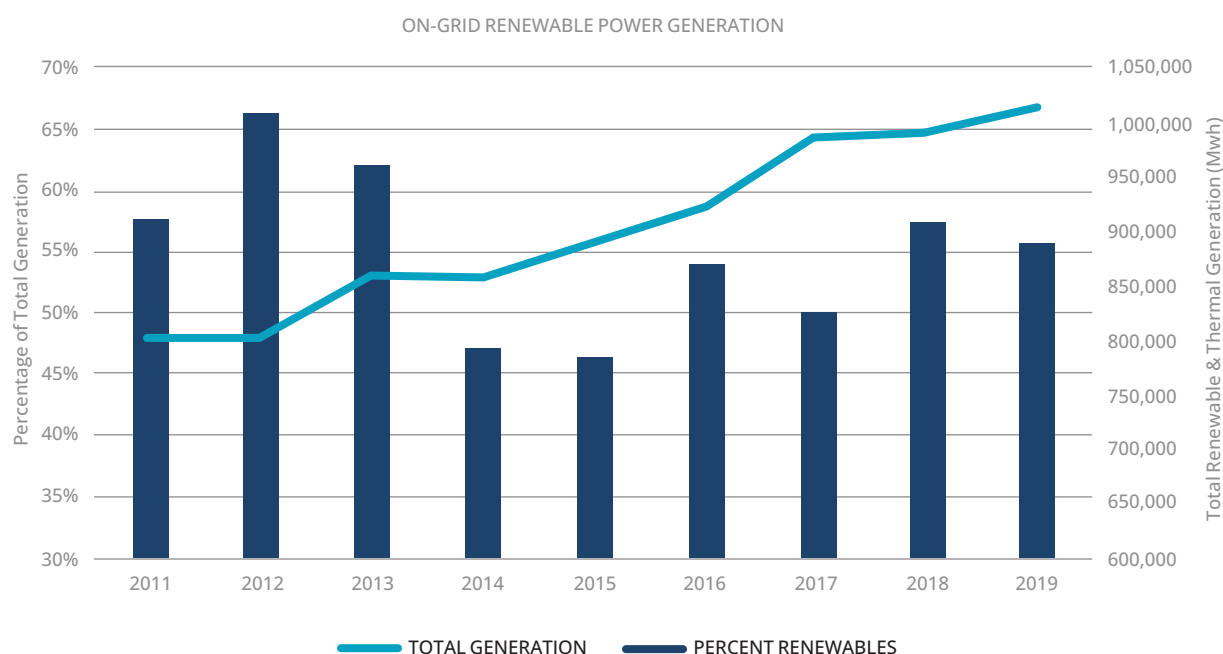


Figure 2: On-grid renewable power generation (source EFL Annual Report 2019)

1.1 CONTEXT OF THE NDC INVESTMENT PLAN

This NDC Investment Plan and the annexed Programme Pipeline present the transport and energy-efficiency sectors mitigation opportunities in Fiji. It is noted that from the context of reducing GHG emissions, the mitigation opportunities defined in this NDC Investment Plan fall within both the existing boundary of the unconditional and conditional mitigation targets of Fiji's (Intended) NDC, and to a large extent are included in Fiji's NDC Implementation Roadmap and Low Emission Development Strategy (LEDS) for the sectors. The mitigation opportunities also address the transformational strategic thrust of the 5-Year and 20-Year, Year National Development Plan. This NDC Investment Plan offers more detailed elaboration of individual mitigation opportunities in terms of technical, implementation, and financing concepts, than the previously mentioned documents, which were prepared in 2017 and 2018, respectively. In the context above, this NDC Investment Plan, the NDC Implementation Roadmap and the Low Emission Development Strategy (LEDS) can be used as tools to enhance the transparency of the physical and financial pathways of how Fiji can reach its NDC targets with support through Means of Implementation (e.g. capacity building, technology transfer, and finance).

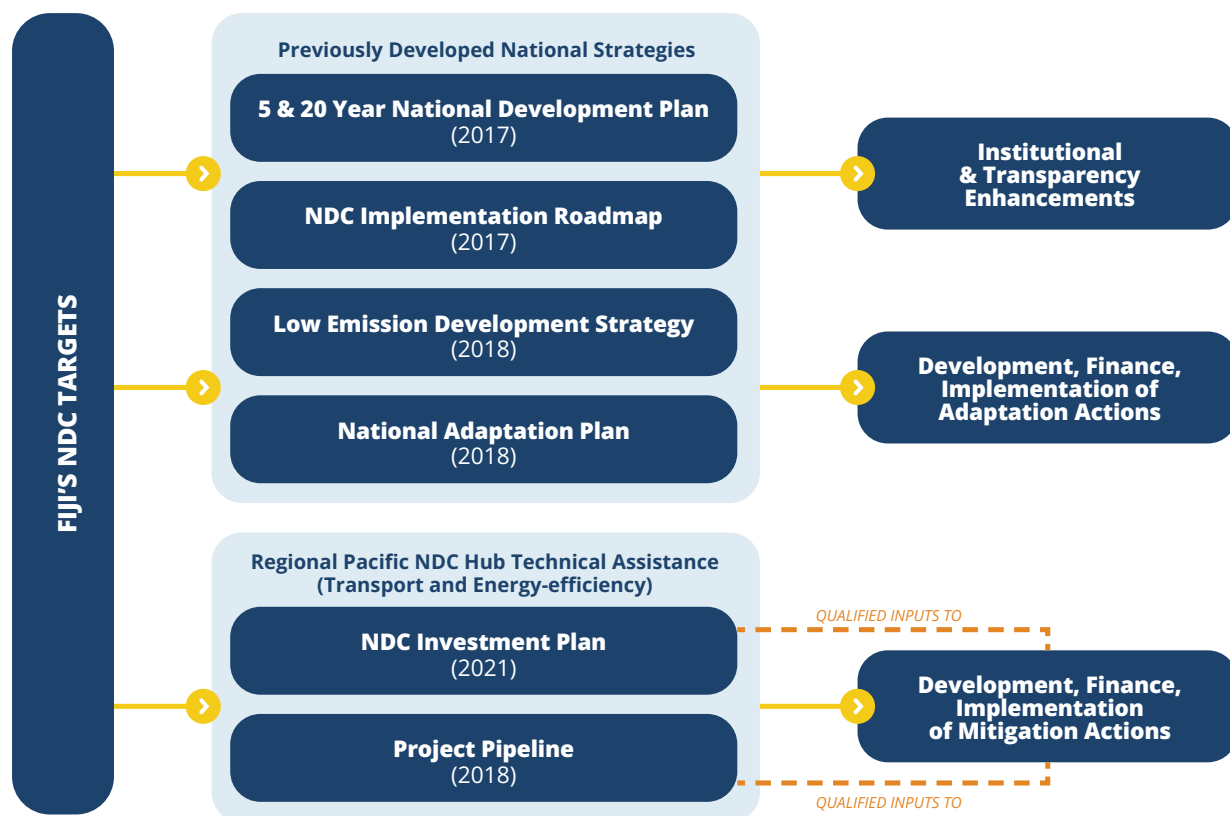


Figure 3: Diagram for the alignment of the NDC Investment Plan & Programme Pipeline with NDCs

To enhance the transparency of mitigation actions and support needs in accordance with guidance under the Paris Agreement, the NDC targets and outcomes should be supported by standard information on the mitigation actions taken and the national and international support needed and received to develop, finance, and implement these actions.¹⁵ This NDC Investment Plan and annexed Programme Pipeline provide such information for the development and implementation of mitigation opportunities within the transport and energy-efficiency sectors.

1.2 GOAL, OBJECTIVES, AND USE OF THE NDC INVESTMENT PLAN

This NDC Investment Plan and annexed Programme Pipeline have the overall goal to increase the transparency of the Fijian Government's ability to implement mitigation actions in the transport (land, maritime, and aviation) and energy-efficiency sectors contributing to its NDC overall target/commitment. This NDC Investment Plan has several objectives for financing mitigation opportunities, as given below:

OBJECTIVE 1

To provide stakeholders, such as potential financial partners, with a brief general description of the status of the transport and energy-efficiency sectors. This includes the sectors' current development, market structures and existing efforts, along with a list of the key stakeholders in the sectors.

OBJECTIVE 2

To identify the key constraints to low-carbon development in the sectors, and opportunities to strengthen the enabling environment of the sectors.

OBJECTIVE 3

To provide a brief description of the pipeline of opportunities proposed and prioritised by Fiji that will contribute to the NDC targets, and their investment needs.

OBJECTIVE 4

To present the overall needs for financial products and instruments that can support financing of the opportunities in the sectors, as well as identify potential partners for financial cooperation, and a pathway to implement the mitigation opportunities.

CONTEXT OF FIJI AND GHG STAKEHOLDER ENGAGEMENT PROCESS

The process of stakeholder engagement during the development of this NDC Investment Plan included an initial workshop and parallel one-on-one meetings with key national stakeholders in the transport, energy-efficiency, and finance sectors. This initial workshop and one-on-one meetings identified the potential mitigation opportunities in the transport and energy-efficiency sectors, information availability, the use of existing financial instruments in the finance sector, and sources of financing. Initial results of this NDC Investment Plan were made available to over 150 applicable stakeholders in Fiji consisting of a broad representation of government, education institutions, financial institutions, private sector, NGOs, and development partners. These applicable stakeholders provided feedback through a virtual consultation process that included on-demand videos, a comprehensive feedback survey, and subsector small-group meetings. The outcomes of the initial results and the valued feedback from the consultations were used to update key information regarding the 31 identified mitigation opportunities, and narrowed these down to 20 “primary mitigation opportunities”. The full draft of the NDC Investment Plan was then validated through a consultation including written feedback regarding the draft and subsector consultation meetings attended by key national stakeholders in the transport, energy-efficiency, and finance sectors.

1.3 SUMMARY INFORMATION OF PRIMARY MITIGATION OPPORTUNITIES

This NDC Investment Plan presents 20 primary mitigation opportunities and 11 secondary mitigation opportunities, and only the primary mitigation opportunities are fully addressed in terms of potential planning for implementation and financing. The primary mitigation opportunities consist of 11 opportunities in the transport sector and 9 opportunities in the energy-efficiency sector, and are identified in Section 4.1. A summary of the GHG mitigation potential, capacity building & technical assistance needs (CB & TA), and capital investment needs of the primary mitigation opportunities are shown in Figure 4 below. Figure 4 gives information on the totals for all the primary mitigation opportunities together, by sector, and by sub-sector. General descriptions of the primary mitigation opportunities (and secondary opportunities) can be found in Chapters 2 and 3, and further detailed information on each mitigation opportunity can be found in Annex A.

PRIMARY MITIGATION OPTIONS IN THE TRANSPORT & ENERGY- EFFICIENCY SECTORS



Potential Mitigation in 2030: 635,000 tCO₂ per year
Total CB & TA Needs: US\$29M
Total Capital Investment Needs: US\$1.95B

TRANSPORT SECTOR

Potential Mitigation in 2030: 179,000 tCO₂ per year
CB & TA: US\$12.2M | **Capital Investment:** US\$0.86B



MARITIME TRANSPORT

Potential Mitigation in 2030: 25,000 tCO₂ per year
CB & TA: US\$2.5M | **Capital Investment:** US\$159M



LAND TRANSPORT

Potential Mitigation in 2030: 147,000 tCO₂ per year
CB & TA: US\$7.3M | **Capital Investment:** US\$705M



AVIATION

Potential Mitigation in 2030: 7,000 tCO₂ per year
CB & TA: US\$2.5M | **Capital Investment:** US\$0

ENERGY-EFFICIENCY SECTOR

Potential Mitigation in 2030: 456,000 tCO₂ per year
CB & TA: US\$16.9M | **Capital Investment:** US\$1.09B



POWER AND UTILITIES*

Potential Mitigation in 2030: 389,000 tCO₂ per year
CB & TA: US\$4.4M | **Capital Investment:** US\$890M



CITIES AND BUILDINGS

Potential Mitigation in 2030: 4,000 tCO₂ per year
CB & TA: US\$5.6M | **Capital Investment:** US\$184M



APPLIANCE, GOVERNMENT, INDUSTRY*

Potential Mitigation in 2030: 63,000 tCO₂ per year
CB & TA: US\$6.9M | **Capital Investment:** US\$15M

Figure 4: Summary of mitigation and finance needs for primary mitigation opportunities

1.3.1 DETERMINATION OF GHG MITIGATION, INVESTMENT, AND SUPPORT NEEDS

DETERMINATION OF GHG MITIGATION

The GHG (expressed as CO₂) mitigation potentials¹⁶ provided in this document are determined based on the available information gained from stakeholders in Fiji, applicable international sources, and the most applicable conservative methodologies available that take into account IPCC 2006 guidance. There is a partial lack of accurate data or unknown level of activity (e.g. the possible extent of future implementation) associated with several mitigation opportunities.¹⁷ Where applicable data was not available, the mitigation potentials are estimated based on various qualified assumptions.¹⁸ Improving accuracy of the mitigation potential of the opportunities will require a more robust set of underlying data, and possibly additional studies when required data is missing, and securing this is beyond the scope of this current activity. Noting that several activities for improved data availability and accuracy are included in the capacity-building and technical assistance activities of many of the mitigation opportunities proposed within this NDC Investment Plan.¹⁹ The mitigation potentials do however, provide sufficient information for Fiji to make decisions as to which opportunities shall be prioritised and for taking further steps to improve data availability and accuracy. All mitigation potentials are rounded to the nearest thousand, and key assumptions for each mitigation opportunity can be found in the Concept Notes in Annex A.

DETERMINATION OF INVESTMENT AND SUPPORT NEEDS

The investment and support needs (project/programme development, capacity building, technical assistance) costs are determined in 2019 United States dollars (US\$) and are based on estimated costs as incurred in the Pacific region up through 2019. These values are rounded to the nearest one hundred thousand US\$ or higher. These costs are also dependent on the accuracy of data and level of activities as described above, and equally can reflect a similar level of error. This level of error can be improved through the capacity-building and technical-assistance activities associated with many of the mitigation opportunities.²⁰ In addition, the impact of external factors, such as but not limited to the global economic downturn caused by the COVID-19 pandemic, and recent energy and commodity price swings, means that the cost estimates should be seen as indicative.²¹ More accurate costs will need to be determined during the development and technical assistance activities of each mitigation opportunity.

1.3.2 ALIGNMENT OF THE NDC INVESTMENT PLAN TO NATIONAL POLICIES/STRATEGIES/PLANS

The Fijian Government has extensively integrated climate change across national-level policies, strategies, and plans, as well as integration into the planning of several sectors. This NDC Investment Plan is aligned with twelve primary policies, strategies, and plans divided into the following three categories shown in Figure 5 below: Multi-Sector National, Multi-Sector Climate Change, and Energy & Transport Sectors.²² Further analysis of the alignment of this NDC Investment Plan with the below primary policies, strategies, and plans can be found in Annex B.

This NDC Investment Plan was developed after the above policies, strategies, and plans were issued and is aligned to but not integrated within them. The nature of the planning cycle in Fiji means that there is the opportunity to integrate chosen mitigation opportunities of the NDC Investment Plan into future national and sectoral planning. Moreover, the NDC Investment Plan is deemed to be a living document that would be updated as more information and data is collected and the domestic policy environment evolves.

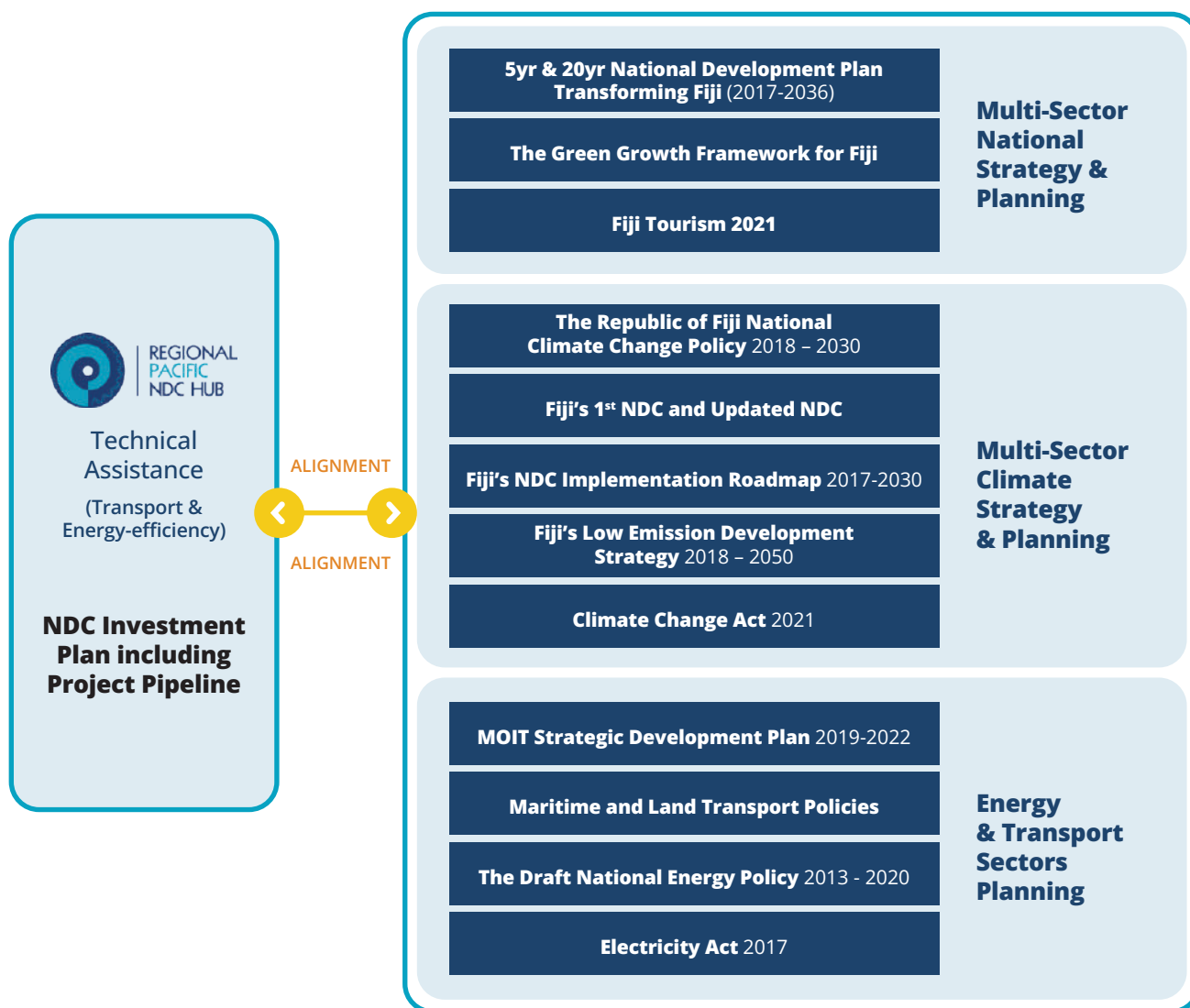


Figure 5: NDC Investment Plan alignment with national strategy and planning

1.3.3 CONSIDERATION OF MULTI-COUNTRY EFFORTS & LESSONS FROM EMERGENCIES

This NDC Investment Plan takes into consideration two factors that were identified during consultations with stakeholders in Fiji, and these are Multi-Country Efforts and Lessons Learned from Emergencies. The context of both factors is described in the following sub-sections.

MULTI-COUNTRY EFFORTS

Fiji is one of the larger Pacific Island Countries (PICs) and faces the same common challenges as other PICs in the development, implementation, and financing of climate-change and social & economic development. This reality of common challenges has the opportunity to be addressed in the PICs through Multi-Country Efforts to increase effectiveness and efficiency and guided by a country-driven process. Currently, there are dozens of development partners and “centres” operating in the PICs that are often competing for funds and are applying their efforts through individual projects and programmes focusing on climate change and social & economic development. To optimise PICs' wide efforts in climate change, including for NDC implementation and finance, Multi-Country Efforts specific to certain sectors can be

emphasised via single coordinating entities in order to optimise shared resources, ensure a coordinated and collective regional effort, and capitalise on the economies of scale. It is important to note that the Fijian Government and the governments of other PICs do not currently have the capacity to finance, host, and coordinate Multi-Country Efforts. It is also recognised that Fiji and other PICs will rightly focus on their internal domestic needs first; however, there are examples of internationally financed Multi-Country Efforts addressing climate change in the transport and energy-efficiency sectors in the PICs.

An example of a Multi-Country Effort via a single coordinating entity for the Maritime Transport sector is the Pacific Blue Shipping Partnership (PBSP)²³ which is a PICs-driven framework to allow PICs to access blended finance and capacity-building & technical assistance at a large-scale. The PBSP has the purpose to catalyse a multi-country transition to sustainable, resilient, and low-carbon maritime transport in the Pacific region. The Prime Minister of Fiji announced the establishment of the PBSP by the governments of Fiji and the Marshall Islands in 2019, which will be coordinated in partnership with Kiribati, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, and others.²⁴ The PBSP has the goal to accelerate the development of a 100% carbon-free maritime transport sector by 2050, including a 40% reduction of greenhouse gas (GHG) emissions from shipping by 2030. In 2020 the PBSP is in initial stages of preparation and is being coordinated by its member states to reduce the regional cost of the low-carbon transition of the Pacific maritime sector by increasing the level of regional coordination and by ensuring effective and efficient delivery to member states.²⁵ The PBSP will also allow for greater regional resilience to disasters and emergencies by improving the regional capacity to mobilise resources and by facilitating the growth of regional commerce.

Another example of a Multi-Country Effort via a single coordinating entity for the Energy-efficiency sector is the Pacific Centre for Renewable Energy and Energy-efficiency (PCREEE)²⁶, which supports the PICs with capacity building & technical assistance in common renewable energy and energy-efficiency efforts. The PCREEE was established in 2014 in cooperation between Pacific Community (SPC), the Sustainable Energy Island and Climate Resilience Initiative (SIDS DOCK), and the United Nations Industrial Development Organization (UNIDO). An example of PCREEE's, and its parent entity SPC's, efforts are the multi-country project for Pacific Appliance Labelling and Standards Programme (PALS)²⁷ between 2012-2019, which also targeted Fiji and achieved mixed results. However, lessons have been learned in addressing the common challenges in energy-efficiency in the PICs, and these can be carried further to enhance energy-efficiency efforts through actions in the future.

LESSONS LEARNED FROM EMERGENCIES

Fiji lies within the general pathway of Pacific cyclones and faces the same severe weather events as other PICs, and Fiji and other PICs suffer from the impact of other emergency challenges such as COVID-19 and sea-level rise. In this context, COVID-19 has provided an opportunity to reset PICs' priorities towards decarbonisation in economic sectors through green economic recovery and interisland and multi-country reciprocity in trade. This potential for decarbonisation in economic sectors addresses the two following current emergency challenges faced by PICs:

1. *Integration of Green Recovery and Green Jobs creation within COVID-19 response and recovery to enhance the implementation of sectoral mitigation actions and achieve NDC targets. This challenge offers a key opportunity for Fiji and other the PICs to include greening in their economic recovery, especially for jobs creation and related vocational and professional training needed to support the transition to a decarbonised economy. The focus of recovery efforts can in many cases integrate or even focus on mitigation actions, which also helps increase resilience to climate change as well as reduce the economic burden and dependency on imported fossil fuels. For example, with the downturn in the tourism sector, retraining tourism-boat crews in the use and maintenance of 4-stroke and electric motors, or addressing the training for installation of energy-efficiency technology in the hospitality and commercial sectors.*

2. COVID-19 has led to restrictions on the availability and movement of goods (including food) in the Pacific, including Fiji. Critical thinking has identified that culture and community are core strengths of Pacific Islanders and have been fundamental to their resilience in the past.²⁸ Inter-island and multicountry reciprocity in times of disaster response and enhancement of trade will in general provide solutions that strengthen regional and national resilience from global shocks. This critical thinking stresses the need for transformative actions to be based on sound science and cultural and community strengths, which places environmental sustainability and resilience above pure economic development. For example, the low-carbon passenger transport could be used to transport excess food crops no longer needed for the international tourist market in Fiji to neighbouring states experiencing food shortages.

1.4 USING THE NDC INVESTMENT PLAN

This NDC Investment Plan and its annexes are meant to support each other in terms of communicating to stakeholders certain information regarding the sector and sub-sector, and offering detailed information for individual mitigation opportunities in Fiji. The NDC Investment Plan offers the mitigation context and consolidated information for each sector and sub-sector and a summary of the opportunities and their investment needs. It also presents a financing pathway and macro-level needs for financial instruments and sources of finance. The annexes offer more detail about each of the aspects presented in the body of the NDC Investment Plan, and the Programme Pipeline (Concept Notes) provides further pertinent information for each mitigation opportunity identified in the NDC Investment Plan, including needs for financing, support, and implementation. Figure 6 presents the information that is found within the NDC Investment Plan and the annexes.



Figure 6: Diagram for information found in the NDC Investment Plan and Programme Pipeline



Sacred Heart Cathedral
Archdiocese of Suva

The Cathedral of Peace is a symbol of our unity and the presence of God in our midst. It is a place of prayer, worship, and service to the community. It is a place where we can find comfort, strength, and hope. It is a place where we can meet with God and with each other. It is a place where we can live out our faith and our love for God and for our neighbor.

MASS SCHEDULE

SUNDAY	7:00am - 8:00am - 9:00am - 10:30am - 12:00pm - 5:00pm - 7:00pm
MONDAY	8:00am - 10:00am - 5:00pm
TUESDAY	8:00am - 10:00am - 5:00pm
WEDNESDAY	8:00am - 10:00am - 5:00pm
THURSDAY	8:00am - 10:00am - 5:00pm
FRIDAY	8:00am - 10:00am - 5:00pm
SATURDAY	8:00am - 10:00am - 5:00pm

ADDITIONAL SERVICES

CHRIST THE KING	8:00am - 10:00am - 5:00pm
ST. JOHN THE BAPTIST	8:00am - 10:00am - 5:00pm
ST. MARY'S	8:00am - 10:00am - 5:00pm

CONTACT

PHONE	322 4444
FAX	322 4444

02

NDC INVESTMENT PLANNING FOR TRANSPORT (LAND, MARITIME, AVIATION)

Fiji is one of the leading voices in the Pacific region calling for action in the broader agendas for sustainable development, climate change, and oceans, including the decarbonisation of the transport sector. Transport-sector resilience and decarbonisation are extensively integrated into Fiji's national climate-change agenda such as in the national, sectoral, and climate-change strategies, and in planning highlighted in Section 1.3.2. Although much progress is still needed in implementing the climate-change agenda, Fiji has started decarbonising the transport sector as evidenced by its leading the region in the import of hybrid vehicles,²⁹ being actively involved in initiating and developing the PBSP,³⁰ and purchasing some of the Pacific region's most fuel-efficient aircraft.³¹

As indicated in the TNC, the transport sector had 0.98 MtCO₂e of emissions in 2011 and was the sector with the highest sub-category GHG emissions in Fiji at that time. In recognition of this, the reduction of GHG emissions from planned actions in transport are considered in several of the forward-looking national and sectoral policies and plans as presented in Section 1.3.2.

The transport sector is also the biggest importer of goods into Fiji, with machinery and transport equipment making up approximately 40% of all imports, totaling FJ\$2.3B in 2019. This status is followed closely by the import of mineral fuels, valued at FJ\$1.1B in 2019, of which the transport sector is one of the largest consumers.³² In the recent past, Fiji had already made significant investment in land transport as well as, in the Government Shipping Services (GSS) and Fiji Airways' international fleet. Actions also include implementing energy-efficiency savings measures in the Lautoka and Suva sea ports. In addition, much of the revenue raised from the green bonds issued in 2017 have been allocated to upgrade infrastructure. According to the International Monetary Fund (IMF) the transport sector has the greatest need for investment in Fiji, requiring 51% of all investment needed for building up Fiji's resilience to climate change,³³ after and received the largest share of the Asia Development Bank's (ADB) funding to Fiji in 2018: US\$247M out of a total of US\$593M.³⁴ Much of the investment need highlighted by the IMF and ADB relates to infrastructure and not new vehicles, vessels, and aircraft. The COVID-19 pandemic has had a profound impact on Fiji's transport sector, particularly international aviation, but also on domestic aviation, shipping and land transport, with movement being halted and restricted³⁵ and a significant reduction in transport demand being associated with the halt in international tourism.

2.1 LAND TRANSPORT SUB-SECTOR

The Land Transport Act 1998 forms the institutional and legal basis for the planning and regulation of the land-transport sub-sector in Fiji.³⁶ Current land-transport policy, planning, and regulation are coordinated with the national-level and sectoral-level strategy and planning (see Section 1.3.2). The Ministry of Infrastructure & Meteorological Services (MIMS) and the Ministry of Commerce, Trade, Tourism & Transport (MCTTT) and their associated statutory bodies address national-level land-transport policy, planning, and regulation. The MOE and its associated statutory bodies, working in cooperation with MIMS and MCTTT, address fiscal policy and related regulation that ties into the land transport sub-sector. Local government bodies participate in addressing planning and enforcement at the subnational level in Fiji.

The vast majority of the land-transport infrastructure in Fiji, with 7,525 km of roadways (1,707 km sealed, 5,818 km unsealed), including of 1,251 bridges and 47 jetties, is managed by the Fiji Roads Authority (FRA) and is valued at more than FJ\$7B in land footprint and built infrastructure.³⁷

Fiji has no domestic vehicle production, and all vehicle types are imported in used or new condition. Vehicles in new condition are predominantly imported through car dealerships with brand distribution licenses from manufacturers, and vehicles in used condition through car dealerships importing from overseas resellers. Local trading is through local dealership buy-backs and individual resellers in the local market. There were 119,960 motor vehicles registered with the Land Transport Authority (LTA) in 2018, and 98% of this vehicle fleet is operated by the private sector for personal use, public transport, and other commercial operations. Only 2% of motor vehicles were registered for government use, but the government fleet is growing at a higher rate proportional to total vehicle registration growth.³⁸ The vehicles imported into Fiji consist of salon cars/SUVs, pick-ups, buses, mini-buses, lorries, motorbikes, construction/heavy-industry vehicles, bicycles and motor & all-terrain bikes. In 2018 these imports totalled 19,739 vehicles, and 10,176 bicycles and motor & all-terrain bikes.³⁹

2.1.1 KEY NATIONAL SUB-SECTOR STAKEHOLDERS IN LAND TRANSPORT

The key national stakeholders involved in land transport in Fiji come from both the public and private sectors, each playing key roles in connecting the cities, towns, and rural areas of Fiji and ensuring access to commerce and public services. Key national stakeholders and their roles are listed below, and additional information on key stakeholders and their existing planning and actions in land transport can be found in Annex C.

KEY STAKEHOLDER	ROLES WITHIN THE SECTOR
Ministry of Commerce, Trade, Tourism, and Transport (MCTTT)	<p>MCTTT addresses transport-related policy and regulation relating to vehicles and fuels in Fiji, and oversees the Land Transport Authority (LTA) and the Fijian Competition and Consumer Commission (FCCC).</p> <p>MCTTT will play a key role as the regulatory entity for implementing changes in planning, technical/financial regulation, and enforcement for vehicles and fuels in low-carbon activities.</p>
Ministry of Infrastructure and Meteorological Services (MIMS)	<p>MIMS oversees energy planning and policy and transport infrastructure throughout Fiji and is the presiding line ministry of Fiji Roads Authority (FRA), and Energy Fiji Limited (EFL).</p> <p>MIMS will play a key role as the regulatory entity for implementing changes in planning, regulation, and enforcement of infrastructure development and maintenance for low-carbon activities, as well as overall energy planning.</p>

Ministry of Economy (MOE)	<p>MOE oversees all climate change-related commitments, including development of the NDC and LEDS, as well as oversight of the Fiji Revenue & Customs Service (FRCS) and Fiji Bureau of Statistics (FBOS).</p> <p>MOE will play a key role in creating an enabling environment and determining Fijian Government fiscal policy and incentives, as well as prioritisation and allocation of the Government budget and leveraging global public finance for climate action.⁴⁰</p>
Energy Fiji Limited	<p>EFL is the grid electricity utility (covering generation, transmission and distribution) in Fiji.</p> <p>EFL will play an infrastructure implementation role in rollout of EV charging systems and need to improve distribution networks and increase renewable energy power generation, distribution, and storage. EFL may also be impacted by the use blended (bio and fossil) fuels used for power generation.</p>
Fiji Development Bank (FDB)	<p>FDB provides lending under a variety of financial products which have been used for financing the implementation of low-carbon technology in Fiji in the past.</p> <p>FDB has the opportunity to operate lending facilities focused on lending to commercial entities to finance the implementation of low-carbon technologies. It also serves as an accredited entity of GCF for direct access to project funds and may contribute to blended financing arrangements in project implementation.</p>
Reserve Bank of Fiji (RBF)	<p>RBF addresses monetary policy and regulation in Fiji, including the provision of liquidity in local currency (FJ\$), and the regulation and accreditation of insurance and finance facilities (in cooperation with national banks).</p> <p>RBF can play a key role in providing monetary lending regulation to national banks for financing low-carbon technologies, and for the expansion of existing finance facilities/instruments regulated by RBF.</p>
Private Sector Banks & Credit Facilities	<p>A range of lending institutions, under license and oversight of the RBF as regulator, provide commercial and retail finance to the businesses and general population of Fiji.</p> <p>Private Sector Banks & Credit Facilities may engage in commercial and retail lending to finance private sector investments in low-carbon land transport actions.</p>
Fiji Competition & Consumer Commission (FCCC)	<p>This agency is responsible for setting price controls for public transport services (passenger fees) and fuel prices.</p> <p>FCCC can play a key role in helping regulate prices to encourage viable and bankable business models for the private sector to implement low-carbon technologies.</p>
Fiji Revenue & Customs Service (FRCS)	<p>FRCS is responsible for customs and tax compliance, inclusive of all imports of vehicles, parts, tools, and equipment associated with land transport, as well as taxation on goods & services provided domestically through the sector.</p> <p>FRCS plays a key role in the regulation and enforcement of tax-based incentives and penalties for the private sector.</p>
Fiji Roads Authority (FRA)	<p>FRA is responsible for capital development and maintenance of the land transport infrastructure (as well as jetties).</p> <p>FRA will play a key role in the approval of standards and designs for non-motorised/motorised transport, along with implementation related to traffic planning and infrastructure development.</p>

Land Transport Authority (LTA)	<p>LTA is the national regulatory and enforcement agency addressing licensing of drivers, as well as registration and regulation of all motor vehicles.</p> <p>LTA will play a key role in the registration and deregistration of vehicles, and disaggregated data collection of vehicle types and use, as well as strengthening incentives/penalties pertaining to vehicle efficiency and emissions potential.</p>
Fiji Police Force (FPF)	<p>The Fiji Police Force provides enforcement around moving violations and accident response through the Traffic Division, which supplements LTA's enforcement division.</p> <p>FPF will supplement the enforcement of vehicle regulations and registration and deregistration of vehicles.</p>
INDEPENDENT BUSINESSES; <ul style="list-style-type: none"> • Fiji Bus Operators Association (FBOA) • Road Haulage Association (RHA) • Fiji Commerce & Employers' Federation (FCEF) 	<p>The private sector includes a range of industry-specific associations (FBOA, FCEF, and RHA), as well as bus, taxi, and minibus operators, and independent businesses.</p> <p>Private Sector entities will be the main parties implementing mitigation actions, through the purchase and operation of vehicles.</p>
Households	<p>Households purchase and operate vehicles, take public transport, and utilise non-motorised transport.</p> <p>Private Sector entities will be the main parties implementing mitigation actions (through vehicle purchases), or using public transport and non-motorised transport.</p>

2.1.2 KEY CONSTRAINTS AND OPPORTUNITIES TO STRENGTHEN THE ENABLING ENVIRONMENT IN THE LAND TRANSPORT SUB-SECTOR

Strengthening the land transport sub-sector's capacity to finance, implement, and measure mitigation opportunities in Fiji requires coordinated activities among multiple ministries, agencies, development partners, financial entities, private businesses, and individuals. The steadily increasing vehicle registration and import numbers in Fiji mean there will be greater congestion in urban areas, strain on infrastructure capacity (bridges in particular), negative socio-economic impacts on the population, and increased GHG emissions.⁴¹ The distributed road infrastructure and decentralized layout of both sealed and unsealed carriageways in Fiji mean that analysing their use and options for traffic and modal shift improvements without additional infrastructure is challenging. Addressing these systemic constraints, requires a systematic approach to mitigating GHG emissions in the sub-sector. Financing all the changes necessary to reach substantive mitigation levels is beyond the ability of the Fijian Government and the private sector to finance, without significant conditional international support.

In order to decarbonise land transport, the market requires clear, cost-competitive alternatives to BAU practices. Almost all vehicles registered in Fiji run on unleaded petroleum (ULP) or automotive diesel (ADO), with a very small share of LPG vehicles. A series of well-established licensed dealerships selling new vehicles are accompanied by an even larger second-hand vehicle market. Currently, the financial incentives and availability of alternatives to the BAU paradigm, such as existing tax incentives for electric vehicle charging stations and for biofuels use, are not compelling enough to motivate change at the individual or commercial level within the market in Fiji. A policy environment is required in which both governing bodies and the general population understand the socio-economic and environmental benefits of shifting from the currently available

range of vehicles and infrastructure designs to other cleaner options available globally, even where additional economic cost is required. The 2020-2021 budget ensures that hybrid vehicles cannot be more than 5 years old, and all non-hybrid vehicles do not have an age limit but must be Euro 4 compliant. Within this budget, the Environment & Climate Adaptation Levy (ECAL) was lowered from 10% to 5% for all vehicle types. Fiscal duties for used nonhybrid vehicles was lowered from 32% to 15% and new non-hybrid vehicles from 15% to 5%. Fiscal duties for used hybrid vehicles was lowered by 75%, and new hybrid vehicles are duty-free. Lowering taxes without a direct connection to low emissions policy and regulation will not incentivise the reduction of emissions from the land transport sub-sector. ECAL rates are applied to licensed rental/hire car operators, and registration fees and roadworthiness inspections are also standard for vehicles in Fiji. The constraints identified below highlight the need for strengthening the enabling environment to encourage the greater inclusion of decarbonising technologies and other solutions in the land transport sector in Fiji.

Table 2: Key constraints & enabling environment strengthening opportunities in Land Transport

CONSTRAINT/BARRIER	ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES
Market Structures and Financing	<ul style="list-style-type: none"> • Revising the tax structure for the import of vehicles is needed where low emission vehicles have a lower duty/excise taxes and higher emission vehicles have higher duty/excise taxes. • Tailoring commercial and retail lending mechanisms to support a more rapid transition to lower emissions land transport technologies are needed. • Explore technology transfer and trade facilitation with nations manufacturing nextgeneration land transport technology to make the technology more accessible to Fiji. • Engage with MOE and other ministries to structure inter-ministerial mechanisms for bulk ordering or leasing arrangements to bring down per unit costs when procuring low emission government vehicles. • Revise vehicle registration fees to more steeply reflect the relative fuel efficiency (and emissions in gCO₂ per km) of the vehicles being registered, according to engine size/type and rated emissions output. • Create fiscal concessions at both registration and taxation levels for zero-emission transport (both electric and non-motorised) and mass transit vehicles, for businesses in the form of commercial tax incentives. • Amend mass transit pricing methodologies (adjusting levies/fees collected on passenger fares) to support commercial business shifting to lower emission mass transit vehicles (e.g. bus efficiency standards determine price breaks for operators). • Develop incentives for the appropriate decommissioning of vehicles assets at the end of their lifecycle.
Data/Analytics *	<ul style="list-style-type: none"> • Segregate fuel use data, especially fuels distributed to petrol stations to determine emissions attributable to land transport activities, with possible sample surveys. • Establish reporting requirements (or voluntary schemes) for private vehicles and the commercial sector to record and update odometer data to evaluate travel distances across the national vehicle fleet. • Conduct additional modal transport sample surveys, or mandate data collection, in urban areas to gain greater understanding on passenger travel behaviour, and linkage to infrastructure planning and public transport business models.

Standards*	<ul style="list-style-type: none"> • Incorporate new infrastructure and design standards for non-motorised transport into existing capital investment and maintenance schedules and the FRA budget.
Public Awareness*	<ul style="list-style-type: none"> • Deploy campaigns addressing personal accountability for land transport behaviour choices, emphasizing potential emission reductions and long-term social-economic benefits. • Reinforce co-benefits of land transport behavioural shift with other sectors (health, fitness, poverty reduction, etc.)
Land Use*	<ul style="list-style-type: none"> • Incorporate both green space/vegetation and land transport infrastructure (EV charging stations/parking, cycling racks, bus stands, etc.) into zoning and policy guidance. • Explore inland and coastal waterway opportunities for reduction of land transport congestion. • Incentivize the removal of derelict vehicles to reclaim the currently unused/ degraded land footprint. • Focus decarbonisation initiatives in areas where committed investment is not prohibitive (e.g. Lautoka City) • Enhance the enforcement of regulations for town planning in the development of commercial estates/lots to reduce traffic congestion.

** Note that these are common issue for most PICs, and a multi-country initiative is possible.*



MITIGATION EXAMPLE: **POLICY AND REGULATIONS ENCOURAGING EXPANSIVE BICYCLE USE IN DENMARK**

Denmark's first Traffic Law, in 1923, allowed cyclists to use the 1m shoulder of roads to cycle. The Law was revised in 1932 to ensure that bicycle infrastructure was made mandatory. In 1930, there were only around 88 km of bicycle infrastructure along roads. Infrastructure had increased to 342 km by 1993 mainly in urban areas, and was associated with only 4% of all the country's roads. During this same period standards were developed for both planning of cycling infrastructure and design of cycling paths (and associated roads). In the past 100 years cycling has become widespread in Denmark, with 12,000 km of cycle routes. It has become a symbol of equality and freedom within the Danish population and is estimated to mitigate GHG emissions by 20,000 twCO₂ per year. The city of Copenhagen has extensive planning and regulations for cycling infrastructure and plans to increase its related spending to US\$28M (DKK178M) in 2021 from an annual average of US\$13M (DKK87M) over the past ten years. This municipal infrastructure spending focuses on establishing new neighbourhood bike-paths, super-bike routes, eco-bike routes, bicycle parking, traffic-control measures, and capacity building. This infrastructure is financed through a combination of national and municipal government funds (from taxes), where the more than 673,000 bicycles in the city are privately and commercially financed. These investments will increase the percentage of persontrips in the city from the current value of 28%, which already exceeds the 2025 target of 25%. To implement similar actions in Fiji under T13 and T18, new regulations and standards for pathways and bicycle lanes along roads and will need to be enacted. Planning activities for new (upgraded) infrastructure and the increase of bicycles will then be needed, as well as the financing to support these activities.

Sources: Copenhagenize.com (2012) "Danish Bicycle Infrastructure History", Denmark.dk (2020) "A nation of cyclists", Københavns Kommune (2020) "Cykelredegørelse 2021".

2.1.3 MITIGATION OPPORTUNITIES AND INVESTMENT NEEDS IN LAND TRANSPORT AND CROSS CUTTING AREAS

There are ten mitigation opportunities that focus on Land Transport and Cross Cutting opportunities. Together, these have the potential to reduce 1.38M tCO₂ emission by the end of 2030, with an annual mitigation potential of 208,000 tCO₂/yr in 2030. This annual mitigation potential is approximately equal to 8% of the projected 1st NDC's energy sector BAU emission in 2030. The estimated capital investment needed to reach the mitigation potential is US\$5.2B between 2020 and 2030, along with an estimated US\$948M for project/programme development, capacity building & technical assistance.

Table 3: Aggregated information for mitigation opportunities in Land Transport

OPPORTUNITIES ⁴² (NUMBER IS PRIORITY WITHIN THE TRANSPORT SECTOR)	INDICATIVE DEVELOPMENT, CB AND TA 2020- 2030 (US\$M)*	INDICATIVE INVESTMENT NEEDS TO 2020- 2030 (US\$M)	COST OF MITIGATION US\$/tCO ₂	ANNUAL MITIGATION 2030 (tCO ₂ /YR)	TOTAL MITIGATION 2020-2030 (tCO ₂ /YR)
T2 Alternative Fuels in Land and Maritime Transport	1.1	36.0	200	42,000	211,000
T4 Vehicle Replacement Program for Cars and Taxis**	1.0	524.9	1,200	59,000	448,000
T5 Lautoka Zero Carbon Transport Challenge/Strategy	1.0	0	NA	NA	NA
T7 Vehicle Replacement Program for Lorries and Buses**	0.8	134.4	600	36,000	250,000
T9 End-of-Life Vehicle Programme	0.5	5.0	500	2,000	11,000
T11 Bicycle/E-Bike Financing Initiative**	2.8	4.2	100	8,000	65,000
T13 Traffic Congestion Reduction Measures***	20	25.8	800	7,000	59,000
T15 Bus Network Information Transport System (ITS)***	8.9	104.6	900	18,000	137,000
T16 Electric Vehicle Network Development **	11.8	592.2	3,500	30,000	173,000
T18 Land Transport Infrastructure Upgrade for Non-motorised Transport***	899.7	3,736.50	210,000	6,000	22,000
TOTAL MITIGATION POTENTIAL OF ALL⁴³	947.6	5,163.60		208,000	1,376,000

*Financial Needs for Project/Programme Development, Capacity Building (CB), and Technical Assistance (TA).

**Includes the total investment in vehicles.

***Includes the total investment in roads (vehicle & bike lanes and barriers) and other traffic management activities.

T2 – ALTERNATIVE FUELS IN LAND AND MARITIME TRANSPORT:

Biofuels are currently used and mandated extensively in Brazil, Europe, North America, and Indonesia for land transport, especially biodiesel and ethanol blends which replace completely fossil-based fuels. These developed markets for biofuel blends consume the majority of the current world production, which is blended and shipped internationally from ports such as Singapore. Under this opportunity it is expected that biofuel blends will be imported to Fiji in bulk, to ensure high quality and savings from economies of scale. Currently the cost of biofuel blends is higher than the cost of fossil fuels and is supported in these developed markets through regulatory and fiscal policy. This opportunity focuses on introducing biofuel blends for biodiesel and ethanol in Fiji, which are used by both land and maritime transport, and includes technical assistance to prepare needed regulatory and fiscal policy instruments, and related infrastructure improvements. The technical assistance should also address the applicability, appropriateness, and financial viability of a broad set of alternative fuels as the cost and practicality of using some of these is likely to be prohibitive in the PICs in the short- and medium-term.

T4 - VEHICLE REPLACEMENT PROGRAM FOR CARS AND TAXIS:

This opportunity focuses on the continual improvement of the Cars and Taxis fleets in Fiji in terms of fuel efficiency (fuel use per km) and the related fleet wide reduction in CO₂ emissions. This opportunity will substitute the importation of 56,000 cars and 4,000 taxis with more efficient vehicles between 2020 and 2030. This opportunity will support the ongoing policy and enforcement actions by the Fijian Government for instituting age limits for imported used vehicles combined with vehicle fuel efficiency and/or carbon emissions standards for all imported vehicles (e.g. for used and new vehicles). In addition, this opportunity continues the existing incentives in Fiji for importing hybrid vehicles. For this opportunity to lead to GHG mitigation, measures to prevent additional vehicle imports will need to be introduced in combination with the fuel efficiency standards that ensure that emissions from new imports do not exceed the NDC's BAU emissions scenario. A first phase of this is expected to be instituted through new requirements for the Fijian Government fleet and related leasing of vehicles. Financing activities under this opportunity focus on tax incentives and lending for encouraging the private sector to purchase the most fuel-efficient vehicles.

T5 - LAUTOKA ZERO CARBON TRANSPORT CHALLENGE/STRATEGY:

The Lautoka District (encompassing Lautoka City, and the Port of Lautoka including the Vuda Tank farm) presents a promising case study in which to promote a low-carbon transition vision and strategy for combined land and maritime transport. Lautoka is Fiji's second largest city and was originally a planned settlement built around the international sugar trade. It does not have the geographic constraints of Fiji's other main urban areas. Lautoka is blessed with a well laid-out grid plan with flat and gentle hills, international port, wide carriageways, and sheltered marine access, and is not prone to seasonal flooding. This opportunity focuses on technical assistance to create a comprehensive phased planning strategy for combined low-carbon transport for Lautoka and will include the preparation of bankable private-sector transport business models and supporting financing instruments. The planning will require a comprehensive multi-stakeholder planning and commitment process, followed by mechanisms for monitoring implementation.

T7 - VEHICLE REPLACEMENT PROGRAM FOR LORRIES AND BUSES:

This opportunity focuses on the continual improvement of the Lorries and Buses fleets in Fiji in terms of fuel efficiency (fuel use per km) and the related fleet-wide reduction in CO₂ emissions. This opportunity will substitute the import of 5,500 lorries, 420 buses, and 200 min-buses between 2020 and 2030. Similar to opportunity T5, this opportunity will support ongoing policy and enforcement actions by the Fijian Government for instituting age limits for imported used vehicles combined with vehicle fuel efficiency and/or carbon emissions standards for all imported vehicles (e.g. for used and new vehicles). The opportunity will include preventing the importation of additional vehicles which is needed to ensure that emissions from new imports do not exceed the NDC's BAU emissions scenario. Financing activities under this opportunity focus on tax incentives and lending for encouraging the private sector to purchase the most fuel-efficient vehicles.

T9 – END-OF-LIFE VEHICLE PROGRAMME:

Fiji's growing vehicle market carries with it the challenge of dealing with disposing of older or derelict vehicles, which have the potential to cause negative environmental impacts when not properly scrapped. This situation is exacerbated by the large volume of imports of secondhand vehicles with shorter usable lifespans, which increases the likelihood of greater numbers of unused and derelict vehicles in Fiji. There are scrap metal traders in Fiji, and this opportunity focuses on increasing the capacity and incentives for private sector operators to collect, process, and export scrap materials from recovered vehicles. This opportunity is expected to be implemented through private sector supporting measures and/or public-private partnerships. The process of replacing older vehicles when additional vehicles are imported into Fiji is a key element in ensuring that the quantities and emissions of the vehicle fleet do not exceed the NDC's BAU baseline for land transport emissions. Direct emissions reduction from this opportunity relates to the potential for sequestration of carbon on land areas no longer occupied by derelict vehicles. It is noted that indirect emissions reductions are achieved when older vehicles are permanently removed from the Fijian market and replaced by more efficient vehicles over time (this is accounted for in opportunities T4 and T7). This opportunity also includes addressing the end-of-life issue for proper lithium ion battery disposal (for recycling off-shore) from hybrid vehicles and potentially EVs in the future.

T11 – BICYCLE/E-BIKE FINANCING INITIATIVE:

The use of bicycles and e-bikes for commuting and general transport in Fiji can lead to savings in household expenditure, emission reductions, and health benefits for the population of Fiji. It is acknowledged that the use of bicycles for commuting and general transport has fallen in Fiji as the popularity of private vehicles has grown. The Fiji Revenue and Customs Service (FRCS) reveals that over the 2017-2019 period, bicycles only comprised 0.9% of the total vehicle imports into Fiji. This opportunity focuses on appropriate financial instruments, technical assistance and capacity-building activities to introduce up to 10,000 bicycles/e-bikes in Fiji, focusing on both urban and rural areas. This opportunity will help address the behavioural barriers to the reintroduction of bicycles in Fiji; however the infrastructure barriers, especially in urban areas, will need to be addressed through other opportunities such as T13 and T18.

T13 – TRAFFIC CONGESTION REDUCTION MEASURES:

The implementation of Congestion Reduction Measures (CRM) amounts to energy-efficiency practices through the management of traffic flow. Traffic behaviour is based upon the individual needs of road users, and while they do not conventionally conform to collective best practices, interventions may be organised to guide better behaviour for the overall traffic network. This opportunity addresses technical assistance and capacity building for MCTTT, FRA, LTA, and local governments in additional traffic planning. This additional planning includes determining the feasibility and implementation needs for the following interventions: urban car-free zones, responsive traffic signalling, clearways, lane reversals, enhanced pedestrian infrastructure, congestion pricing, office relocations, and staggered public-service office hours. The main target of this opportunity will be the Greater Suva Area (GSA), where emission reductions are achieved through more efficient traffic flow.

T15 – BUS NETWORK INFORMATION TRANSPORT SYSTEM (ITS):

This opportunity involves the installation of GPS monitoring for all buses and operators, central monitoring, enforcement of bus routes, and the inclusion of bus stops and terminals with Passenger Information System (PIS) displays throughout the urban/semi-urban areas of Fiji. This opportunity will increase the efficiency of bus service in Fiji and mitigate GHG emissions through related fuel savings from the bus fleet. It includes the installation of PIS at approximately 6,830 bus stops and GPS in approximately 1,790 buses in Fiji.

T16 – ELECTRIC VEHICLE NETWORK DEVELOPMENT:

The potential for achieving emission reductions through the introduction of an Electric Vehicle (EV) network in Fiji is significant. The development of an EV network in Fiji requires both financial instruments to facilitate the financing of electric vehicle technology (e.g. vehicles and charging stations), and assistance for planning the infrastructure improvement needed to support EVs. In Fiji, the majority of vehicles are centred in urban areas, but vehicles are still distributed across various islands, and the vast majority of vehicles are second-hand Internal Combustion Engine (ICE) imports. The EV market is relatively new globally, which means a robust second-hand EV market is not readily available to economically replace second-hand ICE imports in Fiji. This opportunity focuses on the import of up to 16,000 new EVs and their charging stations & installation. Included in this opportunity are regulatory means to address end-of-lifecycle proper battery disposal. This opportunity will be implemented first through Government leasing, and later through private-sector uptake. The investments determined in this opportunity do not include the investment needed to increase power-generation capacity and strengthen the power distribution system in Fiji.

T18 – LAND TRANSPORT INFRASTRUCTURE UPGRADE FOR NON-MOTORISED TRANSPORT:

This opportunity includes the design and implementation of enhanced land-transport infrastructure that encourages decarbonisation through the safe use of non-motorised transport in Fiji. This enhanced land-transport infrastructure will include footpaths and bicycle lanes separated from traffic lanes for motorised vehicles,, and potentially include dedicated pathways exclusively for non-motorised transport. Separation from vehicle traffic lanes is achieved through the use of green space or other barriers which will also lead to improved drainage and carbon sequestration. A central component of this opportunity is for the Fiji Roads Authority (FRA) and local governments to institute additional infrastructure planning, design standards/criteria, regulation, and enforcement during the implementation of carriageways/roads and bridges with access for non-motorised transport. The implementation of this opportunity is expected to start in high-traffic areas and Central Business Districts, as well as feasible areas for last-mile transport connected to the public transport system (e.g. paths leading to bus stops), and total up to 2,800 km of new or rehabilitated road ways by 2030. This opportunity will help to diminish traffic congestion, improve pedestrian and bike-rider safety, and lead to GHG mitigation.



MITIGATION EXAMPLE: HYBRID AND ELECTRIC VEHICLES IN FIJI

The Fijian Government introduced legislation in 2016 to waive the excise fees of 32% for the import of both used and new hybrid vehicles which led to the importation of more than 4,000 hybrid passenger cars by the end of 2017, and an estimated minimum annual GHG mitigation of 3,400 tCO₂ assuming that all hybrid imports substituted a traditional ICE vehicle. This was a successful fiscal policy (e.g. lower tax), where the investment in the hybrid vehicles was fully private sector financed. However, the fiscal policy appears to have led to a greater increase in vehicle imports increasing than planned in 2016-2017, which can potentially contribute to a net increase in GHG emissions beyond the BAU baseline. Due to the large number of imports, the waiver of excise fees was applied only to new hybrid vehicles in the following years. Fiji also waives the excise fees for new electric vehicles and their charging stations, but these fiscal policy incentives have not led to a measurable increase in electric vehicles in Fiji due to the higher cost of introducing EVs and lack of second-hand EVs that can be imported.

2.2 MARITIME TRANSPORT SUB-SECTOR

Maritime transport in Fiji is governed by numerous regulations promulgated under the Maritime Transport Act 2013 and Ship Registration Act 2013.⁴⁴ The Maritime Safety Authority of Fiji Act 2009 establishes MSAF as the regulating body for maritime transport. Fiji's current maritime regulations deal with ship registration, safety, and aquatic environmental concerns (e.g. ballast water, biofouling, oil spills and garbage disposal/waste, etc.).⁴⁵ While none of the current regulations in Fiji directly address GHG emissions, some regulations do have indirect consequences for GHG emissions from domestic maritime vessels (e.g. age limit registration requirements).

There are a number of current national and sectoral plans and strategies that include development in domestic maritime transport and the potential decarbonisation of the sub-sector. These are highlighted in Section 1.3.2 and explained in general in Annex B. Many of these current strategies and plans identify common challenges, actions and priorities to facilitate change in domestic maritime transport.

Various financial incentives are in place to encourage financial viability in domestic maritime transport, including a VAT exemption to assist licensed shipping companies import vessels, a VAT exemption for import of hybrid and electric ships, fiscal concessions for public transportation (inter-island shipping), and other fiscal incentives for engines and ships.⁴⁶ The Fijian Government also provides significant budget allocation to support education and training through a variety of scholarships and programmes, such as the rural maritime livelihood programme (which could target skills needed for decarbonisation of maritime transport).

The majority of the larger vessels in Fiji are owned and operated by private companies, though the GSS, and other government vessels (e.g. Education, Fisheries, Navy, Police, Health) play a key role in connectivity for outer islands as well in delivery of government programmes. GSS owns and operates 14 vessels and is well placed to act as a "first mover" in retrofit of existing vessels and trials of renewable-energy options in new builds, as well as operational measures to reduce emissions.

Households and commercial companies make up the majority of entities operating vessels in Fiji. Many of the vessels used in Fiji are associated with the tourism industry, while the passenger/cargo vessels operating on the economic routes are one of the largest sources of GHG emissions. Available MSAF data⁴⁷ shows that there were 3,426 vessels registered in Fiji in 2019. Of these 90% are small boats (<15m) owned and used by households and individuals for artisanal fishing and local passenger transport, the vast majority of which are powered by outboard motors. The 2017 National Census found that households owned 4,205 small boats <15m (this did not include any boats owned by churches or schools, resorts or businesses), indicating a large number of unregistered vessels. Many of the registered vessels are listed as 'pleasure craft',⁴⁸ reflecting the high proportion of vessels <15m used for fishing, and passenger transport by households in addition to commercial vessels used for the same purpose.

Tourism is a significant segment of the domestic maritime sub-sector and is well positioned to trial and uptake low/zero-carbon options for maritime transport, reflecting the co-benefits for the tourism sector and the sector's access to financing. Several tourism-related companies in Fiji have invested in low-emission technologies such as retrofitting vessels and switching to 4-stroke outboard motors. The COVID-19 pandemic has had a profound impact on this sub-sector in particular, although it is also one of the few to re-open with initiatives such as the Blue Lane programme, which encourage overseas yachts to come to Fiji. Fiji is host to the Pacific Global



FINANCING AND IMPLEMENTING PARTNER EXAMPLE: PACIFIC BLUE SHIPPING PARTNERSHIP (PBSP)

The Pacific Blue Shipping Partnership (PBSP) is a framework driven by Pacific Island Countries (PICs) that is being developed to allow PICs access to blended finance and capacity building at a large scale, with the purpose of catalysing a multi-country transition to sustainable, resilient, and low-carbon maritime transport in the Pacific region. The PBSP was established by the governments of Fiji and the Marshall Islands in 2019, and is being developed as a coordinated partnership with Kiribati, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, and others. The PBSP has the goal to reduce regional GHG emission from maritime transport by 40% in 2030, and reach carbon neutrality by 2050, which closely reflects the national climate-change goals of several PICs and exceed those of the IMO's Initial Strategy.

Governed by a Ministerial Council, the PBSP will work to facilitate US\$ 500m of finance into the maritime sectors of the participating PICs between 2020 and 2030, with a focus to address the holistic 'whole-of-sector' challenges faced in the Pacific. The PBSP will work with financial and implementing institutions to deliver low-carbon vessels and supporting infrastructure and capacity building to the shipping needs of the partner countries, setup a Small-to-Medium Scale Enterprise (SME) finance facility enabling regional private sector access to low-carbon maritime technology, and strengthen technical research and advisory support to partner countries.

The PBSP will be coordinated by its members through a Ministerial Council supported by a secretariat (building on the PNA model) and will reduce the regional cost of the low-carbon transition of the Pacific maritime sector by increasing the level of coordination and by ensuring effective and efficient delivery to member states as a broad programme of transition. The PBSP will also allow for greater regional resilience to disasters and emergencies by improving the regional capacity to mobilise resources and by facilitating the growth of intra-regional commerce.

Maritime Technology Cooperation Centre (MTCC), which is hosted by SPC and SPREP.⁴⁹ The MTCC is involved in pilot projects to reduce emissions from ships, including collection of data on domestic vessel fuel use and GHG emissions, and is in discussions for a pilot trial of retrofit on a GSS vessel. Fiji has also been working with the Micronesian Centre for Sustainable Transport (MCST), which is hosted by the University of the South Pacific (USP) and has developed several proposals for wind-assist trials on GSS vessels and other energy-efficiency measures as well as for research on Fiji maritime transport decarbonisation.⁵⁰

It is also important to note that Fiji's maritime-transport sector is well established and comparatively large compared to its PIC neighbours, and reflects Fiji's role as the regional transshipment and maritime maintenance hub. Fiji hosts international shipping companies and has the main international seaports in Suva and Lautoka. Much of the Pacific region's cargo is transhipped through either Suva or Lautoka, and there are slipways, dry docks and boat-yard facilities and support services that can cater for comparatively large commercial vessels.

2.2.1 KEY NATIONAL SUB-SECTOR STAKEHOLDERS IN MARITIME TRANSPORT

The key national stakeholders involved in domestic maritime transport in Fiji come from both the public and private sectors, each playing key roles in connecting the scattered island communities to the urban markets and in providing the means for communities to maintain social and cultural connections and access health and education services. Key national stakeholders and their roles are listed below, and additional information on key stakeholders and existing planning and actions in domestic maritime transport can be found in Annex C.

Table 4: Key National Stakeholders In Maritime Transport

STAKEHOLDER	ROLES WITHIN THE SECTOR
Transport Planning Division (TPD) at MCTTT	<p>Government Department responsible for transport planning, regulation and enforcement, under which various offices and SOEs (e.g. MSAF, GSS, FPCL, FSHIL, FPTL and FMA) sit.</p> <p>TPD/MCTTT is the main regulatory entity for implementing changes in planning, regulation, and enforcement for low-carbon activities.</p>
Maritime Safety Authority of Fiji (MSAF)	<p>Sitting under TPD, MSAF is responsible for registration and surveying of vessels and licensing of seafarers, as well as regulating and ensuring compliance with both national and international shipping safety standards.</p>
Government Shipping Services (GSS)	<p>GSS is an SOE that is both owner/operator of vessels providing shipping services for government departments and ministries to deliver outer island projects, private charters, navigational aids, and jetty/mooring maintenance.</p> <p>This SOE has extensive operational experience GSS is a prime candidate for implementing effective decarbonisation technology and low-carbon vessels.</p>
Commercial Shipping Companies	<p>Commercial companies that are the owners/operators of vessels for fishing, passengers/cargo, and specialised vessels, as well as land-based maritime services.</p> <p>These entities will implement decarbonisation activities for vessels within the private sector.</p>
Tourism Companies	<p>Tourism companies that are the owners/operators of vessels for passenger and leisure activities as well as land-based infrastructure at resorts.</p> <p>These entities will implement decarbonisation activities for vessels within the private sector, and traditionally have greater ability to finance new investments.</p>
<ul style="list-style-type: none"> • Fiji Maritime Academy (FMA) • Fiji National University (FNU) • FIT College (FIT) • University of the South Pacific <p>Pacific Technical and Further Education (Pacific TAFE)</p>	<p>These are the primary vocational-education institutions in Fiji providing training and education services to the work force entering the maritime sector, and the research institutions addressing Pacific regional maritime activity.</p> <p>These entities are central in providing training services for the use of low-carbon technologies and ensuring their proper application both in Fiji and within the region.</p>

Fiji Port Corporation Ltd.(FPCL)	<p>FPCL is the SOE responsible for management and operations of Ports of Suva and Lautoka, Malau, Levuka, Wairiki, and Rotuma (Fiji Ports Terminal Ltd) and ship repair facilities (Fiji Ships & Heavy Industries Ltd).</p> <p>FPCL can play a key role in providing infrastructure and maintenance services for the implementation of low-carbon technologies.</p>
Fiji Development Bank (FDB)	<p>FDB provides lending under a variety of financial products that have been used for financing the implementation of low-carbon technology in Fiji in the past.</p> <p>FDB has the opportunity to operate loan facilities focused on lending to commercial entities to finance the implementation of low-carbon technologies.</p> <p>As a GCF Direct Access Entity, FDB has potential to shore up blended financing for a variety of projects.</p>
Reserve Bank of Fiji (RBF)	<p>RBF addresses monetary policy and regulation in Fiji, including the provision of liquidity in local currency (FJ\$), and the regulation of insurance and some finance facilities (in cooperation with national banks).</p> <p>RBF FPCL can play a key role in providing monetary lending regulation to national banks for financing low-carbon technologies, the expansions of existing lending facilities operated by RBF.</p>
Fiji Revenue & Customs Service (FRCS)	<p>FRCS is responsible for customs and tax compliance, inclusive of all imports of vessels, motors, and other equipment, as well as taxation on goods & services provided domestically throughout the sector.</p> <p>FRCS plays a key role in the regulation of tax-based incentives for the private sector.</p>
Fiji Competition & Consumer Commission (FCCC)	<p>This agency is responsible for setting price controls for shipping services (passenger and cargo fees) and fuel prices.</p> <p>FCCC can play a key role in helping regulate price to encourage viable and bankable business models for SOEs and the private sector to implement low-carbon technologies.</p>
<ul style="list-style-type: none"> • Fiji Roads Authority (FRA) • Ministry of Local Government • Town and City Councils 	<p>These government entities maintain, upgrade, and build jetties and pontoons.</p> <p>These entities can play a key role in providing basic infrastructure for effective low-carbon vessels and technology.</p>
<ul style="list-style-type: none"> • Fiji Police Force • Fiji Navy • Ministries of Health & Education/Schools • Ministry of Agriculture, Fisheries 	<p>These government entities are the owners/operators of vessels for government, passenger and cargo activities.</p> <p>These entities have extensive operational experience and are prime candidate for implementing effective low-carbon vessels</p>
Fiji Bureau of Statistics (FBOS)	<p>FBOS is the central government entity providing data collection and statistical analysis services.</p> <p>FBOS can play a key role in providing data services to ensure the effective financing, implementation, and monitoring of low-carbon vessels and technology.</p>

<ul style="list-style-type: none"> • Micronesian Centre for Sustainable Transport (MCST) • Pacific Global Maritime Technology • Cooperation Centre (MTCC) 	<p>MCST and MTCC are regional specialists for research and advisory, including management of pilot projects and other technology and best-practise-based enhancements in the regional maritime sector.</p> <p>These entities play a central role for the inclusion of new technologies and best-practise in the sector.</p>
<ul style="list-style-type: none"> • The Fiji Ship Owners and Agents Association • Fiji Maritime Workers Association • Fiji Women in Maritime Association • Marina Industry Association • Seafarers Guild • Seafarers Fiji • Merchant Navy Fiji • Other Social/Industry Groups 	<p>These groups provide forums for local owners and operators of commercial vessels and marinas, and those employed in the industry, to exchange views and to ensure the industry and workers have a voice in the decision making processes that affect them.</p> <p>These entities play a central role in disseminating information on the implementing of low emissions technologies, accessing financing opportunities, and encouraging effective and working friendly business models.</p>

2.2.2 KEY CONSTRAINTS AND OPPORTUNITIES TO STRENGTHEN THE ENABLING ENVIRONMENT IN THE MARITIME TRANSPORT SUB-SECTOR

Fiji has in place various tax incentives, the Shipping Franchise Scheme, and Community Service Obligations⁵¹ to provide domestic shipping services. These incentives and mechanisms do not currently encourage the greater implementation of low-carbon technologies in the maritime transport sub-sector. This sub-sector lacks access to commercial lending at affordable rates for the private sector and individuals to invest in new low-carbon technologies and vessels. Insurance is often not available or not affordable in Fiji leaving most vessel owners, including the Government, to assume the risk of loss and damage of vessels. This makes securing loans within the sub-sector even more challenging due to increased risk.

Existing maritime policy is not fully coordinated, and there is no sectoral-level policy providing an enabling environment for decarbonisation of the sector, including for the enhanced enforcement of regulation. Conflicting fiscal policies in Fiji (e.g. duties and excises and import restrictions, fuel-price controls, subsidies) currently discourage private-sector investment in reducing emissions in this subsector. There is also a lack of disaggregated fuel-use data and detailed data on boats and motors, and this limits the ability of the Fijian Government to design appropriate fiscal incentives for the private sector and households to invest in low-carbon technologies and vessels.

The human capacity to facilitate change within both the public and private sectors is limited in Fiji, although the tourism sector may be an exception. The education institutions in Fiji need to provide the courses and training relevant for a low-carbon shipping future. Raising the level of awareness in the public and private sector on transitioning from fossil fuels, and what options are available and appropriate, as well as available financial incentives are essential to encourage the low-carbon transition of this sub-sector in Fiji.

The key constraints impacting the Maritime Transport sub-sector are highlighted below, along with potential opportunities to strengthen the enabling environment for Maritime Transport.

Table 5: Key constraints and enabling environment strengthening opportunities in Maritime Transport

CONSTRAINT/BARRIER	ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES
Market Structures and Financing	<ul style="list-style-type: none"> • Revise tax structure for the import of efficient outboard motors with a lower duty/excise taxes on cleaner technology and higher values on high emission motors. • Commercial and retail lending mechanisms tailored to support a more rapid transition to lower emissions maritime transport technologies. • Engage with MOE and other ministries to structure an inter-ministerial mechanism for public procurement of maritime transport technologies. • Make available blended financing that provides for the specific needs of each stakeholder, recognising that the financing needs for businesses operating inter-island ferries on uneconomic routes are different from those servicing the tourist sector, which in turn are different from the individual household using boats for personal use and fishing.
Insurance/Risk Mitigation *	<ul style="list-style-type: none"> • Insurance products are needed to underwrite risk for performance of commercial operations and loss & damage of vessels.
Knowhow, Training, and Data/Analytics *	<ul style="list-style-type: none"> • MSAF could amend vessel survey requirements to include GHG emissions and fuel-use data collection and reporting, and require commercially operating vessels to develop and implement a vessel/fleet decarbonisation plan as part of a mandatory Ship Energy Management Plan • Consolidation of data collection type and methods, including disaggregated data, within the maritime transport sector (e.g. MSAF, DOF, TPD, FRCS, FBOS, etc.) • MCST and MTCC are both in process of developing online courses specifically focused on shipping emissions and low-carbon transition. • Government scholarships and livelihood programmes can be expanded to prioritise skills relevant to maritime decarbonisation. Existing FMA, FNU and USP TVET training curriculum can be expanded.
Coordination	<ul style="list-style-type: none"> • Increased integration of inter-governmental co-ordination and cooperation, for planning and incentives to increase the implementation of mitigation actions. • Extend/broaden the use of existing stakeholder workshops and meetings, and private-sector associations to encourage effective and efficient implementation of mitigation actions, e.g. Transport Consultative Forum...etc.
Awareness *	<ul style="list-style-type: none"> • Existing forums, both run by government and private-sector organisations already have been raising awareness on the challenge of decarbonising shipping⁵¹. Specific targeted public information campaigns on vessel safety could be expanded to incorporate energy-efficiency and emissions reduction. Hosting of green shipping expo/trade event opportunities could be explored.

* Note that these are common issue for most PICs, and a multi-country initiative is possible

2.2.3 MITIGATION OPPORTUNITIES AND INVESTMENT NEEDS IN MARITIME TRANSPORT

There are four mitigation options that focus on domestic Maritime Transport. Together, these have the potential to reduce 150,000 tCO₂ emission by the end of 2030, with an annual mitigation potential of 25,000 tCO₂/yr in 2030. This annual mitigation potential is approximately equal to 1% of the projected 1st NDC's energy sector BAU emission in 2030. The estimated capital investment costs needed to reach the mitigation potential is US\$158.8M between 2020 and 2030, along with an estimated US\$ 2.5M cost for project/programme development, capacity building & technical assistance.

Table 6: Aggregated information for mitigation opportunities in Maritime Transport

OPPORTUNITIES	INDICATIVE DEVELOPMENT, CB & TA 2020-2030 (US\$M)*	INDICATIVE INVESTMENT NEEDS TO 2020-2030 (US\$M)	COST OF MITIGATION US\$/tCO ₂	ANNUAL MITIGATION 2030 (tCO ₂ /YR)	TOTAL MITIGATION 2020-2030 (tCO ₂ /YR)
T1 National Action Plan for Decarbonising Maritime Transport	0.6	NA	NA	NA	NA
T3 Outboard Motor Transition**	0.4	114.6	1,100	16,000	105,000
T8 Sail-powered Cargo/ Passenger Ferry***	1.4	35.0	900	8,000	40,000
T10 Zero Carbon Passenger Ferry Trials***	0.1	9.2	1,800	1,000	5,000
TOTAL MITIGATION POTENTIAL OF ALL	2.5	158.8		25,000	150,000

*Financial Needs for Project/Programme Development, Capacity Building (CB), and Technical Assistance (TA).

**Includes the total investment in vehicles.

***Includes the total investment in roads (vehicle & bike lanes and barriers) and other traffic management activities.

T1 - NATIONAL ACTION PLAN FOR DECARBONISING MARITIME TRANSPORT:

This opportunity provides technical assistance for the preparation and implementation of a coordinated national-level action plan for decarbonizing maritime transport. The action plan will involve several components addressing both international ships (calling in Fiji ports) and domestic vessels through a coordinated programme of actions and decarbonisation incentives to transition domestic shipping to a zero-carbon future by 2050. This national-level action plan will not directly lead to emission reductions but will facilitate direct emission reductions through the planning actions. The national action plan is expected to be lodged with the International Maritime Organisation (IMO).

T3 - OUTBOARD MOTOR TRANSITION:

Outboard motors are likely to be the single largest source of GHG emissions for the maritime sector in Fiji, due to the large number of 2-stroke petrol outboard motors currently being operated in Fiji. This opportunity focuses on technical assistance and financial support for the transition to 4-stroke outboard motors, which are considerably more energy-efficient than 2-stroke outboards, and eventually lead to a transition to fully electric outboard motors. This opportunity expects to facilitate the transition by replacing existing 2-stroke outboards with up to 3,950 4-stroke outboards and up to 3,950 fully electric outboard motors and their charging infrastructure. The investments determined in this opportunity do not include the investment needed to increase power-generation capacity and strengthen the power-distribution system in Fiji.

T8 - SAIL-POWERED CARGO/PASSENGER FERRY:

The main inter-island shipping routes connecting Fiji's inhabited islands are serviced using passenger/cargo ferries of up to 5,000 tonnes that are often aged or second-hand. This vessel type is the largest in the domestic maritime fleet and produces the greatest proportion of GHG emissions per vessel. There are minimal options for major efficiency and mitigation improvements for such vessels given their age and design. This opportunity focuses on a new design vessel, such as the Neoliner, which can offer in excess of 80% efficiency savings through a whole-of-ship design approach and use of sails. This opportunity includes changing the prevailing business model to a higher investment/lower operational cost approach. This opportunity will include the Government Shipping Service (GSS) initially owning and operating a new build vessel under strictly monitored trials to demonstrate the potential for efficiency and financial savings to the private sector. When successful, the vessel will then be sold in Fiji to the private-sector operators for operation on inter-island routes.

T10 - ZERO CARBON PASSENGER FERRY TRIALS:

This opportunity involves the government providing the enabling environment to incentivise the private sector to implement zero-carbon ferry trials in Suva (focused on commuters) and Nadi waters (focused on tourism). Concept development would consider vessel acquisition options (new build in Fiji or import from overseas), recharging stations, and scrappage/recycling. Tax exemptions are already in place for the import of electric/hybrid vessels, but other fiscal policies will be implemented under this opportunity to ensure that finance is aligned with the total needs for vessel and supporting infrastructure. The opportunity is expected to provide financial and business incentives for the private sector to implement the actions. The opportunity is also expected to replicate the proven initiatives undertaken in other parts of the world where governments have provided grants and lending opportunities to support private sector trials and the setup of bankable Public Private Partnerships, as well as provisions of shore-side infrastructure (pontoons, jetties, recharging).



MITIGATION EXAMPLE: SV KWAI RETROFIT

The SV Kwai cargo vessel is a 179 GRT converted fishing vessel built in 1950, that has been operating since 2006 out of Honolulu and over time has retrofitted a soft sail ketch rig, which has resulted in recorded fuel savings of 30%. The resulting cost savings contribute significantly to the continued operation of the vessel without subsidy. The Kwai uses a crew-voyage profit incentive to maximize use of the sails and reduce fuel use. Crewed mainly by Kiribati seafarers, the Kwai provides a wellknown example familiar to many. Given the niche and unique operating scenario of the Kwai, whilst the retrofit of sails on other vessels is replicable, the financing needed to support a similar pipeline project would likely need to be sourced from a mix of grants and loans depending on the target vessel's owner.

Other examples of soft sail retrofit include the 1980's trials in Fiji on the GSS vessels Mataisau and Cagidonu, which showed fuel savings of 23% overall and up to 37% if all sails were used. Trials were on domestic routes under the ADB funded US\$40,000 project monitored by Southampton University. (Satchwell, 1985, Wind ship technology in Proceedings of the international symposium on wind ship technology (Windtech '85) Southampton, and Clayton, 1987, Wind-Assisted Ship Propulsion Physics in Technology 18 53, UK).

For Fiji to encourage a similar vessel operating on domestic waters, a full concept note/proposal application for development will be needed, followed by a review of vessel-design options, feasibility studies, route planning, vessel build plans, and vessel construction.

2.3 AVIATION TRANSPORT SUB-SECTOR

Given both the size and distribution of Fiji's population, plus the average monthly arrivals of over 70,000 tourists in 2019,⁵² Fiji has developed a relatively robust and diversified domestic aviation service industry compared to the rest of the PICs. The domestic aviation sector in Fiji is governed by the Department of Civil Aviation (DCA), operating under the Office of the Attorney-General. Domestic aviation services provided by aircraft registered in Fiji are regulated and licensed by the Department of Civil Aviation's Air Transport Licensing Board (ATLB) in accordance with the Civil Aviation (Licensing of Air Services) Regulations 1978.⁵³ The Civil Aviation Authority of Fiji (CAAF), is responsible for enforcing the existing regulations established under the Civil Aviation Act (1976) and the Civil Aviation Reform Act 1999. Fiji has also developed a State Action Plan for the Reduction of Aviation Greenhouse Gas Emissions⁵⁴ in the context of international aviation, and the basket of measures recommended for reducing emissions from international air transport will be utilized as a reference point for corresponding reduction options in the domestic aviation sector. Under the current fiscal policy, there are no aviation sub-sector-specific tax incentives.

From a financial standpoint, both the relevance of the MOE in the budgetary/taxation policies and the investment policies of the Fiji National Provident Fund (FNPF) have had significant bearing on the development of the domestic aviation sector. The lending contributions from the FNPF to develop the national airline (Fiji Airways/Fiji Link) have been largely repaid through the growth of the international aviation sector. However, the COVID-19 pandemic has curbed this return on investment, and has created liability issues for Fiji Airways and FNPF.

Under the CAAF corporate objectives, there is an expectation that industry growth will continue, and CAAF will need to meet the needs of an expanding aviation market (both in terms of volume and distribution of services). There has been growth in the private sector over the 2010-2020 period, with additional businesses starting operations, and the planning of a larger international airport outside Labasa on Vanua Levu to take place during the 2020-2030 period is expected.

Given the relevance of the tourism industry to Fiji's national economy, the aviation transport sub-sector is readily supported by the Fijian Government. As an example FJ\$129M was invested in the Nadi Airport terminal upgrades in 2018⁵⁵, and a FJ\$3B expansion was announced in December 2019 (which may be delayed due to the current revisions in forecasted aviation demands due to the COVID-19 pandemic).⁵⁶ These improvements illustrate the value of aviation infrastructure in allowing larger aircraft to land, which is of particular relevance to the international visitor arrival figures. Similar improvements at outer island airstrips will have associated benefits in reducing fuel consumption on a per passenger basis, as well as increasing passenger capacity between outer islands even if frequency of flights does not increase. The length and quality of airport runways is recognized as a constraint for the additional 13 domestic airfields in operation.

2.3.1 KEY NATIONAL SUB-SECTOR STAKEHOLDERS IN AVIATION TRANSPORT

The main Fijian Government stakeholders for domestic aviation are mentioned below, and domestic aviation flight services are currently provided by at least thirteen different entities in Fiji, with Fiji Link and Northern Air operating the largest number of flight-routes.⁵⁷ Whereas, ground services are provided by Airports Fiji Limited and Air Terminal Services Limited. There are also sectoral associations such as the Association of South Pacific Airlines, the Fiji Airline Pilots' Association, and the Pacific Aviation Safety Office which provide sector-wide support structures, standards, and services which impact domestic aviation operations in Fiji.

Key national stakeholders and their roles are listed below. Additional information on key stakeholders and existing planning and actions in domestic Aviation Transport can be found in Annex C.

Table 7: Key national stakeholders in Aviation Transport

STAKEHOLDER	ROLES WITHIN THE SECTOR
Ministry of Economy (MOE)	<p>MOE has oversight over national budgeting, as well as thresholds for lending between government-owned entities.</p> <p>MOE will play a key role in fiscal policy and economic planning impacting the domestic aviation sub-sector.</p>
Department of Civil Aviation (DCA)	<p>DCA has oversight over the entire aviation sector, primarily executed through CAAF, with FAL and ATS servicing the airlines.</p> <p>DCA will play a key role sectoral planning.</p>
Civil Aviation Authority of Fiji (CAAF)	<p>CAAF is the national regulator for the aviation sector, including oversight of Fiji Airways/Fiji Link, FAL, and ATS. CAAF deals with both international and domestic aviation sectoral concerns, including ICAO compliance and national-level GHG inventory reporting.</p> <p>CAAF will play a key role sectoral regulation, future aircraft and infrastructure standards, and sector monitoring.</p>
Fiji Airways/Fiji Link	<p>Is majority owned by the Fijian Government and is the largest carrier in Fiji and the largest airline whose businesses serve the international and domestic routes.</p> <p>Fiji Link will implement mitigation actions through the purchase and operation of new aircraft.</p>
Fiji National Provident Fund (FNPF)	<p>The national superannuation fund has provided capital lending to Fiji Airways for re-fleeting since 2014.</p> <p>FNPF is a potential source for debt finance of aircraft and infrastructure.</p>
Fiji Revenue & Customs Service (FRCS)	<p>FRCS is responsible for recording national fuel import statistics for all aviation fuel and tracking the value and composition of all other purchases related to the sector. FRCS also addresses commercial tax regulation and collection.</p> <p>FRCS has the potential role to enforce new tax regulations on equipment and fuels, as well as collect tax-related data on purchased good and services.</p>
Fiji Airports Limited (FAL)	<p>Fiji Airports Limited operates the various airport facilities around the country.</p> <p>FAL will implement ground-based improvements leading to mitigation.</p>
Air Terminal Services Limited (ATS)	<p>ATS is responsible for handling operations at Nadi International Airport.</p> <p>ATS will implement ground-based improvements leading to mitigation.</p>
Private Sector	<p>Including private companies providing domestic aviation services (Northern Air, Pacific Island Air, Sunflower Aviation, HeliPro, Island Hoppers, and SkyDive Fiji), as well as flight schools (Advance Aviation Training and Pacific Flying School), and private aircraft operated by Kokomo Island, Laucala, Turtle Island, Vatuvara, and Wakaya resorts.</p> <p>These entities will implement mitigation actions through the purchase and operation of new aircraft.</p>

2.3.2 KEY CONSTRAINTS AND OPPORTUNITIES TO STRENGTHEN THE ENABLING ENVIRONMENT IN THE AVIATION TRANSPORT SUB-SECTOR

A limiting factor to cost-effective socio-economic development is delivering services to outer islands with economies of scale. Accommodating larger aircraft on one of Vanua Levu's airstrips (Savusavu and Matei airports currently cannot handle an ATR-72) is a priority for the Fijian Government. Additionally, ensuring that the various other outer-island airstrips can accommodate next generation aircraft will be crucial to providing increased connectivity over the 2020-2030 period. Ground operations can be enhanced at Fiji airport/airfields to reduce fuel consumption by aircraft, and this requires additional operational training. Currently, no reporting mechanism is in place for monitoring, reporting, and verification of fuel use by domestic aviation operators, or the fuel efficiency of aircraft. These elements can be incorporated into the licensing and inspection process for airworthiness. The key constraints impacting the Aviation Transport sub-sector are highlighted below, along with potential opportunities to strengthen the enabling environment for Aviation Transport.

Table 8: Key constraints and enabling environment strengthening opportunities in Maritime Transport

CONSTRAINT/BARRIER	ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES
Market Structures and Financing	<ul style="list-style-type: none"> • New aircraft design and performance standards can be set and enforced, and fiscal incentives can be offered to encourage the use of low-carbon technology. • The differences in cost between biofuels and standard aviation fuel can be addressed by taxation on aviation fuels relative to fuel type. This will require additional data and methodologies to set appropriate taxation.
Knowhow, Training, and Data/Analytics *	<ul style="list-style-type: none"> • Reporting requirements for aviation operators can be strengthened to improve domestic GHG inventory and accounting efforts either in line with CORSIA standards or by using a separate domestic methodology. • Technical assistance is needed at both the regulator and operator level to deliver the necessary range of training measures to ensure enhanced operational performance and safety. • Publicly available certification/qualification courses may be scheduled for both Fiji Airways/Fiji Link and the rest of the private sector. • Airworthiness certification may be tied to reporting mechanisms for monitoring, reporting, and verification of fuel use and technology by domestic aviation operators.
Infrastructure Scaling	<ul style="list-style-type: none"> • Technical and economic feasibility studies for the accommodation of larger aircraft at all airports and airfields beyond Nadi and Nausori International Airport can determine the ability and investment needed to lower domestic per-passenger GHG emissions. • Technical and economic feasibility studies, preparation, and regulation for use of new fuels (e.g. bunkering of new fuel blends...etc.) to fuel next generation aircraft will enable wider service to outer islands.
GHG Accounting & Methodology	<ul style="list-style-type: none"> • It is possible that the CORSIA methodology to be agreed upon by ICAO for international aviation will be robust enough to adapt and implement for domestic GHG accounting.

2.3.3 MITIGATION OPPORTUNITIES AND INVESTMENT NEEDS IN AVIATION TRANSPORT SUB-SECTOR

There are four mitigation options that focus on domestic Aviation. Together, these have the potential to reduce 203,000 tCO₂ emissions by the end of 2030, with an annual mitigation potential of 30,000 tCO₂/yr in 2030. This annual mitigation potential is approximately equal to 1% of the projected 1st NDC's energy sector BAU emission in 2030. The estimated capital investment needed to reach the mitigation potential is US\$332.1M between 2020 and 2030, along with an estimated costs for project/programme development, capacity building & technical assistance of US\$10.5M.

Table 9: Aggregated information for mitigation opportunities in Maritime Transport

OPPORTUNITIES ⁵⁸	INDICATIVE DEVELOPMENT, CB & TA 2020-2030 (US\$M)*	INDICATIVE INVESTMENT NEEDS TO 2020-2030 (US\$M)	COST OF MITIGATION US\$/tCO ₂	ANNUAL MITIGATION 2030 (tCO ₂ /YR)	TOTAL MITIGATION 2020-2030 (tCO ₂ /YR)
T6 National Action Plan for Decarbonising Maritime Transport	2.5	0	100	7,000	50,000
T12 Outboard Motor Transition**	4.5	276.0	10,600	5,000	27,000
T14 Sail-powered Cargo/ Passenger Ferry***	3.0	49.5	4,700	2,000	11,000
T17 Zero Carbon Passenger Ferry Trials***	0.5	6.6	100	16,000	115,000
TOTAL MITIGATION POTENTIAL OF ALL	10.5	332.1		30,000	203,000

*Financial Needs for Project/Programme Development, Capacity Building (CB), and Technical Assistance (TA).

**This includes the investment in new aircraft and technology.

T6 - AVIATION OPERATIONAL TRAINING PROGRAMME:

This opportunity includes technical assistance for re-training the domestic airlines and airports staff to allow for more efficient ground operations. This opportunity is expected to yield minor emissions reductions in domestic aviation through improved on-the-ground and in-flight systems management, air traffic management, and associated operational efficiency measures. This will not require any specific change in technology, instead prioritising behavioural change and best practices to make additional contributions to the expected energy-efficiency gains realised through other technological interventions. Certification for training in these practices is expected through technical and vocational education training (TVET) which can be done at both a national and Pacific regional level.

T12 - AIRCRAFT RE-FLEETING PROGRAMME:

This opportunity focuses on the process of renewing the nationwide fleet for domestic aviation in Fiji through continual improvements in aircraft performance. These improvements include higher-performance aircraft, aerodynamic efficiency, lighter-weight construction, efficient engines, and efficient in-flight mechanical and electrical systems. This opportunity includes the potential for mainstreaming future zero-emission technology under commercial deployment, including hybrid fuel/electric systems, fully electric systems, and hydrogen fuel-cell systems. Given the potential service life of aircraft – an average of 25 years – the phase-out of the existing fleet would be scheduled to deliver the most robust technology available to meet the decarbonisation targets set. Depending upon the maturity of each technology as current aircraft are phased out, emission reductions of between 15% and 100% may be realized. It is projected that hybrid and all-electric technology for small- and medium-sized aircraft will be commercially available between 2025 and 2030.

T14 - AIRPORT & AIRFIELD INFRASTRUCTURE UPGRADE:

Aviation infrastructure customarily consists of runways and taxiways, airport buildings, service facilities, and ground support equipment. This opportunity focuses on the whole-of-lifecycle emissions from these assets, but these emissions are not currently being captured under the domestic aviation category. The attribution of emissions solely to flight activities reduces the emissions mitigation potential relative to the overall cost of the investment. Under the 5-Year and 20-Year National Development Plan, MOE has identified several recommended improvements to domestic aviation infrastructure supporting the aviation sub-sector at Matei airport and Rotuma Airstrip. This is part of the implementation of a programme to facilitate the development of new airstrips and upgrade of current airstrips to ensure provision of reliable and quality domestic air services. The upgrades are not only expected to improve the efficiency of flight services, but will also allow for emission reductions through lower per-passenger emissions as higher capacity aircraft can be used in domestic routes.

T17 - SUSTAINABLE AVIATION FUEL INTEGRATION INITIATIVE:

Integration of biofuels - sustainable aviation fuel (SAF) - into the domestic airline operational fuel mixture provides an opportunity for immediate reductions in emissions for all flights that utilise the fuel, including for domestic aviation services. SAF is commercially available from various sources, and various types of aviation-grade biofuels are developed across the private sector and in use. However, the supply of SAF is currently limited in the international market as the larger international airlines currently consume the lion's share of SAF.



03

NDC INVESTMENT PLANNING FOR ENERGY-EFFICIENCY (POWER, APPLIANCES, BUILDINGS, GOVERNMENT, INDUSTRY)

Fiji has the need for economy-wide action targeting energy-efficiency. Previous activities by the Fijian Government and development partners have identified general areas for energy-efficiency improvements in Fiji, and these can be categorised in the energy-efficiency sub-sectors of Power & Utilities, Buildings & Cities, and Appliances, Government, and Industry. Past efforts by the Fijian Government and the private sector have mainly focused on piloting energy auditing and the installation of more efficient equipment in a limited number of buildings, as well as energy labelling for a small number of appliance types. Fiji has significant potential for gaining nationwide benefits from wider implementation of energy-efficient technologies and practices. These benefits may include reducing the total energy costs borne by households, businesses, and the Fijian Government, and a reduced need for additional investments in future power generation.

A significant challenge for implementing economy-wide energy-efficiency in Fiji is the split of responsibilities and authority for various Fijian Government entities (e.g. MIMS, MCTTT, MOE, and local governments). Current responsibilities and authority mean that Fijian Government entities are required to coordinate extensively to implement individual energy-efficiency measures. In the past this has created challenges for implementation and caused duplication of efforts. Energy-efficiency is more difficult to measure, monitor or assess, and hence there are needs for an adequate level of human capital (e.g. trained and certified experts) to ensure adequate implementation. Similar to other PICs, the Fijian Government and private companies in Fiji lack capacity in terms of human capital qualified to address energy-efficiency actions.

Financing energy-efficiency is challenging, as the assets that are implemented through energy-efficiency are often not of high value, are spread over many locations, or are not easily transferable, making them difficult to be used as collateral for borrowing. In addition, financial institutions perceive the difficulty in measuring and assessing energy-efficiency as a risk, which increases the cost of financing. The relatively smaller size of the market in Fiji and its remoteness make it less attractive for traditional financial products that address energy-efficiency, and less attractive for suppliers to bring in advanced energy-efficient products or technologies. Energy-efficiency in the building sector has an additional specific challenge of a split incentive in that the owners of the buildings who invest in energy-efficiency measures may not be the direct beneficiary of the cost savings such as when a building is occupied by tenants who realize energy savings.

3.1 POWER AND UTILITIES SUB-SECTOR

EFL is the SOE that is the main power generator and distributor of grid-connected electricity in Fiji. EFL delivers electricity to an estimated 90% of the population on the main islands of Viti Levu, Vanua Levu, Ovalau, and Taveuni, which together account for just under 90% of Fiji's population. In 2019, the total on-grid power generation was 1 112 GWh, of which 95% was generated by EFL (42% from diesel and heavy fuel oil, 53% from hydro power, 0.25% from wind power) and 5% by Independent Power Producers (IPP's). EFL aims to generate 90% of grid-connected power from renewable energy resources by 2025.⁵⁹

Fiji has three large Independent Power Producers (IPPs), the SOEs Tropik Wood Industries, and the Fiji Sugar Corporation (FSC), and the privately owned Nabou Green Energy, all of which have installed biomass power generation. FSC has 3 sites (Ba, Lautoka and Labasa), where power is generated only during the sugar crushing season. In addition, there are two smaller off-grid cogeneration plants on Taveuni where power and heat are provided to copra plantations.

The central and western regions of Viti Levu have an interconnected power transmission backbone consisting of a 132 kV transmission line between Vuda, Wailoa, Nadarivatu and Cunningham, and 33 kV and 11 kV distribution lines leading to end consumers. On Vanua Levu, there are two independent 11 kV power grids, one supplying the Labasa-to-Dreketi corridor and another supplying the Savusavu-to-Saivou corridor. Ovalau and Taveuni each have independent 11 kV power grids.

The performance of grid-connected power generation and the transmission and distribution systems are comparable to global good-practice values for small utilities. EFL reports a specific fuel consumption figure for its diesel power plants of 4 kWh per litre of fuel, which is better than the Pacific regional average. The transmission and distribution losses are reported to be approximately 10%⁶⁰ against a Pacific regional average of 21%. Most mini-grid systems in Fiji rely on lead-acid battery storage, although some of the latest installed systems have Li Ion batteries storage.

The Water Authority of Fiji (WAF) is the SOE responsible for centralised water supply and wastewater treatment in Fiji, and is the largest single power consumer. The main water sources in Fiji are rivers/basins, wells, and desalination plants, and in some areas water harvesting is practiced even though it is not presently mandatory in Fiji. There are 11 Wastewater Treatment Plants (WWTP) managed by WAF, handling all types of effluents.⁶¹

3.1.1 KEY NATIONAL SUB-SECTOR STAKEHOLDERS IN POWER AND UTILITIES

The key national stakeholders involved in Power and Utilities in Fiji are mostly SOEs, government entities, and the private sector, each playing key roles in delivering services to consumers along with the consumers themselves. Key national stakeholders and their roles are listed below, and additional information on key stakeholders and existing planning and actions in Power and Utilities can be found in Annex C.

Table 10: Key national stakeholders in Power and Utilities

STAKEHOLDER	ROLES WITHIN THE SECTOR
Energy Fiji Limited (EFL)	<p>EFL is the electricity utility in Fiji, covering generation, transmission and distribution.</p> <p>EFL has the opportunity to play a leading implementing and supporting role for all demand side management (DSM) and demand response (DR) programmes, and for the Li Ion battery storage opportunities being proposed.</p>
Department of Energy (DOE) at MIMS	<p>DOE has the mandate to plan and support the energy sector in Fiji.</p> <p>DOE is anticipated to take the lead role for a more integrated and systematic energy planning process in Fiji.</p>
Fiji Competition & Consumer Commission (FCCC)	<p>FCCC is the agency responsible for setting price controls on a variety of products, including fuel, electricity tariffs, and certain consumer goods.</p> <p>FCCC is expected to play a key role in the potential for regulation of Time of Day (TOD) tariffs for power, and potentially adjust any direct and indirect subsidies for fossil fuels, and play a role in regulation for transferring such benefits towards energy-efficiency and renewable energy.</p>
The Water Authority of Fiji (WAF)	<p>WAF is in charge of water supply and wastewater treatment and disposal. WAF is the largest electricity consumer for EFL.</p> <p>WAF would have to play a major role in the mitigation actions proposed in the future for efficient operation and maintenance of the water supply and wastewater systems.</p>
Fiji Bureau of Statistics (FBOS)	<p>FBOS is the central government entity providing data collection and statistical analysis services.</p> <p>FBOS is expected to play a key role in the proposed efforts to develop capacity on energy statistics.</p>
Ministry of Infrastructure and Meteorological Services (MIMS)	<p>Oversees energy planning and the electricity and transport infrastructure throughout Fiji.</p> <p>A major portion of energy-efficiency efforts will be led by MIMS, as MIMS has regulatory oversight of DOE, WAF, and EFL.</p>
Ministry of Commerce, Trade, Tourism and Transport (MCTTT)	<p>MCTTT develops and implements policies and strategies to facilitate growth in industry, trade, and tourism, and sets standards for goods and services.</p> <p>The Standards Unit at MCTTT will have a lead role in further implementing the MEPLS programme, which can impact DSM, including setting up and operating product-testing facilities. MCTTT will also support coordination for industrial energy-efficiency.</p>
Ministry of Economy (MOE)	<p>MOE has oversight over national budgeting, thresholds for lending between government-owned entities, and oversees all climate change-related planning.</p> <p>MOE will play a key role in planning, oversight, and fiscal incentives for mitigation actions.</p>

Department of Environment under the Ministry of Waterways and Environment (MWE)	<p>Promotes the sustainable use and development of Fiji's environment and efficient implementation of policies, legislation and programs, and is also in charge of fulfilling Fiji's Obligation under regional and international environment-related conventions and treaties, and in addition is mandated to regulate ozone depleting substances in AC and refrigeration.</p> <p>The Department of Environment will play a role in planning and access to support.</p>
Fiji Revenue & Customs Service (FRCS)	<p>FRCS is responsible for recording national fuel import statistics for all fuel and track the value and composition of all other purchases related to the sector. FRCS also addresses commercial tax regulation and collection.</p> <p>FRCS has the potential role to enforce new tax regulations on equipment and fuels, as well as collect tax related data on purchased good.</p>
Independent Power Producers	<p>These currently include 2 SOEs (Tropik Wood Industries, Fiji Sugar Corporation), and the privately owned Nabou Green Energy, all producing power from biomass.</p> <p>The good performance of their existing facilities, especially in terms of improved energy-efficiency and better asset management, could help contribute to meeting growing power demand using low-carbon power. This could also encourage more private investments into power production.</p>
Private Sector	<p>Apart from their potential role as Independent Power Producers, private sector suppliers could play a key role in supplying, installing and servicing more energy-efficient equipment, as well as equipment, sensors, accessories, hardware and software that enable energy-efficiency and those needed for monitoring energy-efficiency and maintenance parameters for the power sector and other related centralised utilities such as water and waste water treatment.</p>

3.1.2 KEY CONSTRAINTS AND OPPORTUNITIES TO STRENGTHEN THE ENABLING ENVIRONMENT OF THE POWER AND UTILITIES

Fiji needs a more comprehensive and fully integrated energy planning process, with a greater level of integration between all the energy sub-sectors. The responsibilities of different energy sector stakeholders are fragmented and there is less coordination among the various energy sub-sectors and even within sub-sectors. A concern raised by stakeholders was that although most of the mitigation actions under the NDC are energy related, there are several ministries that are focal points on various aspects of sustainable energy planning and regulation, and this leads to coordination, planning, and implementation.

Meeting peak demand for power is always a challenge in a growing economy, and all options to manage peak demand need to be fully exploited in order to limit the additional needs of investment in power generation and distribution. Time of Day (TOD) tariffs for larger consumers is missing in the power tariffs in Fiji, as well as other potential measures to control energy demand, such as a utility-led demand-side management (DSM).

WAF is the largest consumer of electricity in Fiji and there is significant potential to reduce energy use for pumping and treatment, and in the technical losses of water in the distribution system. Currently non-revenue water (NRW) is around 39%, with technical losses from leakages estimated to amount to 32%.⁶² A more proactive approach in implementing water management can reduce the demand for water and the need for additional

water and wastewater-treatment facilities.⁶³ In addition, the effective water supply and sewage treatment in the outer islands is an ongoing challenge, with increasing demand from the islands of Yasawa, Taveuni, Savusavu (in the island of Vanua Levu), Mamanuca Islands and Kadavu. Urgent upgrade work is also required to avoid ground water contamination. The constraints identified below briefly summarise the need for strengthening the enabling environment for energy-efficiency for Power and Utilities in Fiji, and more information on these can be found in Annex F, and the Concept Notes for each opportunity.

Table 11: Key constraints and enabling environment opportunities in Power & Utilities

CONSTRAINT/BARRIER	ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES
Market Structures and Financing	<ul style="list-style-type: none"> • Develop targeted fiscal instruments (e.g. different tax incentives) to support actions in energy-efficiency by consumers through lower investment costs. • Prepare and fund financial instruments (e.g. commercial and retail loans and related guarantees) to support actions in energy-efficiency by consumers, and utilities.
Knowhow, Training, and Data/Analytics *	<ul style="list-style-type: none"> • Enhanced capacity building for energy planning is essential for all the major stakeholders such as EFL, DOE, MOE, MWCPA, TPD, LTA, DCA, FBOS. • Capacity building is needed for collecting energy statistics for the enhanced energy planning processes. • Institutional planning and implementation structures for major stakeholders need to be set up. • Support is needed for WAF to assess and improve energy-efficiency in water supply and wastewater treatment, water loss prevention in the water supply system, and to build institutional capacity for preventive maintenance practices.
Management of peak power demand *	<ul style="list-style-type: none"> • Introducing TOD tariffs for medium to large industrial and commercial users. • Introducing demand reduction measures such as DSM and demand response (DR).
Improving supply side energy-efficiency *	<ul style="list-style-type: none"> • Support is needed for stakeholders such as DOE, EFL, FCCC, and private companies to develop the market and responsible tariffs for on- and off-grid Li Ion battery storage

* Note that these are common issue for most PICs, and a multi-country initiative is possible.

3.1.3 MITIGATION OPPORTUNITIES AND INVESTMENT NEEDS IN POWER AND UTILITIES

There are five mitigation options that focus on energy-efficiency in Power and Utilities. Together, these have the potential to reduce 1,340,000 tCO₂ emission by the end of 2030, with an annual mitigation potential of 390,000 tCO₂/yr in 2030. This annual mitigation potential is approximately equal to 14% of the projected 1st NDC's energy sector BAU emission in 2030. The estimated capital investment needed to reach the mitigation potential is US\$894.8M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US\$6.3M.

Table 12: Aggregated information for energy-efficiency opportunities in the Power and Utilities

OPPORTUNITIES ⁶⁴	INDICATIVE DEVELOPMENT, CB & TA 2020-2030 (US\$M)*	INDICATIVE INVESTMENT NEEDS TO 2020-2030 (US\$M)	COST OF MITIGATION US\$/tCO ₂	ANNUAL MITIGATION 2030 (tCO ₂ /YR)	TOTAL MITIGATION 2020-2030 (tCO ₂ /YR)
E1 Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji***	0.5	NA	2	75,000	254,000
E5 Promotion of Lithium Ion Batteries	1.2	184.2	3,800	14,000	48,000
T14 Programme to Manage Peak Demand and Energy Savings in Fiji **	1.3	702.2	800	259,000	898,000
E8 Efficient Operation and Maintenance of Water Supply Systems	1.5	3.6	40	41,000	136,000
E12 Efficient Operation and Maintenance of Wastewater Treatment Systems	1.8	4.8	1,700	1,000	4,000
TOTAL MITIGATION POTENTIAL OF ALL	6.3	894.8		390,000	1,340,000

* Financial Needs for Project/Programme Development, Capacity Building (CB), and Technical Assistance (TA).

** This includes the investment within consumer/household purchases of appliances and electrical equipment.

*** Does not include all capital investments due to the limited availability of information needed to quantify activity.

E1 - CAPACITY BUILDING FOR INTEGRATED ENERGY PLANNING AND ENERGY STATISTICS IN FIJI:

This opportunity encompasses technical assistance for the development of a systematic approach to energy statistics and integrated energy planning processes for key stakeholders in Fiji. The primary output of this opportunity is the development of an Integrated Energy Plan and Energy Balance for Fiji and setting up the institutional infrastructure for integrated energy planning and energy statistics in Fiji. Included within this opportunity is capacity building focusing on integrated energy planning with a dedicated training programme for Fijian Government entities. The training component will include the development of an education module to be included in the existing course curriculum at University of the South Pacific (USP) and the development of an online course for continual education of professionals including curriculum and certification. The training components can possibly be carried out with other PICs.

E5 - PROMOTION OF LITHIUM ION BATTERIES:

This opportunity encompasses technical assistance to support policy/regulation development, fiscal incentives, and financing schemes for promoting the use of Li Ion batteries (and newer technology) for on-grid and off-grid energy storage instead of lead-acid batteries in Fiji. The expected need for on-grid storage capacity is 162 MWh and will be managed by Energy Fiji Limited (EFL), while the expected need for off-grid storage capacity is 25 MWh and will be managed by the Fijian Government, the private sector, and communities & households. This opportunity includes the development and implementation of a capacity-building, awareness-raising and advocacy programme on the use and safe end-of-life disposal of Li Ion batteries in properly equipped recycling and disposal facilities in other countries.

E7 - PROGRAMME TO MANAGE PEAK DEMAND AND ENERGY SAVINGS IN FIJI:

Meeting peak demand is a challenge for EFL. The lack of reserve capacity can also become a challenge for carrying out maintenance activities. This opportunity focuses on supporting the power sector and consumers' actions to lower demand for electricity in Fiji and control peak demand of the system through various methods,

including through tariff revision, demand-side management (DSM) and demand response (DR) programmes. Technical assistance will be provided to EFL and the Fijian Competition & Consumer Commission (FCCC) to conduct a study to support the revision of existing power tariff regulation for industrial and larger commercial end users to incorporate Time of Day (TOD) tariff⁶⁵ as a means to lower peak power demand in Fiji. Further technical assistance would be provided to EFL to develop and implement a demand-response (DR) programme,⁶⁶ to control peak demand and save energy. This would involve identifying key non-critical loads in the grid that can be either shifted to off-peak period operations or taken offline when there is demand driven stress on the grid, and includes identifying the means for monitoring and controlling such actions. In addition, technical assistance and financing would be provided to a public-private partnership (led by a GOF/public sector entity, ideally EFL or else DOE) to develop and implement a long-term demand side management (DSM) programme to ensure economy wide energy savings. The initial phase of the DSM programme will focus on bulk procurement of high-performance energy labelled appliances and mass retail financing and distribution to households. Only consumers who return or dispose of their old, inefficient appliances will be able to join the first phase of the DSM programme. This first phase will be done in association with the Fiji Procurement Office, national commercial importers/retailers and financial institutions. Under the first phase of the DSM programme, a financing instrument will be developed through the technical assistance component, for example where a payment mechanism may be operated through the pre-payment system at EFL. The proposed first phase of the DSM programme will help counter a potential increase in prices of these appliances through the enhanced Standards and Labelling or Minimum Energy Performance Labelling and Standards (S&L or MEPLS) programme (proposed separately under E3) and increase awareness of the benefits of these appliances. Taxation changes are expected to support this opportunity. By the time the enhanced S&L programme is fully operational and effective, the first phase of the DSM programme can be gradually phased out, as the enhanced S&L programme can eliminate the products with low energy efficiency from the market over time.

E8 - EFFICIENT OPERATION AND MAINTENANCE OF WATER SUPPLY SYSTEMS:

This opportunity will support the Water Authority of Fiji (WAF) to initiate a programme for improving efficiency in water production, reduction in water demand, and the efficient operation and maintenance of the water-distribution system. This action includes technical assistance for mass balance, energy and maintenance auditing of the water system, feasibility studies for investments, and support for procurement of infrastructure improvements. Further technical assistance will be provided to strengthen and sustain institutional knowledge and practices within WAF for improved maintenance practices to prevent water losses in the distribution system. Financing activities under this opportunity focus on replacing inefficient pumps with efficient pumps, replacing inefficient flow-control devices with more efficient ones, modifications in the system to rationalise pumping pressure and to reduce pressure drops, and improvements in energy-efficiency in desalination plants.

E12 - EFFICIENT OPERATION AND MAINTENANCE OF WASTEWATER TREATMENT SYSTEMS:

This opportunity will focus on continuing improvements in the wastewater system managed by WAF in Viti Levu and Vanua Levu islands, including the 11 wastewater plants. This action includes technical assistance for a water and mass-balance study of the wastewater system, identifying major wastewater sources, and determining the amount and location of major infiltrations into the system. This study will complement a review to be conducted of the National Liquid Waste Management Strategy and Action Plan, as well as progress in implementing it, leading to recommendations to systematically reduce wastewater flows into the wastewater system. In addition, a detailed energy and maintenance audit will be conducted for the wastewater system, and a prioritised investment list will be developed for energy-efficiency improvements. Further technical assistance will be provided to strengthen and sustain institutional knowledge and practices within WAF for improved operation and maintenance practices at wastewater treatment and pumping stations. Financing activities under this opportunity focus on replacing inefficient pumps with efficient pumps, replacing inefficient flow-control devices with more efficient ones, modifications in the system to rationalise pumping pressure and to reduce pressure drops, and improvements in energy-efficiency in treatment processes at plants.



MITIGATION EXAMPLE: EGAT DEMAND SIDE MANAGEMENT - THAILAND

In 1993, through its electric utility Electricity Generating Authority of Thailand (EGAT), Thailand initiated a US\$189M DSM program, with essential financing from a tariff mechanism and additional grant funding from GEF and the Government of Australia (total US\$15.5M) and a US\$25M concessional credit guarantee from the Overseas Economic Cooperation Fund of Japan. EGAT's DSM Office started with four initiatives:

1. A replacement programme switching fluorescent tubes: EGAT negotiated a voluntary agreement with all five Thai manufacturers and the sole importer of the less efficient T-12 fluorescent tubes to switch from producing and importing T-12 tubes to the more efficient T-8 tubes, and in return, EGAT supported a consumer information campaign.
2. Refrigerator labelling programme: EGAT negotiated with the manufacturers a voluntary labelling scheme for refrigerators and sponsored a large advertising campaign to promote the scheme. EGAT also partnered with the Thailand Industrial Standards Institute to test domestically available refrigerators. In 1998, the labelling scheme was made mandatory, and in 1999 EGAT reached an agreement with the manufacturers to increase efficiency by 20% in the scheme.
3. Air conditioner labelling programme: EGAT could not negotiate a voluntary agreement with the air-conditioning industry, as it was more diverse and fragmented. Instead, considering the higher incremental cost for labelled air-conditioners, EGAT worked with local credit card companies to offer interest-free loans for the incremental cost of Level 5 units, and also offered rebates to shop owners who sold Level 5 models during promotional summer periods.
4. Compact Fluorescent Lamp (CFL) bulk purchases: EGAT purchased CFLs in bulk and re-sold them through a distribution network of convenience stores, leading to lower consumer costs. EGAT tested and labelled lamps to ensure consistent quality and also paid for nationwide advertising costs. Over 900,000 CFLs were sold as of early 2000, at 40 percent below the prevailing market price.

Later the programme was expanded with another 15 initiatives. Overall, the DSM programme resulted in a saving of 570MW in capacity and 3.15GWh. The programme came in under budget and the cost of saved peak demand was much lower than the cost of supplying additional power.

Fiji has the opportunity to implement similar actions as defined in E1, E3, and E7, which expands upon the existing S & L programme for some appliances in Fiji. This includes setting up bulk procurement and commercial/retail financing facilities, and a domestic-appliance testing facility.

Sources: Iris M. Sulyma et al (2000). Taking the Pulse of Thailand's DSM Market Transformation Programs. Consumer Behavior and Non-Energy Effects. Marbek Resource Consultants & Global Change Strategies International (2006). World Bank/GEF Post-Implementation Impact Assessment: Thailand Promotion of Electrical Energy-efficiency Project.

3.2 CITIES AND BUILDINGS SUB-SECTOR

In 2017, 56%⁶⁷ of the population of Fiji was urban and there are twenty-one urban areas in Fiji consisting of 2 cities, 11 incorporated towns, and 8 unincorporated towns.⁶⁸ The urban areas in Fiji are governed by municipal councils, with national level oversight by the Ministry of Local Government (MLG) and the Department of Town and Country Planning (DTCP) under it. The municipal councils manage the urban areas through strategic and forward planning, as well as the regulation of urban development. In Fiji there has traditionally been greater regulatory focus placed on controlling the impact of site development and compliance with building and construction codes, rather than broad long-term strategic planning. The municipalities' strategic plans provide the long-term direction and the specific town planning and by-laws that are used to regulate and control development. There are several other regulations that are used to manage the areas on the periphery of municipalities. The revision and updates to these municipal plans often do not keep pace with the enhanced ambitions for addressing climate change at the national level in Fiji. It is noted that there are periodic development support activities that addressed climate change and disaster risk reduction in Fiji's urban areas, and these often address adaptation and consist of profiles and vulnerability assessments for planning, and do not have a mitigation focus.⁶⁹ The MLG is currently overseeing the development of a Strategic Spatial Master Plan for Viti Levu, with the objective to provide a roadmap for all future development decisions on Viti Levu with a focus on the decentralised governance of urban planning and enforcement in Fiji.⁷⁰

The Fiji National Building Code is set out as part of the Public Health (National Building Code) Regulations 2004, and currently does not have specific clauses for energy-efficiency. A study in 2014 suggested incorporating energy-efficiency in the Code, but it was not done because a more comprehensive review of the Code was desired (especially after Tropical Cyclone Winston in 2016, which caused significant structural damages to buildings throughout Fiji). Efforts by MIMS are currently in progress to begin developing a new building code, and there is an acknowledgement that including energy-efficiency and water conservation measures within the new building code will lead to positive mitigation impacts.

There have been a number of studies determining the energy-efficiency potential in the building sector in Fiji, as well as a few pilots for implementing such actions. Several of these are aimed at identifying potential energy-efficiency measures for hotels.⁷¹ The DOE at MIMS also recently completed a study that indicates a potential for electrical energy savings of approximately 10% for hotels and 5% for commercial buildings in Fiji, and potential thermal energy savings in hotels of 20%.⁷²

Fiji currently grant fiscal incentives on an annual basis for buildings that focus on the tourism industry (hotels) and residential developments, with several conditions which apply to each. For hotels these include an investment allowance, tax holidays, and lowered import duty concessions. For residential developments these include a tax exemption on the profit from sales, a subsidy on capital expenditures, and free import duty and excise for equipment.⁷³

3.2.1 KEY NATIONAL SUB-SECTOR STAKEHOLDERS IN CITIES AND BUILDINGS

The key national stakeholders involved in Cities and Buildings in Fiji are mostly government entities and the private sector, each playing key roles in delivering services to residents/consumers and tourists. Key national stakeholders and their roles are listed below. Additional information on key stakeholders and existing planning and actions in Cities and Buildings can be found in Annex C.

Table 13: Key national sub-sector stakeholders in Cities and Buildings

STAKEHOLDER	ROLES WITHIN THE SECTOR
Department of Energy (DOE) at MIMS	<p>DOE oversees planning and coordination for the energy sector in Fiji.</p> <p>DOE is currently playing a key role in further development of the Building Code.</p>
Ministry of Local Government (MLG)	<p>MLG is responsible for the formulation and implementation of local governance, urban planning, housing and environmental policies and programs.</p> <p>MLG will be the key national stakeholder for the proposed project on sustainable cities and assisting with integration of energy-efficiency in city-town planning.</p>
Ministry of Health and Medical Services (MHMS)	<p>MHMS is responsible managing a large number of buildings within the public health sector.</p> <p>MHMS will be a key national stakeholder for the proposed project on energy-efficiency buildings and public procurement, in terms of implementation.</p>
Fiji Development Bank (FDB)	<p>FDB has experience in implementing lending facilities.</p> <p>The FDB has the opportunity for commercial lending to the private sector for building energy-efficiency actions.</p>
Government Architect at MIMS and Construction Implementation Unit (CIU) at Ministry of Economy	<p>The Government Architect responsible for the team in MIMS designs government buildings and oversees construction & refurbishment.</p> <p>The Government Architect is keen on energy-efficiency and is trying to integrate it within ongoing urban planning processes, as well as into the future Building Code.</p> <p>The CIU is responsible for overseeing the design, development and management of Government buildings in Fiji. The CIU will play an important role in factoring energy-efficiency into public building designs.</p>
Fiji Hotel and Tourism Association (FHTA)	<p>The Association is proactive and continues to address major issues of concern to the Hotel and Tourism Industry in Fiji.</p> <p>FHTA can be a lead partner for addressing the hotels sub-sector under the project on promoting green tourism and help coordinate best practices and the use of fiscal incentives.</p>
Ministry of Commerce, Trade, Tourism and Transport (MCTTT)	<p>MCTTT formulates and implements policies and strategies to facilitate growth in industry, investment, trade, tourism, co-operative businesses, micro and small enterprises, and enhance standards, and consumer protection.</p> <p>MCTTT will be a key national stakeholder to integrating energy-efficiency into the Building Code, as well as in facilitating the development and implementation of the proposed project to promote green tourism.</p>
Fiji Roads Authority (FRA)	<p>FRA manages and develops Fiji's road network, as well as street lighting.</p> <p>FRA will have a lead implementer role to play for the conversion of existing streetlights into LED based ones in cities and towns.</p>

Local Governments/ Municipalities	<p>Local Governments/Municipalities in Fiji are responsible for the city and town planning, development, and enforcement of building and construction regulations.</p> <p>Local Governments/Municipalities will be central to the implementation of the green city opportunity and the enforcement of the new building code.</p>
Pacific Islands Development Forum (PIDF)	<p>Participatory platform for coordinating development in the PICs, and on the Green Economy</p> <p>PIDF would have a key role to play in the project proposed for developing the market for Bamboo in construction. They will also have an interest in the proposed sustainable cities opportunity, including transferring lessons learned to other PICs.</p>
Fiji Bureau of Statistics (FBOS)	<p>Collects and analyses household and micro- and macro- level anthropological, economic, and environmental data in Fiji.</p> <p>FBOS can conduct an urban household energy use survey in Fiji which could provide a lot of useful information needed for energy planning. FBOS could play a key role in the urban household energy data needed to make the green cities and buildings opportunities effective and efficient.</p>
Fiji Commerce and Employers Federation (FCEF)	<p>FCEF is Fiji's National Private Sector Organization under the umbrella of the Pacific Islands Private Sector Organization.</p> <p>FCEF has expressed interest in supporting energy-efficiency measures and could help ensure participation of their member companies involved in the design, construction, operation, and maintenance of buildings in proposed initiatives for energy-efficiency and sustainability in construction and construction materials, hotels/commercial buildings and urban planning.</p>

3.2.2 KEY CONSTRAINTS AND OPPORTUNITIES TO STRENGTHEN CITIES AND BUILDINGS

Energy-efficiency has not been integrated into urban planning in an impactful way in Fiji and takes a back seat behind the need for economic development and resilience to climate change. Current practice in Fiji can potentially lead to a large missed opportunity, resulting in a large amount of investments being made in a built environment that is energy inefficient. There is a large potential to integrate energy-efficiency at the city/town scale, also for the integration of mitigation with approaches to climate change adaptation and disaster-risk reduction.

The enhancement of existing policy and regulatory tools and implementation of new tools are needed to improve energy-efficiency in cities and buildings in Fiji. If implemented properly, an energy-efficiency building code will be one of the most cost-effective ways of ensuring energy-efficiency buildings in Fiji. A green-building rating system could also be developed and implemented to encourage further energy-efficiency gains. The implementation of opportunities for enhancing energy-efficiency in cities and buildings will require a significant long-term level of additional capacity (e.g. knowhow and trained personnel) for the design and construction of low energy/carbon buildings and for building energy assessments/audits.

Fiji faces a challenge in availability of environmentally friendly and low-carbon building materials. Hence designers are forced to specify more carbon intensive materials and technology that are not available locally, which leads to greater global GHG emissions. Using more locally available sustainable building materials could significantly reduce emissions from the sector, which might require support to build up the industry supply chain and market. This is especially the case with bamboo, which has the potential to be a viable building material. Fiji also faces a lack of availability of energy-efficient appliances, equipment, and machinery to be integrated

into the built environment. The constraints identified below, briefly summarise the needs for strengthening the enabling environment for energy-efficiency for Cities and Buildings in Fiji. More information on these can be found in Annex F, and the Concept Notes for each opportunity.

Table 14: Key Constraints and enabling environment opportunities in Buildings and Cities

CONSTRAINT/BARRIER	ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES
Market Structures and Financing	<ul style="list-style-type: none"> • Develop targeted fiscal instruments (e.g. different tax incentives) to support actions in energy-efficiency in buildings. • Prepare and fund financial instruments (e.g. commercial loans and related guarantees) to support actions in energy-efficiency in buildings.
Policy and regulatory tools *	<ul style="list-style-type: none"> • To develop the energy-efficiency component of the new building code and a green building rating system, and encourage greater enforcement.
Knowhow, Training, and Data/Analytics *	<ul style="list-style-type: none"> • Build capacity for relevant professionals in the design, construction, operation and assessment of energy-efficient buildings. • Development of a low-carbon building design and construction guidelines for different building typologies.
Availability of energy efficient products and materials *	<ul style="list-style-type: none"> • Strengthening and expanding the existing standards and labelling programme. • Sustainable public procurement and cooperative procurement programme will help to develop the market for energy-efficient products for buildings. • Development of a market for sustainable construction materials like bamboo which could partially replace energy intensive building materials.
Consideration of energy-efficiency in urban planning	<ul style="list-style-type: none"> • Implementing a comprehensive sustainable cities programme that will help develop targets and action plans to reduce GHG emissions, energy consumption and water consumption.
Energy-efficiency in the tourism sector *	<ul style="list-style-type: none"> • Implementing a green tourism programme, with focus on integrating energy-efficiency in large hotels and commercial buildings.

* Note that these are common issues for most PICs, and a multi-country initiative is possible.

3.2.3 MITIGATION OPPORTUNITIES AND INVESTMENT NEEDS IN BUILDINGS AND CITIES

There are four mitigation options that focus on energy-efficiency in Buildings and Cities. Together, these have the potential to reduce 169,000 tCO₂ emission by the end of 2030, with an annual mitigation potential of 50,000 tCO₂/yr in 2030. This annual mitigation potential is approximately equal to 2% of the projected 1st NDC's energy sector BAU emission in 2030. The estimated capital investment needed to reach the mitigation potential is US\$188M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US\$11.2M.

Table 15: Aggregated information for energy-efficiency opportunities in Buildings and Cities

OPPORTUNITIES ⁷⁴	INDICATIVE DEVELOPMENT, CB & TA 2020-2030 (US\$M)*	INDICATIVE INVESTMENT NEEDS TO 2020-2030 (US\$M)	COST OF MITIGATION US\$/tCO ₂	ANNUAL MITIGATION 2030 (tCO ₂ /YR)	TOTAL MITIGATION 2020-2030 (tCO ₂ /YR)
E2 Programme to Promote Enhanced Green Tourism***	4.2	5.0	4,100	1,000	2,000
E9 Assessment, Design and Construction of Low Energy/Carbon Buildings**	1.4	179.2	17,000	3,000	11,000
E10 Sustainable Cities Programme****	4.5	1.4	40	44,000	150,000
E13 Developing the Market for Bamboo as a Construction Material****	1.1	2.0	500	2,000	6,000
TOTAL MITIGATION POTENTIAL OF ALL	11.2	187.6		50,000	169,000

* Financial Needs for Project/Programme Development, Capacity Building (CB), and Technical Assistance (TA).

** This includes the investment within households and Government for installing EE measures in buildings.

*** This includes the investment within hotels and commercial building for installing EE measures.

**** Does not include all capital investments due to the limited availability of information needed to quantify activity.

E2 - PROGRAMME TO PROMOTE ENHANCED GREEN TOURISM:

The focus of this opportunity is to provide technical assistance and financial incentives to hotels and commercial buildings that commit themselves to carrying out energy-efficiency retrofits, demonstrating the viability of energy-efficiency and low-carbon measures in Fiji. Technical assistance will consist of performing preliminary energy audits of 90 large hotels and commercial buildings, and detailed energy audits at 50 selected hotels and commercial buildings. Technical assistance will later include post-investment assessments to verify that energy-efficiency retrofits are completed. Financing activities under this opportunity will focus on providing financial incentives to address energy-efficiency measures in the 50 selected hotels and commercial buildings. The success of the auditing programme and financial incentives is expected to encourage further improvement in hotels and commercial buildings throughout Fiji.

E9 - ASSESSMENT, DESIGN AND CONSTRUCTION OF LOW ENERGY/CARBON BUILDINGS:

This opportunity will focus on providing technical assistance to MIMS to develop guidelines for low-carbon building design and construction, an energy-efficient building code (possibly integrated within the new building code), and the development of a voluntary green-building rating system. Further technical assistance will be provided to develop and deploy a certification system for building-energy assessors. Training programmes would be conducted for architects and engineers, and new education modules will be developed for low energy/carbon buildings to be included in existing curriculum at Fiji National University (FNU) and USP. Financing activities under this opportunity will focus on providing financial incentives to address energy-efficiency measures in up to 150 government buildings and up to 17,024 households.

E10 - SUSTAINABLE CITIES PROGRAMME:

The main focus of this opportunity will be to support 10 cities and towns in Fiji to develop climate-change mitigation targets and action plans, and to mainstream these within the existing strategic plans and town-planning schemes. The first phase of the technical assistance will focus on supporting the ongoing efforts to develop master plans for Suva, Lautoka, Sigatoka, and Nadi. This technical assistance will also include capacity building of staff from MLG and the various municipal councils. In addition, FRA will receive technical assistance

and financing support to shift all remaining non-LED streetlights into LED, and explore how LED streetlighting can contribute to non-lighting revenue generation and for the implementation of smart city functions.

E13 - DEVELOPING THE MARKET FOR BAMBOO AS A CONSTRUCTION MATERIAL:

Most construction in Fiji is concrete masonry-based or traditional, and cement is produced in Fiji. Bamboo could be a more sustainable and viable alternative construction material for Fiji and the Pacific, replacing construction material, timber, steel and plastics in some cases. Its cultivation could also help to restore degraded lands, prevent deforestation, and provide some form of resilience, while offering an important source of rural employment and income for local communities. This opportunity will include efforts in Fiji (and potentially other PICs) to develop the bamboo industry and supply chain, and support further work in partnership with the Fiji Bamboo Centre and its partners. Minimum standards for materials from bamboo and composites for use in construction in Fiji will be developed through the ongoing initiative of the MCTTT (through its Standards Unit) in association with the World Bank.



MITIGATION EXAMPLE: ENERGY-EFFICIENCY BUILDING CODE IN CARICOM

The CARICOM Regional Energy-efficiency Building Code (CREEBC) is meant to meet the specific needs of nations in the Caribbean and other countries with tropical climates. It covers both commercial and residential construction and is a joint effort by the CARICOM Regional Organisation for Standards and Quality (CROSQ), the International Code Council and ASHRAE. The CREEBC establishes minimum energy-efficiency requirements for buildings in the Caribbean Community (CARICOM) countries using prescriptive and performance-related provisions covering the building envelope, heating ventilation and air-conditioning (HVAC) system, pumping and lighting systems.

During the development of the Code, all Member States were required to establish National Committees to review the base document and the recommended modifications identified by the consultant. It was endorsed by the CROSQ Council and approved by the CARICOM Energy Ministers in April 2018. The code will be updated every 6 years.

The CREEBC is an adaptation of the International Energy Conservation Code, 2018 Edition, which includes the ANSI/ASHRAE/IES Standard 90.1-2016. The requirements are specified based on specific climatic zones, and it allows the use of building simulation software. It encourages improving maintenance practices by requiring maintenance information, equipment commissioning reporting, and documentation requirements. It also has provisions for application, enforcement and administration, such as defining which buildings and changes are required to comply with the code and the description of code officials' roles and professional qualifications for building professionals.

Fiji has the opportunity to implement a similar Energy-efficiency Building Code under opportunity E9, which requires developing and enacting the Energy-efficiency Building Code separate or in connection with the Structural Building Code, and then supporting its implementation via a financial support facility.

Sources: D. Gardner(2019), "Integrating variability within an era of uncertainty: Climate, energy & the built environment" CARICOM Secretariat.

3.3 APPLIANCES, GOVERNMENT, AND INDUSTRY SUB-SECTORS

The potential for increased use of energy-efficient appliances in households and government offices, and efficient technologies in industry have been investigated in Fiji in the recent past. The mitigation potential is significant, but existing incentives and systematic measures are not sufficient to encourage wider implementation of energy-efficient actions in the Appliances, Government, and Industry Sub- Sectors. The setting of standards for appliances entering Fiji are governed under the Trade Standards and Quality Control Act 1992 and are developed by the Standards Unit at MCTTT, and the regulation of labelling for energy-efficient appliances under the Standards and Labelling or Minimum Energy Performance Labelling and Standards (S&L or MEPLS) programme is the responsibility of the DOE. Fiji has implemented a S&L or MEPLS programme, but only for refrigerators and freezers. The DOE is currently working in collaboration with MCTTT to expand the S&L programme with the inclusion of TVs, ACs and lighting products. There are still no dedicated testing facilities in Fiji to support the S&L programme.

The Fijian Government procures approximately FJ\$1B per year in goods and services, which is around 25% of the State budget and 10% of the GDP in 2019. The Fiji Procurement Office (at MOE) directly procures approximately 50% of these goods and services, and the other ministries and departments procure the remaining 50%.⁷⁵ Currently, public procurement through the Fiji Procurement Office does not cover procurement by State Owned Enterprises (SOEs). The Fiji Procurement Office can directly or indirectly influence Government procurement through its own operation and through centralized training and guidance. Due to the volume of goods and services procured by Government, the GOF has the potential to influence the price and uptake of efficient appliances and equipment economy-wide through higher-volume procurement. Public procurement process is currently based on 'Value of Money' using life-cycle cost-evaluation methods. Fiji Procurement Office is in the process of developing a sustainable procurement framework that includes climate-related criteria.

One of the most thriving sectors within Fiji's growing economy is the manufacturing sector. This sector currently includes textiles, garments, footwear, sugar, tobacco, food & processed food, coconut & copra, beverages (including mineral water), and wood-based industries. Much of this is exported internationally, including to other PICs. A survey managed by the DOE indicated the potential for approximately 5% savings in electrical energy and 5% for thermal energy in the manufacturing industry of Fiji.⁷⁶

3.3.1 KEY SECTOR STAKEHOLDERS AND EXISTING PLANNING IN APPLIANCES, GOVERNMENT, AND INDUSTRY

The key national stakeholders involved in Appliances, Government, and Industry in Fiji are mostly government entities and the private sector, each playing key roles in the consumption of goods or manufacturing. Key national stakeholders and their roles are listed below. Additional information on key stakeholders and existing planning and actions in Appliances, Government, and Industry can be found in Annex C.

Table 16: Key Stakeholders in Appliances, Government, and Industry

STAKEHOLDER	ROLES WITHIN THE SECTOR
Fiji Procurement Office at MOE	Together, these stakeholders procure all the goods and services for the Fijian Government.
Other ministries procurement offices	The Fiji Procurement Office is willing to take the lead on sustainable public procurement and cooperative procurement initiatives, and coordinate capacity building in cooperation with other ministries.

Ministry of Commerce, Trade, Tourism and Transport (MCTTT)	<p>MCTTT develops and implements policies and strategies to facilitate growth in industry, trade, and tourism, and sets standards for goods and services.</p> <p>The Standards Unit at MCTTT will have a lead role in further implementing the S&L programme, including setting up and operating of product-testing facilities. MCTTT will also support coordination for industrial energy-efficiency.</p>
Fiji Retailer Association	<p>The Fiji Retailer Association would have a major role to play in ensuring participation and awareness-raising activities of various retailers in the S&L initiative and the sustainable public procurement initiative.</p>
Fiji Commerce and Employers Federation (FCEF)	<p>FCEF is Fiji's national private sector organization under the umbrella of the Pacific Islands Private Sector Organization.</p> <p>FCEF can support the inclusion of energy-efficiency measures and help ensure participation of their member companies, as well organise and implement capacity building and awareness raising activities.</p>
Fiji Chamber of Commerce and Industry (FCCI)	<p>FCCI provides a forum for businesses and other organisations to address significance of the major shifts taking place in the Fijian economy.</p> <p>FCCI can support the inclusion and participation of industry in the proposed initiative on energy-efficiency in industry.</p>
<ul style="list-style-type: none"> • Fiji Sugar Corporation (FSC) • Tropik Wood Industries Ltd (TWI) • Pacific Fishing Company Ltd (PAFCO) 	<p>These SOEs are heavy-industry producers of goods for export, and two of them are Independent Power Producers.</p> <p>FSC, TWI, and PAFCO have the potential to implement industrial energy-efficiency measures and can participate in capacity building efforts.</p>
Fiji Ports Corporation Ltd (FPCL)	<p>FPCL owns and carries out maritime operations in the four main ports of Suva, Lautoka, Levuka and Malau, and also administers the second-tier ports of Wairiki and Rotuma. They have developed a Green Port Master Plan in 2019 to be implemented by 2023.</p>
Other Large and Medium Industry Companies	<p>Individual large and medium industry companies that consume a reasonable amount of energy.</p> <p>These companies have the potential to implement industrial energy-efficiency measures and can participate in capacity building efforts.</p>

3.3.2 KEY CONSTRAINTS AND OPPORTUNITIES TO STRENGTHEN APPLIANCES, GOVERNMENT, AND INDUSTRY

The S&L programme can eliminate energy inefficient products from the market in Fiji over the long run, and consumers will get better quality and more energy-efficient products. However, in most cases a higher initial investment is needed for the more energy-efficient products which might discourage the consumers purchases under a BAU scenario. This can be countered through changes in taxation, public procurement, and bulk procurement.

Most energy-labelled appliances being sold in Fiji are lower star-rated products, which could make any S&L programme less effective. This could mean that the consumers are not aware of the benefits of a higher star-rated product or aware of life cycle costs and will choose the low-cost options. However, more specific information is needed on consumer perception of energy-efficient products and appliances in Fiji to reach a definite conclusion.

Information on the production process, technology, and specific energy use of industry is not readily available in Fiji, and enhanced information is an essential initial step needed to progress with energy-efficiency in industry. There is also a lack of capacity (both persons and knowhow) for industrial-energy auditing and hence learning industry's potential for energy-efficiency. To date, energy auditing in Fiji has been carried out mostly for energy benchmarking and at the preliminary energy-audit level in facilities. The only training on energy assessments has been a short training provided in 2014 by the FNU, and there has been no further institutional training for energy auditing based on international standards.

At the initial stages of increasing energy-efficiency, public finance plays a critical role for early-stage market development activities and thereby reducing risks for private financial flows. This is done by creating the enabling conditions, piloting and demonstrating the feasibility of energy-efficient products, and kick-starting demand for such new products. Because Public Procurement represents a significant percentage of the GDP it can play a major role in promoting energy-efficiency in products, appliances, equipment, and services. The Fiji Procurement Office has already taken an initiative for Sustainable Public Procurement and needs to be supported in furthering its activities. FPCL is also a visible public-sector entity in Fiji, and demonstration of energy-efficiency in the ports under its control could inspire others to follow. FPCL has been quite proactive in environmental management and climate-change mitigation actions and needs support for the next phase of implementation.

The constraints identified below, briefly summarise the needs for strengthening the enabling environment for energy-efficiency in Appliances, Government, and Industry in Fiji. More information on these can be found in Annex F, and the Concept Notes for each opportunity.

Table 17: Key constraints and enabling environment opportunities in Appliances, Government, and Industry

CONSTRAINT/BARRIER	ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES
Market Structures and Financing	<ul style="list-style-type: none"> • Develop targeted fiscal instruments (e.g. different tax incentives) to support actions in energy-efficiency in industry, and lower costs to consumers. • Prepare and fund financial instruments (e.g. commercial loans and related guarantees) to support actions in energy-efficiency in industry.
Strengthened policy and regulatory tools *	<ul style="list-style-type: none"> • Develop and implement an enhanced S&L programme and establish product testing facilities located in Fiji. • Develop and implement a sustainable public procurement programme, and wider capacity building and information dissemination across Fijian Government procurement operations.
Consumer awareness *	<ul style="list-style-type: none"> • Implement a broad awareness campaign for consumers and businesses on the availability, evaluation, and economic benefits of appliance under the S&L programme. • Demonstrate feasibility of energy-efficiency in the public sector, through the sustainable public procurement initiative and through support for FPCL to implement energy-efficiency in the various Ports.
Knowhow, Training, and Data/Analytics *	<ul style="list-style-type: none"> • Develop and implement capacity building and technical assistance for energy auditing in Industry, including a professional certification scheme. • Conduct a national level survey of energy performance of industry and implement a system for regular reporting of high and medium user's energy consumption. • Support the energy auditing of select industries and implement recommendations to identify and demonstrate viable energy-efficiency measures.

* Note that these are common issues for most PICs, and a multi-country initiative is possible.

3.3.3 MITIGATION OPPORTUNITIES AND INVESTMENT NEEDS IN APPLIANCES, GOVERNMENT, AND INDUSTRY

There are four mitigation opportunities that focus on energy-efficiency in Appliances, Government, and Industry. Together, these have the potential to reduce 256,000 tCO₂ emission by the end of 2030, with an annual mitigation potential of 68,000 tCO₂/yr in 2030. This annual mitigation potential is approximately equal to 3% of the projected 1st NDC's energy sector BAU emission in 2030. The estimated capital investment needed to reach the mitigation potential is US\$18.0M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US\$7.0M.

Table 18: Aggregated information for energy-efficiency opportunities in Appliances and Government

OPPORTUNITIES ⁷⁷	INDICATIVE DEVELOPMENT, CB & TA 2020-2030 (US\$M)*	INDICATIVE INVESTMENT NEEDS TO 2020-2030 (US\$M)	COST OF MITIGATION US\$/tCO ₂	ANNUAL MITIGATION 2030 (tCO ₂ /YR)	TOTAL MITIGATION 2020-2030 (tCO ₂ /YR)
E3 Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS)**	1.4	10.0	80	41,000	143,000
E4 Capacity Building in Energy-efficiency in Industry***	4.1	5.0	200	15,000	70,000
E6 Promotion of Sustainable Government Procurement**	0.7	NA	30	7,000	24,000
E11 Supporting the Implementation of the Green Ports Master Plan	0.8	3.0	200	5,000	19,000
TOTAL MITIGATION POTENTIAL OF ALL	7.0	18.0		68,000	256,000

* Financial Needs for Project/Programme Development, Capacity Building (CB), and Technical Assistance (TA).

** This includes emission-reduction benefits in commercial and government entities. Investment in this opportunity is for setting up testing facilities, but does not include all capital investments due to the limited availability of information needed to quantify activity. Commercial and government entities are expected to make the investments irrespective of efficient technology.

*** This includes the investment within industry for energy-efficiency activities

E3 - STRENGTHENING AND EXPANDING THE MINIMUM ENERGY PERFORMANCE AND LABELLING STANDARDS (MEPLS):

This mitigation opportunity focuses on providing technical assistance to review, update, and strengthen the existing Standards and Labelling or Minimum Energy Performance Labelling and Standards (S&L or MEPLS) programme on freezers and refrigerators in Fiji. It further includes supporting the expansion of the MEPLS programme to other appliances, which at a minimum will include TVs, ACs, and lights. This opportunity includes enhancing public awareness so that consumers understand the benefits of buying higher star-rated products and that the higher initial investment pays itself back in the long term. Financing under this opportunity will support the establishment of product-testing facilities in Fiji that could be shared by PICS countries, since many appliances imported to Fiji are not included in the labelling programme of Australia and New Zealand and the product-testing facilities will bring down the cost of the standards-and-labelling programme. This opportunity is envisioned to be implemented in parallel with the DSM programme under opportunity E7 (focusing on residential consumers) as well as the sustainable public procurement opportunity under E6 (which focusses on government consumers)

both of which have links to the standards and labelling programme. The estimates of GHG emission reductions under this opportunity have been lowered to avoid duplication and double counting of emissions reduction with the DSM programme in E7, and with the product/appliance standards and labelling aspects of this opportunity.

E4 - CAPACITY BUILDING IN ENERGY-EFFICIENCY IN INDUSTRY:

This opportunity provides technical assistance to conduct a national survey of energy intensive equipment in industry, including conducting detailed energy audits in up to 50 industrial facilities (prioritised based on the national survey). The technical assistance includes providing advisory support in financing and implementing viable recommendations found in the energy audits. Underlying this is technical assistance to develop and deploy a certification system for energy auditors (which could potentially expand in partnership with other PICs with additional funding). To build capacity, training programmes would be conducted and a curriculum on energy auditing would be developed and deployed. Technical assistance also includes development of a system for reporting and aggregating energy data from medium sized and large industries. Financing under this opportunity will support the implementation of energy-efficiency measures in 50 industrial facilities that participate in this programme.

E6 - PROMOTION OF SUSTAINABLE PUBLIC PROCUREMENT:

Public procurement volume is a significant percentage of the GDP in Fiji (around 10% of GDP in 2019) and can influence the market towards energy-efficient and low-carbon products. This mitigation opportunity focuses on supporting the Fiji Procurement Office, Commercial Statutory Authorities (CSA), and ministerial procurement units in integrating sustainable procurement into existing public procurement rules and guidelines. This opportunity includes technical assistance for strengthening the core government strategy for sustainable procurement and developing new sustainable guidelines for procuring high impact (high volume, carbon intensive) product categories. Technical assistance will also include advisory support during implementation and training of participating government and CSA staff, and the development and deployment of an online training module in cooperation with USP tailored to Fiji and PICs. This opportunity also envisions supporting cooperative procurement within the public procurement system and explores the possibility of doing the same with State Owned Enterprises (SOEs), large private organisations, and eventually other public procurement offices in other PICs. Cooperative procurement provides public procurers with greater bargaining power and help to significantly bring down the prices in the overall market for low-carbon products and services. To avoid double counting, the estimate of benefits achieved from this opportunity do not include those achieved from E3, E7 and E10.

E11 - SUPPORTING THE IMPLEMENTATION OF THE GREEN PORTS MASTER PLAN:

This mitigation opportunity will support the continued efforts of Fiji Ports Corporation Limited (FPCL) to implement its Green Ports Master Plan during 2019-2023 for the four main ports of Suva, Lautoka, Levuka and Malau. Some of the proposed actions under the Green Ports Master Plan include: Major redevelopment or construction to adopt green port guidelines; by 2022 to have smart water metering; by 2020/2021 to implement Energy and Environmental Management Systems; by 2023 to become carbon neutral with respect to its use of electricity. Apart from supporting the ambitions as stated in the Green Ports Master Plan, this opportunity includes the conduct of energy, water and maintenance audits of the ports at Suva, Lautoka, Levuka and Malau and support for implementing the recommendations.



MITIGATION EXAMPLE: **VOLUNTARY AGREEMENT SCHEME ON ENERGY-EFFICIENCY IN DENMARK**

Denmark faced an important barrier in implementing industrial energy-efficiency, which was not a strategic priority for industry, so the Danish Government took a stick-and-carrot policy approach. The Government took three actions:

1. Placing a CO₂ tax on all fossil fuels used by industries,
2. Refunding the entire CO₂ tax for companies taking voluntary energy-efficiency actions that had been approved by the authorities, and
3. Offering subsidies for energy-efficiency actions.

For the tax refund and subsidies, companies were required to operate certified energy management systems (ISO50001). They were also required to investigate where savings could be made and implement all measures with a payback period of 4 years or less. Evaluations of the scheme between 1996 and 2013 estimate energy savings of 5 – 6% in participating companies.

Fiji has the opportunity to implement a similar energy-auditing and taxation incentive scheme for industry under E4.







04

FINANCING PATHWAY FOR THE NDC INVESTMENT PLAN

4.1 PRIORITISING THE MITIGATION OPPORTUNITIES

A combined comparative quantitative/qualitative evaluation and stakeholder prioritisation of the mitigation opportunities for the transport and energy-efficiency sectors was performed to determine the priority for the financing and implementation of the mitigation opportunities. The comparative quantitative/qualitative evaluation considers the four positive criteria and two risk-related negative criteria listed below and is explained further in Annex E. This valuation was performed by the consultants preparing this NDC Investment Plan and leads to final Evaluation Criteria scores found in the table below.

1. Approximate investment level required to implement that interventions (+)
2. Mitigation potential in Fiji (+)
3. Level of private sector financial participation (+)
4. Potential for positive social-economic impact on the population (+)
5. Level of estimated incremental financial needs (+)
6. Level of national or regional technology inclusion (-)
7. Potential for negative environmental impact (-)

During the stakeholder-consultation process, a broad representation of government, educational institutions, financial institutions, private sector, NGOs, and development partners were invited to share their opinions on the priority level for the mitigation opportunities in each sector, ranging from 1 (lowest priority) to 5 (highest priority). Thirty-six of these stakeholders responded with priority scoring. The average value for each mitigation opportunity is then considered to be the value for the Priorities of Stakeholders. (See Annex E for more information).

The score for Evaluation Criteria and the Priorities of Stakeholders are then multiplied together to give a final Priority Value for each mitigation opportunity. This Priority Value is then used to determine Primary or Secondary priority for finance and implementation of the opportunities for the transport and energy-efficiency sectors. Primary opportunities are those leading to a sector threshold total of GHG mitigation potential in 2030 of 456,000 tCO₂/yr for energy-efficiency and 179,000 tCO₂/yr for transport. More information on the prioritisation of the mitigation opportunities can be found in Annex E.

Based on the priorities, the primary mitigation opportunities for the transport and energy-efficiency sectors are indicated in the below table.

Table 19: Priority of Mitigation Opportunities

PRIMARY MITIGATION OPPORTUNITIES IN TRANSPORT		PRIORITY SCORE ⁷⁸	ANNUAL MITIGATION IN 2030 (tCO ₂ /YR)	ACCUMULATIVE MITIGATION IN 2030 (tCO ₂ /YR)
T1	National Maritime Action Plan	55.77	-	-
T2	Alternative Fuels in Land and Maritime Transport	50.40	42,000	42,000
T3	Outboard Motor Transition	49.66	16,000	58,000
T4	Vehicle Replacement Program for Cars and Taxis	42.72	59,000	117,000
T5	Lautoka Zero Carbon Transport Challenge/Strategy	42.00	-	117,000
T6	Aviation Operational Training Programme	40.80	7,000	124,000
T7	Vehicle Replacement Program for Lorries and Buses	40.59	36,000	160,000
T8	Sail-powered Cargo/Passenger Ferry	37.44	8,000	168,000
T9	End-of-Life Vehicle Programme	33.57	2,000	170,000
T10	Zero Carbon Passenger Ferry Trials	33.50	1,000	171,000
T11	Bicycle/E-Bike Financing Initiative	33.21	8,000	179,000
TOTAL PRIMARY MITIGATION POTENTIAL FOR TRANSPORT				179,000
PRIMARY MITIGATION OPPORTUNITIES IN TRANSPORT				
E1	Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji	60.62	75,000	75,000
E2	Programme to Promote Enhanced Green Tourism	57.33	1,000	76,000
E3	Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS)	53.56	41,000	117,000
E4	Capacity Building in Energy Efficiency in Industry	53.04	15,000	132,000
E5	Promotion of Lithium Ion Batteries for Renewable Energy Storage	49.95	14,000	146,000
E6	Promotion of Sustainable Government Procurement	49.44	7,000	153,000
E7	Programme to Manage Peak Demand and Energy Savings in Fiji	45.48	259,000	412,000
E8	Efficient Operation and Maintenance of Water Supply Systems	44.88	41,000	453,000
E9	Assessment, Design and Construction of Low Energy/Carbon Buildings	44.7	3,000	456,000
TOTAL PRIMARY MITIGATION POTENTIAL FOR ENERGY-EFFICIENCY				456,000

Based on the priorities, the secondary mitigation opportunities for the transport and energy-efficiency sectors are indicated in the below table.

Table 20: Priority Mitigation Opportunities

SECONDARY MITIGATION OPPORTUNITIES IN TRANSPORT	PRIORITY SCORE ⁷⁹	ANNUAL MITIGATION IN 2030 (tCO ₂ /YR)	ACCUMULATIVE MITIGATION IN 2030 (tCO ₂ /YR)
T12 Aircraft Re-Fleeting Programme	32.50	5,000	5,000
T13 Traffic Congestion Reduction Measures	32.00	7,000	12,000
T14 Airport & Airfield infrastructure Upgrades	30.96	2,000	14,000
T15 Bus Network Information Transport System (ITS)	28.00	18,000	32,000
T16 Electric Vehicle Network Development	27.63	30,000	62,000
T17 Sustainable Aviation Fuel Integration Initiative	26.40	16,000	78,000
T18 Land Transport Infrastructure Upgrade for Non-motorised Transport	21.78	3,000	81,000
TOTAL SECONDARY MITIGATION POTENTIAL FOR TRANSPORT			81,000
SECONDARY MITIGATION OPPORTUNITIES IN ENERGY-EFFICIENCY			
E10 Sustainable Cities Programme	43.34	44,000	44,000
E11 Supporting the Implementation of the Green Ports Master Plan	32.48	5,000	49,000
E12 Efficient Operation and Maintenance of Wastewater Treatment Systems	32	1,000	50,000
E13 Developing the Market for Bamboo as a Construction Material	17.64	2,000	52,000
TOTAL SECONDARY MITIGATION POTENTIAL FOR ENERGY-EFFICIENCY			52,000

4.2 FINANCING PATHWAY FOR INDIVIDUAL MITIGATION OPPORTUNITIES

Each of the mitigation options for both the transport and energy-efficiency sectors follows the general individual financing pathway as depicted in Figure 7 below. This individual financing pathway is divided into parts:

PART A	Financing the preparation of the mitigation opportunities (or a part thereof) for implementation, and
PART B	Financing the implementation and operation of the mitigation opportunities (or a part thereof).

In general, Part A is needed to secure financing for Part B. Part A has three components, the first of which is to prepare one or more Project Development and Funding Application(s), which can, for example, include developing a multi-donor funding project with GCF, and/or one or more bilateral projects with development agencies. These Project Development and Funding Application(s) may directly fund project implementation, Capacity Building activities for strengthening of institutions before implementation, fund Technical Assistance activities for feasibility studies and/or structuring financial instruments. Part B also has three components, the first of which is the Implementation and Operationalising of Financial Instruments (one or more) that finance the physical activities of the mitigation opportunity including; for example a tax incentive or a loan facility. This is then supported by the other two components of Part B, which may fund Capacity Building activities for an institution's long term operation of the mitigation opportunity or Technical Assistance activities for continuous training of persons skilled in maintaining the mitigation opportunity.

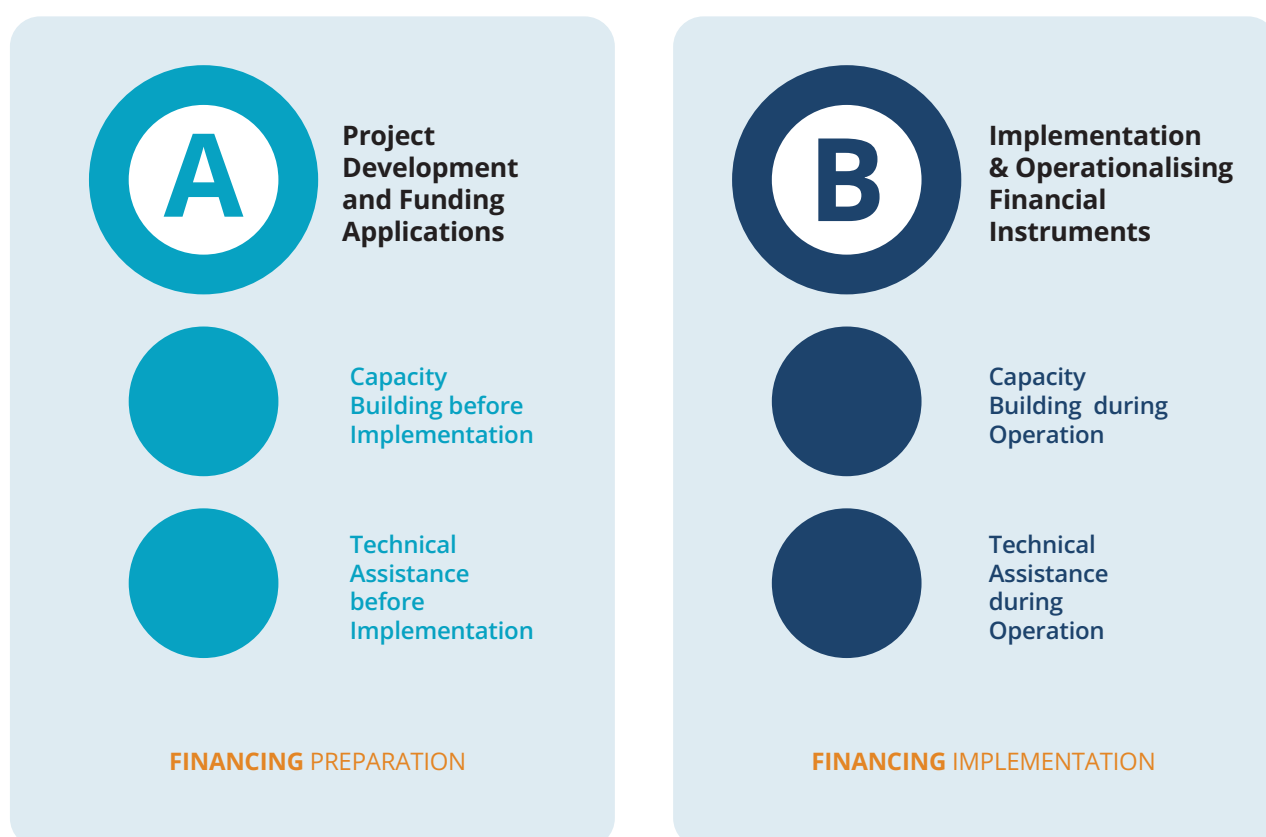


Figure 7: Individual Financing Pathway included in the estimated financing needs

Each of the mitigation opportunities in both the transport and energy-efficiency sectors have different needs for financing and financial instruments, which are indicated in the individual Concept Notes found in Annex A. Nearly all the opportunities have a need for continual private and/or public sector financing of their individual financing pathways through the instruments in Part B. Two examples of continual financing needs are private sector commercial lending (loans) for investment in energy-efficiency improvements made at hotels and commercial buildings, or lower import duties (taxes) applied to high fuel-efficiency vehicles.

4.3 CONSOLIDATED TEMPORAL FINANCING PATHWAY

The consolidated temporal financing pathway for this NDC Investment Plan takes into account only the primary mitigation opportunities for the transport and energy-efficiency sectors. The pathway is divided into three periods between 2020 and 2030. The first period (2020-2022) involves Part A, Financing Preparation under the individual financing pathway of all the primary mitigation options; and Part B, Financing Implementation of a few primary mitigation options, which will require less preparation. The second (2023-2025) and third periods (2026-2030) involve Part B, Financing Implementation of all the primary opportunities.

The consolidated temporal financing pathway of the primary mitigation opportunities in both the transport and energy-efficiency sectors leads to an estimated need for US\$ 1.98B in total investment in the sectors. This includes US\$ 29M in capacity building and technical assistance needs, and US\$ 1.95B in capital investments from 2020 to the end of 2030.

TRANSPORT SECTOR

The primary mitigation opportunities, for the transport sector during the period of 2020 through 2030 as indicated in Section 4.1, have a total indicative cost of US\$ 875M, with a total indicative need for US\$ 12.2M in capacity building & technical assistance, and an indicative need for US\$863M in investment capital. These primary opportunities have the potential to reduce 1,186,000 tCO₂ in the 2020 through 2030 period, and to reach a mitigation potential of 179,000 tCO₂/year in 2030. This is a potential mitigation of 7% of the estimated energy sector BAU baseline in 2030 as defined in the (Intended) NDC from 2015.⁸⁰ This leads to a total indicative cost of carbon of 738 US\$/tCO₂ for the primary opportunities during the period of 2020 through 2030. Figure 8 below shows the periodic breakdown of indicative capacity building & technical assistance needs, investment capital needs, and mitigation potential.⁸¹ More information on the temporal financing pathway for the primary and secondary opportunities for the Transport Sector can be found in Annex H.

TRANSPORT SECTOR PRIMARY MITIGATION OPPORTUNITIES	2020 - 2022	2023 - 2025	2026 - 2030
Capacity Building & Technical Assistance	US\$5.61M	US\$4.69M	US\$1.92M
Investment Capital	US\$301.5M	US\$320.7M	US\$241.8M
GHG Mitigation	123,000 tCO ₂	259,000 tCO ₂	804,000 tCO ₂


MITIGATION IN 2030  179,000 tCO₂/yr

Figure 8: Consolidated temporal financing pathway - Transport Sector Primary Mitigation Options

ENERGY-EFFICIENCY SECTOR

The primary mitigation opportunities, for the energy-efficiency sector during the period of 2020 through 2030 as indicated in Section 4.1, have a total indicative cost of US\$1.11B, with a total indicative need for US\$16.9M in capacity building & technical assistance, and a indicative need for US\$1,089M in investment capital. These primary mitigation opportunities have the potential to reduce 1,586,000 tCO₂ in the 2020 through 2030 period, and to reach a mitigation potential of 456,000 tCO₂/yr in 2030. This is a potential mitigation of 18% of the estimated energy sector BAU baseline in 2030 as defined in the (Intended) NDC from 2015.⁸² This leads to a total indicative cost of carbon of 697 US\$/tCO₂ for the primary opportunities during the period of 2020 through 2030. Figure 9 below shows the periodic breakdown of indicative capacity building & technical assistance needs, investment capital needs, and mitigation potential.⁸³ More information on the temporal financing pathway for the primary and secondary opportunities for the Energy-efficiency Sector can be found in Annex H.

ENERGY-EFFICIENCY SECTOR PRIMARY MITIGATION OPPORTUNITIES	2020 - 2022	2023 - 2025	2026 - 2030
Capacity Building & Technical Assistance	US\$2.60M	US\$10.06M	US\$4.24M
Investment Capital	US\$0M	US\$226.8M	US\$852.4M
GHG Mitigation	0tCO ₂	77,000 tCO ₂	1,509,000 tCO ₂


MITIGATION IN 2030  456,000 tCO₂/yr

Figure 9: Consolidated temporal financing pathway – Energy-efficiency Sector Primary Mitigation Options

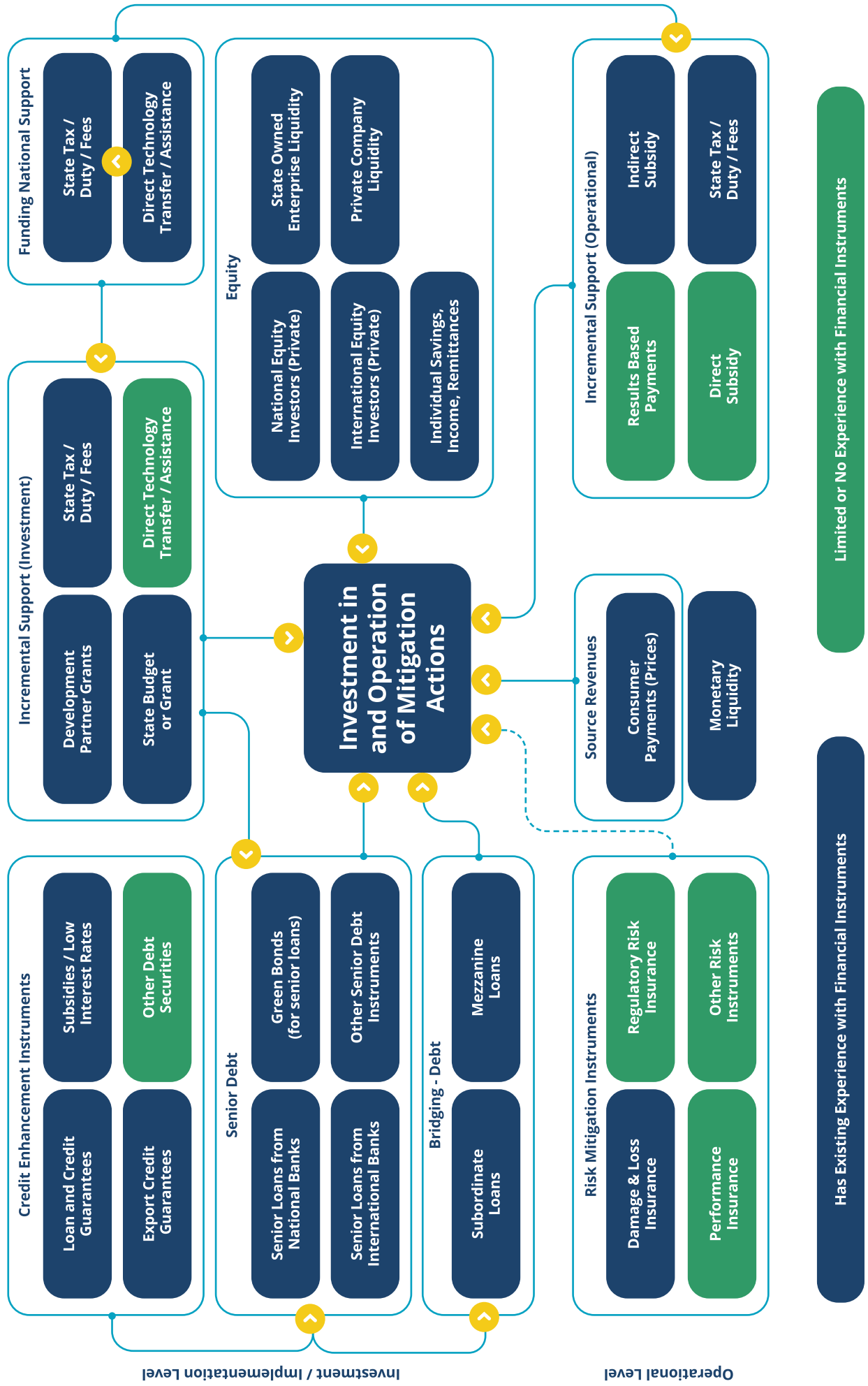
4.4 NEEDS FOR FINANCIAL INSTRUMENTS AND POTENTIAL FUNDING SOURCES

The financial and development sectors operating in Fiji have the benefit of possessing the highest level of experience in the PICs with both structuring and operating financial instruments and in supporting economic sectors in Fiji. This experience exists in both the public and private entities operating in the financial sector, and the private financial sector is strengthened in Fiji due to the depth of public experience with commercial (e.g. business) and retail (e.g. household) financing. The public sector also has robust experience with using fiscal and monetary instruments to catalyse change including changes in taxation, the strategic use of the State budget, and supporting currency and liquidity. However, the Fijian Government has a stable but lower-to-medium-grade credit rating (before the COVID-19 crises) which severely limits its ability to take out loans to finance mitigation actions.⁸⁴

As indicated in Section 4.3, it is estimated that a combined US\$1.98B in investment is needed to implement the primary mitigation opportunities in both the transport and energy-efficiency sectors from 2020 through 2030. To offer an economic perspective of this investment need, it is equivalent to 38% of Fiji's Real GDP in 2018,⁸⁵ and 110% of the Fijian Government's State budget for 2020/2021.⁸⁶

There are several financial instruments needed to ensure the implementation and potential success of the mitigation opportunities in the transport and energy-efficiency sectors in Fiji. Figure 10 lists many of these needed financial instruments which are further described in Table 21. As previously mentioned, Fiji has robust experiences in many of the financial instruments (highlighted in dark blue boxes) but limited or no experience with other financial instruments (highlighted in light blue boxes). Fiji also has limited experience in blended finance, especially when blending together several lending, risk, equity, and fiscal financial instruments, and blended financing will be needed for some of the primary mitigation opportunities in the transport and energy-efficiency sectors.

Figure 10: Financial instruments for the Transport & Energy-efficiency sector have some, limited, or no experience in Fiji



Fiji is known to have experience with twenty-four of the 31 financial instruments shown in Figure 10. Several of these can be directly applied to the transport or energy-efficiency sectors if funded, based on Fiji's existing experience. Even though Fiji has experience with many of the other indicated financial instruments, they may not have been applied to either the transport or energy-efficiency sectors in the past, and thus can only be directly applied to these sectors with additional technical assistance and capacity building support. A general description of the needed financial instruments is given in Table 21 below and for the sub-sectors in Annex G. The potential financial instrument needs for each mitigation opportunity including potential financing sources, can be found in Table 22 and Table 23 and in the individual Concept Notes found in Annex A.

Table 21: Financial instruments needed for NDC Investment

TYPE OF FINANCIAL INSTRUMENT	DESCRIPTION OF THE FINANCIAL INSTRUMENT
Private Equity from Households	Households and individuals in Fiji have private equity usually in the form of individual savings, income, and/or remittance. [common across households in Fiji]
Private Equity from Businesses	Companies in Fiji have private equity usually in the form of corporate savings and income. [common across businesses in Fiji]
Grants for Capacity Building and Technical Assistance	These grants are provided by various multilateral/bilateral institution, and some development agencies (who also gain grants from multi-lateral/bi-lateral institutions). [previously applied across the sectors in Fiji]
Non-Government Grants for Investment	These grants are provided by various multi-lateral/bi-lateral institutions, and some development agencies (who have gained funds from multi-lateral/bi-lateral institutions). [previously applied across the sectors in Fiji]
Guarantees for Credit	These guarantees allow for risk reduction from parties defaulting on loan payments, and thus act as collateral for a type of loan or loan facility (incl. revolving loan funds). [previously applied in Fiji, previously supported RE/EE and aircraft purchase in the commercial sector, but the level of application in the land and maritime transport sub-sectors is unknown]
Guarantees for Export	These guarantees allow for risk reduction from parties defaulting on loan payments that finance specific technology originating from a specific supplying country, and thus act as collateral for a type of loan. [unknown application in the sectors in Fiji, but was applied in aircraft purchases and IPPs in the past]
Concessional Loans	Concessional loans typically originate from IFIs or similar multi-lateral institutions and offer zero-/low-interest rates, long grace periods, and long payback periods. They may finance individual projects or a pool of projects and can act as a large loan providing capital for a pool of smaller loans. These may be backed by guarantees. [previously applied across the sectors in Fiji]
Commercial Senior Loans	Commercial Senior Loans are typically administered by national banks (commercial banks and FDB) and are used by companies to finance no more than 80% of their activities capital needs, usually based on collateral of assets held by the company or a guarantee from another source. [previously applied across the sectors in Fiji]
Retail Senior Loans	Retail Senior Loans are typically administered by national banks and are used by individuals to finance no more than 70% of their activities, usually based on collateral of assets held by the person, their income or a guarantee from another source. [previously applied across the sectors in Fiji]

State Budget & SOEs	The State Budget allocates funds to projects to cover equity investment, provide a guarantee, co-finance activities, and possibly subsidies services. SOEs can also provide equity. [State Budget is previously applied across the sectors in Fiji for example in roads, vehicle purchase, building upgrades, state procurement...etc. SOEs equity is applied in Fiji]
Taxation: import duties & excise, corporate, personal	The Fijian Government has a robust taxation system, and these can be used to increase or decrease import duties & excise on technology (to create price parity), provide tax holiday or income deductions to companies, and provide income deductions to persons. [previously applied across the sectors in Fiji especially in the support of RE, tourism, hybrid vehicles...etc.]
Insurance: Loss/Damage and Performance	Insurance for Loss/Damage allows for recovery of some of the value of an asset that is lost or damaged. Insurance for Performance is usually linked to financing (loans) and covers a part of the risk of a borrower default on a loan payment, including when investments have less than expected returns. Loss & damage insurance is previously applied in land transport, and along with performance insurance, has a very limited application in Fiji.

Table 23: Possible financial instruments and potential funding sources for the Energy-efficiency mitigation projects

FINANCIAL INSTRUMENTS	POTENTIAL SOURCES*	TRANSPORT (T)**												
		E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13
Private Equity from Households	Households							✓✓		✓✓				
Private Equity from Businesses	Companies, SOEs, Communities		✓✓		✓✓	✓✓		✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	
Grants for Capacity Building and Technical Assistance	GEF, AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, WB/IFC, KOICA, CIDCA, EEAS, EIB, PBSP, SIDA, UNDP, UNESCO, UN Habitat, UNESCO, UNIDO, DE-GIZ, JICA	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Non-Government Grants for Investment	GCF, GEF, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, EEAS, KOICA		✓✓	✓✓	✓	✓✓		✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Guarantees for Credit	ADB, WB, IFC, EIB, GCF		✓		✓✓	✓		✓✓	✓✓	✓		✓	✓✓	
Guarantees for Export	Supplier Countries							✓						
Concessional Loans	ADB, WB, IFC, EIB, GCF		✓			✓		✓	✓✓	✓		✓✓	✓✓	
Commercial Loans***	ANZ, Westpac, BRED, HFC, BSP, FDB		✓✓		✓✓	✓✓		✓✓	✓✓			✓		
Retail Loans***	ANZ, Westpac, BRED, HFC, BSP							✓✓		✓✓				
State Budget	MOE, MCTTT, MIMS			✓✓			✓✓			✓✓		✓✓		✓✓
Taxation: import duties & excise, corporate, personal	MOE		✓✓		✓✓	✓✓		✓✓	✓	✓	✓✓		✓	
Insurance: Performance and Loss/Damage	ADB, WB, IFC, EIB					✓								

* This is a primary list of potential finance sources and is not exhaustive (additional finance sources are or may be available in future),

** (blank) financial instrument is not needed, (✓✓) priority financial instrument/most appropriate, (✓) secondary financial instrument/possible

*** Includes the possibility of revolving loan programmes.





05

CONCLUSION

Fiji has the benefit of having the largest economy of the PICs, but the Fijian economy cannot support all the transitional changes needed to ensure low-carbon transport and energy-efficiency. The private sector (households and businesses) and public sector (Fijian Government entities) will finance vehicles, outboard motors, vessels, buildings, industrial equipment, and appliances without any actions taken by the Fijian Government. There is no question that the vast majority within the private and public sectors of Fiji will also go for the most affordable option available to them, which without intervention will likely be the high GHG emissions option. The purpose of the primary mitigation opportunities defined in this NDC Investment Plan is to support the private and public sectors in choosing option emitting the least GHG. The primary mitigation opportunities encourage the private and public sectors in choosing of the least-GHG emissions option by ensuring that it is the only available option or is equal to or cheaper than the high GHG emissions option.

The main challenges and potential opportunities for increasing GHG mitigation in the transport and energy-efficiency sectors in Fiji are defined in this NDC Investment Plan. It is clear that all of the primary mitigation opportunities will require international support in the form of capacity building, technical assistance, and in most cases financing for implementation. Capacity building and technical assistance support are the foundation for each primary mitigation opportunity, and the level of finance support provided to these opportunities is directly proportional to the level of GHG mitigation achieved for most of them.

Due to past financial sector activities, stakeholders in Fiji have experience with the implementation of a significant portion of the financial instruments needed to finance primary mitigation opportunities. However, additional capacity building and technical assistance will be needed to prepare individual financial instruments for each mitigation opportunity and scale them to the level needed to support significant GHG mitigation in the transport and energy-efficiency sectors. Many of these financial instruments will include grants, equity, debt, and fiscal policy/regulation changes which will need to work together as blended finance to ensure the level of transition needed to reach the mitigation potential highlighted for each primary mitigation opportunity in this NDC Investment Plan.

Each of the primary mitigation opportunities has an individual implementation timeline and financing pathway described in the Concept Notes found in Annex A. Included within the implementation timeline are the immediate activities to be undertaken to start the development and implementation of each primary mitigation opportunity. In addition to these activities, there are broad sectoral short-term activities that can encourage the broader implementation of the NDC Investment Plan within the transport and energy-efficiency sectors. Six of these are shown in Table 24 below.

Table 24: Six Recommended Broad Short-term Activities to Implement the NDC Investment Plan

SHORT-TERM ACTIVITIES	DESCRIPTION	POTENTIAL LEAD NATIONAL
1	Organise and hold development partner forums for the development, financing, and implementation of the primary mitigation opportunities.	MOE (CCICD)
2	Build capacity for blended financing of mitigation actions.	MOE (CCICD), FDB, RBF
3	Monetary policy changes to increase domestic lending for energy-efficiency and low-carbon transport.	MOE, RBF
4	Secure the technical assistance needed to implement the opportunities for (T1) National Maritime Action Plan and (E1) Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji.	MCTTT (TPD, MASF), MIMS (DOE)
5	Analysis for jumpstarting the opportunities for (T4) Vehicle Replacement Program for Cars and Taxis, (T7) Vehicle Replacement Program for Lorries and Buses, (T3) Outboard Motor Transition, (E2) Programme to Promote Enhanced Green Tourism through tax policy changes to fiscal year 2021/2022.	MOE (BPD, FRCS), MCTTT (TPD), MIMS (DOE)
6	Further quantify the investment needs for implementation of (E1) Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji, (E3) Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS), (E6) Promotion of Sustainable Government Procurement, and (T5) Lautoka Zero Carbon Transport Challenge/ Strategy.	MCTTT (TPD), MIMS (DOE)

* Other organisations supporting these activities are not included in this list, but can be determined through information found in the Concept Notes in Annex A.





ANNEX

ANNEX A

PROJECT PIPELINE - CONCEPT NOTES OF MITIGATION OPPORTUNITIES

T1 - NATIONAL MARITIME ACTION PLAN

NO.	T1
ACTION NAME	National Action Plan
SUB-SECTOR	Maritime Transport
CONTEXT	<p>A coordinated national level action plan for decarbonising maritime transport, as envisaged in the discussions and for lodging in the IMO⁸⁷. This involves several components addressing both international ships and domestic vessels:</p> <p>A. Identification of opportunities through FPCL to incentivise decarbonisation of international shipping. Several ports already offer preferential fees for more energy-efficient ships⁸⁸ and the Fiji Ports greening initiatives could be expanded⁸⁹.</p> <p>B. Identification of a coordinated programme of actions to transition domestic shipping to zero carbon future, in line with 40% reduction in GHG emissions by 2030 and 100% reduction by 2050 including national fleet replacement strategy.</p> <p>The domestic actions need to be based on a national study of GHG emissions from shipping and full consideration of options, including establishment of tax holidays and loan/grant facilities for the private sector, community groups and households/individuals to access finance to uptake successful options (new vessel purchase, retrofit or improved maintenance of existing vessels, etc.). Loan facilities could be through regional initiatives such as PBSP which includes a US\$250m regional revolving loan and grant modalities or established at national level⁹⁰. No allowance for quantum needed for loan modality for full transition of maritime transport sector is provided for.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Baseline report on GHG emissions from maritime transport sector completed • National action plan adopted, and lodged with IMO • National policies and regulations amended • Staff employed and qualified to drive implementation, monitoring and reporting of national action plan • Scholarships awarded • Revolving loan facility established
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Co-ordinated plan for decarbonizing maritime transport drawing together actions that can be taken to reduce emissions by domestic vessels and visiting international ships, combining both mandatory and voluntary actions • Fits with agenda of IMO and regional initiatives such as PBSP therefore increases potential for funding through IMO and related bilateral and multilateral partners <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Improves overall data on Fiji's domestic maritime GHG emissions • Establishes a revolving loan facility to support individual and private sector actions

MITIGATION POTENTIAL	<p>0tCO₂/YR AND A TOTAL OF 0tCO₂ FOR 2020 - 2030</p> <p>KEY ASSUMPTIONS:</p> <p>No emissions reductions are expected from the production of a National Action Plan as it is a policy document and financing mechanism to facilitate development and implementation of projects that would reduce emissions if implemented.</p>
CO-BENEFITS/SDG LINKAGES	<ul style="list-style-type: none"> • Aligns with IMO international policy (and therefore will provide leverage to Fiji to access IMO (and other) funds to implement NAP) • Aligns with Fiji's plans for increasing opportunity from sustainable tourism, and social and economic development. <p><i>Relevant primary SDGs include 7, 13, 14. Relevant secondary SDGs include 1, 8, 12, 17.</i></p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation (sum to be determined).</p> <p>Estimated development costs US\$2,000.</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs US\$547,500.</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: SIGNIFICANT (1)</p> <ul style="list-style-type: none"> • OECD-DAC/CRS Purpose Code(s): 21011 • Transport policy, planning and administration; 21013 • Transport regulation; 21081 • Education and training in transport and storage;
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>TPU (lead for national maritime policy, interface with IMO, oversight and coordination), MCTTT (lead ministry), MSAF (vessel safety, operations and management regulations and enforcement), FPCL (port infrastructure and port fees for international and national vessels), FRCS (incentives for domestic ships to improve energy-efficiency), RBF/FDB (administration of revolving concessional loan facilities).</p> <p>SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>Vessel Owners/Operators (including GSS) and industry associations, FMA, Shore-side maritime industries, USP MCST – technical support and access to academic networks), IMO (technical assistance and guidance, technical cooperation and GMN MTCC support), USP MCST (technical support and academic network), SPC MTCC (technical support).</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 6 months needed for domestic data collection and analysis, 6 months for production of National Action Plan including consultation with Key Stakeholders</p> <p>TIME NEEDED FOR SECURING FINANCE: 1-2 years needed to secure financing for production of National Action Plan. 2-3 years needed to establish loan/grant facilities.</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: 2020 to 2030.</p> <p>IMMEDIATE STEPS (FIRST 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure technical assistance and capacity building support for items B and C B. National vessel fuel use census/survey C. Project concept development

POLICY/PLAN LINK	<p>MO INITIAL STRATEGY FOR GHG EMISSIONS REDUCTION FROM SHIPS (ISSUED 2018) (RESOLUTION MEPC.304(72))</p> <ul style="list-style-type: none"> • 4.7.6: Encourage the development of national action plans... <p>THE REPUBLIC OF FIJI NATIONAL CLIMATE CHANGE POLICY 2018-2030 (ISSUED 2019)</p> <ul style="list-style-type: none"> • Sub-objective 4.1.1: to decarbonise Fiji's transport sector <p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017)</p> <ul style="list-style-type: none"> • Goal: A resource-efficient, cost-effective and environmentally sustainable energy sector • Goal: Access to transportation through an efficient and sustainable transport network • Goal: Safe, efficient, reliable, and affordable shipping services <p>STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):</p> <ul style="list-style-type: none"> • Goal 1: Coordinated master planning • Goal 2: Modernization plan <p>LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)</p> <ul style="list-style-type: none"> • 4.3 Maritime transport: identifies preparation of a national action plan, collection and analysis of maritime data, and a national fleet replacement strategy as priority actions amongst others. <p>MARITIME TRANSPORT POLICY (ISSUED 2015)</p> <ul style="list-style-type: none"> • Objective: communities and the country enjoy better access to passenger and cargo shipping services • 1.1.20: Domestic Shipping and Green Growth <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 8: Sustainable Transportation <p>NDC IMPLEMENTATION ROADMAP 2017-2030 (ISSUED 2017)</p> <ul style="list-style-type: none"> • Key enabling element: develop a Maritime Transport Energy & GHG Mitigation Plan <p>LONG-TERM ACTION: Development of a strategy for electric transport transition and preparation for transition.</p>
POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY	<p>The production of a NAP would require external financing through a grant to cover data collection and analysis, drafting, consultation with key stakeholders (including private sector vessel owners/operators and shore-side maritime service providers) and lodgement with IMO, as well as salaries for Fiji Government staff to take responsibility for the on-going implementation and MRV of the NAP. The scholarships could be sourced from existing scholarship funding support (e.g. from Governments of Australia and NZ). An initial investment would be required to put together a grant application, identify potential sources of finance (e.g. the PBSP, the proposed International Maritime Research Fund,⁹¹ IMO, or bilateral partners⁹²). In addition to the government there are private sector organisations involved in maritime transport and the majority of boats are owned by individuals/households. One component of developing the NAP would be to quantify and establish revolving zero/low-interest loan facilities for private sector and households to access for decarbonisation of the domestic fleet.</p>
GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<ul style="list-style-type: none"> • DATA AVAILABILITY – preparation for the NAP includes grant/technical assistance for data collection and analysis focused on domestic maritime transport emissions. • HUMAN CAPACITY - lack of personnel within TPU/MSAF (staff are already fully committed) and with maritime emissions expertise (access to such expertise is available through FNU, USP MCST and MTCC). • FINANCING/INSURANCE – NAP would look to include establishment of loan facilities to enable private sector and households/individuals to access underwritten finances.

FINANCIAL SUSTAINABILITY

Ongoing financial support will be required for staff salaries and scholarships. Staff salaries after 2030 would be built into the Government National Budget allocation. Funding for data collection and analysis in order to develop the NAP and amendment of regulations would be a one-off requirement, and ongoing data collection required for MRV purposes would be built into existing Government NDC and other data collection programmes.

The NAP is an overarching policy document, and as such is instrumental in identifying funding opportunities for pilot project implementation. In this regard, lessons learnt from past shipping pilot projects and other development aid are important.

The PBSP is one multi-country response to these experiences and provides a different paradigm for transition of the shipping sector in the Pacific, focusing on collaboration and cooperation to implement shipping decarbonisation from a country-driven perspective. PBSP seeks to raise US\$0.5 billion (blended loans and grants) for participating countries to access and if successfully established represents the best option for securing financing for the sector in Fiji. Securing grants or even concessional loans for purchase of new ships is notoriously difficult, with the major infrastructure banks active in the region (ADB, WB) funding land-based infrastructure (e.g. ports and jetties) and not vessels.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- Grants for Technical Assistance & Capacity Building: 95% of total cost equal to US\$605,00
- Grant for project design and development: 0.5% of total cost equal to US\$30,000
- Revolving concessional loan facility (sum to be determined)

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: PBSP93, **ADB, WB**, PRIF, NDC Hub, USP
- Project Implementation & Management: PBSP, **ADB, WB**, PRIF, SPC

POTENTIAL FINANCIAL PARTNERS/SOURCES:*

- Grants for Technical Assistance & Capacity Building: PBSP, **ADB, WB**, PRIF, **EU/EC**, AUDFAT, NZ-MFAT, France, Norway, GCF, CIDCA, KOICA, JICA, IMO
- Loan Facility: WB, **ADB, IFC** (private sector), EIBC, FDB
- Government Budget & Tax Revenue: **State budget**

**This is not a comprehensive list; other entities are possible as well.*

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE: US\$635,500

1. National vessel fuel use census/survey (representative surveys) (US\$30,000)
2. Domestic fleet GHG emissions analysis (US\$20,000)
3. Project concept development (US\$ 30,000)
4. Review of options for NAP including domestic fleet and role of FPCL to incentivise international shipping decarbonisation (US\$5,000)
5. Review of options for loan/grant modalities for private sector roll-out (US\$30,000)
6. Review of relevant policies and regulations (US\$5,000)
7. Production and lodgement of NAP (US\$10,000)
8. Provision of up to 4 staff positions within MSAF and TPU to lead development and implementation of NAP and MRV (US\$400,000)
9. Scholarships focused on maritime transport decarbonisation (including maritime law, policy, naval architecture/surveying, seafaring) of relevance to NAP (US\$90,000)
10. Amendment of policies and regulations (\$15,000)

**INFORMATION
AND MRV NEEDS**

- Domestic fleet fuel use and emissions⁹⁴ - links to IAS use and enhancement
- Outboard motor ownership and use, fuel use from registered vessels
- Passenger/cargo volumes transported and route data
- Options catalogue for operational and technological means to reduce GHG emissions from domestic fleet
- Options catalogue of financing modalities needed

**SUPPORTING
REFERENCES**

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1, 2, 3, 4, 5, 6,7,8, 9	8, 9, 10	8, 9	US\$4.24M
Estimated CB & TA Costs (US\$)	220,000	165,000	250,000	635,000
Estimated Capital Investment (US\$)	0	0	0	0
Estimated GHG Mitigation (tCO₂)	0	0	0	0
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				0

T2 - ALTERNATIVE FUELS IN LAND AND MARITIME TRANSPORT

NO.	T2
ACTION NAME	Alternative fuels in Land and Maritime Transport
SUB-SECTOR	Land and Maritime Transport
CONTEXT	<p>There is a range of alternative fuels that are already in use or are undergoing R&D globally, including biofuels, bio-fuel blends, methanol, ammonia, and hydrogen. The applicability, appropriateness, and financial viability of some of these fuels needs to be considered carefully via technical assistance, as the cost and practicality of using some of these are likely to be prohibitive in the PICs at this time. Technology piloting in the maritime sector is ongoing, but bio-fuels in land transport, especially biodiesel (<B10) and ethanol (<E10) blending, are already used and mandated extensively in Brazil, Europe and North America, Indonesia, and is already blended and shipped from Singapore.</p> <p>This project focuses on importing and use of high-quality blended biofuels for diesel and petrol. Where one of two options can be taken:</p> <p>A. A requirement that all imported fuels include a blend such as B7 and E5, such as used in the EU,</p> <p>B. Allow for the availability of both biofuel blends and non-biofuel blends fuel types.</p> <p>Either option will require infrastructure investments. Option 1 will only require new terminal storage facilities. Option 2 requires more investment in terminal storage facilities as well as pumps/mini storage to petrol stations. Both actions will require a minimum standard for vehicles on the road of EURO-3 and an import-vehicle standard of EURO-5. The price of blended fuels will likely be higher than standard fuels, and this will depend on the global oil prices.</p> <p>Implementation will require planning activities by MIMS and MCTTT, and regulatory and enforcement actions by LTA, FRCS, and MCTTT. Physical implementation will be done by the private sector fuel companies and petrol station owners across Fiji.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • National fuel planning activities by planning activities by MIMS and MCTTT. • Setting up regulatory and enforcement actions by LTA, FRCS, and MCTTT. • Feasibility studies, ESIA's, and permitting completed for new terminal storage and tank stations. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Grant support is secured for capacity building the technical assistance activities. • A loan facility is established for commercial companies to lend funds for the needed capital investments, including a possible credit guarantee provided by an IFI. • A corporate income tax deduction is established to lower the net cost of physical implementation.

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced GHG emissions via blended biofuels • Improved energy/fuels infrastructure • Increased of trained persons for use of biofuels <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Increased capacity for financial and economic planning/policy in use of biofuels
MITIGATION POTENTIAL	<p><42,300 tCO₂/YR. AND A TOTAL OF <211,500 tCO₂ FOR 2025 – 2030</p> <p>Diesel max = 32,700 = 180,000,000 l x 2.6 kgCO₂/l x 7% biodiesel blend (avg. 2017-18 numbers)/1000</p> <p>Petrol max = 9,600 = 80,000,000 l x 2.4 kgCO₂/l x 5% ethanol blend (avg. 2017-18 numbers)/1000</p> <p>UNDER THE LEDS CONDITIONAL SCENARIO:</p> <p>Diesel max = 23,400 = 180,000,000 l x 2.6 kgCO₂/l x 5% biodiesel blend (avg. 2017-18 numbers)/1000</p> <p>Petrol max = 19,200 = 80,000,000 l x 2.4 kgCO₂/l x 10% ethanol blend (avg. 2017-18 numbers)/1000</p>
CO-BENEFITS/SDG LINKAGES	<p>The biofuels reduce air pollutants to a minor extent and can reduce ecological impact to a minor extent as well, especially with low blends. There is a possible negative impact insofar the biofuel component of the blends tends to cost more than fossil fuels, leading to slightly higher fuel prices.</p> <p>Relevant primary SDGs impacted: 7, 11 and 13.</p> <p>Relevant secondary SDGs impacted: 11 and 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: Up to US\$36M.</p> <p>US\$16M for Option 1 - will require at least 8 new terminal storage tanks and likely 40 medium new standard storage tanks in the outer islands.</p> <p>Option 2 will have an estimate additional cost (over Option 1) of US\$20M for 200 new petrol tanks and pumps for both diesel and petrol, and at least two new tanker trucks.</p> <p>Estimated development costs: US\$150,000</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$1,000,000 – for fuel and market feasibility studies, Engineering and ESIA's, and Training for oil companies and petrol stations, and information dissemination programmes on the use of fuels blends.</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Principal (2) OECD-DAC/CRS</p> <p>PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21020 - Road Transport; 21040 - Water transport; 21081 - Education and training in transport and storage; 21061 - Storage; 23641 - Retail distribution of liquid or solid fossil fuels

IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>IMPLEMENTING ENTITY/STAKEHOLDERS: Fuel Companies and petrol station owners</p> <p>SUPPORTING ENTITY/STAKEHOLDERS: MCTTT, MIMS/DOE</p>
POLICY/PLAN LINK	<p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):</p> <ul style="list-style-type: none"> • Goal 3.2.1: Access to transportation through an efficient & sustainable transport network • Goal 3.2.9: Creating vibrant and environmentally sustainable urban centres. <p>MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);</p> <ul style="list-style-type: none"> • Goal 2: Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services). • Strategic Priority Goal 3.2.1.4: Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework <p>LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)</p> <ul style="list-style-type: none"> • 4.2: Land Transport • 5.5.2: Infrastructure: Land, Maritime, and Air Transport <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 7: Energy Security • Thematic Area 8: Sustainable Transportation <p>NDC IMPLEMENTATION ROADMAP</p> <ul style="list-style-type: none"> • Key Enabling Element: Complete a data assessment study and gap analysis for the vehicle fleet in land transport. • Short-term action: T3: B5 Fuel (5% Biofuel in Diesel)
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: Infrastructure needs, and gaps need to be investigated and feasibility study is needed for new terminal storage, and possible petrol station pumps and storage. Which all also require and EIA and other permitting, and this is not expected to take more than 24 months.</p> <p>TIME NEEDED FOR SECURING FINANCE: Given the need for finance, it is expected to take up to 24 months to secure finance from blended finance.</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: It is expected that financial closure will happen in 2023, and implementation will have 12 months (when investment will happen)? Therefore, the start of operation of vehicles using biofuels will be in 2025 at the earliest.</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure technical assistance and capacity building support for items B and C below. B. Biofuels import supply and internal market feasibility study, and new regulatory and tax policy changes. C. Develop a lending facility for commercial companies.

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY	<p>The business model focuses on the same as existing supply of diesel and petrol fuels but requires infrastructure upgrades at the terminals and petrol stations to allow for blended and non-blended fuels in the first years of implementation. The business model is highly dependent on changes in taxation which encourages the consumer price to be at least in parity to blended and non-blended fuels, or blended fuels being slightly cheaper. A grant is needed for the estimated Enabling, Capacity Building and Technical Assistance Needs.</p> <p>For financing a low interest loan facility (back potentially by a credit guarantee) is needed, along with potential cooperate income tax incentive to encourage fuel imports and petrol station owners to invest in the biofuels infrastructure. Equity will be gained from fuel imports and petrol station owners.</p>
GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<ul style="list-style-type: none"> • The availability of bio-fuel blends in the Pacific region, including the likelihood of availability for shipping from Fiji, or directly from Singapore or Taiwan. Sourcing and contractual assistance will be needed. • Public knowhow on blended biofuels will need to be strengthened (to reduce fears), where a public dissemination programme is needed. • Euro-3 vehicle or higher will be needed, therefore a restriction on the import of any vehicles less than Euro-3 will be required.
FINANCIAL SUSTAINABILITY	<p>The business model is highly dependent on changes in taxation which encourages the consumer price to be at least in parity to blended and non-blended fuels, or blended fuels being slightly cheaper.</p> <p>If the infrastructure upgrades at the terminals and petrol stations are financed under a favourable model⁹⁵ then the nominal cost increase to the consumer would be a minimum of US\$0.08 per l for all fuels. In addition, biofuel blends have a volatile price due to swings in both oil prices and pure-biofuel price, but blends are typically 10-15% higher per litre than non-blends.</p>
POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<p>Grant for Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$ 1,000,000</p> <p>Grant for development costs: US\$150,000</p> <p>Equity of oil companies and petrol station companies: US\$9M (25% of investment)</p> <p>Low interest commercial loans to oil companies and petrol station companies: US\$ 27M (75% of investment),</p> <p>Development credit guarantee for commercial loans: up to US\$ 27M (75% of investment)</p> <p>Investment corporate income tax incentives for the import of biofuels storage and distribution equipment: suggested up to 25% of the investment made.</p>
POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES	<p>PROJECT/FINANCIAL MANAGEMENT ENTITY*:</p> <ul style="list-style-type: none"> • Project Development: ADB, Pacific Regional NDC Hub, GGGI, UNDP, SPC • Project Financial Management: ADB, UNDP, UNIDO, WB/IFC, EIB, SPC <p>POTENTIAL FINANCING PARTNERS/SOURCES*:</p> <ul style="list-style-type: none"> • Credit Guarantee: ADB, WB/IFC, GCF, EIB • Equity: GOF, Fuel Importers/Companies • Loan Facility: ADB, GCF, WB/IFC, EIB, FDB, commercial banks • Grants for Capacity Building and Technical Assistance: ADB, GEF, GCF, AU-DFAT, BMU-Germany, BMZ-Germany, CTCN, WB/IFC, KOICA, CIDCA, EEAS, UNDP, UNIDO • Non-Government Grants for Investment: GCF, GEF, AU-DFAT, NZ-MFAT, IFC, EIB, CIDCA, EEAS, KOICA • Taxation: investment incentives MOE (FRCS) • Insurance: ADB, WB, IFC, EIB

*This is not a comprehensive list, as other entities are possible as well. Partners known to recently support this type of action in Fiji and PICs are indicated in BOLD.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS	<p>ESTIMATED ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS: US\$1,000,000</p> <ol style="list-style-type: none"> 1. Biofuels import supply and internal market feasibility study, and new regulatory and tax policy changes. This includes the engagement of international suppliers to attract them to the Fijian market. (US\$150,000) 2. Engineering for EPC tendering and EIAs for new terminals/storage facilities. (US\$600,000) 3. Development of, and holding, three trainings for oil companies and petrol station companies' biofuels supply and logistics. (US\$75,000). 4. Development and implementing a public information dissemination programme on the use of fuels blends, held over three years. (US\$175,000)
INFORMATION AND MRV NEEDS	<ul style="list-style-type: none"> • Scoping and feasibility study will define the scale of installation need for implementation, and installation and operation are to be later tracked under the MRV. • Blended and standard fuel imports volumes • Vehicles imports of Euro-3 standard or higher • Tax and lending records to evaluate the utilization of subsidies, credits, rebates, and lending instruments will be required of the financial institutions and MOE.
SUPPORTING REFERENCES	<p>FRSC data 2019.</p> <p>Commercial costs for fuels tanks and pumps, and installation (2019).</p>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)		1, 2, 3	3	
Estimated CB & TA Costs (US\$)	200,000	875,000	75,000	1,150,000
Estimated Capital Investment (US\$)	0	59,645,000	36,340,000	114, 550,000
Estimated GHG Mitigation (tCO₂)	0	21,000	190,000	211,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				42,000

T3 - OUTBOARD MOTOR TRANSITION

NO.	T3
ACTION NAME	Outboard Motor Transition
SUB-SECTOR	Maritime Transport
CONTEXT	<p>Outboard motors are likely to be the single largest source of GHG emissions⁹⁶ for Fiji's maritime transport sector, due to the large number of 2-stroke petrol outboard motors in use. 4-stroke motors are considerably more energy-efficient than 2-stroke outboards and fully electric outboard motors are in use commercially in other parts of the world and are now for sale in Fiji commercially. As small vessels make up a sizeable portion of the total emissions from maritime transport⁹⁷, a sizeable percentage of total emissions reduction for the sub-sector is available simply by transitioning from 2-stroke to 4-stroke outboards and then electric.</p> <p>This project aims to achieve reduction in emissions from outboards from a combination over time by switching to 4-stroke petrol and electric outboards, and revitalising sailing canoes.</p> <p>4-stroke outboards are up to 50% more fuel efficient than 2-strokes⁹⁸. Whilst there is no accurate data on the total number of outboards or type, based on LEDS calculations for "small boats" this would equate to 7900⁹⁹ petrol outboards being replaced with 4-stroke and electric by 2030. Transition to electric outboards requires consideration of boat design, charging, and transition to 4-stroke or electric outboards involves several steps:</p> <ul style="list-style-type: none"> • Household census of outboard ownership and use (including fuel use) - ideally this would be nationwide to quantify the number and types of outboards in use and more accurately estimate the GHG emissions – this could be built into the next census. Coordination with Ministry of Fisheries data collection on outboards used in artisanal fishing. • Data collection of outboard motor use and fuel use by commercial boats e.g. "tourism" and "fishing". • Review fiscal policy – this would include no import or fiscal duties on fuel-efficient 4-stroke and electric outboards, lithium ion rechargeable batteries and chargers, parts, and imposing import and fiscal duties on 2-stroke outboards initially and later on 4-strokes. Use of ECAL to raise the price of 2-strokes (and later 4-strokes) to further reduce the price differential down for electric outboards should also be considered. • Development of outboard motor and battery safe disposal and recycling plan. • Tax holidays for private sector investment in e-outboards and shore-based RE powered recharging/battery swap stations, and sales and servicing, focusing initially on the tourism sector. Other incentives could include income tax deductions for those companies purchasing electric outboards and recharging facilities. • Development of training courses for marine mechanics and commercial small boat operators on 4-strokes, electric motors and batteries/accumulators. • Establishment of a low interest revolving loan facility/credit guarantees for purchase of electric outboards and recharging stations. • Publicity campaign to explain the planned transition to new generation outboard motors and the assistance available to support communities in that transition.

KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Outboard motor survey and emissions assessment reports • Fiscal policy review and amendment • Curriculum updated and students enrolled <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Revolving loan facility established
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced fuel use over time with uptake of more efficient 4-stroke and electric outboard motors and sailing canoes and sail assist leading to reduced economic cost of imported petrol, particularly for tourism industry, households and fishers. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Opportunity for new businesses (4-stroke and electric outboard sales and servicing, and battery recharging)
MITIGATION POTENTIAL	<p>AVE. 10,500 tCO₂/YR AND A TOTAL OF 105,000 tCO₂ FOR 2020 – 2030</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • There would be less reduction in early years and more in later years reflecting progressively more outboard motors being switched over time. • Emissions from “small boats” (powered by outboards) are estimated at 21,670 tCO₂/yr based on 2016 baseline of 7,915 outboard motor-powered vessels, with average 750g CO₂/kWh shaft power. As many “tourism” and “fishing” boats are also using outboard motors, the true figure will be higher¹⁰⁰. It is assumed for the purposes of these calculations that on average one 2-stroke outboard motor produces 2.7 tCO₂/yr¹⁰¹. • A phased transition from predominantly premix 2-stroke outboard to 4-stroke to electric over a 10 year period will be required (with a mix of 4-stroke and electric motors) and no increase in number of boats (and motors), rather replacement of existing motors only. • By 2030, 7900 2-stroke outboards would have been replaced, 50% with electric outboards and 50% with 4-strokes, with only a proportion switching in the first few years and growing numbers thereafter. Emissions reduction could be increased further by replacing all 2-strokes with electric, or by replacing more 2-stroke motors earlier with electric and fewer 4-strokes. Further emissions could be mitigated through use of sailing canoes. • Electric outboard batteries would only be recharged from renewable sources (solar PV). <p>No emissions savings from reduced need to import fossil fuels has been included.</p>
CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Reduced need for imported fossil fuels would lead to national and household budgets being available – i.e. improved purchasing power for women at household level particularly • Reduced vulnerability to global fossil fuel price shocks • Potential employment opportunities associated with sale, maintenance, installation, recharging and recycling for electric outboard motors • Reduced risk of environmental damage/pollution from outboard motors • Traditional knowledge of small canoe building and sailing becomes more appropriate¹⁰² • Reduced operating costs over time would reduce pressure on local fisheries¹⁰³ • Replicable and scalable <p>Relevant primary SDGs include 7, 13, 14.</p> <p>Relevant secondary SDGs include 1, 8, 12, 17.</p>

INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation US\$114.55m.¹⁰⁴</p> <p>Estimated development costs US\$30,000.</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs US\$325,000.</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Principal (2)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21040 - Water Transport; 21081 - Education and training in transport and storage; 23642 - Electric mobility infrastructures; 24030 - Formal sector financial intermediaries
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>IMPLEMENTING ENTITY/STAKEHOLDERS: BOS, MSAF, TPU (surveys of outboard ownership and use), FRCS (review of fiscal policy to incentivise private sector investment in e-outboard sales, servicing, recharging and safe disposal), FMA & FNU (training for mechanics and marine engineers), TPU, MSAF (publicity campaign, awareness raising), FDB, RBF (revolving concessional loans/credit guarantees)</p> <p>SUPPORTING ENTITY/STAKEHOLDERS: Ministry of Education/Schools, MAFF (survey of outboard use in fisheries, trial of electric outboards), households, outboard motor manufacturers¹⁰⁵ e.g. Yamaha, Torquedo, Elco, etc. (technical support), USP-MCST, SPC/MTCC (technical assistance)</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 year needed for project development.</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 year needed for establishment of tax holidays for commercial deployment of electric outboard motors, recharging and servicing; and for adjustment of import/fiscal duties. 1-2 years need to secure financing to underwrite and establish revolving loan facility.</p> <p>TIME NEEDED FOR CAPACITY BUILDING: 1-3 years needed for capacity building/training development, data collection, and roll out</p> <p>WHEN WILL THE PROJECT INVESTMENT START AND END: Start 2021 end 2030 (note mitigation would continue after 2030).</p> <p>IMMEDIATE STEPS (FIRST 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure technical assistance and capacity building support for items B and C B. Project development (concept note) C. National small vessel and outboard ownership/fuel use sample surveys

<p>POLICY/PLAN LINK</p>	<p>THE REPUBLIC OF FIJI NATIONAL CLIMATE CHANGE POLICY 2018-2030 (ISSUED 2019)</p> <ul style="list-style-type: none"> • Sub-objective 4.1.1: to decarbonise Fiji's transport sector <p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017)</p> <ul style="list-style-type: none"> • Goal 3.1.2: A resource-efficient, cost-effective and environmentally sustainable energy sector • Goal 3.2.2: Inter-island network – safe, efficient, reliable and affordable shipping services <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 8 Sustainable Transportation <p>MARITIME TRANSPORT POLICY (ISSUED 2015)</p> <ul style="list-style-type: none"> • Objective: communities and the country enjoy better access to passenger and cargo shipping services • 1.1.20: Domestic Shipping and Green Growth <p>LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)</p> <ul style="list-style-type: none"> • 4.3 Maritime transport identifies outboard motor transition as a priority action <p>NDC IMPLEMENTATION ROADMAP 2017-2030 (ISSUED 2017)</p> <ul style="list-style-type: none"> • Mitigation Action T5: fuel efficient outboard motors
<p>POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY</p>	<p>The transition away from 2-stroke outboard motors requires a phased approach and fiscal incentives, supported by capacity building, training and pilot trials. Whilst electric outboards are already available commercially in Fiji, small boat owners will not readily switch without proof that the technology works, and without addressing the differences in purchase cost (2-strokes are cheaper, 4-stroke more expensive, and electric outboards considerably more expensive)¹⁰⁶.</p> <p>Targeted scholarships and training on servicing and use of 4-stroke and electric outboard motors through FMA/FNU will provide the human capacity over time.</p> <p>One business model to be explored for recharging is a “battery swap”, with boat owners collecting charged batteries and returning empty batteries for a fee (as happens with LPG cylinders for cooking), as batteries make up a large part of the Capex and have limited lifespan. The tourism and yachting sector are obvious targets for encouraging a switch from 2-strokes and existing business that sell and service outboard motors and sell fuel for small boats are key stakeholders.</p> <p>The financing strategy is a combination of fiscal policy e.g. significant increase in import duties on 2-stroke outboards and lower duties for 4-stroke and no duties on electric outboards (and batteries/parts) phased in over time supplemented by tax holidays for private sector to invest in sales, recharging and servicing of electric outboards. Over time a revolving low interest loan facility/credit guarantees could be established to encourage switch to electric outboards once the recharging infrastructure and servicing is more commonly available.</p> <p>Early Actions: It is noted that the Fiji Government in its 2020-2021 budget has adjusted tax incentives on Lithium ion batteries which contributes to one or more of the actions described for this mitigation option, and the continuation/extension of the policy may lead to reduced GHG emissions from the BAU scenario.</p>

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- **DATA AVAILABILITY** - no information is available on the total number of outboard motors in use in Fiji, the type of motors, or the fuel used. (Technical assistance to undertake survey of outboard motors in conjunction with MSAF and TPU to register small vessels and outboard motor information).
- **VALLEY OF DEATH¹⁰⁷** – risk to “first movers” of investing in installation and recharging, sales and servicing of electric outboard motors (tax holidays, credit guarantees/low interest loan facility).
- **HUMAN CAPACITY** - lack of personnel within MSAF and TPU, FNU and FMA with expertise and time; lack of private sector and household expertise in maintenance and operation of 4-stroke and electric outboard motors (targeted training programme developed with FNU/FMA; publicity and outreach campaign to raise awareness; scholarships for 4-stroke and e-outboard mechanics).
- **FINANCING** - electric outboard motors are CAPEX high and OPEX low when compared to 2-stroke outboard motors. Recharging stations for electric outboards will be required (tax holidays and duty/excise incentives, credit guarantees/low interest loans).

FINANCIAL SUSTAINABILITY

Use of significantly increased import duties for 2-strokes and reduced duties for 4-strokes and zero import duties for electric outboards and Li batteries will assist in balancing out purchase cost of more efficient motors when compared to 2-strokes.

Tax holidays have been identified as key to incentivising the private sector to invest in installation of electric outboard motor sales, recharging and maintenance/servicing, as well access to staff training on maintenance of electric outboards. These could be done on similar model that exists for tourism accommodation investment with the holiday period being tied to investment made.

The overall longer-term financial viability of the switch from 2-strokes will depend on both sharing of data from those (such as in the tourism sector) demonstrating to households the costs saved by removing need for fuel, and fiscal policy and training.

A revolving loan facility/credit guarantees¹⁰⁸ will enable SMEs/individuals to access finance for more efficient outboard motors and rechargeable battery purchase, with financial savings from reduced or no fuel use over time enabling payback of the loan. Phased transition to a mix of electric and 4-stroke outboards and banning of 2-strokes by 2030 would result in fuel cost savings, noting that additional renewable electricity would be required for recharging for this to be achieved.

If sufficient renewably sourced electricity can be generated by 2030 to power electric outboards, especially in outer island communities, then this project should be financially sustainable if fiscal policy, and a revolving loan facility can adequately address the price differences in Capex, and capacity building and awareness raising can address the current human resourcing capacity gap.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- **GRANT FOR PROJECT DEVELOPMENT:** 0.026% of total cost equal to US\$30,000.
- **GRANTS FOR TECHNICAL ASSISTANCE & CAPACITY BUILDING:** 0.28% of total cost equal to US\$325,000.
- **PRIVATE INVESTMENT:** 99.69% of total cost equal to US\$ 114.55 million.¹⁰⁹
- **REVOLVING LOAN FACILITY/CREDIT GUARANTEES:** to support private investment in electric outboards and recharging infrastructure (expected to be up to 70% of private investment).¹¹⁰
- **STATE BUDGET:** Fiscal duty amendments (imposing import and fiscal duties for 2-strokes and removing duties for 4-stroke and electric outboards and parts) and government purchases. Inclusion of ECAL for 2-stroke outboards. Tax holidays and tax deduction support for corporate investment in electric outboard motors and recharging stations.¹¹¹

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** PBSP¹¹², **ADB, WB**, PRIF, SPC, USP, UNESCAP, GGGI, NDC-Hub
- **Project Implementation & Management:** PBSP, **ADB, WB**, PRIF, SPC, UNDP, GGGI, NDC-Hub

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Grants for Technical Assistance & Capacity Building:** PBSP, Outboard motor manufacturers, JICA, KOICA, CIDCA, AU-DFAT, **NZ-MFAT**, ADB, FAO, GEF, GCF
- **Loan for household and private sector loan facility/credit guarantees through FDB:** **IFC, ADB**, EIB, EIBC
- **Tax/Duty waivers: State budget**
- **Private investment:** Individual/private sector (savings/income/loans)

*This is not a comprehensive list; other entities are possible as well.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE: US\$355,000

1. National small vessel and outboard motor ownership/fuel use census/sample surveys (US\$50,000)
2. Project development (concept note preparation, etc) (US\$30,000)
3. Review of fiscal policies and revenue/excise duties and taxes associated with outboard motors (including rechargeable batteries and charging stations) (US\$25,000)
4. Review and selection of option(s) for revolving loan scheme (US\$30,000)
5. Development of curriculum for FNU/FMA on outboard motor decarbonisation (US\$ 25,000)
6. Amendment of fiscal policies and revenue/excise duties and taxes to incentivise purchase and use initially of 4-stroke then electric outboard motors (including rechargeable batteries and charging stations) (US\$15,000)
7. Scholarships for 4-stroke and electric outboard mechanics (US\$80,000)
8. Awareness raising/publicity campaign (US\$20,000)
9. Salary for suitably experienced part-time staff in FNU/FMA (US\$80,000)

INFORMATION AND MRV NEEDS

- Household outboard motor ownership and fuel use survey (baseline and on-going monitoring of implementation and performance).
- Fiscal import duties and excise, and tax holiday implications of switch to e-outboards.
- Outboard motors and parts imports.
- Number of households with access to affordable financing for outboard motor purchase and maintenance.

SUPPORTING REFERENCES

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1, 2, 3, 4, 5, 6, 8	6, 7, 8, 9	7, 9	
Estimated CB & TA Costs (US\$)	170,000	85,000	100,000	355,000
Estimated Capital Investment (US\$)	18,565,000	59,645,000	36,340,000	114,550,000
Estimated GHG Mitigation (tCO₂)	4,334	26,004	74,762	105,100
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				16,254

T4 - VEHICLE REPLACEMENT PROGRAM FOR CARS AND TAXIS

NO.	T4
ACTION NAME	Vehicle Replacement Program for Private Cars and Taxis
SUB-SECTOR	Land
CONTEXT	<p>This action improves the vehicle fleet in terms of fuel use per km by vehicle to achieve a fleetwide reduction in CO2 emissions. Age limits (which are newly implemented in Fiji) for imported used vehicles would be combined with EURO-5 (or equivalent) vehicle fuel efficiency and/or carbon emissions standards for imported used and new vehicles. In addition, incentives for hybrid vehicles would be continued in Fiji to increase the share of hybrid vehicles in the cars and taxi vehicle fleet. As well a national programme for the scrappage of old vehicles will be implemented, including support for domestic use or export of recycled materials (e.g. T4). There is an option to also set limits on additionality of vehicle imports and/or registration to limit the total registered fleet of vehicles sharing roads in Fiji.</p> <p>In 2020 Fiji is estimated to have up to 82,000 cars on the road which are salon cars, SUVs, and pickup trucks, as well as up to 7,000 taxis and hired cars. This mitigation opportunity expects to substitute 56,000 cars and 4,000 taxis between 2020 and 2030.</p> <p>Policy changes for imports and registration will be managed by MCTTT, and regulatory enforcement by LTA and FRCS. Physical implementation will be by the private sector.</p> <p>Differentiated taxation based on vehicle type will be implemented by FRCS. Equity will be provided by the private sector and retail & commercial lending by commercial banks. RBF has the option to adjust Monetary Policy so that commercial banks to cover the Retail/Commercial individual loans indicated above.</p> <p>This opportunity may be kickstarted by focusing on the government fleet, and the associated leasing programmes. In this case a credit guarantee would be used to allow for cheaper and more secure commercial lending by banks to leasing companies.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Completed in-depth analysis of recent 2015 – 2020 policies for vehicles needs to determine new regulations. • Completed review of the government procurement of vehicles, providing new leasing criteria. • Improved information system at FRCS for vehicles (and linked to LTA) to know which vehicles meet efficiency requirements. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Set up and operate two financing facilities between FDB and commercial banks. One for supporting retail and commercial lending for efficient vehicles, and the second for supporting the commercial company leasing vehicles to the Government.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced fuel use (and associated emissions) through improved efficiency of national vehicle fleet.

**MITIGATION
POTENTIAL****58,900 tCO₂/YR IN 2030 AND A TOTAL OF 448,100 tCO₂ FOR 2020 – 2030****KEY ASSUMPTIONS:**

- This mitigation action expects to substitute 56,000 cars and 4,000 taxis between 2020 and 2030.
- Average emission reduction is 10% on a g CO₂/km basis for ICEs, and 30% on a g CO₂/km basis for hybrids.
- Expected replacement is based on historic import volumes and up to 30% will be hybrids, and the remaining will be ICEs.
- Average driving distance for cars is 13,500 km/yr and for taxis is 60,000 km/yr

For only the Government fleet the emission reductions are expected to be up to 870 tCO₂/yr in 2030 and a total of 7,800 tCO₂ for 2020 – 2030. This assumes that 1,900 vehicles are replaced under the same assumptions as above.

**CO-BENEFITS/
SDG LINKAGES**

The efficient land transport network will reduce both localized air pollutants associated with vehicle emissions and reduce risks associated with oil spills and contamination of both the coastal marine environment and inland waterways. Reducing dependence on imported fossil fuels will encourage retention.

Relevant primary SDGs impacted: 7, 13

Relevant secondary SDGs impacted: 3, 8, 11, 12, and 17.

**INVESTMENT
NEEDS (USD)**

Estimated capital investment needed for the physical implementation: >US\$525M¹¹³ (investment needs for leasing arrangements for Government vehicles is expected to be >US\$ 50.6M)

Estimated development costs: US\$150,000

Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$875,000

**RIO MARKER AND
CRS PURPOSE
CODE(S)**

RIO MARKER: Significant (1)

OECD-DAC/CRS PURPOSE CODE(S):

- 15155 - Tax policy and administration support;
- 21011 - Transport policy, planning and administration;
- 21013 - Transport regulation;
- 21081 - Education and training in transport and storage;

**IMPLEMENTING
AND SUPPORTING
ENTITIES/
STAKEHOLDERS****IMPLEMENTING ENTITY/STAKEHOLDERS:**

- MCTTT: Guiding policy development to support preferential policy toward vehicles.
- LTA: Serves as regulator for vehicles operating on the Fiji land transport network,
- FRCS: Regulates and enforces customs and imports
- Private Sector: Sales/imports the vehicles.

SUPPORTING ENTITY/STAKEHOLDERS:

- Bilateral Donors (EU, NZ-MFAT, AU-DFAT, JICA, GIZ, UK-FCDO etc.): Support financing business development facilities, trade facilitation, and technology transfer (particularly in working with reliable ANPR manufacturers/service providers.).
- Multilateral Development Institutions (ADB, EIB, GCF, World Bank, UN system): support financing of technical assistance to structure financial models around generating revenue on a responsive platform.
- MOE: Allocates budget to support infrastructure spending through MIMS for EFL, and FRA, and MCTTT for LTA.

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: may be expected to take up to 12 months.

TIME NEEDED FOR SECURING FINANCE: Financing the pilot phase through multilateral institutions may take up to 12 months for review and approval.

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B, C, and D below.
- B. Completed in-depth analysis of recent 2015 – 2020 policies for vehicles needs to determine new regulations.
- C. Completed review of the government procurement of vehicles, providing new leasing criteria.
- D. Setting up a commercial lending facility (with credit guarantee) with commercial banks to support leasing companies supplying vehicles to the government.

POLICY/PLAN LINK

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):

- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network.
- **Goal 3.2.9:** Creating vibrant and environmentally sustainable urban centres.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.2:** Land Transport
- **5.5.2: Infrastructure:** Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 7:** Energy Security
- **Thematic Area 8:** Sustainable Transportation

NDC IMPLEMENTATION ROADMAP 2017-2030 (ISSUED 2017)

- Key enabling element: develop a Maritime Transport Energy & GHG Mitigation Plan
- **Short-term action: Mitigation Action T1:** Vehicle Replacement Programme (including Hybrid Vehicles and Scrappage)

**POTENTIAL
BUSINESS
MODEL
AND FINANCING
STRATEGY**

The private sector is instrumental in making vehicle purchase choices, both at a business and personal/household level. This requires significant investment which is already taking place in Fiji through own equity and commercial lending. While the Fijian Government is currently leasing its vehicle fleet under 3 yr/150,000 km contracts with leasing companies (private sector).

The above business and financing model arrangements shall continue in Fiji, where this mitigation action should focus on two elements to encourage the more efficient vehicle fleet.

The first elements would be to amend the duties and excise tax scheme for imported vehicles, so that the highest efficiency vehicles have the lowest duties and excise tax, and the lowest efficiency vehicles have the lowest duties and excise tax. This practice will likely slightly increase the cost of imported vehicles in the short term.

The second element would be to create a lending facility (through monetary policy or via credit guarantees) overseen by FDB and managed by commercial banks. The purpose of the lending facility is to reduce the risk of lending by commercial banks, and thus lower their interest rate, and lengthen loan periods, on retail and commercial lending of the vehicles (either at the import point or the retail point). The lower interest rates and longer loan periods will help offset the potential increase in consumer costs of higher efficient vehicles.

**GAPS & BARRIERS TO
IMPLEMENTATION,
INCLUDING
PROPOSED
ENABLING
MECHANISMS**

- The disparity in price points between second-hand ICE automobiles and new highly efficient vehicle will be a barrier to market acceptance.
- As duty and excise designations for vehicles are not fully linked to their levels of CO₂ emission per/km.
- The use of Government procurement can facilitate the inclusion of highly efficient vehicles, which are leased new by the Government and then sold by the leasing company on the domestic market after the lease is expired.

**FINANCIAL
SUSTAINABILITY**

See the section on “Potential Business Model and Financing Strategy” Regulatory means shall be established as a part of the TA & CB for the safe disposal of batteries once EV are no longer operational, and this may include the takeback/recycling agreements with vehicle/battery suppliers.

**POTENTIAL
FINANCING
AND NEED FOR
FINANCIAL
SUPPORT AND/OR
FINANCIAL
INSTRUMENTS**

Estimated capital investment needed for the physical implementation is: >US\$ 525M (investment needs for leasing arrangements for Government vehicles is expected to be >US\$ 50.6M)

- Private equity of at least 20% is expected (2020 – 2030): >US\$105M for the private sector.
- Retail/Commercial individual loans of 80% or less is expected (2020 – 2030): >US\$420M for the private sector.
- Monetary Policy of providing low interest capital to commercial banks to cover the Retail/Commercial individual loans indicated above. This would be similar to the RBF Import Substitution and Export Finance Facility.
- OR (without the above) A credit guarantee is made available to commercial banks at low interest to back at least 50% of the Retail/Commercial individual loans.
- Monetary Policy of providing low interest capital to commercial banks OR credit guarantees to companies leasing vehicles to GOF (up to US\$50.6M).

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: **FDB**, UNESCAP, **GGGI**, NDC-Hub, **ADB**, **WB/IFC**, PRIF, IEA, IRENA, CTCN, EEAS, **SPC**, **UNDP**, UNIDO, USP, UNCTAD
- Project Implementation & Management: **FDB**, **UNDP**, GGGI, NDC-Hub, **ADB**, WB/IFC, CIDCA, EEAS, SPC

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantees: **GCF**, **ADB**, **WB/IFC**, EIB
- Debts & Loans: **FDB**, ADB, **WB/IFC**, EIB, **GCF**, **Commercial Banks**
- Equity: **Fijian Government/SOEs**, **Private Companies/Vehicle Owners**
- Grants for Technical Assistance & Capacity Building: **GEF**, **AU-DFAT**, NZ-MFAT, CTCN, **ADB**, GCF, **WB/IFC**, **KOICA**, EEAS, **UNDP**, GIZ
- Government Budget & Taxes Incentives: **MOE (FRCS)**
- Risk Instruments: ADB, WB/IFC, EIB

*This is not a comprehensive list, as other entities are possible as well. Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE: US\$875,000

1. An in-depth analysis of recent 2015 – 2020 policies for vehicles needs to be made done determined which regulations have worked best based on real data, and reviewing in this context the various planning studies made during this time, and proposing a revised duties and taxation scheme supporting FRCS. (US\$45,000).
2. TA for the review of the government procurement of vehicles, providing leasing criteria and carrying out the first years leasing tender to increase the efficiency of the governments fleet of vehicles. (US\$30,000).
3. Improving information system at FRCS for vehicles (and linked to LTA) to know which vehicles meet efficiency requirements, and duties/excise rates to apply, and those still on the road. (US\$350,000).¹¹⁴
4. Set up and operate two financing facilities between FDB and commercial banks. One for supporting retail and commercial lending for efficient vehicles, and the second for supporting the commercial company leasing vehicles to the Government. (US\$450,000).

The above may be reduced if T8 is implemented in parallel.

INFORMATION AND MRV NEEDS

CENTRAL MRV DATABASE IS LINKED TO LTA AND FRCS DATA FOR:

- Total number of vehicle stock (with type of vehicle, vehicle ID-number; age, fuel type, status of registration)
- For new/imported vehicles: (Type, age, fuel type, CO2e/km, year of first registration)
- Information about incentives provided from GOF (e.g. tax waver)
- Confirmation of scrappage completed per vehicle.

SUPPORTING REFERENCES

NDC Implementation Roadmap 2017-2030 (issued 2017).
FRCS importation data to 2018.
LTA registration data to 2018.

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2, 3, 4	3,4	3	
Estimated CB & TA Costs (US\$)	825,000	75,000	125,000	1,025,000
Estimated Capital Investment (US\$)	239,493,000	149,942,000	135,495,000	524,929,000
Estimated GHG Mitigation (tCO₂)	68,000	115,000	265,000	448,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				59,000

T5 - LAUTOKA ZERO CARBON TRANSPORT CHALLENGE/STRATEGY

NO.	T5
ACTION NAME	Lautoka Zero-Carbon Transport Challenge
SUB-SECTOR	Maritime and Land Transport
CONTEXT	<p>A Lautoka 2030 transport transition strategy. Fiji government has set a transport decarbonisation target of 40% by 2030. No detailed planning has been undertaken at municipality level for how such targets are to be met.</p> <p>The Lautoka District (encompassing Lautoka City, and the Port of Lautoka including the Vuda Tank farm) presents as the most promising case study in which to promote a low-carbon transition vision and strategy for both land and maritime transport. Lautoka, Fiji's second city was originally a model planned settlement built around the international sugar trade and does not have the geographic constraints of Fiji's other main cities. Well laid out on a grid structure with flat and gentle hills, there is a well-established infrastructure base, international port, wide carriageways, predominately fine weather, good drainage and sheltered marine access. There is little of the current congestion faced in Suva or the ribbon nature of other coastal towns and there are multiple options for both land and maritime transport transition pathways. Sugar, wood pulp and general international and domestic cargo, fuel tankers, regular cruise liners, a thriving island tourism industry and local commercial, public and private transport needs mean most transition technology types are represented in single case study, even a railway. The strategy would require an intense multi-stakeholder design and commitment process, coordination with other municipality planning processes, followed by monitored implementation pipelines. The funding indicated covers only the Strategy development component. This is only stage 1, and implementation of the strategy would be required to achieve emissions reduction in line with Fiji's transport decarbonisation targets. The project assumes that fully inclusive, locally owned and situated solutions are most robust and that it logical to combine maritime and land transport transition, and to integrate these with wider planning processes underway to develop a master plan for Lautoka.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Feasibility studies completed • Project concept developed • Master Plan developed • Monitoring report
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Integrated plan for maritime and land transport decarbonisation for one city as a demonstration pilot within the broader Lautoka City master planning framework. • Detailed sub-sector plans (e.g. for greening Lautoka Port, rail/road/pedestrian infrastructure upgrades, alternative fuel potential) <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Clear direction/guidance for future development within Lautoka area in regards transport • Coordination of longer-term transport decarbonisation actions within strategic spatial master planning and conceptual municipal master plan for Lautoka.¹¹⁵

MITIGATION POTENTIAL	<p>NO FORMAL ACCOUNTING OF LAUTOKA'S TRANSPORT EMISSIONS IS AVAILABLE.</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> Existing planning processes for Lautoka City do not consider emissions reduction potential from transport nor integrate transport modes. <p><i>Baseline data establishment and feasibility studies are initial priorities.</i></p>
CO-BENEFITS/SDG LINKAGES	<ul style="list-style-type: none"> Enhanced community awareness and ownership of future transport options. Improved public health through increased uptake of active transport solutions, 40% reduction in harmful transport fuel emissions. Improved, more accessible and affordable transport solutions. Staged transition to clean transport employment/career training. Community pride and marketing potential Replicable and scalable <p>Relevant primary SDGs include 7, 11,13.</p> <p>Relevant secondary SDGs include 1,8, 9, 14,17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: to be determined</p> <p>Estimated development costs US\$50,000</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs US\$475,000</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21081 - Education and training in transport and storage;
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>MCTTT/MSAF, Ministry of Local Government, Lautoka City Council, Lautoka Port Authority, Ministry of Sugar, Ministry of Economy/CCD, Commissioner Western.</p> <p>SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>FRA, Chambers of Commerce, Sugar Board, private sector and industries, residents, transport operators, end users, church groups, schools, etc.</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 year needed for project development</p> <p>TIME NEEDED FOR SECURING FINANCE: 1-2 years needed to secure financing for Lautoka transport decarbonisation plan development (financing to implement the plan would require an estimated additional 1-3 years to secure once quantum is determined)</p> <p>TIME NEEDED FOR CAPACITY BUILDING: 1-4 years needed for research, consultation, outreach, visioning, strategic planning integration, and communications; Sub-sector implementation plan development e.g. Lautoka Green Port Plan; school bicycle recycling plan; e-public transport transition plan, etc.</p> <p>WHEN WILL THE PROJECT INVESTMENT START AND END: Start 2023 end 2026.</p> <p>IMMEDIATE STEPS (FIRST 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure technical assistance and capacity building support for items B and C B. Project concept development and planning C. Feasibility studies

POLICY/PLAN LINK	<p>STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):</p> <ul style="list-style-type: none"> • Goal 1: coordinated master planning • Goal 2: modernization plan <p>LAND AND MARITIME TRANSPORT POLICY (ISSUED 2015)</p> <ul style="list-style-type: none"> • 1.1.2 Public Private Partnerships • 1.1.16 Transport Integration & Remote Rural Access <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 8 Sustainable Transportation <p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017)</p> <ul style="list-style-type: none"> • Goal: Access to transportation through an efficient and sustainable transport network • Goal 3.1.2: A resource-efficient, cost-effective and environmentally sustainable energy sector <p>THE REPUBLIC OF FIJI NATIONAL CLIMATE CHANGE POLICY 2018-2030 (ISSUED 2019)</p> <ul style="list-style-type: none"> • Sub-objective 4.1.1: to decarbonise Fiji's transport sector <p>Lautoka Town Planning Scheme and master plan</p>
POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY	<p>The production of a decarbonisation plan for Lautoka's transport would require external financing through a grant to cover data collection and analysis, feasibility studies, drafting, consultation with key stakeholders (including private sector and households). An initial investment would be required to put together a grant application to undertake the planning, and to identify potential sources of finance to implement decarbonisation and multi-modal transport actions contained in the plan. Such investment will depend heavily on grants, but also incorporate aspects already provided for in national budget (e.g. town planning development, transport infrastructure upgrades, tax incentives for electric recharging stations).</p> <p>The plan would include consideration of a financing strategy for action implementation. For example, in the longer-term private sector investment could play a key role in terms of implementation of the plan once adopted (e.g. establishment of service industries for low-carbon transport vehicles/vessels) which could be supported by concessional loans.</p>
GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<p>No in depth integrated strategic planning exercise has yet been implemented at municipality level for transitioning entire communities to low-carbon transport futures in Fiji, although it is clearly a prerequisite of ambitious national targets.</p> <p>There is a minimal in-country planning capacity for this type of work so it suggested this gap be built through an existing partnership (such as the Singapore Corporation Enterprise)¹¹⁶ and also a long term research partnership with a recognised international school and a system of postgraduate intern exchange to build and retain local capacity over time.</p>
FINANCIAL SUSTAINABILITY	<p>This project comprises a coordinated and integrated planning exercise, and as such is a "one off" exercise dependent on a mix of grants and national budget allocations. The funding required to implement the strategy has not been quantified and detailed feasibility studies included in this project pipeline would determine the longer-term financial sustainability of decarbonising Lautoka's transport in an integrated fashion (combining maritime and land transport modes). It is assumed that the longer-term financial sustainability would depend upon national budget allocations (for infrastructure maintenance and upgrade), fiscal incentives (e.g. tax holidays/duty exemptions), and private investment (private sector and households/individuals). Improvements to public health, reduction in fuel use (and therefore cost) would be expected to balance these ongoing costs.</p>

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<ul style="list-style-type: none"> • Grant for project development: total cost equal to US\$ 50,000 • Grants for Technical Assistance & Capacity Building: total cost equal to US\$ 950,000 • Grants for implementation of infrastructure upgrades, decarbonisation projects, etc.: to be determined¹¹⁷ • National budget: infrastructure upgrades (roads, ports, rail)
POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES	<p>MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*</p> <ul style="list-style-type: none"> • Project Planning, Development & Design: ADB, WB, PRIF, UN Habitat, GGGI, NDC-Hub, SPC, UNESCO • Project Implementation & Management: ADB, WB, PRIF, UN Habitat, GGGI, NDC-Hub, SPC <p>POTENTIAL FINANCIAL PARTNERS/SOURCES:*</p> <ul style="list-style-type: none"> • Grants for Technical Assistance & Capacity Building: Singapore, ADB, WB, UN Habitat, UNESCO, UNDP • National budget: allocations for town planning for Lautoka as well as road and port infrastructure planning <p><i>*This is not a comprehensive list; other entities are possible as well.</i></p>
ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS	<p>ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE: US\$1,000,000</p> <ol style="list-style-type: none"> 1. Baseline data collection and project development/grant application(s) (US\$50,000) 2. Feasibility studies (for marine, pedestrian, road and rail transport options) and integration within Lautoka Town Planning scheme and master plans (US\$875,000) 3. Awareness raising and stakeholder engagement (US\$75,000)
INFORMATION AND MRV NEEDS	<ul style="list-style-type: none"> • Data and analysis of current fuel consumption for land and maritime transport for Lautoka • Options for decarbonising transport in Lautoka (including electricity needs assessment & RE electricity generation potential, and alternative fuels) • Planned changes to Lautoka Town Planning scheme and master plan
SUPPORTING REFERENCES	<ul style="list-style-type: none"> • Thomas D (June 2019) Urban Structure, Spatial Planning and Climate Emissions. NESC Secretariat Papers Paper No. 18. National Economic & Social Council http://files.nesc.ie/nesc_secretariat_papers/No_18_UrbanStructure_SpatialPlanning_ClimateEmmissions.pdf • Dalkmann & Sakamoto (2012) Low-carbon Green Growth Roadmap for Asia and the Pacific (Background Policy Paper) Urban Transport: Policy recommendations for the development of eco-efficient infrastructure. UNESCAP & KOICA. https://www.unescap.org/sites/default/files/7.%20Urban-Transport.pdf • UN Habitat (2012) Fiji: Lautoka City Urban Profile ISBN 978-92-1-132023-7 https://unhabitat.org/sites/default/files/documents/2019-05/fiji_lautoka_urban_profile.pdf • Fiji Ports Corporation Ltd (2019) Green Port Case Study: challenges and perspectives PowerPoint http://prdrse4all.spc.int/sites/default/files/agenda_item_6c_-_fpcl.pdf • Prakash P (22 Feb 2020) Master plan for Suva, Nadi and Lautoka to be completed by mid 2020. FBC News https://www.fbcnews.com.fj/business/master-plan-for-suva-nadi-and-lautoka-to-complete-by-mid-2020/ • International Transport Forum webpage Decarbonising Transport initiative (accessed Oct 2020) https://www.itf-oecd.org/decarbonising-transport • Ye Y et al (2017) Low-Carbon Transportation Orientated Urban Spatial Structure: Theory, Model and Case Study. Sustainability 2018 10,19; doi:10.3390/su10010019 https://www.mdpi.com/2071-1050/10/1/19/pdf

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	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)		1,2, 3	3	
Estimated CB & TA Costs (US\$)	0	5,00,000	25,000	1,025,000
Estimated Capital Investment (US\$)	0	0	0	0
Estimated GHG Mitigation (tCO ₂)	0	0	0	0
Estimated Annual GHG Mitigation In 2030 (tCO ₂ /yr)				0

T6 - AVIATION OPERATIONAL TRAINING PROGRAMME

NO.	T4
ACTION NAME	Operational Training Programme
SUB-SECTOR	Aviation
DESCRIPTION	Providing additional training to the FAL and ATS staff, as well as private sector operators, will be expected to yield minor emissions reduction potential through improved on-the-ground and in-flight systems management, air traffic management (ATM), and associated operational efficiency measures. This will not necessitate any specific change in technology, instead prioritizing behaviour and best practices to make additional contributions to the expected energy-efficiency gains realized through other technological interventions.
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • All personnel have received Operational Training concerning efficiency improvements. • 5% efficiency improvements and savings verified across industry operations. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • All training completed for private sector airline personnel on a national level, on an annual basis.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced emissions associated with taxiing and on-ground operations of aircraft. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Improved sub-sectoral performance by both ground and flight crew working with ATS, FAL, Fiji Airways/Fiji Link, and the rest of the private sector.
MITIGATION POTENTIAL	<p><4,267tCO₂/YR. AND A TOTAL OF 49,652 tCO₂ FOR 2020 – 2030</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • Based upon the estimated growth rates in the State Action Plan for the international aviation sub-sector, building on the LEDS' estimated 5,000,000 litres of Jet A1 kerosene and 2,500,000 litres of Avgas used domestically in 2013, relative to a total 350,812,390 litres for international fuel, under a BAU scenario, 116,637,066 litres of Jet A1 and 58,318,533 litres of Avgas would be consumed over the 2020-2030 period, yielding 441,868 tCO₂ in total. • Given the World Bank estimates of up to 8% efficiency savings for in-flight operations, and 5% efficiency savings for on-the-ground activities, up to 13% exists as emissions reduction potential.
CO-BENEFITS/ SDG LINKAGES	<p>CO-BENEFITS INCLUDE:</p> <ul style="list-style-type: none"> • Improved passenger comfort and level of service enjoyed (inclusive of reduced loading/unloading times, delays, and potentially reduced flight durations.) • Improved safety practices associated with increased awareness of management systems by operational staff. • Improved equity of service delivery to all citizens/areas of Fiji. <p>Relevant primary SDGs impacted: 8, 9, 12 and 13.</p> <p>Relevant secondary SDGs impacted: 1, 7, 10, 11, and 17.</p>

INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: >US\$0.¹¹⁸</p> <p>Estimated development costs US\$0.25 million.¹¹⁹</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$2.5 million.¹²⁰</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21050 - Air Transport; 21081 - Education and training in transport and storage;
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <ul style="list-style-type: none"> • Dept. of Civil Aviation, CAAF, Fiji Airways/Fiji Link, Private Sector, FAL, ATS <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <ul style="list-style-type: none"> • MOE, MCTTT
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: Up to 12 months (The process of identifying needs and gaps, identifying, selecting, and coordinating with training providers for delivery.)</p> <p>TIME NEEDED FOR SECURING FINANCE: Up to 12 months (Bilateral support for national standards and multilateral financing through technical assistance grants may begin at the necessary scale rapidly compared to infrastructure development/capital expenditures)</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: 2022 onward (The training process should be rolled out to all personnel across Fiji's airports/airstrips, occurring after a selection process, which could begin if the needs are identified and relevant operational training requirements are selected. Continual training for new staff and supplementary exercises for new technology will be necessary throughout the 2020-2030 period.)</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure technical assistance and capacity building support for items B and below. B. Prepare a new policy (or regulation) for inclusion of operational training initiatives in the FAL, Fiji Airways, and other private sector airline protocols. C. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK	<p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):</p> <ul style="list-style-type: none"> • Goal 3.1.7: A socially inclusive Fiji and empowered Fijians • Goal 3.2.1: Access to transportation through an efficient and sustainable transport network • Goal 3.2.3: Unlocking our economic potential through consistent and reliable domestic air services. • Goal 3.2.4: Enhancing Fiji's status as a vibrant and modern regional and international hub for people and cargo movement. • Goal 3.2.10: Promoting equal opportunities, access to basic services and building resilient communities. • Goal 3.2.16: A World-class tourism destination that increasingly adds value to the local economy. <p>MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);</p> <ul style="list-style-type: none"> • Goal 2: Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services). • Strategic Priority Goal 3.2.1.3: Extending rural transportation services. • Strategic Priority Goal 3.2.1.4: Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework • Strategic Priority Goal 3.2.10.2: Expanding the rural economy – development of rural infrastructure, rural electrification <p>LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)</p> <ul style="list-style-type: none"> • 4.4: Domestic Air Transport • 5.5.2: Infrastructure: Land, Maritime, and Air Transport <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 7: Energy Security • Thematic Area 8: Sustainable Transportation • Thematic Area 9: Technology and Innovation • Thematic Area 10: Greening Tourism and Manufacturing Industries
POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY	<p>Specifically targeted investments towards technical assistance and capacity building, with a focus on ongoing monitoring, reporting and verification of best practices on-the-ground, up to 5% fuel savings (US\$7,561,000) and 8% in-flight (US\$12,098,000) can be saved from 2022-2030 for a total of \$19,659,000, paying off the investment within 2 years.</p> <p>Both the private sector and the employees of SOEs would benefit from associated training opportunities, and these best practices should be transferrable within the aviation sector from airport to airport.</p> <p>This technical assistance and capacity development exercise should be provided as a grant, and supported by regional/international aviation institutions (PASO and ICAO), as well as multilateral development institutions which customarily fund aviation infrastructure (such as ADB and World Bank), along with bilateral trade and tourism partners invested in the service of aircraft which utilize airport facilities in Fiji (such as the Governments of Australia, China, Japan, New Zealand, etc.)</p>
GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<ul style="list-style-type: none"> • The primary barriers to implementation are currently budgeting, logistical, and scheduling constraints. • The aviation market in Fiji is relatively centralized around a few key airports but disseminating knowledge and training to generate benefits at all outer island airstrips will also require significant input and attention. • Phased delivery of training may be required to avoid interruptions or reductions in aviation services provided (particularly with Nadi Airport staff), which will mean additional costs incurred for providing multiple training sessions on the same material in different locations.

FINANCIAL SUSTAINABILITY	<p>Financial sustainability of providing capacity building opportunities for FAL, ATS, Fiji Airways/Fiji Link, and the rest of the private sector personnel across the national aviation sector should provide, for an estimated investment of US\$2.75m, annual savings of over US\$1.6m in fuel costs.</p> <p>Continued training, both of new staff and of existing staff in accordance with changing and updated best practices, may add to the total cost over the 2020-2030 period, but if finance is provided through technical assistance grant mechanisms, all savings accrued may be dedicated towards MRV and additional staff skill development as budget lines within each organization's annual operating/training budget.</p>
POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<p>It is expected operational training may be financed through technical assistance grants, ideally co-financed through established professional development and staff training budgets allocated within the FAL/ATS, and private sector budgets, supported by MOE through development partners.</p> <p>Total Project Value: US\$2.75m</p> <ul style="list-style-type: none"> • Grant for project development: 9.1% of total cost equal to US\$250,000 • Grants for Technical Assistance & Capacity Building: 90.9% of total cost equal to US\$ 2,500,000
POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES	<p>MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*</p> <ul style="list-style-type: none"> • Project Planning, Development & Design: PASO, UNDP, GGGI, NDC-Hub, ADB, ICAO, CTCN, EEAS, IRENA, WB/IFC, CIDCA, PCREEE-SPC, FAO, WFP • Project Implementation & Management: ADB, WB/IFC, GGGI, NDC-Hub, CIDCA, PCREEE-SPC, FAO <p>POTENTIAL FINANCING PARTNERS/SOURCES:*</p> <ul style="list-style-type: none"> • Credit Guarantees: GCF, ADB, WB/IFC, EIB • Debts & Loans: GCF, ADB, WB/IFC, EIB, commercial banks, FDB • Equity: FAL, ATS, Fiji Airways/Fiji Link, Private Sector, FNPF • Non-Government Grants for investment: GCF, GEF, WB/IFC, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT • Grants for Technical Assistance & Capacity Building: GEF, AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, WB/IFC, CIDCA, KOICA, UNDP, GGGI, UNESCAP, UNCTAD, ICAO, PASO • Government Budget & Taxes Incentives: MOE (state budget) • Risk Instruments: ADB, WB/IFC, EIB <p>*This is not a comprehensive list; other entities are possible as well. Partners known to recently support this type of action in Fiji and PICs are indicated in BOLD.</p>
ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS	<ol style="list-style-type: none"> 1. A comprehensive, sector-wide understanding of new international regulations, new technology, on-the-ground logistics management, in-flight systems, and correlation between these activities and emissions reductions will be instrumental to avoiding costs and improving efficiency of the aviation subsector. (US\$250,000). 2. Training requirements will extend beyond the operational needs of FAL/ATS, and the private sector to include CAAF and Dept. of Civil Aviation staff to provide expertise for policy and regulatory oversight. (US\$1,750,000). 3. Ongoing training needs to incorporate improved practices and address needs of new staff over operational period (US\$250,000).

**INFORMATION
AND MRV NEEDS**

- Implementation will require significant dissemination of information by relevant selected training institutions, which will entail testing for comprehension and compliance on the part of all trained personnel.
- It is expected that periodic reviews be included in the MRV process to evaluate retention and compliance.
- Staffing qualifications/certifications for various on-the-ground and in-flight systems will help in quantifying the understanding and adherence to new systems.
- Compliance statistics will need to be compared against fuel/energy consumption per kilometre, operational costs, and time aircraft spend on the ground, taxiing, and in-flight to determine efficacy of training.

**SUPPORTING
REFERENCES**

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	1, 2, 3	1, 2, 3	
Estimated CB & TA Costs (US\$)	0	0	0	0
Estimated Capital Investment (US\$)	2,000,000	321,429	178,571	2,500,00
Estimated GHG Mitigation (tCO₂)	4,267	14,484	30,900	49,652
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				6,957

T7 - VEHICLE REPLACEMENT PROGRAM FOR LORRIES AND BUSES

NO.	T7
ACTION NAME	Vehicle Replacement Program for Lorries and Buses
SUB-SECTOR	Land
DESCRIPTION	<p>This action improves the vehicle fleet in terms of fuel use per km by vehicle to achieve a fleetwide reduction in CO₂ emissions. Age limits (which are newly implemented in Fiji) for imported used vehicles would be combined with EURO-5 (or equivalent) vehicle fuel efficiency and/or carbon emissions standards for newly imported used and new vehicles. In addition, incentives for hybrid vehicles would be put in place when hybrid lorries and buses are readily available. As well a national programme for the scrappage of old vehicles will be implemented, including support for domestic use or export of recycled materials (e.g. T4).</p> <p>In 2020 Fiji is estimated to have up to 22,600 lorries on the road, as well as up to 1,800 buses and 550 minibuses. This mitigation action expects to substitute 5,500 lorries, 420 buses, and 200 min-buses between 2020 and 2030.</p> <p>Policy changes for imports and registration will be managed by MCTTT, and regulatory enforcement by LTA and FRCS. Physical implementation will be by the private sector.</p> <p>Differentiated taxation based on vehicle type will be implemented by FRCS. Equity will be provided by the private sector and commercial lending by commercial banks. RBF has the option to adjust Monetary Policy so that commercial banks to cover the Retail/Commercial individual loans indicated above.</p> <p>This opportunity may be kickstarted by focusing on the government fleet, and the associated leasing programmes. In this case a credit guarantee would be used to allow for cheaper and more secure commercial lending by banks to leasing companies.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Completed in-depth analysis of recent 2015 – 2020 policies for vehicles needs to determine new regulations. • Completed review of the government procurement of vehicles, providing new leasing criteria. • Improved information system at FRCS for vehicles (and linked to LTA) to know which vehicles meet efficiency requirements. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Set up and operate two financing facilities between FDB and commercial banks. One for supporting retail and commercial lending for efficient vehicles, and the second for supporting the commercial company leasing vehicles to the Government.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced fuel use (and associated emissions) through improved efficiency of national vehicle fleet.

MITIGATION POTENTIAL	36,000 tCO₂/YR IN 2030 AND A TOTAL OF 250,000 tCO₂ FOR 2020 – 2030 KEY ASSUMPTIONS: <ul style="list-style-type: none"> • This mitigation action expects to substitute 5,500 lorries, 420 buses, and 200 min-buses between 2020 and 2030. • Average emission reduction is 10% on a g CO₂/km basis for ICEs, and 30% on a g CO₂/km basis for hybrids. • Expected replacement of buses is based on historic import volumes and up to 50% will be hybrids, and the remaining will be efficient ICEs. Replacement of lorries and minibuses will be 100% efficient ICEs. <p><i>Average driving distance for lorries is 50,000 km/yr, buses and minibuses are 60,000 km/yr.</i></p>
CO-BENEFITS/SDG LINKAGES	<p>The efficient land transport network will reduce both localized air pollutants associated with vehicle emissions and reduce risks associated with oil spills and contamination of both the coastal marine environment and inland waterways. Reducing dependence on imported fossil fuels will encourage retention.</p> <p>Relevant primary SDGs impacted: 7, 8, 13</p> <p>Relevant secondary SDGs impacted: 3, 11, 12, and 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: >US\$134M¹²¹</p> <p>Estimated development costs: US\$150,000</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$650,000</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21081 - Education and training in transport and storage;
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <ul style="list-style-type: none"> • MCTTT: Guiding policy development to support preferential policy toward vehicles. • LTA: Serves as regulator for vehicles operating on the Fiji land transport network, • FRCS: Regulates and enforces customs and imports • Private Sector: Sales/imports the vehicles. <p>SUPPORTING ENTITY/STAKEHOLDERS:</p> <ul style="list-style-type: none"> • Bilateral Donors (EU, NZ-MFAT, AU-DFAT, JICA, GIZ, UK-FCDO etc.): Support financing business development facilities, trade facilitation, and technology transfer (particularly in working with reliable ANPR manufacturers/service providers.). • Multilateral Development Institutions (ADB, EIB, GCF, World Bank, UN system): support financing of technical assistance to structure financial models around generating revenue on a responsive platform. • MOE: Allocates budget to support infrastructure spending through MIMS for EFL, and FRA, and MCTTT for LTA.

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: may be expected to take up to 12 months.

TIME NEEDED FOR SECURING FINANCE: Financing the pilot phase through multilateral institutions may take up to 12 months for review and approval.

WHEN WILL THE PROJECT/INVESTMENT START AND END: 2022 onward (The training process should be rolled out to all personnel across Fiji's airports/airstrips, occurring after a selection process, which could begin if the needs are identified and relevant operational training requirements are selected. Continual training for new staff and supplementary exercises for new technology will be necessary throughout the 2020-2030 period.)

- A. Secure technical assistance and capacity building support for items B, C, and D below.
- B. Completed in-depth analysis of recent 2015 – 2020 policies for vehicles needs to determine new regulations.
- C. Completed review of the government procurement of vehicles, providing new leasing criteria.
- D. Setting up a commercial lending facility (with credit guarantee) with commercial banks to support leasing companies supplying vehicles to the government.

POLICY/PLAN LINK

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):

- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
- **Goal 3.2.9:** Creating vibrant and environmentally sustainable urban centres.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.2:** Land Transport
- **5.5.2:** Infrastructure: Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 7:** Energy Security
- **Thematic Area 8:** Sustainable Transportation

NDC IMPLEMENTATION ROADMAP 2017-2030 (ISSUED 2017)

- **Key enabling element:** develop a Maritime Transport Energy & GHG Mitigation Plan
- **Short-term action:** Mitigation Action T2: Vehicle Replacement Programme (including Scrappage)

**POTENTIAL
BUSINESS
MODEL
AND FINANCING
STRATEGY**

The private sector is instrumental in making vehicle purchase choices, both at a business and personal/household level. This requires significant investment which is already taking place in Fiji through own equity and commercial lending.

The above business and financing model arrangements shall continue in Fiji, where this mitigation action should focus on two elements to encourage the more efficient vehicle fleet.

The first elements would be to amend the duties and excise tax scheme for imported vehicles, so that the highest efficiency vehicles have the lowest duties and excise tax, and the lowest efficiency vehicles have the lowest duties and excise tax. This practice will likely slightly increase the cost of imported vehicles in the short term.

The second element would be to create a lending facility (through monetary policy or via credit guarantees) overseen by FDB and managed by commercial banks. The purpose of the lending facility is to reduce the risk of lending by commercial banks, and thus lower their interest rate, and lengthen loan periods, on retail and commercial lending of the vehicles (either at the import point or the retail point). The lower interest rates and longer loan periods will help offset the potential increase in consumer costs of higher efficient vehicles.

**GAPS & BARRIERS TO
IMPLEMENTATION,
INCLUDING
PROPOSED
ENABLING
MECHANISMS**

- The disparity in price points between second-hand ICE automobiles and new highly efficient vehicle will be a barrier to market acceptance.
- As duty and excise designations for vehicles are not fully linked to their levels of CO₂ emission per km.
- The use of Government procurement can facilitate the inclusion of highly efficient vehicles, which are leased new by the Government and then sold by the leasing company on the domestic market after the lease is expired.

**FINANCIAL
SUSTAINABILITY**

See the section on “Potential Business Model and Financing Strategy”

Regulatory means shall be established as a part of the TA & CB for the safe disposal of batteries once EV are no longer operational, and this may include the takeback/recycling agreements with vehicle/battery suppliers.

**POTENTIAL
FINANCING
AND NEED FOR
FINANCIAL
SUPPORT AND/OR
FINANCIAL
INSTRUMENTS**

Estimated capital investment needed for the physical implementation is: >US\$ 134M

- Private equity of at least 20% is expected (2020 – 2030): >US\$ 26M for the private sector.
- Retail/Commercial individual loans of 80% or less is expected (2020 – 2030): >US\$ 108M for the private sector.
- Monetary Policy of providing low interest capital to commercial banks to cover the Retail/Commercial individual loans indicated above. This would be similar to the RBF Import Substitution and Export Finance Facility.
- OR (without the above) A credit guarantee is made available to commercial banks at low interest to back at least 50% of the Retail/Commercial individual loans.

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: **FDB**, UNESCAP, **GGGI**, NDC-Hub, **ADB**, **WB/IFC**, PRIF, IEA, IRENA, CTCN, EEAS, **SPC**, **UNDP**, UNIDO, USP, UNCTAD
- Project Implementation & Management: **FDB**, **UNDP**, GGGI, NDC-Hub, **ADB**, **WB/IFC**, CIDCA, EEAS, SPC

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantees: **GCF**, **ADB**, **WB/IFC**, EIB
- Debts & Loans: **FDB**, **ADB**, **WB/IFC**, EIB, **GCF**, **Commercial Banks**
- Equity: **Fijian Government/SOEs**, **Private Companies/Vehicle Owners**
- Grants for Technical Assistance & Capacity Building: **GEF**, **AU-DFAT**, **NZ-MFAT**, CTCN, **ADB**, **GCF**, **WB/IFC**, **KOICA**, EEAS, **UNDP**, **GIZ**
- Government Budget & Taxes Incentives: **MOE (FRCS)**
- Risk Instruments: **ADB**, **WB/IFC**, **EIB**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$ 650,000

1. An in-depth analysis of recent 2015 – 2020 policies for vehicles needs to be made done determined which regulations have worked best based on real data, and reviewing in this context the various planning studies made during this time, and proposing a revised duties and taxation scheme supporting FRCS. (US\$45,000).
2. TA for the review of the government procurement of vehicles, providing leasing criteria and carrying out the first years leasing tender to increase the efficiency of the governments fleet of vehicles. (US\$30,000).¹²²
3. Improving information system at FRCS for vehicles (and linked to LTA) to know which vehicles meet efficiency requirements, and duties/excise rates to apply, and those still on the road. (US\$350,000).
4. Set up and operate one financing facilities between FDB and commercial banks, for supporting retail and commercial lending for efficient vehicles. (US\$225,000)

The above may be reduced if T7 is implemented in parallel.

INFORMATION AND MRV NEEDS

- Central MRV database is linked to LTA and FRCA data for:
- Total number of vehicle stock (with type of vehicle, vehicle ID-number; age, fuel type, status of registration)
- For new/imported vehicles: (Type, age, fuel type, CO2e/km, year of first registration)
- Information about incentives provided from GOF (e.g. tax waver)
- Confirmation of scrappage completed per vehicle.

SUPPORTING REFERENCES

NDC Implementation Roadmap 2017-2030 (issued 2017).
FRCS importation data to 2018.
LTA registration data to 2018.

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2, 3, 4	3, 4	3	
Estimated CB & TA Costs (US\$)	600,000	75,000	125,000	800,000
Estimated Capital Investment (US\$)	38,646,00	38,697,00	57,057,00	134,400,000
Estimated GHG Mitigation (tCO₂)	35,000	61,000	154,000	250,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				36,000

T8 - SAIL-POWERED PASSENGER/CARGO SHIP

NO.	T8
ACTION NAME	Sail-powered Passenger/Cargo Ship demonstration trial
SUB-SECTOR	Maritime Transport
DESCRIPTION	<p>The main inter-island shipping routes connecting Fiji's 330 islands have historically been serviced using aged, second-hand, Pax/Cargo ferries of up to 5,000 tonnes. This vessel type is the largest in the domestic maritime fleet and produces the greatest proportion of emissions for the sector/vessel. Usually retired ferries at the end of their service life, they are bought at low cost or scrap value. Related high fuel costs and low profit margins, combined with systemic issues of affordable maritime finance and insurance underwriting, means operators employ a low asset cost approach with ever increasing maintenance and operational costs. Such vessels may burn up to 12-15 tonnes of diesel/day. There are minimal options for any major efficiency or abatement of such vessels given their age and design and little incentive (or even available options) for ship operators to vary the established business model. The situation is replicated in many other island and maritime countries. Designs, such as the Neoline vessel, now offer an alternative promising in excess of 80% efficiency savings through a whole-of-ship design approach (including advanced hull and propulsion design, waste heat recovery, wind-hybrid drive, etc.). Deploying this level of technology would require a change in business model to a high CAPEX/low OPEX approach. A demonstration model is proposed where GSS initially owns and operates a new build vessel under strictly monitored trials to demonstrate efficiency and financial savings potential to the private sector. If successful, the vessel would then be put up for sale in Fiji for purchase by private sector.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Feasibility studies completed • Project concept developed • Crew trained in vessel operation and maintenance • Sea trials commenced • Monitoring report <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Loan secured • Vessel ordered • Vessel delivered
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced fossil fuel consumption and emissions from vessel type which is one of the major sources of maritime emissions • Proof of concept vessel to provide real data for Fiji's shipping private sector <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Newer more energy-efficient vessel available to the domestic private fleet after positive trials • Demonstrated leadership by Fiji Government in area of great investment globally

MITIGATION POTENTIAL	~8,000tCO ₂ /YR. AND A TOTAL OF ~40,000tCO ₂ FOR 2020 – 2030 (ASSUMES VESSEL OPERATIONAL IN 2024)
	<p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • Assumes vessel would be operational by 2026 • Assumes a conventional ship would burn ~12 tonne MDO/day operational 270 days/year. There could be up to 50% variance on this figure • Assumes at least 70% efficiencies achievable¹²³ <p><i>Does not include savings if a successful pilot is replicated/scaled. There is an immediate national market and a larger regional market for vessels of this size.</i></p>
CO-BENEFITS/SDG LINKAGES	<ul style="list-style-type: none"> • Essential national connectivity for main Fijian centres and communities, primary logistics mover for all aspects of cargo, trade and internal passenger movements at this scale, enabler of sustainable development initiatives and essential government services throughout the island groups through regular logistic network provision. • If it results in reduced transport costs due to improved operational efficiencies this will result in savings for both state maritime budgets and improved service delivery to end consumer. • Critical and vital link in national logistics chain • Potential for fabrication, manufacture of some local componentry, maintenance, supply, provisioning contracts, etc. Potential increases if regional application as Fiji as a logical hub. • Greatly increased safety potential • Replicable and scalable <p>Relevant primary SDGs include 7, 13, 14.</p> <p>Relevant secondary SDGs include 1, 8, 12, 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation US\$35m.</p> <p>Estimated development costs US\$50,000.</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs US\$1.3m.</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21040 - Water Transport; 21081 - Education and training in transport and storage;
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>TPU, PS (Project oversight), GSS, MSAF (vessel trials and operations/certification), MoE/Climate Change Division (emissions accounting), FMA (cadet training).</p> <p>SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>PBSP (technical cooperation and support network), USP MCST (technical support and access to academic networks), SPC (technical support through MTCC).</p>

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: Time needed for securing finance: 1-3 years needed to secure financing for vessel acquisition and monitored trials

TIME NEEDED FOR VESSEL ACQUISITION: 1-2 years construction, trials, commissioning, business plan, management structure, operational SOPs, MRV plan

TIME NEEDED FOR MONITORED TRIALS: 3 years needed for MRV of effectiveness of vessel in both return on investment projections and for reducing emissions

WHEN WILL THE PROJECT INVESTMENT START AND END: Start 2021 end 2030 (mitigation would continue beyond 2030)

IMMEDIATE STEPS FIRST 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B and C
- B. Project concept development and planning
- C. Feasibility studies and business case

POLICY/PLAN LINK

THE REPUBLIC OF FIJI NATIONAL CLIMATE CHANGE POLICY 2018-2030 (ISSUED 2019)

- **Sub-objective 4.1.1:** to decarbonise Fiji's transport sector
- **Objective 4.2:** to prioritize GHG mitigation initiatives that increase national resilience and help achieve the SDGs

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017)

- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
- **Goal 3.2.2** Inter-island network – safe, efficient, reliable and affordable shipping services

STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- **Goal 1:** safe, efficient, reliable, and affordable shipping services
- **Goal 2:** modernization plan (includes acquisition of new GSS vessel)

NDC IMPLEMENTATION ROADMAP 2017-2030 (ISSUED 2017)

- Identifies long-term action as development of a strategy for electric transport transition and preparation for transition of maritime transport sector using alternative propulsion to fossil fuels using renewable energy

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.3** Maritime transport

MARITIME TRANSPORT POLICY (ISSUED 2015)

- **Objective:** communities and the country enjoy better access to passenger and cargo shipping services
- **1.1.20:** Domestic Shipping and Green Growth

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 8** Sustainable Transportation

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

The options for financing and potential business models for a vessel of this size in Fiji are extremely limited. Fiji's private sector currently purchases cheap older vessels from overseas at the end of their lives, and runs these, often without insurance, for as long as is possible before selling these as scrap or retiring them from service. Fiji Government, recognising this dilemma, has proposed a business model whereby the GSS acquires new vessels, trials them for several years, and then puts these newer vessels on the local market. This project is designed with this model in mind.

Whilst the national budget often includes allocation for new vessel purchase (usually of landing craft or similar), the type of vessel proposed under this project is of significantly higher Capex, and therefore a grant is required to subsidise the vessel acquisition costs. The grant would be for the preparatory stages (feasibility studies, vessel design) and construction/purchase of a new vessel to be owned and operated by GSS.

The much higher upfront Capex costs of purchasing a new purpose-built vessel versus a second-hand vessel limit commercial bank options (neither ADB nor WB have funded purchase of vessels, instead funding grants and loans for ports, jetties, and other maritime transport infrastructure).

PBSP offers an alternative potential future funding source, enabling GSS to access a regional funding pool made from blended financing sourced from mixture of grants and loans. PBSP will target GCF and other sources of funding to provide a pool of blended finance for participating Pacific governments and private sector to access specifically for a suite of shipping decarbonisation initiatives. PBSP is therefore the proposed financing strategy for this and the other maritime transport pilot projects. The project includes funding for hiring and training of crew for this vessel type (until 2030). It would be anticipated that by 2030 the vessel would have demonstrated its energy-efficiency and effectiveness and would be put up for sale to the local private sector to run the vessel on routes within Fiji (these could be either the "economical" or "uneconomical" routes).

Operational costs (vessel maintenance and fuel) would be from within national budget allocation for GSS and revenue generated from freight and passenger charges.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

The project is being promoted in the context of the PBSP and assumes that it is one element of an overall transition that also addresses the underlying issues of access to appropriate investment finance and insurance. Until there is a shift from the current investment model, there will be no real options to meet national emissions reduction targets for this vessel type. Assuming the broader project can meet this need, the logical next step is a monitored proof of concept vessel trial of a high efficiency design to demonstrate real time operational efficiency savings to the private sector. As a demonstration pilot of a new build design and the first such SIDS situated deployment globally, an initial research phase of the vessel, physical and financial operating environments and a comprehensive MRV plan will be required throughout the project. The pilot and experimental nature of the project suggests that a strong national government/research academy/bilateral and industry partner approach is desirable (as per the proven Norwegian model).

FINANCIAL SUSTAINABILITY

It is projected that the vessel design (i.e. low-carbon, utilising wind to assist in vessel propulsion, use of solar PV for auxiliary power needs) would lead to considerable operational savings, both as the vessel would be new and purpose built, but also due to reduced need for diesel fuel for the main engines. Whilst the higher CAPEX costs would have to be covered by grant initially, the OPEX costs over the anticipated lifespan of the vessel (25 years) due to reduced fuel consumption should result in a financially sustainable ship when compared to other vessels currently used for inter-island passenger/cargo transport. Without grants this project is not financially sustainable in the short term, due to the considerably higher Capex involved as a "first mover". Longer term financial sustainability is possible once GSS sells the vessel to the private sector, dependent on a range of external factors (such as operations, maintenance, etc).

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

This project would need to be either a. fully externally publicly financed as a pilot and research demonstration or b. as a PPP with an experienced operator. As the government SOE has expressed their intention to own and operate, it is assumed this would be a donor-funded project. The project could be a good fit between a trusted development partner such as Japan and their relevant industry research and development partners. As a demonstration pilot of a new build design and the first such SIDS situated deployment globally at this vessel scale, an initial research phase of the vessel, physical and financial operating environments and a comprehensive MRV plan will be required throughout the project.

FINANCIAL SUPPORT NEEDED INCLUDES:

- Grant for project development: 0.14% of total cost equal to US\$ 50,000
- Grants for Technical Assistance & Capacity Building: 3.58% of total cost equal to US\$ 1,300,000
- Grant for vessel purchase: 96.29% of total cost equal to US\$ 35,000,000

NATIONAL BUDGET: operating costs minus crew costs (assumed to be covered by existing budget allocation to GSS)

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** PBSP¹²⁴, **ADB, WB**, PRIF, NDC Hub, SPC, USP
- **Project Implementation & Management:** PBSP, **ADB, WB**, PRIF, SPC
- **Grants for Technical Assistance & Capacity Building:** **ADB, WB**, PRIF, **GCF**, GEF, EU/EC, Australia, NZ, France, GCF, CIDCA, KOICA, JICA

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Grants for Investment:** **WB**, ADB, **GCF**, GEF
- **National budget:** contribution towards vessel acquisition¹²⁵ MOE
- **Insurance/Underwriting:** **ADB, WB**, EIB
- **Taxation:** MOE

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$1,350,000

1. Concept note/proposal application development (US\$50,000)
2. Vessel design options review, feasibility studies, route planning, vessel build plans, etc. (US\$250,000)
3. Staff costs (for project management, vessel inspection/certification, and MVR) and crew salaries (US\$900,000)

Crew training (US\$ 150,000)

INFORMATION AND MRV NEEDS

- Fuel/emissions data, CAPEX and annual OPEX accounts for existing and replacement vessels
- Transport need (passenger/cargo volumes on existing “economical” and “uneconomical” routes)

SUPPORTING REFERENCES

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- Ship Technology (4 July 2019) Neopolia to build two sail-powered ro-ro cargo ships for Neoline <https://www.ship-technology.com/news/neoline-neopolia-ro-ro-cargo-ships/>
- Vahs et al (2019) Technical and Operational Options Catalogue: Proposal for technical and operational options to reduce fuel consumption and emissions from inter atoll transport and inside lagoon transport. University of Applied Sciences Emden-Leer https://mcst-rmiusp.org/images/Projects/TLCSeaT_HEL_TechnicalAndOperationalOptionsCatalog.pdf

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)		1, 2, 3, 4	3, 4	
Estimated CB & TA Costs (US\$)	0	550,00	800,000	1,350,00
Estimated Capital Investment (US\$)	0	35,000,000	0	35,000,000
Estimated GHG Mitigation (tCO₂)	0	0	40,000	40,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				8,000

T9 - END-OF-LIFE VEHICLE PROGRAMME

NO.	T9
ACTION NAME	End-of-Life Vehicle Programme
SUB-SECTOR	Land Transport
DESCRIPTION	<p>Derelict vehicles are an often-hidden consequence of the proliferation of vehicles in Fiji. The nation's growing second-hand vehicle market imports with it the end-of-life vehicle issues from the countries exporting vehicles before they dispose of them. Given the disparity between FBOS and LTA registration figures (wherein LTA only keeps active registrations on the books, while FBOS was reporting cumulative figures through 2012), it is expected at least 92,943 vehicles as of 2012 were largely deregistered and no longer functioning. Given the vehicles brought in following this period, the assumption over 100,000 derelict vehicles are present across the nation remains a conservative estimate, as no nationally endorsed mechanism for disassembling, consolidating, and exporting scrapped vehicles currently exists.</p> <p>There are scrap metal traders and lead acid battery collectors, but the recent hybrid vehicle influx and lithium ion battery sets have not been addressed in policy updates over the past decade. The opportunity for government intervention to be accompanied by private sector operators in the collection and export of scrap materials from recovered vehicles may be addressed through public-private partnerships or service contract/licensing arrangements.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Logistics and supply chain management of the removal of derelict vehicles. • Training and support to establish processing, recycling, packing, and shipping of derelict vehicle chasses and associated parts. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Supporting establishment of facilities to process at least 100,000 legacy vehicles and up to 7,000 per annum.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Removal/recovery of waste materials for salvage and/or export. • Opportunity for sequestration of carbon through restored vegetation. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • New industry developed. • Remediation and beautification of currently occupied and degraded land area.
MITIGATION POTENTIAL	<p>2,280 tCO₂/yr by 2030. and a total of 11,200 tCO₂ for 2020 – 2030</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • Given the sequestration potential, land reclamation may account for 1,372,045m² from automobiles for a total of 1605 tCO₂ from at least 130,764 legacy vehicles.¹²⁶ • At least 62 tCO₂ per annum in additional sequestration from 2022 onward in avoided land degradation.¹²⁷ <p><i>Given the number of legacy vehicles, their recovery and scrappage would be spread over the 2022-2030 period. The sequestration should be calculated as cumulative for the rehabilitated land area recovered when vehicles are removed.</i></p>

CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Recovery of devalued land • Rehabilitation of both greenspace and otherwise usable land • Resource recovery potential (for steel recycling and other material processing) • Beautification/remediation of land to improve aesthetic value for locals and, upon resumption of travel, tourists bringing in additional revenue to the economy. <p>Relevant primary SDGs impacted: 9, 15</p> <p>Relevant secondary SDGs impacted: 3, 6, 8, 10, 11, 13, 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: >US\$5,000,000.¹²⁸</p> <p>Estimated development costs: >\$150,000.¹²⁹</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: >US\$300,000.¹³⁰</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <p>15155 - Tax policy and administration support;</p> <p>21011 - Transport policy, planning and administration;</p> <p>21013 - Transport regulation;</p> <p>21081 - Education and training in transport and storage;</p> <p>43032 – Urban Development; 33120 – Trade facilitation;</p>
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>MIMS, MCTTT, LTA.</p> <p>SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>MOE, FCCC, MOE, Private Sector Companies, SPREP, and UNEP.</p>

**GENERAL
TIMELINE FOR
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AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: 6-9 months (Structures for organizing vehicle disposal may be derived from existing systems, however, the unique logistical challenges and costs of identifying and recovering derelict vehicles from outer islands will require much more scoping and consultation than in many other scenarios. Similar waste audit and recommendation reports being generated around design of waste management systems may take 6 months and market assessment of the appropriate price thresholds for incentivizing appropriate disposal may take another 1-3 months.)

TIME NEEDED FOR SECURING FINANCE: 6-12 months (Financial instruments will need to be put in place to establish the end-of-life vehicle management system between donors/financiers, private sector, and Government. This may be structured to sustainably fund itself following start-up costs based upon the cost recovery from the steel recycling market.)

WHEN WILL THE PROJECT/INVESTMENT START AND END: 2022 (It can reasonably be expected to begin to draw down the number of derelict vehicles and continually prevent the dumping of new vehicles through enforcing penalties for the mismanagement of vehicle waste, running indefinitely to address ongoing completion of vehicle lifecycles.)

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B, C, and D below.
- B. Prepare a new policy (or regulation) for standards and practices around vehicle scrappage and disposal requirements.
- C. Determine, through one or more feasibility study(s), the appropriate locations for vehicle scrappage facilities around Fiji (Central, Northern, and Western Divisions, etc.).
- D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations including land considerations.

POLICY/PLAN LINK

As addressed in the LEDS, long-term mitigation actions include mandating vehicle scrapping or maximum vehicle age in coordination with the increased adoption of EVs and alternative modes of transport. The National Development Plan notes the need for a strategy around proper vehicle de-registration and scrapping of vehicles to maintain national fleet composition at manageable levels, and the Green Growth Framework established a medium term (3-5 year) goal to accelerate vehicle replacement schemes which has yet to come to fruition.

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):

- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
- **Goal 3.2.9:** Creating vibrant and environmentally sustainable urban centres.
- **Goal 3.2.10:** Promoting equal opportunities, access to basic services and building resilient communities.
- **Goal 3.2.16:** A World-class tourism destination that increasingly adds value to the local economy.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.1:** Ensure safe, efficient (including reducing traffic congestion) and affordable transportation services.
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework
- **Strategic Priority Goal 3.2.10.2:** Expanding the rural economy – development of rural infrastructure, rural electrification

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.2:** Land Transport
- **5.5.2:** Infrastructure: Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 2:** Waste Management
- **Thematic Area 8:** Sustainable Transportation

NDC IMPLEMENTATION ROADMAP

- **Key Enabling Elements:**
 - » Design and implement a scrappage policy (including standards, recycling) and incentive scheme.
 - » Design and implement a recycling and disposal policy for batteries of hybrid vehicles in place.
 - » Complete a feasibility study and Environmental Impact Assessment (EIA) per the mitigation actions.
 - » Design and implement eligibility criteria development for vehicles scrapped and replaced.
- **Short-term action: Mitigation Action T1:** Vehicle Replacement Programme (including Hybrid Vehicles and Scrappage)
- **Short-term action: Mitigation Action T2:** Vehicle Replacement Programme (including Scrappage)

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

- Due to the need for a centralized mechanism for tracking recovery of derelict vehicles, government involvement in the establishment and oversight of vehicle scrappage facilities will be instrumental to successful operations.
- The private sector should be involved heavily in the collection and deposit process for the derelict vehicles currently present around Fiji. Trade and refurbishment of any salvageable vehicle components should be undertaken by private sector industry.
- There are three avenues of approach that may be taken by the Fijian Government to manage the Whole-of-Lifecycle Vehicle programme, depending on Ministerial capacity, purview, and preferences.
 - » the government could delegate within the Ministerial structure, seating the programme and all facilities under either ministerial staff in a newly formed division or State-owned Enterprise (such as an expansion of LTA to handle vehicles post-deregistration.)
 - » The other options involve private sector engagement, such as; tendering for a Public-Private Partnership wherein the mechanism for investment, revenue collection, and operation of car scrappage facilities is handled by a private sector entity, operating under one of the Ministries (MIMS or MCTTT, most likely) instead of establishing an SOE. The market is larger than elsewhere in the region, and it is possible multiple businesses would prove able to handle breaking down vehicles in Central/Eastern, Western, and Northern Divisions, as an example.
- Those who deliver a derelict car with certificate of registration and title will receive a certificate of destruction, which can be provided by LTA or an authorized agent (similar to the inspection protocols currently in place.)

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- The establishment of a scrapyard and facility for storage of derelict vehicles will require significant allocation of land to accommodate the collection and processing of >130k legacy vehicles and the additional 69,604 vehicles estimated to be due for removal over the 2020-2030 period at 3.57% removal per year from 2022-2030), and this may prove complicated to delineate based upon existing land use and tenure arrangements.
- Data collection on the distribution of derelict vehicles will be a significant logistical undertaking.
- The actual logistics of removing derelict vehicles from outer islands will prove complicated given the current capacity limitations in loading large vehicles as cargo when they're not fit to roll-on/roll-off under their own power and costs will be prohibitive for this service between islands.
- Disassembly of chasses and removal will likely need to be coupled with maritime transport project activities to meet the needs of this programme, as high transportation costs inhibit profitability.
- The notice period, grace period, and penalties for failing to remove derelict vehicles or failing to properly dispose of a vehicle upon deregistration will require market assessment.
- The start-up financing for the infrastructure, training, and initial collection will likely need to be sourced outside of Fiji, which will require adherence to a range of donor requirements.

FINANCIAL SUSTAINABILITY

- Given the current legacy of derelict vehicles distributed across the country, and both the expected 8-12 year lifespan of existing vehicles in the market coupled with the expected increases in the land transport vehicle fleet, the whole-of-lifecycle vehicle programme will be needed for the indefinite future.
- Pending availability of a sufficient allocation of land for the consolidation and disassembly of derelict vehicles, the upfront costs associated with needed scrapping activities may ideally be supported through private sector investment coupled with TA/capacity building grants from regional/international partners (such as ADB, WB/IFC, DFAT-AU/MFAT-NZ, UNEP, and SPREP) to upskill a local labour force to undertaken scrapping and salvage activities for the foreseeable future.
- The main barrier to financial sustainability will be in the transport (both by land and maritime means) of derelict vehicles, which under the BAU scenario, would be prohibitively expensive and sufficiently cut into the profitability of breaking down and exporting scrap materials to make operation of the programme unsustainable without additional support.
- This support can be provided through state budgetary allocations raised through a disposal levy upon import of vehicles, as well as revenue raised through penalties/fines for improper disposal of vehicles.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- Multilateral financial institutions may be necessary for the capital investment in the vehicle processing facility, as well as initial support to financing operationalization to begin the removal of the existing legacy derelict vehicles.
- It is possible a public-private partnership may be structured for various aspects of the programme to be handled by different entities. The public finance may be possibly supported by concessional loans from the World Bank and ADB for vehicle dismantling and export infrastructure, and for private sector components, Commercial Banks, FDB, and IFC may have funding sources available to participate in investment and operations of the programme. An expected total cost of US\$5,450,000 is projected.
- Capital Investment: 91.7% of the total cost, equating to US\$2.5m Equity from the Private Sector (or MOE and a combination of MCTTT and LTA or another SOE if a PPP is not desired), and 50% concessional lending from ADB/WB/IFC equal to US\$2.5m.
- Grants for Project Development: 2.8% of total cost, equal to US\$150,000
- Grants for TA/CB and project development: 5.5% from multilateral/bilateral financing facilities (ADB/WB/IFC) equal to US\$300,000.

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** **FDB**, UNESCAP, GGGI, NDC-Hub, **ADB**, **WB/IFC**, EEAS, SPREP, UNEP, MCST-USP
- **Project Implementation & Management:** **SPREP**, UNEP, GGGI, NDC-Hub, ADB, IUCN, FDB, **WB/IFC**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** GCF, **ADB**, **WB/IFC**, EIB
- **Debts & Loans:** **FDB**, **Commercial Banks**, **ADB**, **WB/IFC**, EIB, CIDCA
- **Equity:** LTA (or other SOE under MCTTT), **Private Companies**
- **Non-Government Grants for investment:** AU-DFAT, NZ-MFAT, GCF, GEF, **ADB**, **WB/IFC**, EIB, CIDCA, EEAS, KOICA
- **Grants for Technical Assistance & Capacity Building:** GEF, GCF, ADB, WB/IFC, KOICA, EEAS, UNDP, GGGI, UNIDO, SPREP, GIZ, UNDP, UNEP, **AU-DFAT**, **NZ-MFAT**
- **Government Budget & Taxes Incentives:** **MOE (state budget)**
- **Risk Instruments:** **ADB**, **WB/IFC**, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$1,350,000¹³¹

1. Practical training will be required for the servicing and maintenance of compacting machinery and other disassembly equipment, as well as outfitting trained technicians with relevant equipment and tools. This includes the engagement of international suppliers to attract them to the Fijian market. (US\$200,000)
2. A marketing push to promote the financial mechanism to the public will be required across all islands to encourage recovery of derelict vehicles. (US\$100,000)

INFORMATION AND MRV NEEDS

- Data will be required in an initial assessment to validate how many derelicts and/or deregistered vehicles need to be removed from Fiji against which a percentage of collection and rate of removal can be determined.
- Statistics on personnel engaged in the vehicle recovery industry will be required to determine if the scrapping industry is sufficient to meet the needs of vehicle disassembly and removal.
- Tonnage collected, tonnage stored, and tonnage exported will be necessary to determine material flow of vehicle scraps and evaluate if reductions are taking place at a sufficient rate.
- Bills of lading and export permits for each shipment will need to be collected and maintained to evaluate where materials are being transported.
- The revenue of metal sold to scrap markets will need to be recorded for comparison with the finances required to operate the Whole-of-Lifecycle Vehicle programme.

SUPPORTING REFERENCES

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**SUPPORTING
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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	1,2	1,2	
Estimated CB & TA Costs (US\$)	350,000	37,500	62,500	450,00
Estimated Capital Investment (US\$)	4,000,000	375,000	625,000	5,000,000
Estimated GHG Mitigation (tCO₂)	241	2,195	8,752	11,187
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				2,276

T10 - ZERO CARBON PASSENGER

NO.	T10
ACTION NAME	Zero Carbon Passenger Ferry Trials
SUB-SECTOR	Maritime Transport
DESCRIPTION	<p>Various proposals for trials of harbour ferries to reduce road congestion in Suva have been floated in recent years, including review of shore-side infrastructure requirements for passenger pick-up/drop-off points for both Lami-Suva corridor and Nausori-Suva corridor. There are already several fast ferries¹³² using fossil fuels servicing the tourism market predominantly in Nadi waters including Mamanuca and Yasawa, where jetties and pontoons are already in place. Harbour and short distance routes (such as inside Suva harbour and Denarau-Mamanucas) are ideal for trialling of electric/hybrid vessels and there are now numerous examples around the world of zero carbon harbour ferries in operation or being built. This project involves the government providing the enabling environment to incentivise private sector supported by grants/concessional loans to trial zero-carbon ferries in Suva (focused on commuters) and Nadi Waters (focused on tourism) initially. Concept development should consider vessel acquisition options (new build in Fiji or import from overseas), recharging stations, including scrappage/recycling. Tax exemptions are already in place for import of electric/hybrid vessels, but other fiscal policies require realignment with emissions reduction targets. The project could also replicate the initiatives that have been undertaken in other parts of the world where governments¹³³ have provided grants to support private sector trials and development of zero emissions ferries, or concessionary loans.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Feasibility studies completed • Project concept developed • Fiscal policy reviewed and amended • Sea trials commenced • Monitoring report <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • PPP agreements signed • Loans secured • Vessel(s) ordered • Infrastructure upgrades completed • Vessel(s) delivered

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Practical trials of electric harbour ferries in two locations as “proof of concept” lead by private sector • Reduced fuel use for passenger transfers (tourism sector and commuters) • Improved shore-side infrastructure for recharging <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Improved passenger drop-off/pick-up pontoons/jetties in greater Suva area for water-based transport • Reduced road congestion Suva to Nausori and Lami corridors
MITIGATION POTENTIAL	<p>~860 tCO₂/YR. AND A TOTAL OF 5,160 tCO₂ FOR 2020 - 2030</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • Assumes vessels operational in 2024 • Assumes a conventional ship would burn - 2-3 tonne MDO p.d. operational 300 days/year. There could be up to 50% variance on this figure. • Assumes 100% electric propulsion achievable¹³⁴ and that all recharging is from renewables. <p><i>Does not include savings if a successful pilot is replicated/scaled in Fiji or elsewhere.</i></p>
CO-BENEFITS/SDG LINKAGES	<ul style="list-style-type: none"> • Reduction in demand for land transport by providing alternate transport modality of travellers in greater Suva area, so reducing traffic congestion in both Lami and Nausori corridors. 200,000 commuter trips/yr by harbour ferry would equate to a 9% diversion of commuters from the road on a Lami-Suva route (based on the recorded 6,000 round commuter trips/day passing the Lami speed camera, which is 2.2 million/year). • Demonstration to other tourism operators operating passenger transfer vessels. • Opportunity for cadet training increasing opportunity for Fiji seafarers familiar with low-carbon shipping operations access to international shipping employment • Reduction in emissions of air pollutants such as SO_x and particulate matter, which are harmful to human health. • Replicable and scalable • If a Pacific construction is possible, the project will contribute significantly to strengthening regional maritime construction capacity <p>Relevant primary SDGs include 7, 13, 14.</p> <p>Relevant secondary SDGs include 1, 8, 12, 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation US\$9.2m.</p> <p>Estimated development costs US\$30,000.</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs US\$90,000.</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21040 - Water Transport; 21081 - Education and training in transport and storage;

**IMPLEMENTING
AND SUPPORTING
ENTITIES/
STAKEHOLDERS**
IMPLEMENTING ENTITY/STAKEHOLDERS:

Private sector (vessel owners and operators, boat yards and suppliers), MSAF & TPU (regulatory and project oversight) FPCL (port and harbour control and shore-side infrastructure), FRA, City and Town Councils (shore-side infrastructure) FRCS/RBF/FDB (fiscal policies and loans/grants)

SUPPORTING ENTITY/STAKEHOLDERS:

MCTTT (especially in regard to tourism sector support for vessel in western Viti Levu) PBSP (technical cooperation and support network), USP MCST (technical support and access to academic networks), and SPC (technical support through MTCC).

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: 1 year needed for feasibility studies for zero carbon commuter ferry trials, including identification of shore-side infrastructure needs, passenger demand and routes

TIME NEEDED FOR SECURING FINANCE: 1-2 years needed to secure financing for establishment of financial mechanisms (tax/excise incentives, concessionary loans, grants, etc)

TIME NEEDED FOR IMPLEMENTATION: 1-3 years needed for vessel construction/acquisition and monitored operational trials

WHEN WILL THE PROJECT INVESTMENT START AND END: Start 2021 end 2024 dependant on securing financing (mitigation would continue beyond 2030)

IMMEDIATE STEPS (FIRST 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B and C
 - B. Feasibility studies for Suva Harbour and Nadi Waters relating to harbour ferry infrastructure requirements (recharging and berthage)
 - C. Business case development
-

POLICY/PLAN LINK

THE REPUBLIC OF FIJI NATIONAL CLIMATE CHANGE POLICY 2018-2030 (ISSUED 2019)

- Sub-objective 4.1.1: to decarbonise Fiji's transport sector
- Objective 7.1 to enhance public and private sector engagement and alignment

STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- Goal: ensure safe, efficient (including reducing traffic congestion) and affordable transportation services
- Goal: development of the domestic shipping industry
- Goal: development of maritime infrastructure
- Goal: ensure safe, efficient, affordable, environmentally sustainable inter-island transportation services

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017)

- Goal 3.2.1: Access to transportation through an efficient and sustainable transport network
- Goal 3.2.2 Inter-island network – safe, efficient, reliable and affordable shipping services

NDC IMPLEMENTATION ROADMAP 2017-2030 (ISSUED 2017)

- long-term action: development of a strategy for electric transport transition and preparation for transition of maritime transport sector using alternative propulsion to fossil fuels using renewable energy

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- 4.3 Maritime transport

MARITIME TRANSPORT POLICY (ISSUED 2015)

- Objective: communities and the country enjoy better access to passenger and cargo shipping services
- 1.1.20: Domestic Shipping and Green Growth

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- Thematic Area 8 Sustainable Transportation

FIJI TOURISM 2021 (ISSUED 2017)

- Strategy 21: promote climate resilient infrastructure and energy-efficiency

POTENTIAL
BUSINESS
MODEL
AND FINANCING
STRATEGY

This mitigation action requires grants for the preparatory stages (feasibility studies, vessel design) and for improvements to shore-side infrastructure and partial grants to support private sector investment in construction/acquisition of two new vessels. The grant to upgrade shore-side infrastructure in Suva City in particular, would include construction of pontoons and passenger pick-up/drop off points, as well as recharging infrastructure for the vessels. The partial grant is needed to de-risk the investment for first movers (Valley of Death) in purchase of electric ferries.

Operational costs (e.g. crew wages, vessel maintenance) would be covered by the private sector owner/operators of the harbour ferries, and it is assumed this cost would be covered by earnings from 2024 onwards.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<ul style="list-style-type: none"> • Data on infrastructure and shore-based requirements (recharging, pontoons, jetties) etc. as well as assessment of potential demand for Suva Harbour commuter ferry routes/stops. • Lack of shore-side infrastructure (e.g. jetties, pontoons) and recharging systems. • Financing and insurance for private sector purchase and trial of zero carbon vessels. • Fiscal policy – includes disincentives to invest in zero carbon vessels as well as incentives currently.
FINANCIAL SUSTAINABILITY	<p>This project focuses on support private sector investment and once vessels are operational, would run on a purely economic business model once vessels are operational. One of the first steps is to undertake detailed feasibility studies to assess the transport demand, infrastructure investment requirements, and the appropriateness of electric harbour ferries for the proposed routes. The grants to assist with vessel purchase/acquisition and to upgrade and install shore-side infrastructure would only proceed if favourable outcomes were projected from the feasibility studies.</p>
POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<ul style="list-style-type: none"> • Grant for project development: total cost equal to US\$ 30,000 • Grants for Technical Assistance & Capacity Building: total cost equal to US\$ 120,000 • Grant for support towards vessel purchase: 21.46% of total cost equal to US\$ 2,000,000 • Private investment for vessel purchase: 34.33% of total cost equal to US\$ 3,200,000 • Grant for shore-side infrastructure upgrade: 42.92% of total cost equal to US\$ 4,000,000 • National budget: Excise/tax incentives to include tax holidays, removal of import tariffs, etc.
POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES	<p>MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*</p> <ul style="list-style-type: none"> • Project Planning, Development & Design: PBSP¹³⁵, ADB, WB, PRIF, SPC, USP • Project Implementation & Management: PBSP, ADB, WB, PRIF, SPC <p>POTENTIAL FINANCING PARTNERS/SOURCES:*</p> <ul style="list-style-type: none"> • Grants for Technical Assistance & Capacity Building: ADB, WB, GCF, GEF, PRIF, EU/EC, AU-DFAT, NZ-MFAT, France, GCF, CIDCA, KOICA, JICA, IMO • Non-Government Grants for investment: GCF, GEF, WB/IFC, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT • Loan Facility: WB, ADB, IFC (private sector), EIB, FDB <p><i>*This is not a comprehensive list, as other entities are possible as well.</i> Partners known to recently support this type of action in Fiji and PICs are indicated in BOLD.</p>
ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS	<p>Enabling, Capacity Building and Technical Assistance: US\$120,000</p> <ol style="list-style-type: none"> 1. Feasibility studies and engagement of international suppliers to attract them to the Fijian market. (US\$80,000). 2. Project development (concept note and proposal development) (US\$30,000). 3. Fiscal policy review and amendment, establishment of grant facility (US\$10,000) .
INFORMATION AND MRV NEEDS	<ul style="list-style-type: none"> • Route planning and infrastructure needs assessment (e.g. pontoons, jetties, recharging options, weather/sea state/operating environments, etc) • Options review for zero carbon ferries (review of existing zero carbon ferries, technologies and propulsion type: electric, fuel cells, solar PV etc) • Projected passenger demand • Current fuel use for existing passenger ferries of comparable size/type.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2, 3	3		
Estimated CB & TA Costs (US\$)	110,000	10,000	0	120,00
Estimated Capital Investment (US\$)	0	9,200,00	0	9,200,00
Estimated GHG Mitigation (tCO₂)	0	860	4,300	5,160
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				860

T11 - BICYCLE/E-BIKE FINANCING INITIATIVE (LIFECYCLE INITIATIVE)

NO.	T11
ACTION NAME	Bicycle/E-Bike Financing Initiative (LifeCycle Initiative)
SUB-SECTOR	Land
DESCRIPTION	<p>The use of bicycles and e-bikes for commuting and general transport in Fiji can lead to savings in household expenditure, emission reductions, and health benefits for the population of Fiji. It is acknowledged that the use of bicycles for commuting and general transport has fallen in Fiji as the popularity of private vehicles has grown. The Fiji Revenue and Customs Service (FRCS) reveals that over the 2017-2019 period, bicycles only comprised 0.9% of the total vehicle imports into Fiji. This opportunity focuses on appropriate financial instruments, and technical assistance and capacity building activities, to introduce up to 10,000 bicycles/e-bikes in Fiji focusing on both urban and rural areas. This opportunity will help address the behavioural barriers to the reintroduction of bicycles in Fiji, however the infrastructure barriers, especially in urban areas, will need to be addressed through other opportunities such as T1 and T6.</p> <p>In previous decades, bicycles dropped off in popularity as a socially acceptable mode for commuters of all ages in Fiji while the private vehicle fleet has grown. FRCS' customs data reveals over the 2017-2019 period, bicycles only comprised 0.9% of the total vehicle imports, with only motorbikes/motorcycles representing a smaller share of the imported unit total. 659 bicycles/e-bikes were logged in comparison to the 69,699 buses, cars, motorbikes, and trucks brought into Fiji over the past three years. Elevating bicycle use by people of all ages should secure cost savings, emission reductions (>5,224tCO₂/yr. with a total of >71,782tCO₂ for 2020 – 2030), and significant health and well-being benefits for the population of Fiji. This transition should take place alongside integration with emerging, cost-competitive e-bike technology. This mitigation action will address the import and use of up to 10,000 bicycles/e-bikes in Fiji.</p> <p>Nothing has been initiated thus far to finance non-motorised transport interventions in Fiji beyond tax concessions on bicycle components.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Support will be required to increase the share of bicycles in use by people of all ages through broad promotional efforts coupled with preferential financing, subsidies, and provision of facilities to raise public appeal of bicycles <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Provide capital to encourage import and use of up to 10,000 standard and e-bikes between 2022 and 2030 through both lending and direct purchase mechanisms.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced GHG emissions and air pollutants from land transport sources. • Improved public health and fitness, inclusive of reduced costs and burden on the Fiji healthcare system. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Significantly decreased costs associated with land transport fuel and private vehicle imports.

MITIGATION POTENTIAL	<p>>5,300 tCO₂/YR. (7,800 tCO₂/YR IN 2030) AND A TOTAL OF > 65,264tCO₂ FOR 2020 – 2030.</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • Over the last three years of customs data, bicycle imports represented 0.9% of total vehicle imports. Motorbikes/motorcycles are even less popular, with a 0.6% share of total vehicle imports. • The key assumption of 853,746tCO₂ projected for 2020 across the sub-sector, the 0.6% of emissions that may be attributed to motorbikes (5,345tCO₂ in 2021) should be assumed as the base for replacement with bicycle/e-bike as a mode.¹³⁶ <p><i>At current rates, an additional 9,987 bicycles would be on the road in 2030, which would primarily confer health benefits, as bicycle operations are already nominally zero-carbon.</i></p>
CO-BENEFITS/SDG LINKAGES	<ul style="list-style-type: none"> • Committed investment by the population in bicycles and e-bikes will have daily health and fitness benefits for all users, contributing to avoided medical costs and reduced mortality. • Reduce localized air pollutants. • Reduce risks associated with oil spills and contamination of both the coastal marine environment and freshwater lens, similar to benefits of broader EV adoption. • Reduce dependence on imported fossil fuels. • Reduced economic losses from congestion if the mode shift from taxis and private vehicles is successfully realized. <p>Relevant primary SDGs impacted: 11 and 13.</p> <p>Relevant secondary SDGs impacted: 3, 5, 7, 8, 10, 12, 13, 14, 15, and 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$4.240,000.¹³⁷</p> <p>Estimated development costs: US\$750,000.¹³⁸</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$2.07M.¹³⁹</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 12350 - Other prevention and treatment of NCDs, 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21081 - Education and training in transport and storage; 23642 - Electric mobility infrastructures; 24081 - Education/training in banking and financial services
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>MIMS, MCTTT, LTA, FRA</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>MOE, MYS, EFL, MCST-USP, Private Sector Companies, WHO, ONOC</p>

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: Under 1 month (Programme development of both a nation-wide advocacy programme and prospective financial instruments for low-value loans and credit have already been developed for Fiji, and may just need to be updated in accordance with a current round of consultations.)

TIME NEEDED FOR SECURING FINANCE: Under 12 months (Existing revolving funds and technical assistance grants in Pacific Island Countries have been designed and deployed within a year of proposal and endorsement, pending available funding.)

WHEN WILL THE PROJECT/INVESTMENT START AND END: A Q1 2021 start date should be targeted with a soft investment programme planned for four years, accompanied by a revolving financing structure which will run indefinitely to ensure residents of Fiji are able to obtain and service bicycles indefinitely with minimal financial burden.

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B, C, and D below.
- B. Prepare a new policy (or regulation) for inclusion of bicycle and e-bike financing and infrastructure projects.
- C. Updated policies and standards for how roads, footpaths, bicycle lanes, and the space between them shall be utilised by both bicycles and e-bikes.
- D. Pilot items B and C in one or more feasibility study(s) for the LifeCycle initiative in all municipalities.
- E. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

Bicycles are regulated separately from the Land Transport Act 1998 under the Bicycles Act 1940, which is widely out of date.

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):

- **Goal 3.1.7:** A socially inclusive Fiji and empowered Fijians
- **Goal 3.1.8:** Empowering youth to be agents of change and promoting sports for development
- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
- **Goal 3.2.9:** Creating vibrant and environmentally sustainable urban centres.
- **Goal 3.2.10:** Promoting equal opportunities, access to basic services and building resilient communities.
- **Goal 3.2.16:** A World-class tourism destination that increasingly adds value to the local economy.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.1:** Ensure safe, efficient (including reducing traffic congestion) and affordable transportation services.
- **Strategic Priority Goal 3.2.1.2:** Further development of full road networks to international standards with a greater emphasis on maintenance, rehabilitation and upgrade.
- **Strategic Priority Goal 3.2.1.3:** Extending rural transportation services.
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework
- **Strategic Priority Goal 3.2.10.2:** Expanding the rural economy – development of rural infrastructure, rural electrification

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.2:** Land Transport
- **5.5.2:** Infrastructure: Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 4:** Inclusive Social Development
- **Thematic Area 7:** Energy Security
- **Thematic Area 8:** Sustainable Transportation

NDC IMPLEMENTATION ROADMAP

- **Key Enabling Element:** Design and execute an awareness campaign among key stakeholders and the public, and addressees of the incentive scheme/action.

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

The significantly lower per-unit cost of standard and e-bicycles relative to automobiles (and similar price of e-bicycle to smaller motorbikes) leaves a portion of the national population with the opportunity to acquire their own independent land transportation without significant additional subsidies required from outside partners at a significantly lower cost than the average private vehicle.

According to FRCS, between 2010-2017, over 88,750 bicycles were imported at a total value of over FJ\$7.95m (US\$3.98m).

National-scale bulk purchasing from preferred suppliers of standard and e-bicycles and spare parts should be arranged in coordination with lending agencies (FDB and Commercial Banks) which may provide competitive lending packages at a significantly reduced interest rate to place higher quality bicycles and new e-bikes into circulation (as the per unit value of current stocks indicate very low quality), including a financial support guarantee provided to the lending agencies. Lending mechanisms may require both performance and loss & damage insurance as a part of the risk structuring. This lending may be supported through a revolving fund replenished by private sector purchases to the retailers.

On a household/individual level, fuel and vehicle costs should be promoted as avenues for greater cost savings. As not all households will have access to retail lending at a small scale, especially to purchase e-bicycles, a micro-lending facility including a financial support guarantee provided to the lending agencies will allow for financing access.

Multilateral and bilateral partner support for technical assistance grants and project development funds to support the service, maintenance, repair, and supply chain requirements to help the existing bicycle mode share expand and thrive.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- The establishment of a more robust parts & service environment will be necessary to ensure purchases stay in operable and in good repair, as current parts & service options are extremely limited and the majority of bikes imported since 2010 do not appear to be in active service.
- Disseminating information around the lending mechanism to encourage participation will be a significant challenge to address if its success is to be ensured.
- Duty, excise, and VAT designations for e-bikes must be properly grouped alongside bicycles and bicycle parts – revenue is currently minimal from both bicycles and e-bikes, so political will to reform tax policy should be easily surmounted.
- Importers and retailers may need to collaborate (where otherwise functioning competitively) to reduce purchase costs for bicycles and e-bikes through a government/collectively aligned bulk purchasing system.

FINANCIAL SUSTAINABILITY

Unlike some of the larger scale projects with massive capital outlay required for infrastructure investment, the financial sustainability of a standard and e-bicycle mitigation options would be supported by a simple and low volume lending model and a broader customer base from amongst the private sector, which will reduce the risk of non-payments of loans at the commercial and retail level.

Additionally, transport costs associated with importation of standard and e-bicycle should be significantly lower than with EVs or other motor vehicle alternatives. On a per-unit basis, for trips under 15km, bicycles provide the greatest increase in range and speed of land transport relative to the material and recurring costs to produce and operate, respectively. This will make them particularly suited towards populations in urban areas.

Sustainability should be achievable from a financing perspective with fewer required inputs from outside Fiji. The TA for maintenance training will also help ensure longer life for standard non-motorized bicycles and e-bikes, as the legacy of imports are largely out of service as evidenced by the absence of greater representation within the total land transport mode share.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

Externally sourced finance should aid in initiating a revolving fund (either through guaranteeing lending by FDB and commercial banks in Fiji or a concessional loan to be administered through FDB or another state-run entity). It could be supplemented through steadily increasing tax rates on the import of ICE motor vehicles and diverting a set percentage of this additional revenue into the fund. The bulk of the project is based around capacity building mechanisms, so technical assistance grants will need to be requested from development partners.

WITH A TOTAL PROJECT VALUE OF AT LEAST US\$ 7.44M THE FINANCIAL BREAKDOWN IS AS FOLLOWS:

- Grant for Project Development: 11.5% of total cost equal to US\$750,000
- Grants for subsidising incremental costs exceeding the revolving/commercial loan facility: 19% of total cost equal to US\$1.24m
- Grants for Capacity Building & Technical Assistance: 23.4% of total cost equal to US\$2.07M
- State Budget: Tax concessions (VAT): 5.9% of total cost (9% of capital cost) equal to US\$380,000
- Private Sector investment: 46.1% of total cost equal to US\$3m. This will be a full equity by households, or in combination with micro-finance Commercial/Revolving Loan Facility and this many require multilaterally backed guaranteed lending facility via commercial banks.

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** FDB, UNESCAP, GGGI, NDC-Hub, ADB, WB/IFC, EEAS, PCREEE-SPC, UNIDO, UNCTAD, MCST-USP
- **Project Implementation & Management:** FDB, UNDP, GGGI, NDC-Hub, ADB, WB/IFC, PCREEE-SPC, MCST-USPC

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** GCF, **ADB**, WB/IFC, EIB
- **Debts & Loans:** FDB, **Commercial Banks**, **ADB**, **WB/IFC**, EIB
- **Equity:** Government/SOEs, **Private Companies/Bicycle Owners**
- **Non-Government Grants for investment:** AU-DFAT, NZ-MFAT, GCF, GEF, **WB/IFC**, EIB, CIDCA, EEAS, KOICA
- **Grants for Technical Assistance & Capacity Building:** GEF, AU-DFAT, MFAT- New Zealand, CTCN, **ADB**, GCF, **WB/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNIDO, GIZ,
- **Government Budget & Taxes Incentives:** **MOE (state budget)**
- **Risk Instruments:** **ADB**, **WB/IFC**, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$2,071,000¹⁴⁰

1. Support & training will be required both in the scoping and technology selection phase (tendering, procurement, contracting, etc.) for cost-competitive and fit-to-purpose products best suited to Fiji's needs. This includes the engagement of international suppliers to attract them to the Fijian market. (US\$280,000).
2. Practical training will be required for the servicing and maintenance of bicycles and e-bikes, as well as trail mapping/development, outfitting trained technicians with relevant tools and start-up supply stock. (US\$960,000).
3. A marketing push to promote the financial mechanism to the public will be required across the country – particularly providing access to outer islands without robust road networks. (US\$281,000).
4. Pre-feasibility studies for cycling routes in major urban areas of Suva, Lautoka, and Nadi. Note that the capital investment is not included in this opportunity. (US\$550,000).

INFORMATION AND MRV NEEDS

- A market assessment both domestically and technology review of global product options will be required before determining which manufacturers to include as suppliers of qualified products under the financial mechanism.
- Bulk orders will need to be consolidated for procurement and shipping arrangements, which will include inventory management and logging of orders/bills of lading, and all shipping details.
- Certification records for bicycle/e-bike technicians benefitting from training will need to be maintained in a registry to refer bicycle owners to their local mechanics regarding issues with repairs and access to parts.
- Tax and lending records to evaluate the utilization of subsidies, credits, rebates, and lending instruments will be required of the financial institutions (FDB & commercial banks), as well as MOE and FRCS.
- MOH personnel should be tracking the Non-communicable disease diagnoses and associated costs across the national healthcare system to evaluate health and fitness benefits.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2, 3	1,2, 3		
Estimated CB & TA Costs (US\$)	1,128,000	1,692,000	0	2,071,000
Estimated Capital Investment (US\$)	750,000	1,209,000	2,277,000	4,236,000
Estimated GHG Mitigation (tCO₂)	12,900	18,200	36,100	65,200
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				7,850

T12 - AIRCRAFT RE-FLEETING PROGRAMME

NO.	T12
ACTION NAME	Aircraft Re-Fleeting Programme
SUB-SECTOR	Aviation
DESCRIPTION	<p>The process of renewing the nationwide fleet in Fiji provides a suitable opportunity for continual improvements in aircraft performance, which means also mainstreaming zero-emission technology in addition to the expected energy-efficiency gains realized with iterative improvements upon previous aircraft designs and componentry (including aerodynamic efficiency, lighter weight construction, and improved taxiing and in-flight mechanical and electric systems)</p> <p>Given the potential service life of aircraft – an average of 25 years – the scheduled phase-out of the existing fleet should be scheduled to deliver the most robust technology available to meet the decarbonisation targets set. Depending upon the maturity of each technology as current aircraft are phased out, emission reductions of between 15% and 100% may be realized.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Evaluation of emerging alternatively fueled aircraft technology will require engagement and training of regulators, policymakers, and operational personnel. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Meeting the aircraft re-fleeting requirements for replacement of the various fossil fuel-powered aircraft across the domestic aviation fleet.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Efficiency gains and cost savings from GHG emission reductions in domestic aviation activities. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Integration of next-generation aircraft technology into the domestic fleet operating in Fiji.
MITIGATION POTENTIAL	<p>>3,779 tCO₂/YR AND A TOTAL OF 26,558 tCO₂ FOR 2020 – 2030</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • Based upon the estimated growth rates in the State Action Plan for the international aviation sub-sector, building on the LEDS' estimated 5,000,000 litres of Jet A1 kerosene and 2,500,000 litres of AvGas used domestically in 2013, relative to a total 350,812,390 litres for international fuel, under a BAU scenario, 116,637,066 litres of Jet A1 and 58,318,533 litres of AvGas would be consumed over the 2020-2030 period, yielding 441,868 tCO₂ in total. <p><i>Disaggregated fuel data for domestic/international aviation is still needed to update the estimates to appropriately evaluate the emission reduction potential of mitigation activities, but given the potential for new aircraft technology, the expected range in emissions reductions is estimated between 15-100% (an average of 57.5% will be assumed).</i></p>

CO-BENEFITS/ SDG LINKAGES	<p>CO-BENEFITS INCLUDE:</p> <ul style="list-style-type: none"> • Enhanced passenger (and higher value/lower volume and/or perishable cargo) capacity. • Improved regularity of air travel to/from outer islands and between island groups. • Improved ability to provide emergency response services (disaster relief, medical evacuations, etc.). • Improved equity of service delivery to underserved citizens/areas of Fiji. <p>Relevant primary SDGs impacted: 8, 12, 13.</p> <p>Relevant secondary SDGs impacted: 1, 7, 9, 10, 11, and 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: >US\$276 million.¹⁴¹</p> <p>Estimated development costs: <US\$1.38 million.¹⁴²</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: >US\$2.76 million.¹⁴³</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21050 - Air Transport
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>Dept. of Civil Aviation, CAAF, Fiji Airways/Fiji Link, Private Sector</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>MOE, FRCS, FAL, FNFP, FDB, Commercial Banks, PASO</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: Up to 18 months (Market assessment, due diligence, budgeting, tender, and selection process)</p> <p>TIME NEEDED FOR SECURING FINANCE: 12-36 months (Depending on the funding pipeline, bilateral support would likely come within budget programming, but multilateral financing channels face additional delays.)</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: 2025 onward (The re-fleeting process will be phased, occurring throughout the 2020-2030 period as the existing aircraft in the domestic fleet reach their end of service across the entirety of the private sector.)</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure technical assistance and capacity building support for items B, C, and D below. B. Prepare a new policy (or regulation) for inclusion of non-fossil fuel-powered aircraft in accordance with domestic and international aviation regulations. C. Update aviation infrastructure design standards in accordance with expected electric/fuel cell aircraft utilisation. D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations following the COVID-19 recovery.

POLICY/PLAN LINK**5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):**

- **Goal 3.1.7:** A socially inclusive Fiji and empowered Fijians
- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
- **Goal 3.2.3:** Unlocking our economic potential through consistent and reliable domestic air services.
- **Goal 3.2.4:** Enhancing Fiji's status as a vibrant and modern regional and international hub for people and cargo movement.
- **Goal 3.2.10:** Promoting equal opportunities, access to basic services and building resilient communities.
- **Goal 3.2.16:** A World-class tourism destination that increasingly adds value to the local economy.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.3:** Extending rural transportation services.
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework
- **Strategic Priority Goal 3.2.10.2:** Expanding the rural economy – development of rural infrastructure, rural electrification

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.4:** Domestic Air Transport
- **5.5.2:** Infrastructure: Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 7:** Energy Security
- **Thematic Area 8:** Sustainable Transportation
- **Thematic Area 9:** Technology and Innovation
- **Thematic Area 10:** Greening Tourism and Manufacturing Industries

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

The combination of leasing arrangements with concessional loans backed by guarantees is expected to reduce risk associated in acquiring new, high-value assets such as aircraft.

While Fiji Link is the nationally owned domestic air carrier, there are a variety of other registered aircraft operating in Fiji, so involvement of the private sector is significant in providing service to outer islands and resorts (though resort occupancy is currently at a minimum.)

The most appropriate approach to financing the re-fleeting of aircraft for domestic routes will involve official development assistance from bilateral partners, coupled with concessional lending guaranteed by multilateral development banks where available as co-financing. Repayment on loans can be supported by savings accrued through efficiency improvements and reductions in fuel expenditures to Fiji Link and other aircraft operators accrued during operation of next-gen aircraft.

With the recent acquisition of ATR 72-600 aircraft by Fiji Link, it appears to have the youngest fleet operating domestically. Cost sharing arrangements will likely need to be devised to build domestic capacity beyond Fiji Link, as financing new assets may be a limiting factor for the smaller operators.

It is expected aircraft re-fleeting will be financed through concessional lending, or through a structured operational/financial leasing arrangement, as per MOE directives and participatory preferences of the private sector operators.

The bilateral funding partners and multilateral investment institutions mentioned earlier may provide the opportunity for access to blended finance – ADB/World Bank/GCF may provide concessional loan support to the national air carrier, and on-leasing arrangements paired with technical assistance grants to support new decarbonised flight systems may be arranged to allow the private sector to access new aircraft at reduced payback rates.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- A diversified aviation market with competing operators at various scales, with assets of varied age, will mean re-fleeting must be approached on a case-by-case basis for each aircraft, and building a system to avoid ad hoc purchases will be instrumental to successfully transitioning to higher efficiency in the domestic fleet.
- The primary barriers to implementation are funding gaps for capital expenditure, which need to be resolved prior to re-fleeting. Additionally, the scaling barriers to cost-competitive uptake of new technology need to be remedied at a global market level before Fiji will be able to take advantage of the next generation of decarbonised aviation.
- Human capacity development for both ground and flight crew will need to be developed
- Given the long lifespan of the asset, concessional loans combined with technical assistance grants should bring down the interest rates and reduce payback periods while ensuring efficiency gains are maximized in the recurring OPEX of the aircraft. Leasing arrangements with manufacturer support would assist in ensuring these gains, as well.

FINANCIAL SUSTAINABILITY

The financial sustainability of the re-fleeting process will be dependent upon three factors, assuming a service life of 20+ years for the aircraft;

- A. The capital outlay for the new aircraft,
- B. The percentage of savings associated with efficiency and alternative propulsion fuels, and
- C. The revenue increases provided through higher passenger volume per km travelled.

At the low end of the spectrum (US\$12m per aircraft), US\$600,000 per annum in avoided fuel costs and increased revenue to pay itself off within 20 years. At the higher end, (US\$32m per aircraft), this figure rises to over US\$1.6m per annum. Given the total projected jet fuel/AvGas consumption for 2020 (prior to COVID-19 travel restrictions) was previously estimated at 7,668,366/3,834,183 litres, respectively, with prices at US\$0.73/US\$1.01, minimum total annual costs would total US\$9,470,433. Eliminating the entirety of Fiji's domestic aviation fuel use would only be sufficient to meet the payback period for the 23+ planes if replaced on the proposed re-fleeting schedule at a minimum value of US\$276,000,000. To ensure financial sustainability, the provision of outside grant financing to subsidize the cost of aircraft replacement will be necessary to avoid financial losses over the lifespan of the aircraft.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

TOTAL PROJECT VALUE: US\$318,780,000

- Grant for project development: 0.4% of total cost, equal to \$1.38m
- Grants for Technical Assistance & Capacity Building: 0.9% of total cost, equal to \$2.76m
- Private Sector Investment: 37.2% of total cost, equal to \$118.8m¹⁴⁴
- Concessional Loans: 49.3% of total cost, equal to \$157.2m
- State budget: 12.1% of total costs, equal to US\$38.64m (14% of capital costs)¹⁴⁵

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** PASO, UNDP, GGGI, NDC-Hub, **ADB**, ICAO, CTCN, EEAS, IRENA, **WB/IFC**, CIDCA, WFP
- **Project Implementation & Management:** **ADB**, **WB/IFC**, GGGI, NDC-Hub, ADB, CIDCA

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** GCF, **ADB**, **WB/IFC**, EIB
- **Debts & Loans:** GCF, **ADB**, **WB/IFC**, EIB, commercial banks, FDB
- **Equity:** Fiji Link, other commercial operators, FNPF
- **Non-Government Grants for investment:** GCF, GEF, **WB/IFC**, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT
- **Grants for Technical Assistance & Capacity Building:** GEF, AU-DFAT, NZ-MFAT, CTCN, **ADB**, GCF, **WB/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNIDO, UNCTAD, PASO, ICAO
- **Government Budget & Taxes Incentives:** **MOE (state budget)**
- **Risk Instruments:** **ADB**, **WB/IFC**, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

1. Operational Training on new aircraft technology, flight, and fuel systems: (US\$2,000,000)¹⁴⁶
2. Policy and Regulatory oversight and compliance training: (US\$760,000)¹⁴⁷

INFORMATION AND MRV NEEDS

- Implementation will be primarily about financing and documentation associated with acquisition of the new aircraft and decommissioning of old aircraft indicating transference of ownership for various assets.
- Once in operation, fuel/energy consumption per kilometre, cost per unit, and operational time both on the ground, taxiing, and in-flight will all be instrumental in determining performance, payback rate, and verifying emissions reductions, and will need to be required of all private sector companies to pass airworthiness inspections going forward.
- Staffing qualifications/certifications for various on-the-ground and in-flight systems will help in quantifying the support for the new aircraft. Performance reviews, staffing numbers, and organization structure will also assist in evaluating service delivery.
- These dimensions will all assist in quantifying delivery of National Development Plan and Green Growth Framework objectives concerning the aviation sector.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	1,2	1,2	
Estimated CB & TA Costs (US\$)	1,035,000	1,150,000	2,300,000	4,485,000
Estimated Capital Investment (US\$)	0	46,000,000	230,000,000	276,000,000
Estimated GHG Mitigation (tCO₂)	0	3,779	22,779	22,558
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				5,129

T13 - TRAFFIC CONGESTION REDUCTION MEASURES

NO.	T13
ACTION NAME	Traffic Congestion Reduction Measures
SUB-SECTOR	Land
DESCRIPTION	<p>Congestion Reduction Measures amount to energy-efficiency practices in the management of traffic flow. Traffic behaviour is based upon individual needs of road users, and while they do not conventionally conform to the collective best practice, interventions may be organized to guide better behaviour for the overall traffic network. Inclusive of urban car free zones, responsive traffic signalling, clearways, lane reversals, street addressing standardisation, congestion pricing, office relocations, and staggered public service office hours, the opportunities for reducing the congestion borne by commuters in the Greater Suva Area (GSA) are numerous, with varying levels of investment cost and efficacy.</p> <p>The current state of financing congestion reduction measures has been limited to establishment of clearways and re-routing traffic flows through signage and road painting in various locales. This also contributes to the allocation of LTA enforcement personnel to ensure the clearway compliance is adhered to during the hours in which they are in effect. While speed/traffic cameras have been installed at key points around the country, Automated Number-Plate Recognition (ANPR) capacity has yet to be supported and financed for the implementation of congestion monitoring/reduction purposes.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Policy development to encourage congestion reduction measures being put in place must be provided to best understand efficacy of various measures. • Training and capacity building for regulation and enforcement personnel (particularly FRA, LTA, and Fiji Police Force) must be provided. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investment is needed to fund the installation of congestion reduction-related infrastructure.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced fuel use (and associated GHG emissions) through improved efficiency of national vehicle fleet, particularly in urban areas. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced labour hours wasted in transit. • Reclamation of additional urban areas for commerce and pedestrian activities.

**MITIGATION
POTENTIAL****>3,779 tCO₂/YR AND A TOTAL OF 26,558 tCO₂ FOR 2020 – 2030****KEY ASSUMPTIONS:**

- Under the emissions profile projected through the LEDS, emissions are estimated to have increased during the 2015-2019 period from 663,751tCO₂ to 818,077tCO₂ in line with the recorded growth rates. From 2019 onward, an average growth rate of 4.36% is assumed, with 853,746tCO₂ projected as emissions from the sector for 2020, and 11,731,108tCO₂ over the entire 2020-2030 period projected under a BAU scenario.
- Measures to reduce emissions through streamlining traffic flow by way of
 - A. congestion mitigation strategies,
 - B. speed management techniques, and
 - C. traffic flow smoothing techniques are all estimated to yield savings of at least 7% in real world trials¹⁴⁸, and an average of over 14% emission savings could be accrued if all are successfully implemented in the points of highest traffic density (the Greater Suva Area).

However, significant congestion scenarios are primarily isolated to the GSA, and potential benefits would be minimal outside of congestion zones. As per the 2017 Census totals, the GSA holds 268,423 of the 884,887 national population, representing 30.33%, with at least 233,499 tCO₂/yr and a total of <3,558,533tCO₂ for 2020 – 2030 attributable. an average of over 14% may be accrued in potential emissions savings for this urban area during peak congestion times (assuming 1.5hr AM rush hour, 1.5hr PM rush hour = 3/24hrs per day).

**CO-BENEFITS/
SDG LINKAGES**

- Reducing congestion and the volume of traffic on the road at any given time will have the following co-benefits beyond emission reductions.
- Consumer savings (both actual and avoided costs) associated with fuel, parking, and lost time/labour value,
- Improved role of public transit network in cost-effective commuting
- Reduced road traffic injury rates,
- Increased air and waterway safeguarding from oil runoff and fossil fuel pollutants
- Improved land use/value.

Relevant primary SDGs impacted: 9, 11, and 13.

Relevant secondary SDGs impacted: 1, 3, 5, 8, 10, 12, 13, 14, 15, and 17.

**INVESTMENT
NEEDS (USD)**

Estimated capital investment needed for the physical implementation: >US\$25.79m¹⁴⁹

Estimated development costs: ~US\$452,700¹⁵⁰

Estimated Enabling, Capacity Building and Technical Assistance Needs: ~US\$19.5m¹⁵¹

**RIO MARKER AND
CRS PURPOSE
CODE(S)**

RIO MARKER: Significant (1)

OECD-DAC/CRS PURPOSE CODE(S):

- 21011 - Transport policy, planning and administration;
- 21013 - Transport regulation;
- 21023 - National road construction;
- 21081 - Education and training in transport and storage;
- 43030 - Urban development and management

**IMPLEMENTING
AND SUPPORTING
ENTITIES/
STAKEHOLDERS**
POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:

MCTTT, FRA, LTA, Municipal Councils, Private Sector

POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:

MOE, EFL, Dept. of Town & Country Planning

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: Up to 12 months (Consultation and scoping for the design and structure of congestion reduction measures, including identification of appropriate locations for ANPR installations, traffic calming barriers, etc.)

TIME NEEDED FOR SECURING FINANCE: Up to 12 months (Both the costs associated with required capacity building and the capital required for infrastructure development will require a blended lending approach, particularly given the opportunity for businesses to generate increased revenue through the project.)

WHEN WILL THE PROJECT/INVESTMENT START AND END: 2021 onward (The infrastructure scoping and replacement should begin as part of the existing strategies/actions, and the construction of infrastructure and establishment of a traffic control centre where the impacts of congestion reduction measures may be monitored should continue indefinitely as the measures and practices are fully established.)

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B, C, and D below.
 - B. Prepare a new policy (or regulation) for inclusion of congestion reduction measures, including infrastructure, financial mechanisms, and incentives/penalties for traffic behaviour.
 - C. Evaluate item B in one or more feasibility study(s) for cost-effectiveness and emission reduction potential of various congestion reduction measures in urban areas (primarily the Greater Suva Area, as well as Lautoka, Labasa, and Nadi).
 - D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.
-

POLICY/PLAN LINK	<p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):</p> <ul style="list-style-type: none"> • Goal 3.2.1: Access to transportation through an efficient and sustainable transport network. • Goal 3.2.9: Creating vibrant and environmentally sustainable urban centres. • Goal 3.2.10: Promoting equal opportunities, access to basic services and building resilient communities. • Goal 3.2.12: Competitive, sustainable and value-adding agriculture. • Goal 3.2.16: A World-class tourism destination that increasingly adds value to the local economy. <p>MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);</p> <ul style="list-style-type: none"> • Goal 2: Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services). • Strategic Priority Goal 3.2.1.1: Ensure safe, efficient (including reducing traffic congestion) and affordable transportation services. • Strategic Priority Goal 3.2.1.2: Further development of full road networks to international standards with a greater emphasis on maintenance, rehabilitation and upgrade. • Strategic Priority Goal 3.2.1.4: Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework. <p>LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)</p> <ul style="list-style-type: none"> • 4.2: Land Transport • 5.5.2: Infrastructure: Land, Maritime, and Air Transport <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 4: Inclusive Social Development • Thematic Area 8: Sustainable Transportation <p>GREATER SUVA TRANSPORT STRATEGY</p> <ul style="list-style-type: none"> • 2.3.2 Road Network • 2.3.3. Urban Development • 4.1 Transport Infrastructure • 5.1.1 More efficient use of road space.
	<p>GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION</p> <p>Time needed for development: Up to 12 months (Consultation and scoping for the design and structure of congestion reduction measures, including identification of appropriate locations for ANPR installations, traffic calming barriers, etc.)</p> <p>Time needed for securing finance: Up to 12 months (Both the costs associated with required capacity building and the capital required for infrastructure development will require a blended lending approach, particularly given the opportunity for businesses to generate increased revenue through the project.)</p> <p>When will the project/investment start and end: 2021 onward (The infrastructure scoping and replacement should begin as part of the existing strategies/actions, and the construction of infrastructure and establishment of a traffic control centre where the impacts of congestion reduction measures may be monitored should continue indefinitely as the measures and practices are fully established.)</p>

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

The opportunity to guide and influence improved behaviour by road users (motorists, in particular) is based upon fulfilling their individual needs.

Currently, the trend toward increased automotive use (particularly in the private vehicle demographic), is substantially reducing efficiency of the overall fleet. Without intervention concerning additionality of vehicle registrations or expansion of the total distance covered by the road network, the 7,525km of roadway¹⁵² accommodating an estimated 130,649 vehicles in 2020 yield at least 17 cars per km (~59 meters per vehicle, including chassis length and space from the closest car.) By 2030 under BAU scenarios, Fiji would total 200,191 vehicles, averaging nearly 27 cars per km (~38 meters for vehicles.) For the GSA, to estimate congestion conditions, 30.33% of the vehicle total is spread across 675km of sealed road (2020: ~59 cars/km | 17m/vehicle, and 2030: ~90 cars/km | 11m/vehicle.) To maintain a 2-second gap as safe distance between vehicles, in 2020 terms, this means urban speeds averaging 30kmph, and by 2030 projections, 20kmph for safe operation. This would entail trips taking 50% longer, and the opportunity cost of lost labour and productivity should be analysed further as indirect savings to justify the financial requirements.

The financing strategy to deliver urban car free zones, responsive traffic signalling, clearways, lane reversals, congestion pricing, office relocations, and staggered public service office hours, can be achieved with varying levels of investment cost and efficacy for each intervention. It will require a mixture of operational budgeting on the part of government supplemented by infrastructure and TA/CB grants, as well as private sector investment in amenities involved in improving pedestrian access to the impacted urban-located businesses.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- Congestion reduction measures may be taken up in parallel, so ensuring MRV systems are designed to determine impact of individual interventions on the land transport sub-sector will likely require more training and transport planning capacity within the ranks of the relevant stakeholders.
- Pushback from private vehicle operators will likely be substantial, given the opportunity for revenue generation through penalty mechanisms and taxation for use of land transport assets.
- Conversely, upfront costs will be relatively low compared to some other infrastructure/platform-based interventions, so payback rate through revenue will be relative rapid.
- The intersection between the different stakeholders involved in the practical implementation of various measures will need to be clarified in the instance of each intervention, as some may highly localised, and others cross-jurisdictional (in multiple municipalities).
- The cost of infrastructure commitment to establish clearways and car-free areas should be readily available based upon FRA experience implementing trial projects.

FINANCIAL SUSTAINABILITY

There are four main contributing factors towards financial sustainability of congestion pricing:

- An estimated ~2.6% savings on fuel costs (and associated emissions) for GSA vehicle operators.
- Opportunity costs avoided (up to 50% time saved by 2030 if congestion is abated through a selection of measures)
- Revenue from fines, fees/congestion pricing tolls accrued from non-mass transit vehicles (buses to be exempted from charges to encourage cost competitiveness)
- Increased tax revenue from consumer spending at more readily accessible retail outlets.

From a macroeconomic perspective, these factors should accrue millions of dollars per annum in both savings and additional revenue for Fiji. The efficacy of the project will hinge primarily on broad public awareness of the various measures, their purpose, their benefit, and encouragement/reinforcement of socially managed traffic situations. Unlike the technology/infrastructure selections addressed in T1-T5, the success of this project is highly dependent on broader social participation and enforcement of compliance with measures introduced.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

TOTAL PROJECT VALUE: US\$45,738,000

- Grant for Project Development: 1% of total cost, equal to US\$457,000.
- Grant for Capacity Building & Technical Assistance: 42.6% of total cost, equal to US\$19,500,000.
- Private Investment: 14.3% of total cost, equal to US\$6,552,000 for ANPR and traffic calming/car-free zone infrastructure.
- Grants/sovereign loans: 42.1% of total cost, equal to US\$19,234,000 for pedestrian facilities upgrading and traffic signal improvement.

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** GGGI, NDC-Hub, **ADB, WB/IFC**, PRIF, CTCN, EEAS, SPC, UNIDO, UNDP, UNESCAP, USP
- **Project Implementation & Management:** ADB, WB/IFC, LTA, FRA, UNIDO, UNDP

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** GCF, **ADB**, WB/IFC, GCF, EIB
- **Debts & Loans:** FDB, Commercial Banks, **ADB**, WB/IFC, EIB, GCF
- **Equity:** Private Sector, **FRA, LTA**, Municipal Councils
- **Non-Government Grants for investment:** GCF, GEF, WB/IFC, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT
- **Grants for Technical Assistance & Capacity Building:** GEF, AU-DFAT, NZ-MFAT, CTCN, **ADB**, GCF, WB/IFC, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNIDO, GIZ
- **Government Budget & Taxes Incentives:** **MOE (state budget)**
- **Other Risk Instruments:** **ADB**, WB/IFC, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE: US\$19,500,000¹⁵³

Training will be required to conduct the following aspects of congestion reduction measures. US\$19.5m.

1. CBD road network review and modelling (US\$200,000)
2. pedestrian network development (US\$150,000),
3. Blackspot programme to manage traffic in high-risk areas with the Police Map Database (crash statistics) to prioritise future intersection upgrades. (US\$10,000,000)
4. Traffic Data Collection Programme (US\$2,300,000)
5. ANPR training, as both will be used to gather crucial data on traffic flows and bottlenecks in the network (which are exacerbated by accidents.) (US\$150,000)
6. Driver training to improve driver behaviour (US\$700,000)
7. Vehicle emissions restriction programme (US\$750,000)
8. Pedestrian Awareness Campaign (US\$2,750,000)
9. Expand vehicle enforcement team (US\$2,500,000)

INFORMATION AND MRV NEEDS

- Occupancy of parking areas per hour, per day, will be necessary to track trends in utilization of the congestion reduction measures by the public and track efficiency improvements shifting from the baseline towards a traffic pattern better distributed across the day with lower overall time spent in vehicles per passenger.
- ANPR records will be instrumental for determining direction, speed, and volume of traffic flows, as well as the timeframe during which traffic peaks and ebbs. Revenue will be generated based upon this recording system, and revenue models should be responsively adjusted to incentivize/penalize commuter behaviour leading to bottlenecks and inefficiency.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1, 2, 3, 4, 5, 6, 7, 8	1, 2, 3, 4, 5, 6, 7, 8, 9	2, 3, 4, 9	
Estimated CB & TA Costs (US\$)	4,357,000	5,850,000	9,7750,000	19,957,000
Estimated Capital Investment (US\$)	5,157,200	7,735,800	12,893,000	25,786,000
Estimated GHG Mitigation (tCO₂)	9,923	16,567	32,791	59,282
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				7, 130

T14 - AIRPORT & AIRFIELD INFRASTRUCTURE UPGRADE

NO.	T14
ACTION NAME	Airport & Airfield infrastructure upgrade
SUB-SECTOR	Aviation
DESCRIPTION	<p>Aviation infrastructure customarily consists of runways and taxiways, airport buildings and service facilities, and ground support equipment. Construction of infrastructure is a large factor in whole-of-lifecycle emissions for assets, but these emissions are not currently being captured under the domestic aviation category. The attribution of emissions solely to transport activities reduces the emissions mitigation potential relative to the overall cost of the investment.</p> <p>Under the National Development Plan, MOE has identified a number of recommended improvements to infrastructure supporting the aviation sub-sector.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> Operational and facility upgrades have been delivered for the 11 sites under Airports Fiji Limited oversight. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> Facility upgrade requirements have been met for the 11 sites handling aircraft arrivals.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> Reduced GHG emissions as a consequence of efficiency improvements associated with infrastructure upgrades. Increased passenger capacity per flight and reduced emissions per passenger/km flown for those routes serving upgraded airfields. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> Improved inter-island connectivity and opportunity for expanded domestic economic activity.
MITIGATION POTENTIAL	<p>>1,117tCO₂/YR. AND A TOTAL OF 11,172tCO₂ FOR 2020 - 2030</p> <p>KEY ASSUMPTIONS INCLUDE:</p> <ul style="list-style-type: none"> Based upon the estimated growth rates in the State Action Plan for the international aviation sub-sector, building on the LEDS' estimated 5,000,000 litres of Jet A1 kerosene and 2,500,000 litres of Avgas used domestically in 2013, relative to a total 350,812,390 litres for international fuel, under a BAU scenario, 116,637,066 litres of Jet A1 and 58,318,533 litres of Avgas would be consumed over the 2020-2030 period, yielding 441,868 tCO₂ in total. <p>Given the International Energy Agency estimates 3.2% of emissions per passenger/km are attributed to aviation infrastructure, the direct reduction potential is minimal relative to expenditures, at less than 11,172 tCO₂ over the 2023-2030 period.</p>

CO-BENEFITS/ SDG LINKAGES	<p>CO-BENEFITS INCLUDE:</p> <ul style="list-style-type: none"> • Improved capacity for aircraft-related efficiency measures (such as higher payload per litre of fuel used/km travelled due to the potential for larger scale aircraft to operate on upgraded airport infrastructure) • Establishing efficiency standards for ground support equipment (GSE) may be coupled with reform of heavy vehicle policies to impact emission reductions more broadly across the land transport sector and through facilities-based energy-efficiency measures. • Avoided costs in aviation sector (both reduced recurring costs for government and increased profit margin for private sector operators). • Improved safety, security, and support facilities to accommodate both staff and airline customer needs. • Improved equity of service delivery to all citizens/areas of Fiji. <p>Relevant primary SDGs impacted: 8, 9, 12, and 13.</p> <p>Relevant secondary SDGs impacted: 1, 7, 10, 11, 13, and 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$49.5m¹⁵⁴</p> <p>Estimated development costs US\$495,000¹⁵⁵</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$2,475,000¹⁵⁶</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21050 - Air Transport; 21081 - Education and training in transport and storage;
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>Dept. of Civil Aviation, CAAF, Fiji Airways/Fiji Link, Private Sector, FAL, ATS</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>MOE, MCTTT, MIMS</p>

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: Up to 24 months (Infrastructure needs and gaps have already been identified, but all necessary tendering and construction can, based upon the lack of completion under the Green Growth Framework medium-term period from 2015-2020.)

TIME NEEDED FOR SECURING FINANCE: Up to 24 months (Given the blended finance requirements for a variety of infrastructure upgrades and equipment scaled up to FJ\$3 billion for Nadi Airport, bilateral support alone is unlikely to accommodate all needs. Multilateral financing will likely be delivered following a detailed scoping period on the identified needs and gaps, which will involve a review and approval process.)

WHEN WILL THE PROJECT/INVESTMENT START AND END: 2023 onward (The financing process should begin based upon the existing uncompleted infrastructure work identified? The expressed dependence on donors means this period will likely elapse from 2020-2023, with implementation realistically taking place in the 2023-2025 period. Continual maintenance and upgrade work will arise in line with the existing work plans and budgets for FAL, ATS, and Fiji Airways/Link, but identification of aviation infrastructure requirements still needed within the development plan should be oriented toward decarbonizing the sub-sector in the 2025-2030 period.)

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B, and C below.
- B. Undertake priority investments in aviation infrastructure.
- C. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

<p>POLICY/PLAN LINK</p>	<p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):</p> <ul style="list-style-type: none"> • Goal 3.1.7: A socially inclusive Fiji and empowered Fijians • Goal 3.2.1: Access to transportation through an efficient and sustainable transport network • Goal 3.2.3: Unlocking our economic potential through consistent and reliable domestic air services. • Goal 3.2.4: Enhancing Fiji's status as a vibrant and modern regional and international hub for people and cargo movement. • Goal 3.2.10: Promoting equal opportunities, access to basic services and building resilient communities. • Goal 3.2.16: A World-class tourism destination that increasingly adds value to the local economy <p>MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):</p> <ul style="list-style-type: none"> • Goal 2: Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services). • Strategic Priority Goal 3.2.1.3: Extending rural transportation services. • Strategic Priority Goal 3.2.1.4: Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework • Strategic Priority Goal 3.2.10.2: Expanding the rural economy – development of rural infrastructure, rural electrification <p>LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)</p> <ul style="list-style-type: none"> • 4.4: Domestic Air Transport • 5.5.2: Infrastructure: Land, Maritime, and Air Transport <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 7: Energy Security • Thematic Area 8: Sustainable Transportation • Thematic Area 9: Technology and Innovation • Thematic Area 10: Greening Tourism and Manufacturing Industries <hr/> <p>POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY</p> <p>Concessional loans backed by guarantees would provide the upfront capital necessary to upgrade airfields on outer islands and facilitate improved trade domestically.</p> <p>The involvement of the private sector is relevant for a number of resorts supporting their aircraft, but few are able to use larger aircraft given available privately developed infrastructure (which accommodates smaller planes such as Twin Otters.)</p> <p>The most appropriate approach to financing the expansion and upgrade of outer island airfields to facilitate scaling up domestic flights will likely involve concessional lending guaranteed by multilateral development banks as a primary source of capital. The structure utilized by the World Bank for the Tuvalu Pacific Aviation Investment Project, where over US\$6m has been committed towards resurfacing the primary runway in Funafuti, sets a precedent for infrastructure upgrades focused upon airstrips.</p>
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GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- The unidentified financing gap is the largest barrier to implementation of the National Development Plan. It is unclear if matching funds from donors have been prioritized to meet identified needs. Much of the aviation sector development beyond the Nadi terminal upgrade still has yet to take place.
- Given the ADB/World Bank contributions towards maritime infrastructure development, it may require diversification of the donor base to ensure aviation sub-sector infrastructure finds similar levels of support and domestic aviation delivers similar proportional emission reductions.
- The domestic aviation sector is tied tightly to the tourism sector performance outside the Nadi area, so targeting visitor arrivals and revenue earning mechanisms may prove an attractive way to package spending on the prioritized assets if looking to pay back on any form of lending arrangement.

FINANCIAL SUSTAINABILITY

There are two opportunities for expanded revenue as a result of upgrading airport infrastructure; a) increased domestic trade between outer islands and Viti Levu, and b) increased access by tourists/foreign investors upon resumption of travel into the country.

Any expectation of growth in the tourism industry must be tempered against the recent COVID-19 pandemic, and through 2020, a severe contraction in the tourism sector has been recorded thus far.

Budget allocations may support the investment needed to upgrade the remaining 11 domestic airports, as the international airport rehabilitation was undertaken with grant support (coupled with Technical Assistance and Capacity Building grants to facilitate the assessment process.)

It is unlikely grant financing will be provided in-full to cover the capital expenditure budget, and concessional loans will likely be the most readily available mechanism for infrastructure financing, possibly coupled with guarantees on assets to reduce risk associated with fixed assets in areas vulnerable to both climate change impacts and population drift.

The 6.3% growth noted in the State Action Plan provides the primary reference point for emission projections in the sector, but with aviation infrastructure to be paid back within ten years, the infrastructure must facilitate at least US\$49.5m in additional tax revenue from foreign visitors. This represents 25% (6% Service Turnover Tax, 9% VAT, and 10% from ECAL) of the US\$198 additional tourism revenue beyond 2019 figures required to pay off the planned infrastructure in the 2020-2030 period. 3.2% in fuel savings per annum would accrue only US\$4.4m over the 2020-2030 period.

The bilateral funding partners and multilateral investment institutions mentioned previously will be instrumental in devising blended finance arrangements to meet the infrastructure development needs of Fiji, which will not be sufficiently financed by the Fijian Government without support, as the budgetary allocations clearly do not meet the same level of investment placed into Nadi airport. If equitable service delivery across the country is a priority, similar levels of investment will be required.

ADB/GCF/World Bank may be able to provide concessional loans for the bulk of the infrastructure upgrades, coupled with technical assistance funds for capacity building exercises (particularly around scoping and siting of developments). Calculation of payback rate and contributions towards economic growth through a cost-benefit analysis exercise would also require technical assistance, but the tourism revenue generated may make the project attractive as a loan recipient.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

TOTAL VALUE OF PROJECT: US\$52,470,000

- Grant for project development: 0.9% of total cost equal to US\$495,000
- Grants for Technical Assistance & Capacity Building: 4.7% of total cost equal to US\$2,475,000
- Concessional Loans: 92.6% of total cost equal to US\$48.6m.
- State Budget: 1.7% of total cost equal to US\$900,000

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** PASO, UNDP, GGGI, NDC-Hub, **ADB**, ICAO, CTCN, EEAS, IRENA, **WB/IFC**, CIDCA, PCREEE-SPC, FAO, WFP
- **Project Implementation & Management:** **DB**, **WB/IFC**, GGGI, NDC-Hub, CIDCA, PCREEE-SPC, FAO

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** GCF, **ADB**, **WB/IFC**, EIB
- **Debts & Loans:** GCF, **ADB**, **WB/IFC**, EIB, FDB
- **Equity:** FAL, ATS, Private Sector
- **Non-Government Grants for investment:** GCF, GEF, **WB/IFC**, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT
- **Grants for Technical Assistance & Capacity Building:** GEF, **AU-DFAT**, **NZ-MFAT**, CTCN, **ADB**, GCF, **WB/IFC**, CIDCA, KOICA, UNDP, GGGI, UNESCAP, UNCTAD, ICAO, PASO
- **Government Budget & Taxes Incentives:** MOE (state budget)
- **Other Risk Instruments:** **ADB**, **WB/IFC**, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

1. Training on upgrade and construction requirements will involve significant upskilling of construction capacity to meet the labour requirements for the various upgrade projects (US\$2,000,000)
2. Infrastructure/asset management training and responsibilities of FAL, ATS, and the broader private sector needs will necessarily include CAAF, as well as MCTTT, MIMS and Dept. of Civil Aviation staff to achieve ICAO compliance and meet the expected performance standards of the upgraded aviation facilities. (US\$475,000)

INFORMATION AND MRV NEEDS

Implementation will require third-party confirmation of completed works being constructed to acceptable standard. In the event the work is completed by government personnel, then external assessment will be needed. If completed by non-government contractors, government approval of works completed will be required, and criteria for acceptance of work completed must be devised.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	1,2	1,2	
Estimated CB & TA Costs (US\$)	970,000	1,285,714	714,286	2,970,000
Estimated Capital Investment (US\$)	0	18, 562,500	30,937,500	49,500,000
Estimated GHG Mitigation (tCO₂)	0	3,565	7,606	11,172
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				1,713

T15 - BUS NETWORK INFORMATION TRANSPORT SYSTEM (ITS)

NO.	T15
ACTION NAME	Bus Network Information Transport System (ITS)
SUB-SECTOR	Land
DESCRIPTION	<p>Institute GPS monitoring for all bus operators, inclusive of Passenger Information System (PIS) displays (inclusive of arrival/departure times and delay announcements) at bus stands, shelters, and terminals throughout the urban/peri-urban areas encompassed by the sealed road network of ~1,707km. Available ITS technology includes global position monitoring of bus movement (including distance, speed, route, etc.), coordinating with a central data management platform to update digital/LED PIS displays reticulated around the road/electricity network.</p> <p>Currently, the Fijian Government has been developing a GCF proposal for integration of electric buses into the fleet through a US\$10m pilot programme with FDB. This follows the scrappage and replacement programme suggested by ADB and World Bank during previous assessment of the public transport sector, but further incentives have yet to materialise for the industry, and currently, consolidation of the market is underway due to constriction of the public transport industry's growth.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Completing feasibility studies and financing support applications. • Driver and technician training programmes, setting up a mechanism for public-private partnership in the implementation of ITS upgrades, building upon the experience of implementing the e-ticketing system. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Financing bus-based tracking systems, bus stop upgrades, and terminal renovations.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • A strengthened public transport system offering improved land transport services to non-motorists and most vulnerable populations (including children, elderly, and disabled persons). • GHG emission reductions from efficiency gains. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced waiting times and increased efficiency for bus users. • Establishment of integrated bus stop/terminal network, providing public announcement of real-time scheduling and arrival/departure times of buses on each route.

**MITIGATION
POTENTIAL****18,000 tCO₂/YR IN 2030. AND A TOTAL OF 137,300 tCO₂ FOR 2020 – 2030****KEY ASSUMPTIONS:**

- Under the emissions profile projected for buses through the LEDS, emissions from buses are estimated to have increased during the 2015-2019 period from 96,086tCO₂ to 118,427tCO₂ in line with the recorded growth rates. From 2019 onward, an average growth rate of 4.36% is assumed, with 123,590tCO₂ attributable to buses assumed for 2020, and 1,529,222tCO₂ over the entire 2020-2030 period projected under a BAU scenario.

Measures to reduce emissions through streamlining traffic flow by way of congestion mitigation strategies such as ITS have yielded savings of 7-12% in real world trials, and while additional measures such speed management techniques and traffic flow smoothing techniques can contribute similar savings, the sole intervention is being applied to the bus industry, bounded by a 12% maximum reduction value for the emissions attributed to buses (assuming 10% emission savings will be used).

**CO-BENEFITS/
SDG LINKAGES**

- The reduction of wait times and associated opportunity cost for commuters due to poorly scheduled arrival and departure times will have socio-economic co-benefits across the overall economy.
- Competition between bus operators should be better managed as route evaluation takes place and reallocation of buses to areas of greater demand is implemented.
- Students should also benefit from more reliable transport to get to and from school in a timely fashion.

Relevant primary SDGs impacted: 8, 10, 11, 13.

Relevant secondary SDGs impacted: 1, 4, 5, 9, 12, and 17.

**INVESTMENT
NEEDS (USD)**

Estimated capital investment needed for the physical implementation: >US\$104.6m¹⁵⁷

Estimated development costs: ~US\$1,046,000¹⁵⁸

Estimated Enabling, Capacity Building and Technical Assistance Needs: ~US\$7.9m¹⁵⁹

**RIO MARKER AND
CRS PURPOSE
CODE(S)**

RIO MARKER: Significant (1)

OECD-DAC/CRS PURPOSE CODE(S):

- 21011 - Transport policy, planning and administration;
- 21013 - Transport regulation;
- 21023 - National road construction;
- 21081 - Education and training in transport and storage;
- 43030 - Urban development and management

**IMPLEMENTING
AND SUPPORTING
ENTITIES/
STAKEHOLDERS****POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:**

MCTTT, MIMS, LTA, FRA, FBOA

POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:

MOE, EFL, Municipal Councils, Ministry of Information (Dept. of Information Technology & Computing Services), Vodafone/Private Sector Companies

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: 6-12 months (Consultation and scoping for the needs of the bus industry and selection of ITS technology options, including prioritization of installation/upgrade schedule.)

TIME NEEDED FOR SECURING FINANCE: Up to 12 months (Both the capital costs associated with the acquisition of buses and the capital required for infrastructure development will require a phased finance approach, given the scale of the project. Financing the pilot phase through multilateral institutions will include review and approval.)

WHEN WILL THE PROJECT/INVESTMENT START AND END: 2022 through 2025 (The infrastructure scoping and replacement should begin as part of the existing strategy in urban areas to improve scheduling and adherence to timetables. The continuous acquisition of bus ITS systems, training of drivers, installation of bus shelter/terminal displays may be expected to continue through at least 2025 until system is fully established nationwide beyond urban areas.)

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

Secure technical assistance and capacity building support for items B, C, and D below.

- A. Prepare a new policy (or regulation) for utilization of information technology in buses and bus infrastructure network.
- B. Updated bus and bus infrastructure (bus stop, terminal, and depot) design standards for improved information display and commuter service delivery.
- C. Pilot items B and C in one or more feasibility study(s) for a planned network upgrade beginning in urban areas (the Greater Suva Area, Lautoka, Nadi, and Labasa) with peri-urban areas to follow.
- D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):

- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
 - » Expansion of the rural road network
 - » Further development of full road network to international standards with a greater emphasis on maintenance, rehabilitation and upgrading.
 - » Extending rural transportation services
- **Goal 3.2.9:** Creating vibrant and environmentally sustainable urban centres.
- **Goal 3.2.10:** Promoting equal opportunities, access to basic services and building resilient communities.
- **Goal 3.2.12:** Competitive, sustainable and value-adding agriculture.

Goal 3.2.16: A World-class tourism destination that increasingly adds value to the local economy.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.1:** Ensure safe, efficient (including reducing traffic congestion) and affordable transportation services.
- **Strategic Priority Goal 3.2.1.3:** Extending rural transportation services.
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework
- **Strategic Priority Goal 3.2.10.2:** Expanding the rural economy – development of rural infrastructure, rural electrification

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.2:** Land Transport
- **5.5.2:** Infrastructure: Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 7:** Energy Security
- **Thematic Area 8:** Sustainable Transportation

NDC IMPLEMENTATION ROADMAP

- **Key Enabling Element:** Complete a data assessment study and gap analysis for the vehicle fleet in land transport.

GREATER SUVA TRANSPORT STRATEGY

- **2.3.5** Public Transport
- **4.1** Transport Infrastructure
- **5.1.1** More efficient use of road space.

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

- Fiji's national bus fleet is already well-established and operated by over 60 companies with licenses to run their buses on specific routes. It is regulated as an industry by MCTTT, which now has purview over both LTA and FCCC, which serve as operational and financial regulators, respectively.
- The improvement of bus tracking and routing should increase appeal of public transport as a modal options, and will involve engagement of the private sector to promote transit and travel by bus instead of other GHG emitting transport forms (ideally with EVs and bicycles which being utilized in parallel).
- To maintain and strengthen the role of the bus network, the government must introduce sufficient ITS infrastructure, support systems, and public awareness efforts to encourage land transport users to patronize the buses available to them. This will require a blended finance model, inclusive of infrastructure lending for progressive upgrade of bus stops and terminals. Multilateral development banks should couple concessional loans and guarantees with financial grants for the required IT equipment on-board buses and installed at each stop, respectively. Multi-lateral and bilateral parties can provide technical assistance/capacity building grants to develop a qualified labour force to support streamlining decentralized bus operations. Projected increases in revenue from the general public can partially cover the capital costs associated with establishing the bus fleet, and to recover costs associated with operating and maintaining the network nationally.
- The government already sets and monitors passenger tariffs, enforcing e-payment, and can facilitate access to a lending facility for debt and grants to cover the equity portion of investments and help reduce any exposure to additional risk by the bus industry. The Private Sector will also have access to free driver and maintenance training (support by grants)

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- The diversified nature of the bus industry will likely lead to a varied response regarding transition to ITS.
- Expectations around the cost to be borne by the private sector will also need to be addressed.
- A Memorandum of Understanding may be reached with FBOA (and other stakeholders, as needed) prior to creation of new policy and legislation for the industry.
- The intersection between the different stakeholders involved in the practical operation and maintenance of the ICT platform will require a well-defined coordination mechanism.
- The cost of infrastructure commitment to bus shelters/terminals has not been budgeted at similar or sufficient scale to meet the needs of the ITS transition previously.

FINANCIAL SUSTAINABILITY

Fiji's public transport system is fully funded by the private sector, with various operators maintaining credit lines with FDB and commercial banks, and the fares are subject to price controls in one of the more heavily regulated industries across the country. With primarily grant-supported upgrades for the ITS transition, the improvements in routing efficiency and reliability should increase ridership and provide improved margins for those bus operators who are currently profit constrained by the price controls and external factors negatively impacting their bus occupancy.

Fostering behaviour change away from increases in private vehicle use will be instrumental in improving the margins on operations and reducing per capita emissions per kilometre travelled.

Consequential reductions in fuel imports will improve viability on a national level and help substantiate taking the approach of establishing a more coordinated national system of bus operations across the network.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

TOTAL PROJECT VALUE: US\$116,217,000

- Grant for project development: 0.9% of total cost equal to US\$1,046,000
- Grant for infrastructure upgrades to bus shelters/terminals: 73.4% of total cost equal to US\$85,350,000
- Private Sector Investment in on-board GPS: 16.5% of total cost equal to US\$19,229,000
- Grants for Technical Assistance & Capacity Building: 6.8% of total cost equal to US\$7,900,000
- State budget: Tax concessions (Duty, Excise, Vat) on ITS equipment at 2.3% of total value equal to \$2,692,000 (14% of private sector investment)

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** GGGI, NDC-Hub, **ADB, WB/IFC**, PRIF, CTCN, EEAS, SPC, UNIDO, UNDP, USP
- **Project Implementation & Management:** **ADB, WB/IFC**, SPC, UNIDO, UNDP, UNESCAP

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** GCF, **ADB, WB/IFC**, GCF, EIB
- **Debts & Loans:** **FDB, Commercial Banks, ADB, WB/IFC**, EIB, GCF
- **Equity:** **FBOA/Private Sector**
- **Non-Government Grants for investment:** GCF, GEF, **ADB, WB/IFC**, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT
- **Grants for Technical Assistance & Capacity Building:** GEF, **AU-DFAT, NZ-MFAT**, CTCN, **ADB**, GCF, **WB/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNIDO, GIZ
- **Government Budget & Taxes Incentives:** **MOE (state budget)**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

1. The training of personnel serving as both transit drivers and technicians to understand, service, and operate both the fleet and ITS infrastructure will be necessary elements. Cross-training of personnel can occur if other public and private sector coordination mechanisms are developed to coordinate the fleet as the ITS is being established. (US\$3,850,000)
2. Staff from across the public and private sector must be trained in the installation and maintenance of bus stands/shelters/terminals and can be attached to undertaking infrastructure construction and management over the 2020-2030 period. This includes the engagement of international suppliers to attract them to the Fijian market. (US\$3,850,000)
3. MCTTT, MIMS, and MOE staff need to be trained to collaboratively develop the financing model with the private sector in consultation with the financing and development partners who may assist in funding the project to sustainably operate the bus-based ITS network and monitor/quantify returns on investment in ITS system. (US\$200,000)¹⁶⁰

**INFORMATION
AND MRV NEEDS**

- Mileage and operational records (fuel consumption, hours in service per day, days per month in and out of operation, maintenance schedule, etc.) of designated buses in the transit network will be required to track performance and efficiency.
- Occupancy of transit vehicles per route, per day, per km, will be necessary to track trends in utilization of the transit service by the public and track efficiency improvements shifting from the baseline.
- Analysis of average bus speed against locations on each route will be necessary to determine behaviour of the bus fleet within the traffic flow.
- Integrating the current e-ticketing budgetary model into ITS operations, revenue from bus operations will need to be tracked to determine uptake of transit service utilization.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2, 3	1,2, 3	1,2, 3	
Estimated CB & TA Costs (US\$)	2,101,556	2,566,667	4,277,778	8,946,000
Estimated Capital Investment (US\$)	23,154,333	30,319,000	51,112,667	104,586,000
Estimated GHG Mitigation (tCO₂)	12,787	41,805	82,745	137,337
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				17,991

T16 - ELECTRIC VEHICLE NETWORK DEVELOPMENT

NO.	T16
ACTION NAME	Electric Vehicle Network Development
SUB-SECTOR	Land Transport
DESCRIPTION	<p>Development of an EV network in Fiji will require both market instruments to facilitate introduction of electric vehicle technology and planning around allocation of infrastructure to create a sufficient support network for a burgeoning EV market, particularly given the distribution of vehicles across various islands. Introducing EV technology creates both a shift in energy storage and distribution requirements, as well as the current market access and profile of vehicles to achieve emission reductions (>9,712 tCO₂/yr and a total of 104,304 tCO₂ for 2020 – 2030.) Currently, as per records provided by FRCS, individuals and households primarily purchase second-hand vehicles.</p> <p>The EV market developed much more recently, which means a robust second-hand EV market is not readily available to replace the second-hand internal combustion engine imports (which make up the bulk of Fiji's national vehicle imports.) It has been demonstrated through the tax incentives on second-hand hybrid cars (discontinued in 2017) the potential for fiscal policy to impact market behaviour. This mitigation action is expected to include the import of up to 16,000 EVs and charging stations in Fiji.</p> <p>The current financing process is meant to be enabled by broad private sector investment in new vehicles and EV charging units. The Fijian Government has put forth tax incentives and concessions for both charging stations and vehicles, however, uptake has been minimal thus far. Structural realignment of the market will require more robust engagement and financing from both private and development financing providers.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Regulatory standards for policies related to both vehicles and infrastructure will be required by MCTTT, MIMS, • Associated SOEs (LTA, EFL, FRA, etc.) will require technical training for the development of standards for EV performance and charging network development/maintenance. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investment is needed to provide capital for lending associated with both the EV charging infrastructure and EVs themselves.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced GHG emissions through the use of EVs. • Establishment of a distributed charging network <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Removal of localized emissions and air pollutants from land transport-based ICES • Improved integration of transport and electricity generation/storage sub-sectors.

MITIGATION POTENTIAL	30,000 tCO ₂ /yr. in 2030 and a total of 174,000 tCO ₂ for 2020 – 2030
CO-BENEFITS/ SDG LINKAGES	<p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • 119,960 vehicles were registered as of 2018¹⁶¹ (updated registration figures have yet to be provided, and unregistered vehicles exist and operate illegal beyond this 2018 total.) • and over the listed period, 59,889 vehicles have been introduced, marking a 99.7% increase in vehicle population from 2001-2018. The age/model year of currently registered vehicles has not been supplied, so the rate of replacement cannot yet be calculated, but assumptions in the LEDS of 20-year maximum lifespans for vehicles would leave <118,265 vehicles on the road from the 2010-2029 period by 2030, with >69,542 registered during the 2020-2030 period. • As per the current 818,077tCO₂ total estimated emissions from the Land Transport sub-sector in 2019, this averages to 6.54tCO₂ per vehicle (inclusive of automobiles of all sizes, including buses, trucks, and motorbikes), and this per vehicle average is applied per annum. • As per provided customs records, year-on-year emission estimates, and average growth of the registered vehicle fleet, there has been an average annual increase of 4.36%. This means an additional 80,231 of the 200,191 vehicles registered by 2030 if growth continues unabated (a 66.9% increase from 2018 figures, or 53.2% increase from 2020 projections). <p>The estimates assume 25% electrification of additional vehicles entering the market as a maximum value, up to 16,000 new EVs imported by the end of 2030. It is likely the annual emissions mitigated will initially not account for the growth of the national vehicle fleet, but with appropriate infrastructural support over the next decade, may exceed additionality and contribute significantly to the replacement of ICE vehicles as they reach the end of their lifespan.</p> <ul style="list-style-type: none"> • Reduce localized air pollutants. • Reduced risks associated with oil spills and contamination of both the coastal marine environment and inland waterways. • Reduced dependence on imported fossil fuels will encourage retention. Additional employment will be required for the maintenance and upkeep of EVSE and vehicles. <p>Relevant Primary SDGs impacted: 9, 11, and 13.</p> <p>Relevant Secondary SDGs impacted: 3, 6, 7, 8, 12, 14, 15, and 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$ 592M (US\$ 113M for Level 2 charging infrastructure. This figure represents estimates for both EVSE units and installation.¹⁶² The cost of new low-end EVs are estimated at US\$479M¹⁶³ 2022-2030 capital costs are estimated to total US\$592M.)</p> <p>OPTIONAL: US\$ 11.3M for Government Procurement of 304 EVs and Level 2 charging infrastructure during 2022 and 2023.</p> <p>Estimated development costs: US\$300,000¹⁶⁴</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$11.5M¹⁶⁵</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21081 - Education and training in transport and storage; 23642 - Electric mobility infrastructures; 24030 - Formal sector financial intermediaries; 24081 - Education/training in banking and financial services

**IMPLEMENTING
AND SUPPORTING
ENTITIES/
STAKEHOLDERS**
POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:

MIMS, MCTTT, EFL, LTA, FRA

POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:

MOE, FCCC, PPA, Private Sector Companies

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: first development will be 6-12 months (and extending overtime) – Introducing EVs to the market will first require both scoping and siting of the technology and location for installation of EV infrastructure before market uptake begins. This process includes market analysis and site selection, given the scope and distribution of land transport assets. This process would also include the identification of grid integration and improvement needs with the existing EFL electricity network.

TIME NEEDED FOR SECURING FINANCE: 12-24 months – Depending on the technology decided and upon financing requirements could total US\$604m, and the need for multilateral assistance may require significant preparatory arrangements.

WHEN WILL THE PROJECT/INVESTMENT START AND END: 2022 and beyond – Under the National Development Plan, implementation should begin following 2020. Tax incentives are already in place for the private sector to invest presently and may be strengthened alongside mainstreaming efforts.

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure technical assistance and capacity building support for items B, C, and D below.
 - B. Prepare a new policy (or regulation) for inclusion of electric vehicles and electric vehicle infrastructure projects.
 - C. Updated infrastructure design standards for how electricity and parking infrastructure shall be designed, inclusive of renewable energy requirements.
 - D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.
 - E. Enter into discussions with commercial and development financiers to support mechanisms for electric vehicle lending and servicing.
-

POLICY/PLAN LINK**5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):**

- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
- **Goal 3.2.9:** Creating vibrant and environmentally sustainable urban centres.
- **Goal 3.2.10:** Promoting equal opportunities, access to basic services and building resilient communities.
- **Goal 3.2.16:** A World-class tourism destination that increasingly adds value to the local economy.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.1:** Ensure safe, efficient (including reducing traffic congestion) and affordable transportation services.
- **Strategic Priority Goal 3.2.1.2:** Further development of full road networks to international standards with a greater emphasis on maintenance, rehabilitation and upgrade.
- **Strategic Priority Goal 3.2.1.3:** Extending rural transportation services.
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework
- **Strategic Priority Goal 3.2.10.2:** Expanding the rural economy – development of rural infrastructure, rural electrification

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.2:** Land Transport
- **5.5.2:** Infrastructure: Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 7:** Energy Security
- **Thematic Area 8:** Sustainable Transportation

NDC IMPLEMENTATION ROADMAP

- **Key Enabling Element:** Complete a data assessment study and gap analysis for the vehicle fleet in land transport.
- **Short-term action:** Mitigation Action T1: Vehicle Replacement Programme (including Hybrid Vehicles and Scrappage)

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

- Decentralized distribution of electric vehicles (and the requisite infrastructure) must necessarily be attached to concurrently financed renewable electricity projects. This means the roll-out of EVs and introduction to the market should be tailored to the expected RE generational potential slated under the existing National Development Plan and other strategic/policy documents.
- The private sector is instrumental in making vehicle purchase choices, both at a business and personal/household level. This requires significant investment and will likely constitute the majority of financing contributed towards the vehicle purchase cost. However, the additional cost of charging infrastructure will be seen as an entirely separate, and likely unappealing secondary cost, which may not be marketable unless paired with RE generation capacity sufficiently scaled for household/business needs. It is recommended the government vehicle fleet first be targeted for EV transition, as the infrastructure costs can be coupled with bulk purchasing to reduce per unit prices, and the model suggested for Government Shipping Service vessels being re-sold into the private sector after a period of at least 5 years may be adopted here, as well, particularly considering the private vehicle fleet composition heavily leaning towards second-hand vehicles.
- The proposed development of the EV Network would need to be attached to tax concessions and lending packages that remove the existing price premium of EVs and Level 2 charging stations (delivering anywhere from 16-80amps at 240 volts) for household/individually owned vehicles, and Level 2 charging stations for commercially/institutionally owned vehicles. The costs associated with the additional EV charging infrastructure, beyond the EV itself, will need to be packaged with subsidies in the form of tax concessions/rebates, reduced interest lending packages, and bulk purchase models to achieve economies of scale.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- Prior to entry of EVs to the market, the absence of infrastructure must be resolved to allow uptake of new technology.
- The disparity in price points between second-hand ICE automobiles and new EVs will be a significant barrier to market acceptance. The price disparity between EV two-wheelers and ICE motorbikes is less pronounced, which may serve as the most appropriate point upon which incentives may be introduced
- As duty and excise designations for electric vehicles (and charging stations) are not properly encompassed in the existing tariff schedule, nor are VAT exemptions issued for EV network development.
- Rebates/tax credits may be provided to importers/retailers who shift their inventory to EVs and cease trading in ICE vehicles.

Government facilities across all ministries may be encouraged to integrate EVSE sites into parking lot/carport locations, and PVU and government vehicle purchases can facilitate entrance of new EVs to the market as the leading avenue for new vehicles entering the national fleet.

FINANCIAL SUSTAINABILITY

Financial instruments will be necessary to wean the land transport vehicle market off of fossil fuels. For the purchase of EVs and charging stations a new tax policy will be required which increases taxes on fossil fuel vehicles and significantly reduces them from EVs to ensure something close to price parity.

A subsidy may be required per purchase, depending on the structure of the new tax policy. This subsidy should be sourced either through direct government funding or ODA grants.

In addition, a lending facility would need to be established to allow for retail (household) and commercial (dealers) lending to purchase EVs, charging stations, and equipment/spares as these will exceed the normal value and duration of loans currently issued for vehicle in Fiji, and this would require a credit guarantee and may be performance and loss & damage insurance as a part of the risk structuring.

The introduction of EVs depends heavily on continued imports of technology manufactured elsewhere, and without significant donor commitment, this may not be achieved or sustained independently.

Regulatory means shall be established as a part of the TA & CB for the safe disposal of batteries once EV are no longer operational, and this may include the takeback/recycling agreements with vehicle/battery suppliers.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

Externally sourced public finance will be required for the infrastructural investment in the EV charging network. The range of EV infrastructure development could be financed through blended finance, inclusive of grants from bilateral partners and GCF, possibly supported by concessional loans from the World Bank and ADB for EVSE infrastructure.

Regarding market development, the Fijian Government will have to determine which additional state taxes/duties will be waived or adjusted under new HS code designations in the Customs schedule, as the current incentives have no encouraged market shift on their own. For a total project value of US\$ 604M, broken down below:

- Estimated capital investment needed for the physical implementation: 98% of total costs equal to US\$ 5.92M.
- Private sector investment: 79.3% of total costs equal to US\$ 479M (vehicle cost), likely via mix of retail and commercial loans after private equity. This many require multilaterally backed guaranteed lending facility via commercial banks.
- State Budget: Subsidy of a reduction in Duty and Tax concessions on electric vehicle imports, reduced registration fees, coupled with subsidies/tax concessions on EV infrastructure investment.
- Commercial/Revolving Loan Facility: 18.7% of total costs, equal to US\$ 113M, likely via mix of retail and commercial loans after private equity. This is supporting RE-based charging infrastructure coupled to vehicle loans or structured for external of vehicle loans if installation is via a commercial company. This many require multilaterally backed guaranteed lending facility via commercial banks.
- Grants for project development: 1% of capital costs, equal to US\$ 5.9M (expected to address multiple individually funded support projects).
- Grants for Capacity Building and Technical Assistance: 1% of capital costs, equal to US\$5.9M

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** FDB, UNESCAP, GGGI, NDC-Hub, ADB, **WB/IFC**, PRIF, IEA, IRENA, CTCN, EEAS, PCREEE-SPC, UNIDO, USP, UNCTAD
- **Project Implementation & Management:** FDB, UNDP, GGGI, NDC-Hub, ADB, WB/IFC, CIDCA, EEAS, PCREEE-SPC, USP

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** GCF, ADB, **WB/IFC**, GCF, EIB
- **Debts & Loans:** FDB, ADB, **WB/IFC**, EIB, GCF, **Commercial Banks**
- **Equity:** Fijian Government/SOEs, **Private Companies/Vehicle Owners**
- **Non-Government Grants for investment:** GCF, GEF, **WB/IFC**, EIB, CIDCA, EEAS, JICA, KOICA, AU-DFAT, NZ-MFAT
- **Grants for Technical Assistance & Capacity Building:** GEF, **AU-DFAT, NZ-MFAT**, CTCN, ADB, GCF, WB/IFC, JICA, KOICA, EEAS, UNDP, UNIDO, GIZ
- **Government Budget & Taxes Incentives:** **MOE (state budget)**
- **Risk Instruments:** **ADB, WB/IFC**, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE: US\$ 11.5M

1. Support will be required for national level feasibility study activities, covering both the scoping and technology selection phase of options for government vehicles and charging stations (tendering, procurement, contracting, etc.) (US\$590,000)¹⁶⁶
2. TA support for the design and installation of charging infrastructure at various locations and other power system needs (US\$5.59M)
3. Practical training will be required for the large-scale, procedural installation of the EVSE network, with local ministerial and state-sponsored personnel on attachment with contracted, certified installers (particularly working with authorized dealers under the FMTA.) (US\$2.66M)¹⁶⁷
4. Practical training will also be required for mechanical/electrical personnel across the country including proper disposal of batteries (US\$2.66M)¹⁶⁸

INFORMATION AND MRV NEEDS

- The technology options assessment will be needed in the initial phase to make determinations around most appropriate investment strategies.
- Completion reports and network diagrams will be required by MIMS, EFL, and FRA for O&M and monitoring of performance, as well as faults, in the EV network
- Certification records for personnel benefitting from the CB/TA activities will need to be maintained in a registry to refer EV owners to their most appropriate local technician regarding issues with either charging systems or EV maintenance.
- Power generation/consumption monitoring will be required for each charging station installed.
- Tax and lending records to evaluate the utilization of subsidies, credits, rebates, and lending instruments will be required for the financial institutions and MOE.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1, 2, 3, 4	2, 3, 4	2, 3, 4	
Estimated CB & TA Costs (US\$)	3,880,000	2,970,000	4,950,000	11,800,000
Estimated Capital Investment (US\$)	55,130,000	180,269,000	356,823,000	592,227,000
Estimated GHG Mitigation (tCO₂)	4,000	37,000	133,000	174,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				30,000

T17 - SUSTAINABLE AVIATION FUEL INTEGRATION INITIATIVE

NO.	T17
ACTION NAME	Sustainable Aviation Fuel Integration Initiative
SUB-SECTOR	Aviation
DESCRIPTION	<p>Integration of biofuels into the domestic aviation fleet's operational fuel mixture provides an opportunity for immediate reductions in emissions for all flights which utilize the fuel. It is commercially available from various sources, and:</p> <ul style="list-style-type: none"> • Various types of aviation-grade biofuel are being developed across the private sector, having been incorporated into trials by a range of commercial airlines, ranging in feedstock from Jatropha, residual forestry waste for alcohol-based fuels, to coconut oils used in blends. • Local production capacity for marine feed stocks (such as algae and seaweed) may be explored for either processing in-country or bulk export to trade partners who may process and refine sustainable aviation fuel (SAF) from the biomass. <p>Classification of biofuels as SAF is contingent upon the conditions under which the biomass is to be sourced, and will deliver, at most, carbon neutral performance.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Achieving annual market updates on cost-effectiveness and availability of SAF sources. • Identifying appropriate fuel suppliers. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Achieving either full fuel subsidy support or cost-effective subsidies to meet the cost-competitive fossil fuel options available.
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduction in emissions associated with internal combustion engine rotor/jet aircraft. • A reliable, regular supply chain for SAF alternatives has been established through Fiji's fuel providers to support Fiji Link and the rest of the domestic aviation fleet. • Integration of biofuels into national-scale fuel mix. <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Fuel infrastructure and storage upgrades across national aviation fuel depots.
MITIGATION POTENTIAL	<p>Up to 16,100 tCO₂/yr in 2030 and a total of up to 114,600 tCO₂ for 2020 – 2030</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • Based upon the estimated growth rates in the State Action Plan for the international aviation sub-sector, building on the LEDS' estimated 5,000,000 litres of Jet A1 kerosene and 2,500,000 litres of AvGas used domestically in 2013, relative to a total 350,812,390 litres for international fuel, under a BAU scenario, 116,637,066 litres of Jet A1 and 58,318,533 litres of AvGas would be consumed over the 2020-2030 period, yielding 441,868 tCO₂ in total.¹⁶⁹ <p>Given the approved blends range from a maximum of 10-50% SAF with conventional A1 rated kerosene and AvGas, the contributions of SAFs reflect this proportion above (an average of 30% is assumed).</p>

CO-BENEFITS/ SDG LINKAGES	CO-BENEFITS INCLUDE: <ul style="list-style-type: none"> • Updated regulatory environment to account for changing fuel standards in aviation sector. <p>Relevant primary SDGs impacted: 7, 9, and 13.</p> <p>Relevant secondary SDGs impacted: 1, 8, 10, 11, 12, 14, and 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$6.6M¹⁷⁰ (for additional fuel storage and transfer systems).</p> <p>Estimated development costs US\$132,000 (engineering, due diligence, tendering, and procurement process)</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$330,000 (decentralized training and awareness required around SAFs and quality assurance/ compliance for fuels suppliers, Fiji Link, Northern Air, FAL, FTL.</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15155 - Tax policy and administration support; 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21050 - Air Transport; 21081 - Education and training in transport and storage;
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>Dept. of Civil Aviation, CAAF, Fiji Airways/Fiji Link, Private Sector, FAL</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>ATS, FNFP, FDB, and Commercial banks, MOE, FRCS, FCCC</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 6-12 months¹⁷¹</p> <p>TIME NEEDED FOR SECURING FINANCE: Up to 12 month¹⁷²</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: Ongoing from 2022.¹⁷³</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure technical assistance and capacity building support for items B, and C below. B. Prepare a new policy (or regulation) for inclusion of Sustainable Aviation Fuels in the aviation market. C. Investigate a feasibility study for potential integration of SAFs into the fuel blend.

<p>POLICY/PLAN LINK</p>	<p>5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):</p> <ul style="list-style-type: none"> • Goal 3.1.7: A socially inclusive Fiji and empowered Fijians • Goal 3.2.1: Access to transportation through an efficient and sustainable transport network • Goal 3.2.3: Unlocking our economic potential through consistent and reliable domestic air services. • Goal 3.2.4: Enhancing Fiji's status as a vibrant and modern regional and international hub for people and cargo movement. • Goal 3.2.10: Promoting equal opportunities, access to basic services and building resilient communities. • Goal 3.2.16: A World-class tourism destination that increasingly adds value to the local economy. <p>MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019):</p> <ul style="list-style-type: none"> • Goal 2: Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services). • Strategic Priority Goal 3.2.1.3: Extending rural transportation services. • Strategic Priority Goal 3.2.1.4: Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework. • Strategic Priority Goal 3.2.10.2: Expanding the rural economy – development of rural infrastructure, rural electrification. <p>LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)</p> <ul style="list-style-type: none"> • 4.4: Domestic Air Transport • 5.5.2: Infrastructure: Land, Maritime, and Air Transport <p>THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)</p> <ul style="list-style-type: none"> • Thematic Area 7: Energy Security • Thematic Area 8: Sustainable Transportation • Thematic Area 9: Technology and Innovation • Thematic Area 10: Greening Tourism and Manufacturing Industries
<p>POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY</p>	<p>This investment option represents an additional annual recurring cost that will yield emissions reductions, potentially without any shift in infrastructure, added capital costs, or change to operations.</p> <p>The involvement of the private sector beyond Fiji Link is instrumental in mainstreaming fuel blends across the domestic fleet, and all aircraft would need to be assessed for compliance with SAF blends.</p> <p>Given the price premium on SAFs in the current market (2.5-9 times the cost), relative to the current estimated costs of approximately US\$8,909,000 on aviation fuel imported in 2019, shifting the entirety of the supply to available biofuels from 2022-2030 would take the total cost up from US\$124.5m range from US\$311.25-1,120.5m.</p>

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- The primary barrier to implementation is the lack of competitive pricing for SAFs as a recurring operational cost. Additionally, the scaling barriers to cost-competitive uptake of new SAFs need to be remedied at a global market level, as SAF supply is insufficient for the current demand by larger air carriers attempting to decarbonise both domestic operations and international flights under ICAO CORSIA compliance requirements.
- Unless a viable drop-in fuel is selected, infrastructure costs would be required in addition to the premium paid on the fuel itself.
- Fiji will only be able to take advantage of available SAFs if trade arrangements are made (possibly jointly placing orders with airlines in NZ or Australia if delivered from outside the region – most fuel is brought in through refineries and suppliers in Singapore.)
- Attributing a subsidy to fuel for air travel may create competition issues with the maritime shipping sector, and claims of favouritism would have to be addressed and ameliorated prior to going forward with any financing arrangements (differentiation of intended services and customer base may need exploration to avoid cannibalizing parts of the market.)
- The massive upheaval in air travel trends as a result of the COVID-19 pandemic makes rapid adoption of largescale fuel shifts in the domestic aviation sector a minimal priority at the moment.

FINANCIAL SUSTAINABILITY

Without an external partner willing to subsidize more than 100% of the cost of Fiji's domestic aviation fuel value, or until technological breakthroughs occur alongside a significant increase in SAF supply, financing the adoption of SAF for Fiji's aviation activities cannot be considered sustainable given the current market outlook.

The most viable means of achieving this shift in fuel source before SAFs reach a competitive price point in the market would be through coordinating with regional, multilateral, and bilateral partners, but this is not seen as a cost-effective priority at this time.

With SAFs ranging from 2.5 – 9 times the cost of fossil fuels, it may be estimated the cost of sourcing SAFs will increase from the estimated 2019 base cost of ~US\$8.9m, the operating domestic routes at current 2020 rates to US\$22.3 – 80.2m per annum. The structure of subsidies and value of biomass feedstock would go beyond FAL/ATS/Fiji Airways/Link investments and involve fiscal policy led by MOE recommendations.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

TOTAL PROJECT VALUE: US\$ 7.06M

- Grant for project development: total cost equal to US\$132,000
- Grants for Technical Assistance & Capacity Building: total cost equal to US\$330,000
- Grant for Infrastructure: total cost equal to US\$6.7M

POTENTIAL LOWER STATE BUDGET: TOTAL COST, EQUAL TO US\$45.4M¹⁷⁴

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** **PASO**, UNDP, GGGI, NDC-Hub, ADB, **ICAO**, CTCN, EEAS, IRENA, WB/IFC, CIDCA, PCREEE-SPC, FAO, WFP
- **Project Implementation & Management:** CIDCA, WB/IFC, GGGI, NDC-Hub, ADB, CIDCA, **PCREEE-SPC**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Equity: Fuel companies**
- **Credit Guarantees:** GCF, ADB, WB/IFC, EIB
- **Debt & Loans:** GCF, ADB, WB/IFC, EIB, commercial banks, FDB
- **Non-Government Grants for investment:** GCF, GEF, WB/IFC, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT
- **Grants for Technical Assistance & Capacity Building:** GEF AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, WB/IFC, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNCTAD, **ICAO, PASO**
- **Government Budget & Taxes Concessions:** MOE (state budget)
- **Risk Instruments:** ADB, WB/IFC, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

1. Training requirements will extend beyond the operational needs of FAL and ATS to include, Fiji Airways/Link, private sector operators for ground/in-flight crew details, plus CAAF and Dept. of Civil Aviation staff to provide expertise for policy and regulatory oversight: (US\$ 200,000)
2. Those associated with fuel handling and refuelling at FAL and ATS may need additional awareness material and operational training, but the functionality of biofuel systems would differ little from existing infrastructure and practices.: (US\$ 130,000)

INFORMATION AND MRV NEEDS

- Fuel/Energy use per kilometre, cost per unit (and variance from 100% fossil fuel costs), and operational time both on the ground, taxiing, and in flight will all be instrumental in determining performance.
- Environmental sourcing of SAF blends and variance in percentage of blend
- These dimensions will all assist in quantifying delivery of National Development Plan objectives concerning the aviation sector, as well as quantifying emissions mitigated.

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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	-	-	
Estimated CB & TA Costs (US\$)	462,000	0	0	462,000
Estimated Capital Investment (US\$)	4,000,000	2,600,000	0	6, 600,000
Estimated GHG Mitigation (tCO₂)	9,848	33,425	71, 308	114,581
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				16,055

T18 - LAND TRANSPORT INFRASTRUCTURE UPGRADE FOR NON-MOTORISED TRANSPORT

NO.	T18
ACTION NAME	Road Infrastructure Upgrade for Non-motorised Transport (increasing the use of sidewalks, bike lanes, and safe/green road spaces to encourage non-motorised transport)
SUB-SECTOR	Land Transport
DESCRIPTION	<p>This opportunity includes the design and implementation of enhanced land transport infrastructure which encourages decarbonisation through the safe use of non-motorised transport in Fiji. This enhanced land transport infrastructure will include footpaths and bicycle lanes separated from motorised vehicle traffic lanes, and potentially include dedicated pathways for only non-motorised transport. The separation from vehicle traffic lanes is achieved through the use of green space or other barriers which will also lead to improved drainage and carbon sequestration. A central component of this opportunity is for the Fiji Roads Authority (FRA), Ministry of Infrastructure and Meteorological Services (MIMS) and MLG in coordination with local governments, themselves, to institute additional infrastructure planning, design standards/criteria, regulation, and enforcement which includes non-motorised transport in the implementation of new and rehabilitated carriageways/roads and bridges, and stand-alone pathways.</p> <p>The implementation of this opportunity is expected to start in the urban and suburb areas of Suva, Lautoka, and Nadi. It will focus on high-traffic areas and Central Business Districts, as well as feasible areas for last-mile transport connected to the public transport system (e.g. paths leading to bus stops), and implement total up to 2,800 km nationally, focused first upon urban areas, of new or rehabilitated road ways with non-motorised transport by the end of 2030. This opportunity will help to diminish traffic congestion, improved pedestrian and cyclist safety, and lead to GHG mitigation.</p> <p>The implementation of individual road infrastructure follows the annual budgeting process of the Fijian Government, where feasibility, budget requests, and implementation are preformed and regulated by FRA and MIMS. Thus, feasibility, finance, and implementation of this mitigation opportunity will need to follow this multi-year process, and be a continual activity involving multiple individual road/pathway infrastructure projects.</p> <p>NOTE: The cost estimates for this action include the total cost of the roads since the separated non-motorised transport spaces are integrated into the total road design. A significant portion of the budget will be disbursed anyway in a BAU scenario to build new roads or rehabilitate roads (without the non-motorised components described in this opportunity). The non-motorised component will be included into the design of each individual selected investment, and the incremental cost for the non-motorised component will be specific to each individual selected investment and should be determined at the point of feasibility studies.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Updated road & non-motorised transport infrastructure design standards for how roads, footpaths, bicycle lanes, and the space between them shall be designed. • New policy (or regulation) for determining the application of safe non-motorised transport infrastructure when implementing new or upgrading roads, commercial and public spaces. • MIMS, FRA, and local governments prepare feasibility studies (on-going) and tendering for implementation. <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investment is needed to fund the construction of new or rehabilitated roads including footpaths and bicycle lanes separated from motorised vehicle traffic lanes, and potentially include dedicated pathways for only non-motorised transport. Vehicle traffic lanes will be separated by green space/bioswales¹⁷⁵ which can lead to improved safety, drainage and carbon sequestration.

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • GHG mitigation (emissions reduction through a mode shift from motorized to non-motorized transport thanks to the existence of infrastructure for non-motorized transport inducing behavioural change, and carbon sequestration through increased green space being integrated into transport infrastructure.) • Improved access and safety for non-motorized transport users (cyclists and pedestrians) <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Improved operational efficiency for road users and reduced operational costs associated with maintenance and repair of both road infrastructure and vehicles. • Improved localized air quality around high-traffic areas.
MITIGATION POTENTIAL	<p>5,500 tCO₂/yr in 2030 and a total of 22,000 tCO₂ for the 2020-2030 period.</p> <p>KEY ASSUMPTIONS:</p> <ul style="list-style-type: none"> • The emission reductions considered under this project are those directly attributable to sequestration, and any mode shift from motorized to non-motorized transport would be counted in addition to the base sequestration values estimated. • The sequestration rates are based upon area-based carbon contained in vegetation biomass estimated by the FAO (>11.7 tCO₂ per hectare/yr or 1.17 kgCO₂ per m²/yr). • The calculation is based upon the assumption that every kilometre of newly constructed sealed road of the 5,818km between 2024 and 2036 requiring upgrade include this partitioning with greenspace of 1-2m allocated in the road design, with an average of 1.5m, generally allowing at least 3.5m for carriageways in each direction. For the implementation period of 2024 through 2030 this is 2750km of road. <p>Assuming construction begins after 2023 and continues through the 2036 end of the national development plan, at least 448km would need to be upgraded per annum.¹⁷⁶</p>
CO-BENEFITS/ SDG LINKAGES	<p>Partitioning active transport through green space provides the joint benefits of;</p> <ul style="list-style-type: none"> • Encouraging improved health and fitness (muscular and cardiovascular health), • Filtration of various air pollutants (respiratory health), and, • Improved safety for road users (reduced threat of injury and death from motorized vehicles). • Once a functional design is approved, the deployment should be replicable and scalable across the full 5,818km of road network requiring improvement. <p>Relevant primary SDGs impacted: 9, 11, 13</p> <p>Relevant secondary SDGs impacted: 3, 5, 6, 8, 10, 15, 17.</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$3.7 billion during 2020-2030 period.¹⁷⁷</p> <p>Estimated development costs: US\$764M of the US\$7.9 billion 2020-2036 project total.¹⁷⁸</p> <p>Estimated Enabling, Capacity Building, and Technical Assistance Needs: <US\$136M of the US\$7.9 billion 2020-2036 project total.¹⁷⁹</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 12350 - Other prevention and treatment of NCDs, 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21023 - National road construction; 21081 - Education and training in transport and storage; 43030 - Urban development and management

**IMPLEMENTING
AND SUPPORTING
ENTITIES/
STAKEHOLDERS**
POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:

Dept. of Civil Aviation, CAAF, Fiji Airways/Fiji Link, Private Sector, FAL

POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:

ATS, FNFP, FDB, and Commercial banks, MOE, FRCS, FCCC

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: >12 months would be expected. (Implementation of the Third Road Upgrading project¹⁸⁰ took place over twelve years, with preparation primarily occurring in the first twelve months.)

TIME NEEDED FOR SECURING FINANCE: 24-36 months of preparatory arrangements. (Project financing would likely need to be phased and totalling US\$7.9 billion.)

WHEN WILL THE PROJECT/INVESTMENT START AND END: After the start of 2023. (While FRA could begin integrating design standards and incorporating these into scheduled upgrades by 2021 for domestically funded efforts.)

- A. Secure technical assistance and capacity building support for items B, C, and D below.
 - B. Prepare a new policy (or regulation) for inclusion of non-motorised infrastructure and transport infrastructure projects.
 - C. Updated road & non-motorised transport infrastructure design standards for how roads, footpaths, bicycle lanes, and the space between them shall be designed.
 - D. Pilot items B and C in one or more feasibility study(s) for a planned roads project in a selected urban area (in Suva, Lautoka, and Nadi).
 - E. Enter into discussions (and agreements) with supporting agencies for primary investment financing and state budget allocations.
-

POLICY/PLAN LINK

5YR AND 20YR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036) (ISSUED 2017):

- **Goal 3.2.1:** Access to transportation through an efficient and sustainable transport network
 - » Expansion of the rural road network
 - » Further development of full road network to international standards with a greater emphasis on maintenance, rehabilitation and upgrading.
 - » Extending rural transportation services
- **Goal 3.2.9:** Creating vibrant and environmentally sustainable urban centres.
- **Goal 3.2.10:** Promoting equal opportunities, access to basic services and building resilient communities.
- **Goal 3.2.12:** Competitive, sustainable and value-adding agriculture.
- **Goal 3.2.16:** A World-class tourism destination that increasingly adds value to the local economy.

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).
- **Strategic Priority Goal 3.2.1.1:** Ensure safe, efficient (including reducing traffic congestion) and affordable transportation services.
- **Strategic Priority Goal 3.2.1.2:** Further development of full road networks to international standards with a greater emphasis on maintenance, rehabilitation and upgrade.
- **Strategic Priority Goal 3.2.1.3:** Extending rural transportation services.
- **Strategic Priority Goal 3.2.1.4:** Ensure environmentally sustainable transportation for all Fijians based on the principals of the Green Growth Framework
- **Strategic Priority Goal 3.2.10.2:** Expanding the rural economy – development of rural infrastructure, rural electrification

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.2:** Land Transport
- **5.5.2:** Infrastructure: Land, Maritime, and Air Transport

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 8:** Sustainable Transportation

POTENTIAL
BUSINESS
MODEL
AND FINANCING
STRATEGY

- The rationale behind financing the Active Transport Infrastructure Upgrade is based in proportional scaling up of the Transport Infrastructure Investment Sector Project.
- The private sector is primarily engaged through its collective role representing road users, with contributions toward government co-financing of the infrastructure through revenue collected by government through taxes.
- The joint financing contributions of ADB and the World Bank may again provide the bulk of the capital expenditures required, joined by bilateral donor support. The coordination between MCTTT, Ministry of Infrastructure and Meteorological Services, and Ministry of Rural & Maritime Development budgets should contribute towards implementation and funding of this project.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

- The enormity of the financing requirements for nationwide infrastructure upgrades will be a barrier to financing in a single phase, and a staged approach will be needed over a 10-year implementation period, based around the existing upgrade priorities of FRA.
- Formalizing carriageway designs to maximize green space in partitioning lanes is one of the most important aspects to address before this project begins.
- Road User levies and allocations from the Environment & Climate Adaptation Levy (ECAL) can be employed to support this initiative through both the specific allocation of import taxes on vehicles, vehicle registration and licensing fees, and fuel taxation.
- The bulk of financing would need to be sourced outside of Fiji, which will require adherence to a range of donor requirements.

FINANCIAL SUSTAINABILITY

- The ability to financially supply or finance decentralized national-scale infrastructure development without the vast majority of financing being provided by multilateral institutions and bilateral aid arrangements is incredibly limited. It is also recommended, based upon the previous and ongoing ADB/World Bank financed road infrastructure projects, that this exercise be steadily deployed over a timeframe of 7 years (+3 years of preparation). The timeline of the project would, realistically, extend beyond 2030 given the scope of improvements required.
- With an expected lifespan in excess of 30+ years, any sovereign loans issued beyond grant financing would need to be provided with extended payback periods.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

Externally sourced public finance will be required. Given the proportional breakdown of assistance on the most recent multilaterally funded infrastructure project, a similar breakdown could be used as a model for future investment: 33.3% came from the World Bank (US\$50M), 66.7% from ADB (US\$100M), and though no direct Fijian Government co-financing is allocated to the project, the FRA budget is one of the largest capital-intensive budget lines each year (>FJ\$600M). The opportunity for other bilateral government financing should be explored to reduce the scale of commitments on the part of multilateral financing institutions to reduce loan principles and payback periods.

- Estimated capital investment needed for the physical implementation: 87.7% of total costs equal to US\$ 3.736 billion to 2030 (US\$ 6.927B to 2036).
- Estimated development costs: Up to 10.6% of total costs equal to <US\$ 764M million.
- Grants for Capacity Building and Technical Assistance: Up to 1.7% of total costs equal to < US\$ 136M.

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** **ADB, World Bank**, PRIF, NDC-Hub, GGGI, CTCN, UNIDO, UNDP, UNESCAP, IUCN
- **Project Implementation & Management:** **ADB, World Bank**, PRIF, NDC-Hub, GGGI, CIDCA

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantees:** **ADB, World Bank**, EIB
- **Debt & Loans:** **ADB, World Bank**, EIB, GCF
- **Equity:** **MOE, MCTTT (i.e. – state budget)**
- **Non-Government Grants for investment:** **ADB, World Bank**, GEF, GCF, AU-DFAT, NZ-MFAT, CIDCA, KOICA
- **Grants for Technical Assistance & Capacity Building:** GEF, AU-DFAT, MFAT- New Zealand, UNDP, CTCN, ADB, GCF, KOICA, CIDCA, EEAS, GIZ, UNESCAP
- **Government Budget & Tax Revenue:** **MOE (i.e. – state budget)**
- **Risk Instruments:** ADB, WB/IFC, EIB

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

ENABLING, CAPACITY BUILDING, AND TECHNICAL ASSISTANCE: <US\$136M.¹⁸¹

1. The establishment of green space will also require an expanded maintenance regime to ensure the flora integrated into the active transport partitioning thrives and performs its sequestration functions. (31% <US\$42.07M)
2. Continual training in the management and construction of Active Transport Infrastructure for both engineers/supervisors and skilled/un-skilled labour. (62% <US\$84.13M)
3. Technical assistance for planning, feasibility study(s) and funding application(s) (in phases) (5% <US\$ 6.79M)
4. The basic design and EPC tendering, engineering and contract supervision (in phases) (2% <US\$ 2.71M)

INFORMATION AND MRV NEEDS

- During the construction phase, third party completion reports assessing the quality of work will be required to verify design and structural standards have been met. This will be required on a kilometre by kilometre basis.
- Following completion, road degradation, repair, and upkeep of green space will be required – this will involve tracking damage to roadways, drainage/runoff blockages, and health status of flora growing in the partitioning.
- Sealed road coverage and rural access are linked to the existing KPIs for land transport development, so local capacity to continually monitor and evaluate the status of roadways must be developed and decentralized (particularly across Vanua Levu and outer islands). The reporting mechanism to ensure O&M costs are not exacerbated by neglect should be managed between Rural/Provincial government and FRA/MIMS.

SUPPORTING
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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2,3,4	1,2	1,2	
Estimated CB & TA Costs (US\$)	279,200,000	568,747,050	51,735,250	899,682,300
Estimated Capital Investment (US\$)	0	1,067,572,100	2,668,930,250	3,736,502,350
Estimated GHG Mitigation (tCO₂)	0	2,020	12,891	14,912
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				3,474

E1 - CAPACITY BUILDING FOR INTEGRATED ENERGY PLANNING AND ENERGY STATISTICS IN FIJI

NO.	E1
ACTION NAME	Capacity Building for integrated energy planning and energy statistics in Fiji
SUB-SECTOR	Power
DESCRIPTION	<p>This opportunity encompasses technical assistance for the development of systematic approach to energy statistics and integrated energy planning processes for key stakeholders in Fiji. The primary output of this opportunity is the development of an integrated energy plan and energy balance for Fiji and setting up the institutional infrastructure for integrated energy planning and energy statistics in Fiji. Included within this opportunity is capacity building focusing on integrated energy planning with a dedicated training programme for GOF entities. The training component will include the development of an education module to be included in existing course curriculum at University of the South Pacific (USP), and the development of an online course for continual education of professionals including curriculum and certification. The training components can possibly be carried out as activities in common with other PICs.</p> <p>Planning in Fiji is currently done separately for various energy sub-sectors (especially power, transport, industry, commerce, households etc), and with little or no integration with demand side energy sub-sectoral planning (transport, industry, urban etc). In addition, non-commercial biomass-based energy is difficult to plan for due to challenges in getting data. Integrated energy planning will integrate all these considerations, and ensure that energy-efficiency opportunities will be identified, along with renewable energy, in both the demand and supply side. This can identify a least cost framework for energy security and GHG mitigation that also considers traditional priorities like economic, social, and environmental impacts, along with current priorities on sustainable development.</p> <p>National energy planning should be able to meet a large number of varied and often conflicting objectives¹⁸², which will not be addressed through a very basic planning process as is currently used. On the other hand, if all these priorities are considered together in the planning process, the planning process becomes too complex especially for SIDS like Fiji with limited human resources. Hence, there has to be a simplified process, conceptual framework and tools for long term energy policy and strategy formulation. To achieve this objective, the national energy planning process could use a hierarchical planning process effected mainly at three levels, with overlaps and inter-linkages between them, and implemented in a progressive manner suited for the situation in Fiji:</p> <ul style="list-style-type: none"> • Macro-level planning, considering energy sector as a part of the macro-economy: At this level the planning considers inputs needed for the energy sector such as capital, labour and raw materials; impacts on the economy due to energy policies, energy availability, energy prices or energy taxes; investment capital requirements for the energy sector and foreign exchange requirements; environment resources (such as clean air, water, land); impact on the energy strategy due to specific policies in each of the energy end-use sectors(such as policies favouring public transport or electric vehicles) • Energy planning for the energy sector as a separate entity: This considers the energy sector independently and as a whole and its sub-sectors such as power, coal, oil, etc. This allows a more detailed analysis, especially any interaction between the different energy sub-sectors, and the alignment and resolution of any policy conflicts between them. • Energy planning within each of the energy sub-sectors: Each energy sub-sector (power, petroleum, wood fuel etc) has to do its own detailed planning. At the most basic level this involves making energy demand projections for each sub-sector and planning for supply options and investments.

DESCRIPTION

There are a set of priorities that needs to be considered and integrated at all three levels of planning, and energy-efficiency and fuel substitution¹⁸³ are considered primary among them. They can influence planning at each of these levels, and on the other hand, they are influenced by the planning done at each of these three levels.

The integrated energy planning process can be carried out at different levels of sophistication depending on data availability and the capacity (data, human resource) available in the country. In countries with low capacity and little prior experience in energy planning, integrated energy planning may have to be implemented in a phased manner tailored for the requirements of each country. For example, an initial version of the energy planning process could consist of simple supply and demand projections and a set of policies with little scope for impact analysis or iteration. This could rely principally on physical data (e.g., import data, fuel distribution data, electricity sales etc), extrapolation of past trends in energy supply and demand, a simple energy balance, basic consistency checks in the energy balance, and relatively uncomplicated policy analysis. Once experience has been gained and skills built up, more sophisticated approaches may be developed, including multi-sector macro-economic models, more sophisticated supply and demand projections, more comprehensive energy balance and more sophisticated computerized energy modelling systems. However, even a first, simple version of the integrated energy planning process could be a major improvement over the existing uncoordinated approach and could provide immediate and long-term benefits.

The capacity building will be carried out at the national level or could potentially also be a regional PICS effort. The preparation of a national energy plan and a national energy balance might require data collection from various sectors and administrative levels.

The activities could be led by MIMS/DOE, in association with FBOS, FRCS, MCTTT, MOE, EFL, PCREEE-SPC, MOE, USP and the oil importing companies.

There is no investments or financing involved for this mitigation opportunity. Further discussions with proposed stakeholders, finetuning and detailing of project activities, fund raising, and identification of potential consultants (experts/firms) could be the next steps.

**KEY
IMPLEMENTATION
MILESTONES**
POLICY/TECHNICAL ASSISTANCE

- The institutional infrastructure strengthened for integrated energy planning and energy statistics in Fiji
 - The framework and guidelines developed for developing integrated energy plans and energy balances for Fiji
-

OUTCOMES**PRIMARY OUTCOMES**

- GHG mitigation and lower carbon intensity of the economy
- Reduction in energy intensity (TOE or TJ per US\$ of GDP) of the economy.
- The institutional structure is set up and functional in Fiji for coordination and implementation of integrated energy planning and annual energy data collection and reporting activities.
- Capacity developed of key institutions and stakeholders on integrated energy planning and energy statistics, and the capacity is institutionalized in Fiji and regionally.
- Potential for more continuous and stable power for end users.
- Relative reduction in imported fuel expenditures
- Improved energy security
- Potential for contributing to improved profitability for state owned utilities managing the power and oil sectors (e.g. PUB and KOIL)
- Potential for delayed or avoided investments in power and oil infrastructure
- Improved stability and access to energy especially benefiting people living in remote areas
- Improved adherence to grid code and power quality (e.g. voltage, harmonics, power factor)

SECONDARY OUTCOMES

- Reduced air pollution due to reduced supply and use of petroleum products

MITIGATION POTENTIAL

75,300 tCO₂/year in 2030 and a total of 254,000 tCO₂ for 2020 – 2030 (actual emission reductions during 2025-2030, and the mitigation benefit will continue past 2030)

KEY ASSUMPTIONS:

- It is assumed that this mitigation opportunity will result in a 1 % reduction in the primary energy consumption (excluding energy used for transport) as compared to the baseline scenario. While this opportunity will also lead to energy and emission reductions in the transport sector, to avoid double counting, the energy and emission reductions from transport has not been accounted for
- An emission factor (tCO₂/TJ) for the overall economy, was estimated for each year based on the energy balance for each year. This emission factor was used to estimate the GHG emission reduction for each year as a result of this mitigation opportunity.

ESTIMATION OF PRIMARY ENERGY CONSUMPTION AND EMISSION FACTOR FOR 2019 TO 2030:

- **Estimation of primary energy consumption (including transport) and GHG emission factor:** The total primary energy estimate was available for 2011 from the Fiji National Energy Policy 2013 – 2020 document. Assuming that the energy intensity of the economy remained constant¹⁸⁴, the primary energy consumption for 2019 was projected based on the GDP growth rate between 2012 to 2019. The energy consumed in 2019 through individual fuels and electricity generation was estimated from the fuel import and export data of 2019 from FRCS, and the electricity generation data from EFL. 80 % of the net imports of aviation fuel was assumed to be used for international aviation, and this has not been considered as part of the primary energy estimate. However, no data on non-commercial fuel usage was available for 2019. This was back calculated by deducting the energy consumed by all the commercial fuels and electricity generation from the total primary energy consumption estimate for 2019. In this estimate, due to lack of the sales data, it is being assumed that the net import volume of fuel in a particular year is equal to its consumption for that year (inventory/stocks of that fuel is not being considered).

For the years from 2020 till 2030, it is assumed that fossil fuels will grow at the same rate as the average annual GDP growth rate, and renewable energy will grow at 10 % of the NDC GHG emission reduction targets (e.g. as per unconditional commitment). Using this assumption, the fuel consumed, and electricity generated from renewables for each year was projected from 2020 to 2030, thus creating an energy balance and an estimation of the primary energy consumption for each year.

Based on the energy balance for each year during 2020 to 2030, a national level GHG emission factor (Tonnes of CO₂eq/TJ of energy consumed) was estimated for each year. This emission factor is used for estimating the GHG emission reductions for each year.

- **Estimation of primary energy consumption (excluding transport) and corresponding GHG emission factor:** Fiji's Third National Communication (TNC) provides the volume of transport fuels consumed in 2011. Diesel consumption figure by EFL for 2011 was also provided by the TNC. National level data about liquid fuel usage in industry was available for 2000, which was projected using average GDP growth rate values to get the values for liquid fuel usage in industry for 2011. Based on these data for 2011 (total liquid fuel usage and liquid fuel usage in industry and for EFL), the percentage of each liquid fuel that is consumed in the transport sector alone was estimated (approximately 80 % of diesel, 95 % of petrol, 15 % of kerosene was consumed for transportation in 2011). It was assumed that the same pattern holds true till 2030. Based on that, the transport related primary energy consumption was removed from the energy balance and primary energy consumption estimate from 2019 to 2030.

CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Improvement to reliability and stability of power grid could enable more economic activity, as well as non-productive uses of energy. • Improvement of macro-economic conditions, mainly due to lower imports of petroleum and enabling more productive and non-productive use of energy. • Improved health outcomes, due to reduced use of petroleum and resulting lower air pollution • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure <p>Relevant primary SDGs impacted: 7, 9, 11, 12,13</p> <p>Relevant secondary SDGs impacted: 3, 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: Nil (see note).</p> <p>Estimated development costs: US\$46,000.</p> <p>Estimated Enabling, Capacity Building and Technical Assistance Needs: US\$432,000.</p> <p><i>Note this does not include all capital investments due to the limited availability of information needed to quantify activity.</i></p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 11430 - Advanced technical and managerial training; 15196 - Government and civil society statistics and data 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>MIMS/DOE</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>FBOS, FRCS, MCTTT, MOE, EFL, PCREEE-SPC, MOE, USP, private sector companies</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 year needed for the project/programme design.</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and international implementing/development partner assessments</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building will be during 2022 to 2026 (5 years). There are no investments involved. Note that the mitigation benefit will continue past 2030.</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the technical assistance and capacity building package B. Discuss with DOE and other key stakeholders, the needs and the scope of the capacity building efforts C. Develop the terms of reference for recruiting experts who could lead the capacity building efforts D. Enter into discussions with supporting agencies for funding and for state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

1. National Risk Governance

- **Objective 1.4** To improve national capacity for strategic foresight

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050

» **Sub-objective 4.1.1** To decarbonise Fiji's transport sector

- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals
- **Objective 4.3** To preserve and enhance Fiji's natural carbon sinks and carbon reservoirs

5. National Capacity Development

- **Objective 5.1** To improve data availability, analytical-capacity, risk communications and awareness
- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2** Energy "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2** Transformational Strategic Thrusts
 - **3.2.7** Manufacturing and Commerce "Building sustainable and globally competitive manufacturing and commerce"
 - **3.2.9** Sustainable Cities and Towns "Creating vibrant and environmentally sustainable urban centres"

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 1:** Develop mechanisms to enhance coordinated planning for infrastructure development
- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1** Electricity and Other Energy Generation and Use
- **4.7** Waste Sector
- **4.8.2** Tourism Sector
- **4.8.3** Commercial, Industrial, and Manufacturing Sectors

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 2:** Waste Management
- **Thematic Area 6:** Freshwater Resources and Sanitation Management
- **Thematic Area 7:** Energy Security
- **Thematic Area 10:** Greening Tourism and Manufacturing Industries

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- **Electricity Generation and Transmission:**
 - » **E1, E4, E7:** Grid Extension and Improvements
 - » **E2, E5, E8:** RE Power Generation
 - » **E2, E5, E8:** Increased Sustainable Biomass for fuel use
- **Demand-side energy-efficiency**
 - » **D1:** Energy Labelling and Minimum Energy Performance Standards
 - » **D2:** Energy-efficiency in the business community (incl. sustainable tourism)
 - » **D3:** Energy-efficiency in the public sector
 - » **D4:** Updated Codes and Standards for Buildings

FIJI TOURISM 2021 (ISSUED 2017)

- **Strategy 21:** promote climate resilient infrastructure and energy-efficiency
 - » Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)

**POTENTIAL
BUSINESS
MODEL
AND FINANCING
STRATEGY**

The proposed project has no investments involved. The activities will result in direct and indirect cost savings for the various actors in the energy sector, as many existing risks due to poor planning or lack of planning will be reduced in both the supply and demand side, lowering of the energy intensity of the economy, lower import costs and savings in capital expenditure and operating costs. The expenses for the Technical Assistance & Capacity Building activities is proposed to be funded as follows:

- Grants for Technical Assistance & Capacity Building: 70 % of total cost
- State Budget support for Technical Assistance & Capacity Building: 30% of total cost

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<p>As government staff are few and burdened with existing tasks, there is the risk of diluted commitment from them for the training, or risk of inclusion of less relevant personnel being nominated for the training. To overcome this, the training will be directly linked to the actual development and implementation of national and sectoral energy plans and targets, development of national energy balances, links to the NDC implementation and progress reporting etc, which will make the training directly relevant for the trainees and ensure their commitment. To provide flexibility and increase accessibility, an online version of the training would also be developed.</p> <p>There is the risk that the trainees shift jobs or move out of the country and the capacity that was built is lost to the country. Hence, the training needs to be institutionalized at the national and regional level. As part of the project, a national level entity will be identified, and the capacity will be institutionalized there (with multiple people). Further, the capacity will also be institutionalized at the regional university level, as well as through the formation of a network of practitioners. To reduce the risks, the trainees will also be selected from several relevant entities to ensure that the capacity is not concentrated in a single entity.</p>
FINANCIAL SUSTAINABILITY	<p>There are no investments involved. Therefore, financial sustainability hinges on providing full multi-year funding, and possible implemented as a part of a Pacific regional framework. The GOF's contribution the Technical Assistance and Capacity Building will be paid back through the overall lowering of the energy intensity of the economy, lower import costs and savings in the energy sector in capital expenditure and operating costs.</p>
POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<ul style="list-style-type: none"> • Grants for Technical Assistance & Capacity Building: 70 % of total cost. • State Budget support for Technical Assistance & Capacity Building: 30% of total cost <p><i>Note this does not include all capital investments due to the limited availability of information needed to quantify activity.</i></p>
POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES	<p>MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*</p> <ul style="list-style-type: none"> • Project Planning, Development & Design: PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, IEA, IRENA, CTCN, PRIF, UNESCAP • Project Implementation & Management: PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA <p>POTENTIAL FINANCING PARTNERS/SOURCES:*</p> <ul style="list-style-type: none"> • Grants for Technical Assistance & Capacity Building: GEF, GCF, DFAT, GIZ, CTCN, ADB, KOICA, IEA, UNDP, UNIDO, UNESCAP, EEAS, WB/IFC <p><i>*This is not a comprehensive list, as other entities are possible as well.</i> Partners known to recently support this type of action in Fiji and PICs are indicated in BOLD.</p>
ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS	<p>Enabling, Capacity Building and Technical Assistance: US\$432,000 (includes 15% overhead for Implementing Partner)</p> <ol style="list-style-type: none"> 1. 4 comprehensive training programmes implemented on “energy statistics and integrated energy planning”. (US\$271,000) 2. Development of a module on integrated energy planning to be incorporated in existing courses in USP. (US\$27,000) 3. Development of an online course on integrated energy planning tailored for the situation in PICs, to be hosted by USP. (US\$32,000, including US\$5,000 for software) 4. Development of the framework and guideline for preparing integrated energy plans and energy balances for Fiji (US\$46,000, including US\$5,000 for software)

**INFORMATION
AND MRV NEEDS**

- Energy data to track changes in energy intensity (TOE or TJ per US\$ of GDP).
- The institutional structure set up and functional in Fiji for coordination and implementation of integrated energy planning and annual energy data and statistics collection and reporting activities.
- Development of the integrated energy plan for Fiji involving all energy sub-sectors in the supply and demand side, and frequency of updates.
- Development of the energy balance for Fiji and frequency of updates.
- Number of persons trained from relevant institutions and their evaluation of the training.
- Expenditures.

**SUPPORTING
REFERENCES**

- Fuel import and export data obtained from Fiji Revenue and Customs Service (FRCS) in 2019 during consultants' Fiji mission
- Energy Fiji Limited (2020). 2019 Annual Report. EFL <http://www.parliament.gov.fj/wp-content/uploads/2020/05/Energy-Fiji-Limited-2019-Annual-Report.pdf>
- Power Research & Development Consultants Pvt. Ltd (2017). Final Report (Volume 1), Power Development Plan for year 2017 to 2026- Load Forecasting and Generation Planning. FEA
- National Energy Policy Review Advisory Committee(2013). Fiji National Energy Policy 2013 – 2020. Fijian Government. <https://policy.asiapacificenergy.org/sites/default/files/Fiji%20National%20Policy%202013-2020%20%28Final%20Draft%29.pdf>
- Fiji Bureau of Statistics (2018). 2017 Population and Housing Census, Release 1, Age, Sex, Geography and Economic Activity. FBOS https://sdd.spc.int/digital_library/2017-population-and-housing-census-release-1-age-sex-geography-and-economic
- Fiji Bureau of Statistics (2017). Data on Population and Household Statistics, 2017. FBOS
- Climate Change and International Cooperation Division, Ministry of Economy (2013). Republic of Fiji - Third National Communications. Ministry of Economy, Fijian Government
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1	1,2,3,4	3,4	
Estimated CB & TA Costs (US\$)	125,000	316,000	37,000	477,773
Estimated Capital Investment (US\$)	0	0	0	0
Estimated GHG Mitigation (tCO₂)	0	11,000	243,000	254,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				75,000

E2 - PROGRAMME TO PROMOTE ENHANCED GREEN TOURISM

NO.	E2
ACTION NAME	Programme to promote green tourism
SUB-SECTOR	Buildings
DESCRIPTION	<p>The focus of this opportunity is to provide technical assistance and financial incentives to hotels and commercial buildings that commit themselves to carrying out energy-efficiency retrofits, demonstrating the viability of energy-efficiency and low-carbon measures in Fiji. Technical assistance will consist of performing preliminary energy audits of 90 large hotels and commercial buildings, and detailed energy audits at 50 selected hotels and commercial buildings. Technical assistance will later include post-investment assessments to verify that energy-efficiency retrofits are completed. Financing activities under this opportunity will focus on providing financial incentives to address energy-efficiency measures in the 50 selected hotels and commercial buildings. The success of the auditing programme and financial incentives is expected to encourage further improvement in additional hotels and commercial buildings throughout Fiji.</p> <p>While separate measures are being proposed to move the buildings and construction sector in Fiji towards low-carbon design and operations (such as through project E6, energy-efficiency building code, green building rating system, certification programme for building energy assessors, training programmes etc), the transition for hotels and commercial buildings need to be accelerated due to their critical role as a tourism infrastructure.</p> <p>This initiative will be led by MITT, in association with the Fiji Hotel and Tourism Association, Fiji Chamber of Commerce and Industry, Fiji Commerce and Employers Federation, PCREEE-SPC and private companies. Financing of investments under this opportunity will only be provided to those hotels and commercial buildings that will commit themselves to the conduct of energy audits and implementing the recommendations of the energy audits. It would be up to these firms to decide how they would integrate these investments with their business planning process and cycle and their routine operation and maintenance activities.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Preliminary energy audits conducted in 90 hotels and commercial buildings • Detailed energy audits conducted in 50 hotels and commercial buildings • Technical advisory support provided for implementation of the recommendations of the detailed energy audit in 50 hotels and commercial buildings • Post implementation assessment conducted of the investments done in 50 hotels and commercial buildings • A financing facility set up and operated <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investment will need to be made by hotels and commercial buildings that commit to the project objectives. Around 50 hotels and commercial buildings are expected to commit to the project

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • GHG mitigation and lower carbon intensity of the economy • Hotels and commercial buildings in Fiji achieve lower specific energy consumption (kWh/m²/year) • Capacity and awareness strengthened in the tourism sector on energy-efficiency in buildings, including about the requirements of the proposed energy-efficiency building code and the green building rating system • Improved operations and profitability of hotels and commercial establishments <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced air pollution due to reduced use of diesel for power generation. • Improved reliability and stability of the power grid • Delayed or avoided investments in power and oil infrastructure • Reduced petroleum imports • Improved energy security, less disruptions to petroleum imports and less impacts due to increases in international petroleum prices
MITIGATION POTENTIAL	<p>633 tCO₂/year in 2030 and a total of 2,273 tCO₂ for 2020 – 2030 (actual emission reduction occurring during 2025 to 2030)</p> <ul style="list-style-type: none"> • It is estimated that there is a total of 18,000 commercial buildings (based on EFL grid connected consumer data), including hotels. Out of these, assumed that around 10 % are large buildings/properties that contribute to at least 30 % of the total energy consumption from this sub-sector. Assumed that 5 % out of these large commercial buildings (around 90 in total) will commit themselves to this programme, and in 50 of them physical investments will be supported • 40% energy savings is targeted under this project with an investment of USD100,000 per commercial building. • The demonstrations in these 50 buildings will also inspire replications, especially among the target 10 % of total buildings, as well as for new hotels and buildings that might come up. However, this indirect savings and emission reductions has not been considered in the estimates, and hence the estimates given will be less than the actual potential
CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Resulting reduction in air pollution will lead to improved health outcomes. Health benefits will also be obtained through better design features of buildings such as increased natural ventilation, more access to daylighting and better indoor thermal comfort conditions • This will result in improved reliability and stability of power grid which will enable more economic activity, as well as non-productive uses of energy • Resulting improvement in energy access will especially benefit women and people living in remote areas • Improved operations and profitability of hotels and commercial establishments could lead to more job creation and more decent jobs • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure <p>Relevant primary SDGs impacted: 7, 9, 11, 13</p> <p>Relevant secondary SDGs impacted: 12, 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$5M</p> <p>Estimated development costs: US\$188,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$4M</p>

RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15144 – National standards development; 15155 – Tax policy and administration support; 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency; 24030 - Formal sector financial intermediaries; 43932 – Urban development;
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>Ministry of Industry, Trade and Tourism (MITT)</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>Fiji Hotel and Tourism Association, Fiji Chamber of Commerce and Industry, Fiji Commerce and Employers Federation, PCREEE-SPC, private companies</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 year needed for the project/programme design.</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building will be during 2022 to 2030. They will run from 2024 onwards.</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the technical assistance and capacity building package, and especially for items B to C below. B. Initiate discussions with MITT, industry associations and other public and private stakeholders on the selection of hotels and commercial buildings where the preliminary energy audits would be conducted, including any specific criteria for selecting them C. Develop the terms of reference for hiring experts for conducting the preliminary energy audits D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.1** To Increase the use and availability of domestically derived climate finance
- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

7. Private sector Transition and Engagement

- **Objective 7.1** To enhance public and private sector engagement and alignment
- **Objective 7.2** To establish private-public partnerships

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2** Energy "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2** Transformational Strategic Thrusts
- **3.2.9** Sustainable Cities and Towns "Creating vibrant and environmentally sustainable urban centres"
- **3.2.16** Tourism "A world-class tourism destination that increasingly adds value to the local economy"

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- 4.1 Electricity and Other Energy Generation and Use
- 4.8.2 Tourism Sector
- 4.8.3 Commercial, Industrial, and Manufacturing Sectorss

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- Thematic Area 1: Building Resilience to Climate Change and Disasters
- Thematic Area 7: Energy Security
- Thematic Area 10: Greening Tourism and Manufacturing Industries

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D2: Energy-efficiency in the Business Community (incl. Sustainable Tourism)
 - » D4: Updated Codes and Standards for Buildings

FIJI TOURISM 2021 (ISSUED 2017)

- Strategy 21: promote climate resilient infrastructure and energy-efficiency

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

The hotels are more energy intensive than normal households, as most of the rooms are air-conditioned, and in general energy-efficiency is not adequately addressed in building design or its operation and maintenance. The energy saving potential is thus much higher than normal households. Hence, the investments made can pay back on its own due to the higher energy saving potential and relatively higher power tariff that commercial buildings have to pay.

However, the retrofits require upfront investment to be made which would be a burden and discourage building owners to commit to the programme. To overcome this, a short-term interest free/low interest loan for the incremental cost can be provided to the building owner. The incremental cost is assumed as 50,000US\$ per building, which is assumed to be half of the total investment needed per building. In addition, the GOF could also provide an indirect subsidy through fiscal incentive for hotels that undertake energy-efficiency measures and meet the requirements of the EEBC and/or specified levels of the proposed green building rating system. An example of a possible fiscal incentive is refunding a portion of the Environmental and Climate Adaptation Levy (ECAL).

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

Getting initial commitment from building owners to do retrofits would be a major challenge. To ensure this happens, the funding and financing would have to be made attractive, and in addition they have to be convinced about the financial benefits that would accrue over the longer term. Building owners could be provided a soft loan for the retrofits and the initial and final energy audits could be provided free of charge.

Many of these commercial buildings would not have a full time and properly qualified facility manager and in addition there may not be adequate number of service providers in Fiji who have adequate capacity in the assessment, design, operation, maintenance and financing of low-carbon buildings. Hence smooth implementation of the project and communication would require more effort. This would require the use of a local expert who would be able to closely and appropriately interact with the building management and other service providers.

FINANCIAL SUSTAINABILITY

The Technical Assistance and Capacity Building being provided will help ensure better design, procurement, installation, operation and maintenance of the hotels and commercial buildings, thereby improving the energy-efficiency and life of the assets and reducing the operating costs. In the future, it will also help increase the volume and attractiveness of financing products available for energy-efficiency for commercial sector, by reducing the real and perceived risks associated with financing such measures.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS**ESTIMATED CAPITAL INVESTMENT NEEDED FOR THE PHYSICAL IMPLEMENTATION: US\$5M**

- Company equity from 50 hotels: US\$2.5M (50% of investment)
- Corporate investment tax credit: between 50% and 100% of the investment made
- Low interest loans for 50 hotels: US\$2.5M (50% of investment)
- Credit guarantee backing the low interest loans: up to 50% of investment
- Grant for development costs: US\$188,000
- Grants for Enabling, Capacity Building and Technical Assistance: US\$4M

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES**MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):***

- Project Planning, Development & Design: **SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF, WB/IFC**
- Project Implementation & Management: **SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA, WB/IFC**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantee: **GCF, ADB**, Supplier EXIM Banks, EIB, **WB/IFC**
- Debt and Loans: **FDB, ADB, EIB, WB/IFC, commercial banks**
- Equity: **Households/Persons, private sector companies**
- Non-Government Grants for investment: **GEF, GCF, ADB, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS**
- Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, UNDP, UNIDO, EEAS, WB/IFC, UNESCO, UN Habitat**
- Government Budget & Taxes Incentives: **MOE**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$4 million (includes 15% overhead for Implementing Partner)

1. Preliminary energy audits of 90 large hotels and commercial facilities who make an initial commitment to the programme. (US\$522,000)
2. Detailed energy audits of 50 hotels and commercial facilities which have the highest potential for energy savings and have given a firm commitment to the programme (US\$2.1 million)
3. Technical advisory support for implementation of the recommendations of the detailed energy audit in the 50 hotels and commercial facilities, associated with the financing facility (US\$387,000)
4. Survey of the 50 hotels and commercial facilities for assessing if the retrofits have been effective and the energy savings and GHG emission reductions achieved (US\$53,000)
5. Setting up and operating a financing facility (US\$420,000)

INFORMATION AND MRV NEEDS	<ul style="list-style-type: none"> • Specific energy consumption of Hotels and commercial buildings in Fiji (kWh/m²) • Number of hotels and commercial buildings that have met the requirements of the proposed EEBC and/or the green building rating system
SUPPORTING REFERENCES	<ul style="list-style-type: none"> • National Energy Policy Review Advisory Committee (2013). Sustainable Energy for All (SE4All): Rapid Assessment and Gap Analysis. Department of Energy, Fijian Government https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-Fiji_Sustainable%20Energy%20for%20All_Rapid%20Assessment%20and%20Gap%20Analysis.pdf • Energy Fiji Limited (2020). 2019 Annual Report. EFL http://www.parliament.gov.fj/wp-content/uploads/2020/05/Energy-Fiji-Limited-2019-Annual-Report.pdf • Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC https://www.ipcc-nggip.iges.or.jp/public/2006gl/

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1	1,2,3,5	3,4,5	
Estimated CB & TA Costs (US\$)	492,000	2,776,000	920,000	4188,000
Estimated Capital Investment (US\$)	0	1,800,000	3,200,000	5,000,000
Estimated GHG Mitigation (tCO₂)	0	106	2,168	2,273
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				633

E3 - STRENGTHENING AND EXPANDING THE MINIMUM ENERGY PERFORMANCE AND LABELLING STANDARDS (MEPLS)

NO.	E3
ACTION NAME	Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS)
SUB-SECTOR	Appliances
DESCRIPTION	<p>A significant portion of the electricity consumption in Fiji is in appliances used in residences, commercial and government facilities. The census data for 2017 does have data on the number of major appliances in households, but a more specific household level survey on energy consumption has not yet been carried out in Fiji. While Fiji has initiated a standards and labelling programme for freezers and refrigerators, most labelled freezers and refrigerators in the shops were observed to be 3 or 3.5 star rated, and its most likely that consumers do not yet have the willingness to spend more on a more energy-efficient product. DOE is also planning to expand the labelling to TV, ACs and lights. Awareness raising also is important so that consumers become aware of the benefits of buying higher star rated products and that the higher initial investment pays itself back.</p> <p>This mitigation opportunity focuses on providing technical assistance to review, update, and strengthen the existing Standards and Labelling (S&L) programme on freezers and refrigerators in Fiji. It further includes supporting the expansion of the S&L programme to other appliances which at a minimum will include TVs, ACs, and lights. This action includes enhancing public awareness so that consumers become aware of the benefits of buying higher star rated products and that the higher initial investment pays itself back in the long term. Financing under this action will support the establishment of product testing facilities in Fiji which could also be shared by PICS countries, since many appliances imported to Fiji are not included in the labelling programme of Australia and New Zealand and moreover the product testing facilities will bring down the cost of the standards and labelling programme. This action is envisioned to be implemented in parallel with the DSM programme under opportunity E3(focusing on residential consumers) as well as sustainable public procurement opportunity under E11(which focusses on government consumers) both of which have links to the standards and labelling programme. The estimates of GHG emission reductions under E10 have been lowered to avoid duplication and double counting of emissions reduction with the DSM programme in E3, and with the product/appliance standards and labelling aspects of E11.</p> <p>This initiative will be led by MCTTT, and supported by DOE, FNU, PCREEE-SPC, Fiji Retailer Association, Fiji Procurement Office and private sector companies. Investment needed for product testing facilities for 5 products/appliances will be supported by this opportunity. Individuals and public and private organisations need to buy more energy-efficient products/appliances and their decisions would be based on financial backgrounds and individual perceptions of costs and benefits, which can be influenced by fiscal incentives and awareness raising campaigns.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Market survey conducted for 3 candidate products for the S&L programme • Standards and Labelling system developed for 3 products • Product testing facilities established for 5 product categories

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • GHG mitigation and lower carbon intensity of the economy • Reduction in energy intensity of the residential and commercial sub-sectors • Increased availability in Fiji of higher rated labelled products and appliances • Lower cost of administering the existing standards and labelling programme per unit of labelled product <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced air pollution due to reduced supply and use of petroleum products. • Improved reliability and stability of the power grid • Delayed or avoided investments in power and oil infrastructure • Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices • This will improve energy access
MITIGATION POTENTIAL	<p>41,000 tCO₂/year in 2030 and a total of 143,000 tCO₂ for 2020 – 2030 (actual emission reduction during 2025-2030)</p> <ul style="list-style-type: none"> • This mitigation opportunity has an economy wide impact. However, to avoid double counting, the estimation of GHG emission reduction only considers use of appliances in commercial and government/institutional buildings. Energy-efficiency in appliances used in residential sub-sector is captured in the DSM programme under mitigation opportunity E3. • The energy consumption by various appliances is estimated based on annual electricity consumption by the Government/institutional and commercial sub-sectors. 50% of this energy consumption is assumed to be due to the appliances and products being considered for the standards and labelling programme, of which 70% is assumed to be from non-labelled or low rated labelled products/appliances or products/appliances using less recognized labels. This 70% energy consumption will be influenced by the labelling programme. • A comparison of energy consumption between lower star rating and higher star rating (Australian data) for various appliances has also been carried out to substantiate energy savings through energy labelling, which shows a 62% saving potential.
CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Resulting reduction in air pollution will lead to improved health outcomes • This will result in improved reliability and stability of power grid which will enable more economic activity, as well as non-productive uses of energy • Resulting improvement in energy access will especially benefit women and people living in remote areas • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure <p>Relevant primary SDGs impacted: 7, 9, 11, 12, 13</p> <p>Relevant secondary SDGs impacted: 3, 17</p>

INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: 10millionUS\$¹⁸⁵ for setting up product testing facility for 5 appliances and lighting. Investment and financing not considered for end users, as it is expected that the incremental cost incurred by commercial end users and the government for energy-efficient appliances will be borne by themselves. The investment needs for appliances used in residential sub-sector is captured in the project proposal for DSM</p> <p>Estimated development costs: US\$173,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$1.3 million</p> <p><i>Note this does not include all capital investments due to the limited availability of information needed to quantify activity.</i></p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15144 – National standards development; 15155 – Tax policy and administration support; 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency; 24030 - Formal sector financial intermediaries; 43932 – Urban development;
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>Ministry of Industry, Trade and Tourism (MITT)</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>Fiji Hotel and Tourism Association, Fiji Chamber of Commerce and Industry, Fiji Commerce and Employers Federation, PCREEE-SPC, private companies</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 year needed for the project/programme design.</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments.</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: 2022 to 2026 (5 years).</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the technical assistance and capacity building package, and especially for items B to D below. B. Initiate discussions with MCTTT, DOE and other partners and stakeholders on improvements needed for the existing S&L programme and for identifying 3 new products/appliances for expanding the programme. C. Discuss with MCTTT, DOE and other partners and stakeholders the scope for the proposed market survey of for 3 candidate products for expanding the S&L programme D. Develop the terms of reference for hiring experts for the conduct of the market survey and for developing the S&L programme for the 3 candidate products/appliances E. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.1** To Increase the use and availability of domestically derived climate finance
- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

7. Private sector Transition and Engagement

- **Objective 7.1** To enhance public and private sector engagement and alignment

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **1.2 Energy** "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2 Transformational Strategic Thrusts**

- 3.2.9 Sustainable Cities and Towns “Creating vibrant and environmentally sustainable urban centres”
- 3.2.17 Enhancing International Trade and Foreign Relations “Expanding trade base and economic engagement in the global community”

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- 4.1 Electricity and Other Energy Generation and Use
- 4.8.3 Commercial, Industrial, and Manufacturing Sectors

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 7:** Energy Security
- **Thematic Area 9:** Technology and Innovation

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D1: Energy Labelling and Minimum Energy Performance Standards
 - » D2: Energy-efficiency in the business community (incl. sustainable tourism)
 - » D3: Energy-efficiency in the public sector

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

No investments are there for this project. 70% of the costs for the Technical Assistance and Capacity Building activities is expected from international donors and 30% from State Budget. The Technical Assistance and Capacity Building activities will contribute to a strengthened and expanded product standards and labelling system which is a cost-effective method to reduce energy consumption in products and appliances and these energy and cost savings at the national level will offset all costs needed to run this project.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

Getting data on the import of new appliances as well as for second-hand market for appliances is a challenge. Through the project a better system for data collection will be implemented.

Fiji does not have testing facilities for any of these products, nor does any of the PICS countries, and hence they have to rely on accredited testing facilities in other countries for product testing, which increases the cost of the standards and labelling programme. As part of this proposal, product testing facilities are being proposed for energy-efficient Refrigerators, Freezers, TVs and ACs and for LED lighting, which could be shared by the PICS.

FINANCIAL SUSTAINABILITY

Along with the proposed demand side management programme (project E3) and the sustainable procurement programme (project E11), the proposed Standards and Labelling programme will gradually help develop the market for higher rated energy labelled products and appliances, and help phase out less energy-efficient products (non-labelled, less recognised labels and lower rated labelled products). This could gradually increase the average price of these products and appliances. To avoid this, fiscal incentives could be provided in terms of reduced import duties and taxes on products and appliances that meet the criteria of the labelling system.

The proposed Standards and Labelling system and all the project activities will reduce various barriers and perceived and actual risk for energy-efficiency. This will increase confidence of investors and financial institutions in energy-efficiency and thus help lower the cost of financing and could help Financial Institutions and manufacturers/suppliers develop new, attractive financial products for this market segment

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<p>Around US\$10M has been considered for setting up product testing facilities for the 5 product categories (refrigerators, freezers, ACs, TV, fans and LED lighting), to be used by all PICs under a multi-country programme.</p> <p>Investments for appliances is not considered for this project, as it is expected that the incremental cost incurred by commercial end users and the government for energy-efficient appliances will be borne by themselves. The investment needs for appliances used in residential sub-sector is captured in the project proposal for DSM (E3).</p> <ul style="list-style-type: none"> • Multi-government/state budget for investment: US\$ 1.5M (15% of investment) • Grant for investment: US\$ 8.5M (85% of investment) • Grant for development costs: US\$ 173,000 • Grants for Enabling, Capacity Building and Technical Assistance: US\$ 1.3M <p><i>Note this does not include all capital investments due to the limited availability of information needed to quantify activity.</i></p>
POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES	<p>MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*</p> <ul style="list-style-type: none"> • Project Planning, Development & Design: PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, UNIDO, IUCN, CTCN, PRIF • Project Implementation & Management: SPCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, UNIDO, IUCN, CIDCA <p>POTENTIAL FINANCING PARTNERS/SOURCES:*</p> <ul style="list-style-type: none"> • Non-Government Grants for investment: GEF, GCF, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS • Grants for Technical Assistance & Capacity Building: GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, IEA, UNDP, UNIDO, EEAS, WB/IFC • Government Budget & Taxes Incentives: MOE <p><i>*This is not a comprehensive list, as other entities are possible as well.</i></p> <p>Partners known to recently support this type of action in Fiji and PICs are indicated in BOLD.</p>
ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS	<p>Enabling, Capacity Building and Technical Assistance: US\$1.3 million (includes 15% overhead for Implementing Partner)</p> <ol style="list-style-type: none"> 1. Market survey of for 3 candidate products for the S&L programme (US\$78,000) 2. Support development of the Standards and Labelling system for 3 products, including minimum and higher energy performance standards (MEPS, HEPS), and the energy labels, as well as the quality assurance and quality control system. (US\$141,000) 3. Awareness raising and communication campaign in support of the standards and labelling programme. (US\$64,000) 4. Support establishment of product testing facilities for 5 product categories (US\$264,000) 5. Conduct 10 training programmes on quality assurance and quality control for the 5 product categories, 2 for each product category (US\$554,000)
INFORMATION AND MRV NEEDS	<ol style="list-style-type: none"> 1. Residential and commercial energy use per GDP 2. Number of appliances for which product standards and labelling system has been developed 3. Import volume, costs and ratings of each labelled products and appliances 4. Cost of administering the existing product standards and labelling programme per unit of labelled product 5. Evaluation and progress reports of the product standards and labelling programme

SUPPORTING REFERENCES

- Appliances import and export data obtained from Fiji Revenue and Customs Service (FRCS) in 2019 during consultants' Fiji mission
- Energy Fiji Limited (2020). 2019 Annual Report. EFL <http://www.parliament.gov.fj/wp-content/uploads/2020/05/Energy-Fiji-Limited-2019-Annual-Report.pdf>
- GEMS Regulator, Department of Industry, Science, Energy and Resources(2020). Energy Calculator, E3 Program. Government of Australia <https://www.energyrating.gov.au/calculator>
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,4	1,2,3,4,5	3,4,5	
Estimated CB & TA Costs (US\$)	297,000	895,000	245,000	1,437,000
Estimated Capital Investment (US\$)	0	7,500,000	2,500,000	10,000,000
Estimated GHG Mitigation (tCO₂)	0	7,000	136,000	143,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				41,000

E4 - CAPACITY BUILDING IN ENERGY-EFFICIENCY IN INDUSTRY

NO.	E4
ACTION NAME	Capacity building in energy-efficiency in Industry
SUB-SECTOR	Industry
DESCRIPTION	<p>Not much information is available on the energy performance of industry. However, the DOE led energy benchmarking survey, estimated that the energy intensity of meat/seafood processing industry was found to range from 166 to 1,518 kWh/tonne of product (median 938), based on data from 6 units. That for the sugar industry ranged from 4,473 to 5,901 kWh/tonne of sugar (median 5,223), based on data from 3 factories. For cold storages, the range was from 600 to 5,198 kWh/m² (median 1,571), based on data from 5 units. The study concluded that the potential for electrical energy savings was around 5% for manufacturing industry, and in terms of thermal energy, around 5%. However, for the situation in Fiji, these energy saving potential indicated seems to be too low for industry, and it is anticipated that a detailed energy audit could reveal more opportunities for energy savings.</p> <p>This opportunity provides technical assistance to conduct a national survey of energy intensive equipment in industry, including conducting detailed energy audits in up to 50 industrial facilities (prioritised based on the national survey). The technical assistance includes providing advisory support in financing and implementing viable recommendations found in the energy audits. Underlying this is technical assistance to develop and deploy a certification system for energy auditors (which could potentially expand in partnership with other PICs with additional funding). To build capacity, training programmes would be conducted and a curriculum on energy auditing would be developed and deployed. Technical assistance also includes development of a system for reporting and aggregating energy data from medium sized and large industries. Financing support under this action will support the implementation of energy-efficiency measures in 50 industrial facilities that participate in this programme.</p> <p>This initiative will be led by DOE, and supported by USP, Fiji Chamber of Commerce and Industry, PCREEE-SPC, private companies/SOE's and other stakeholders. The investments will be made in 50 industrial facilities that commit to conduct detailed energy audits funded by this initiative and to implement the recommendations of the audit with financing support.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • National survey conducted of energy intensive equipment's and for identifying the potential for cogeneration • Detailed energy audits conducted of 50 industrial facilities in Fiji, prioritised based on the national survey and based on their commitment to the programme • Technical advisory support provided in the 50 industrial facilities for implementation of the recommendations of the energy audit • Certification system developed for energy auditors and for energy managers, which can also be used by other PICs • System developed for reporting and aggregating energy data from medium sized and large Industry <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investment will need to be made by the 50 industrial facilities which commit to the programme and where detailed energy audits are conducted

OUTCOMES

PRIMARY OUTCOMES

- GHG mitigation and lower carbon intensity of the economy
- Reduction in energy intensity of the industrial sector and the economy
- System developed for certifying energy auditors and energy managers
- System developed to collect and report energy consumption data from industry
- Capacity developed of DOE, industries and relevant stakeholders for energy auditing in industry
- Improved operations and profitability of industries

SECONDARY OUTCOMES

- Reduced air pollution due to reduced supply and use of petroleum products.
- Improved reliability and stability of the power grid
- Delayed or avoided investments in power and oil infrastructure
- Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices
- This could lead to improvements in energy access

MITIGATION
POTENTIAL**15,000 tCO₂/year in 2030 and a total of 70,000 tCO₂ for 2020 – 2030.**

- As per 2004 data, 14% of the primary energy consumption is used in industry.¹⁸⁶ In the absence of data, the same value is being used for estimations, though there is a likelihood that this can underestimate GHG emissions and GHG emission reduction potential in industry.
- As per EFL connection data, there are 108 large industries in Fiji, and it is assumed that 50 of them will commit to investing in implementing recommendations identified through energy audits funded by the project. The 50 participating large industries is assumed to consume 20 % of the total energy consumed by industry as a whole.
- The retrofit cost is assumed to be \$100,000 per industry.
- It is assumed that through this mitigation opportunity, around 25% of the energy use in these 50 industries can be reduced.
- The details of the estimation of national annual primary energy consumption and an economy wide GHG emission factor for each year, is given under mitigation opportunity E1. This emission factor was used to estimate the GHG emission reduction for each year through the project intervention period
- Cost savings was estimated by converting the total energy savings (in TJ) to power equivalent (in MWh) and using the electricity tariff applicable for industry.

CO-BENEFITS/
SDG LINKAGES

- Resulting reduction in air pollution will lead to improved health outcomes.
- This will result in improved reliability and stability of power grid which will enable more economic activity, as well as non-productive uses of energy
- Resulting improvement in energy access will especially benefit women and people living in remote areas
- Improved operations and profitability of industries could lead to more job creation and more decent jobs
- Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure

Relevant primary SDGs impacted: 7, 9, 12, 13

Relevant secondary SDGs impacted: 3, 11, 17

INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$ 5 million total investment</p> <p>Estimated development costs: US\$ 187,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$ 3.9 million</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15144 – National standards development; 15155 – Tax policy and administration support; 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency; 32161 - Agro-industries
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>DOE</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>USP, Fiji Chamber of Commerce and Industry, PCREEE-SPC, private companies/SOE's</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 years needed for the project/programme design.</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments.</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building will occur during 2022 to 2026 (5 years). The financing will start from 2024.</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the technical assistance and capacity building package, and especially for items B to C below. B. Initiate discussions with DOE, Fiji Chamber of Commerce and Industry and other public and private stakeholders on the scope of the national survey of energy intensive equipment's, and about developing the system for energy related information collection and reporting by industry C. Develop the terms of reference for hiring experts for conducting the national level survey of energy intensive equipment's D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

1. National Risk Governance

- **Objective 1.4** To improve national capacity for strategic foresight

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

- **Objective 5.1** To improve data availability, analytical-capacity, risk communications and awareness
- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.1** To Increase the use and availability of domestically derived climate finance
- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

7. Private sector Transition and Engagement

- **Objective 7.1** To enhance public and private sector engagement and alignment
- **Objective 7.2** To establish private-public partnerships
- **Objective 7.3** To create a climate-ready workforce and promote social entrepreneurship

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2** Energy "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2** Transformational Strategic Thrusts
- **3.2.7** Manufacturing and Commerce "Building sustainable and globally competitive manufacturing and commerce"

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1** Electricity and Other Energy Generation and Use
- **4.7** Waste Sector
- **4.8.3** Commercial, Industrial, and Manufacturing Sectors

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 2:** Waste Management
- **Thematic Area 7:** Energy Security
- **Thematic Area 9:** Technology and Innovation
- **Thematic Area 10:** Greening Tourism and Manufacturing Industries

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » **D1:** Energy Labelling and Minimum Energy Performance Standards
 - » **D2:** Energy-efficiency in the business community (incl. sustainable tourism)
 - » **D3:** Energy-efficiency in the public sector

**POTENTIAL
BUSINESS
MODEL
AND FINANCING
STRATEGY**

The industrial sector and the private sector are strong in Fiji and given the right opportunities and conditions, they would be able to take the lead in energy-efficiency initiatives especially due to the cost savings they would provide. The market for energy-efficiency in industry in Fiji is also significant, compared to other SIDS.

Though the energy performance related data of industry is not available, considering the status of energy-efficiency in Fiji, it is assumed that there would be significant energy saving opportunities. Any investments are also likely to pay back as the electricity tariff is high. However, the measures and retrofits require upfront investment to be made which would be a burden and discourage industries to commit to the programme. To overcome this, a short-term interest free or low interest loan for 60% of the total investment can be provided to the industry committing to the programme. 70% of the loan could come from international donors and in line with the NDC commitment, Fijian Government could contribute 30% which could be in the form of an indirect subsidy.

At this initial stage of market development for energy-efficiency, two parallel efforts have to happen: Low cost financing to help overcome the barrier of higher initial investment needs for some of the energy-efficiency measures; and risk reduction measures (through the Technical Assistance and Capacity Building measures) and subsidies. In the longer run, through the capacity built through the proposed project and other interventions, the private companies are expected to fund any future investments needed to continue improving the energy and carbon performance of their assets. In the future, more attractive financing products and mechanisms could be offered, along with risk transfer mechanisms for any residual risks associated with energy-efficiency in industry.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

Very little information is available on energy use and performance inside industry and this is the major challenge. As part of the project, a survey will be conducted, and recommendations provided for an effective data collection system.

FINANCIAL SUSTAINABILITY

The Technical Assistance and Capacity Building being provided will help ensure better operation and maintenance of industrial facilities and their energy and environment performance is optimised, cost savings achieved, and the life of the assets are maximised. It will also build the capacity to conduct energy audits. It will also help increase the volume and attractiveness of financing products available for energy-efficiency, by reducing the real and perceived risks associated with financing such measures.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- Company equity from 50 industries: US\$2M (40% of investment)
- Low interest loans for 50 industries: US\$3M (60% of investment)
- Credit guarantee backing the low interest loans: up to 60% of investment
- Corporate investment tax credit: between 40% and 100% of the investment made
- Grant for development costs: US\$187,000
- Grants for Enabling, Capacity Building and Technical Assistance: US\$3.9M

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: **PCREEE-SPC, UNDP, UNIDO, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF**
- Project Implementation & Management: **PCREEE-SPC, UNDP, UNIDO, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantee: **GCF, ADB, Supplier EXIM Banks, EIB, WB/IFC**
- Debt and Loans: **FDB, ADB, EIB, WB/IFC**
- Equity: **private sector companies, Energy Service Companies**
- Non-Government Grants for investment: **GEF, GCF, ADB, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS**
- Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, UNDP, UNIDO, EEAS, WB/IFC**
- Government Budget & Taxes Incentives: **MOE**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$ 3.9 million (includes 15% overhead for Implementing Partner)

1. Conduct a national survey of energy intensive equipment's such as boilers, furnaces, larger driers/ heaters/freezers/refrigeration equipment/cold storages/ice plants etc, and the potential for cogeneration (US\$88,000)
2. Conduct detailed energy audit of 50 facilities in Fiji, prioritised based on the national survey and based on their commitment to the programme (US\$2.2 million)
3. Provide advisory support to support the implementation of viable recommendations of the energy audit. This includes the engagement of international suppliers to attract them to the Fijian market. (US\$370,000)
4. Develop certification system for energy auditors and for energy managers, which can also be used by other PICs, including identification of host institutions, rules and framework for the certification system, syllabus and content for training and exams, system for administering the exams and certification (US\$29,000)
5. Conduct 4 training programmes on energy-efficiency in industry. 4 days each. 20 to 30 participants (US\$169,000)
6. Support development of a system for reporting and aggregating energy data from medium sized and large Industry (US\$ 46,000)
7. Set up and operate a financing facility (US\$420,000)

INFORMATION AND MRV NEEDS

1. Energy consumed by industrial sector in each year and their details
2. Energy consumed each year by the larger industrial units, per unit of output
3. Number of certified energy auditors
4. Number of certified energy managers
5. Number of industries that have conducted energy audits once every 2 years
6. Number of trainees attending the training programmes and their evaluation of the training

SUPPORTING REFERENCES

- Fuel import and export data obtained from Fiji Revenue and Customs Service (FRCS) in 2019 during consultants' Fiji mission
- National Energy Policy Review Advisory Committee (2013). Sustainable Energy for All (SE4All): Rapid Assessment and Gap Analysis. Department of Energy, Fijian Government https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-Fiji_Sustainable%20Energy%20for%20All_Rapid%20Assessment%20and%20Gap%20Analysis.pdf
- Energy Fiji Limited (2020). 2019 Annual Report. EFL <http://www.parliament.gov.fj/wp-content/uploads/2020/05/Energy-Fiji-Limited-2019-Annual-Report.pdf>
- Power Research & Development Consultants Pvt. Ltd (2017). Final Report (Volume 1), Power Development Plan for year 2017 to 2026- Load Forecasting and Generation Planning. FEA
- National Energy Policy Review Advisory Committee (2013). Fiji National Energy Policy 2013 – 2020. Fijian Government <https://policy.asiapacificenergy.org/sites/default/files/Fiji%20National%20Policy%202013-2020%20%28Final%20Draft%29.pdf>
- Fiji Bureau of Statistics (2018). 2017 Population and Housing Census, Release 1, Age, Sex, Geography and Economic Activity. FBOS https://sdd.spc.int/digital_library/2017-population-and-housing-census-release-1-age-sex-geography-and-economic
- Climate Change and International Cooperation Division, Ministry of Economy (2013). Republic of Fiji - Third National Communications. Ministry of Economy, Fijian Government
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1	1,2,3,4,5,6,7	3,5,7	
Estimated CB & TA Costs (US\$)	286,000	2,879,000	886,000	4,052,000
Estimated Capital Investment (US\$)	0	1,800,00	3,200,000	5,000,000
Estimated GHG Mitigation (tCO₂)	0	8,000	62,000	70,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				15,000

E5 - PROMOTION OF LITHIUM-ION BATTERIES FOR RENEWABLE ENERGY STORAGE

NO.	E5
ACTION NAME	Promotion of lithium ion batteries for renewable energy storage
SUB-SECTOR	Power
DESCRIPTION	<p>There remains a significant untapped potential to scale up the use of renewable energy for power generation in Fiji. A key barrier for further expansion of variable renewable energy (VRE) based power is reported to be storage capacity, especially for grid-connected systems managed by EFL and IPPs. In the future, batteries may be installed on a larger scale by EFL or IPPs to smoothen the variability and vulnerability to the grid created by the increased usage of VRE based power. Currently the majority of energy for off-grid VRE based individual power projects is stored using lead acid batteries, with only newer system using Lithium Ion Batteries. The demand for battery storage for individual power projects is expected to increase in the future in Fiji, in line with the increased deployment of on- and off-grid renewable energy power generation, based on the Governments goal to approach 100% on-grid renewable energy power generation by 2030, and increase energy power generation in rural areas.</p> <p>This opportunity encompasses technical assistance to support the policy/regulation development, fiscal incentives, and financing schemes for promoting the use of Li Ion batteries (and newer technology) for on-grid and off-grid energy storage instead of lead acid batteries in Fiji. The expected need for on-grid storage capacity is 162MWh and will be managed by Energy Fiji Limited (EFL), while the expected need for off-grid storage capacity is 25MWh and will be managed by GOF, the private sector, and communities & households. This opportunity also includes the development and implementation of a capacity building, awareness raising and advocacy programme on the use and safe end-of-life disposal of Li Ion batteries in properly equipped recycling and disposal facilities in other countries.</p> <p>In terms of energy consumption and investment requirements, Li Ion batteries have several advantages over traditional lead acid batteries. Li Ion batteries are more efficient which reduces energy lost in storage and conversion. It has longer life which reduces the frequency of replacements required and the investment needs over a longer period of time. Li Ion batteries also have a higher Depth of Discharge¹⁸⁷ through which a larger amount of energy can be withdrawn from it, reducing the capacity needed to be installed and thereby the investment requirements. At present the initial investment needed is higher for Li Ion batteries over that of lead acid batteries, but the cost of Li Ion batteries is predicted to reduce in the near future. However, a natural use of Li Ion batteries is unlikely to happen unless there is a concerted effort in terms of policy development, awareness raising, advocacy, capacity building for service provider/procurers/operation and maintenance personnel, vendor development etc.</p> <p>The initiative will be led by MIMS/DOE and EFL, supported by PPA, PCREEE-SPC, MOE, FNU, USP and private sector companies. The larger investments needed are for Li Ion battery installations in on-grid facilities. The investment and financing decisions for any battery storage infrastructure will follow the business planning and budgeting processes of EFL and the IPPs. Li Ion battery investment decisions for off-grid applications would be taken by public and private sector investors and individuals based on varying financial backgrounds, functional requirements, and perceived costs and benefits. Fiscal incentives and awareness raising about the benefits and feasibility of Li Ion batteries, can have a major influence on these investment decisions.</p>

KEY IMPLEMENTATION MILESTONES

POLICY/TECHNICAL ASSISTANCE

- Market assessment for Li Ion battery conducted, which will also provide necessary recommendations for the revisions to the policy and regulatory framework
- Financing facility set up to support private investments
- Technical advisory support provided for Li Ion installations, attached to the financing facility

INVESTMENT NEEDS

- Investment for the installation of Li Ion batteries to replace lead acid batteries for off grid applications by households and private firms and for on-grid application by EFL

OUTCOMES

PRIMARY OUTCOMES

- GHG mitigation and lower carbon intensity of the economy
- Increase in the % of Li Ion storage capacity out of total storage capacity for variable renewable energy-based power in Fiji
- New and improved policies, regulations, financing and fiscal measures to enable development of the market for Li Ion battery
- Capacity developed of key institutions and stakeholders in the design, installation, operation and maintenance of Li Ion Battery application for power systems.
- Improved profitability for EFL

SECONDARY OUTCOMES

- Reduced air pollution due to reduced supply and use of petroleum products.
- Improved reliability of the power grid
- Delayed or avoided investments in power and oil infrastructure
- Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices

MITIGATION POTENTIAL

14,000 tonnes CO₂eq/year in 2030 and a total of 48,000 tCO₂ for 2020 – 2030 (actual emission reductions during 2025-2030).

- Total off-grid generation was around 32,000 MWh in 2019. It is assumed that 50 % of this is from VRE based power. The VRE based power capacity and generation was projected till 2030 based on a demand growth of 5 % per year. Based on this, the battery storage capacity for each year was estimated using lead acid and lithium ion battery (Battery storage capacity was assumed as 30% of daily solar off-grid generation).
- For grid storage, as per the NDC Roadmap for Fiji, 161.8 MWh of battery storage capacity is planned to be installed by 2030.
- The BAU assumes that all storage from 2020 to 2030 will be through lead acid battery. The alternate scenario assumes that all storage from 2025 onwards will be through Li Ion.
- Installed capacities for lead acid battery (BAU scenario) and Li-ion battery (Alternate scenario) is estimated considering a Depth of Discharge (DOD) of 50% and 80% respectively.
- The efficiencies of lead acid battery and Li-Ion battery are considered at 78% and 98% respectively. This is used to estimate the energy savings which is the difference in losses of lead acid battery and Li-Ion battery for the respective installed capacities.
- Cost of lead acid battery was assumed as 400 US\$/kWh, and Li-Ion battery as 800 US\$/kWh.

CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Reduced air pollution will lead to improved health outcomes • Improved reliability and stability of power grid could enable more economic activity, as well as non-productive uses of energy • This will improve energy access, which will especially benefit women and people living in remote areas • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure <p>Relevant primary SDGs impacted: 7,12,13</p> <p>Relevant secondary SDGs impacted: 9, 11, 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$184 million</p> <p>Estimated development costs: US\$172,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$990,000</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 23110 – Energy policy and administrative management; 23181 – Energy education/training; 23183 – Energy conservation and demand-side efficiency; 23330 – Oil-fired electric power plants; 23230 – Solar energy for centralised grids
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>MIMS/DOE, EFL</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>FNU, PPA, PCREEE-SPC, MOE, USP, private sector companies</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 year needed for the project/programme design</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building will happen during 2022 to 2030. The financing facility would operate during 2025 to 2030</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the proposed technical assistance and capacity building package. B. Consult with stakeholders the scope of the proposed market study for Li Ion, develop the terms of reference for hiring experts. C. Initiate discussions with EFL and IPPs on potential Li Ion on-grid investment projects and confirm investment and financing needs. D. Enter into discussions with supporting agencies for funding and for state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
 - » **Sub-objective 4.1.1** To decarbonise Fiji's transport sector
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2 Energy** "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2 Transformational Strategic Thrusts**
- **3.2.9 Sustainable Cities and Towns** "Creating vibrant and environmentally sustainable urban centres"

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1 Electricity and Other Energy Generation and Use**

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 7:** Energy Security
- **Thematic Area 9:** Technology and Innovation

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- **Electricity Generation and Transmission:**
 - » E4, E7: Grid Extension and Improvements

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY	<p>Two major user groups were identified for Li Ion battery: Households and the utility (EFL). Both of these stakeholders gain net positive returns across the lifecycle of the investment due to higher efficiency and longer life of the lithium ion battery. To reduce the barrier of higher initial investment needed, low interest loans and subsidy are proposed. Public funding would be needed for developing a proper system for safe disposal of Li Ion battery.</p> <p>70 % of the loan and the subsidy could be funded by international donors. The State Budget could fund the remaining 30% in line with NDC commitments. The state funding could be achieved through many routes, for example by an increase in import duties for small and inefficient DG sets, which will also help move the market in favour of solar PV systems and battery storage.</p>
GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<p>Li Ion is a new technology for Fiji and most PICs, and the supply chain is not yet developed in terms of capacity of vendors/service provider/procurers/operation and maintenance personnel. The Policy and regulatory framework are also deficient. Decision makers are also not aware or convinced of this technology. This could be overcome through awareness raising, advocacy, capacity building efforts and also by supporting further development of fiscal policies, product standards, the grid code, procurement guidelines and standards.</p> <p>The higher initial investment needed for Li Ion will be a barrier and innovative funding and financing schemes need to be developed to overcome this</p> <p>The systems for the recycle and reuse of Li Ion battery are not as well developed as that for lead acid battery, partly because it's a relatively new and more complex technology and also because it is less standardized. However, there are good recycling infrastructure in Asia, with South Korea and China being the global leaders. LCA studies also indicate that the life cycle impact of Li Ion is less than that of Lead Acid. Battery manufacturers and miners are also setting up recycling facilities. Reuse of Li Ion is also happening due to its longer life.</p>
FINANCIAL SUSTAINABILITY	<p>The project activities contribute to financial sustainability by supporting better design, procurement, installation, operation and maintenance of battery systems and market expansion of a more efficient and longer lasting battery system, thereby increasing the energy-efficiency and life of the assets, and reducing the capital and operating costs. Appropriate fiscal and policy measures could also help improve the financial sustainability for example through reduced import duties or taxes on Li Ion battery.</p>
POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<p>To partially cover the cost for replacing lead acid battery with Li Ion battery:</p> <p>FOR OFF-GRID APPLICATION BY PRIVATE INVESTORS (HOUSEHOLDS, FIRMS):</p> <ul style="list-style-type: none"> • US\$ 4.7 million as grant, which is 20 % subsidy of the initial investment needed • US\$ 16.6 million as a short-term interest free (or low interest) loan, which is 70 % of the initial investment needed <p>FOR GRID STORAGE BY EFL:</p> <ul style="list-style-type: none"> • US\$ 41 million as grant, which is 25% of the initial investment needed • US\$ 114 million as a short-term interest free (or low interest) loan, which is 70 % of the initial investment needed <p>OTHER</p> <ul style="list-style-type: none"> • An unquantified amount is needed for safe disposal of Li Ion batteries till 2030 and for developing a waste management system • A credit guarantee will likely be required to finance the lending above.

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: **PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, IEA, IRENA, CTCN, PRIF**
- Project Implementation & Management: **PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantee: **GCF, ADB, Supplier EXIM Banks, EIB, WB/IFC**
- Debt and Loans: **FDB, ADB, EIB, WB/IFC**
- Equity: **EFL, Households, RESCO's**
- Non-Government Grants for investment: **GEF, GCF, ADB, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS**
- Grants for Technical Assistance & Capacity Building: **GEF, GCF, DFAT, GIZ, CTCN, ADB, KOICA, IEA, UNDP, UNIDO, EEAS, WB/IFC**
- Government Budget & Taxes Incentives: **MOE**
- Insurance: **ADB, WB, IFC, EIB**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$990,000 (includes 15 % overhead for Implementing Partner)

1. 14 Training programmes on "Design, Installation and Efficient Operation and Maintenance of battery systems for VRE based power, based on Li Ion batteries", 3 days each. 30 participants. (US\$175,000)
2. Development and deployment of a module "Design, Installation and Efficient Operation and Maintenance of battery systems for VRE based power, based on Li Ion batteries" to be integrated into a regular course in FNU. (US\$135,000)
3. Development and deployment of an online training course on "Design, Installation and Efficient Operation and Maintenance of battery systems for VRE based power, based on Li Ion batteries" hosted by FNU. (US\$24,000)
4. Conduct of a market study on how to develop the market for Li Ion in Fiji. (US\$28,000)
5. Technical advisory support for off-grid and on-grid Li Ion installations in Fiji during 2025 to 2030, attached to the financing facility. (US\$260,000)
6. Setting up and operating a financing facility for 6 years during 2025 to 2030 (US\$360,000)

INFORMATION AND MRV NEEDS

1. % of Li Ion storage capacity out of total storage capacity for VRE based power in Fiji
2. Number of trainees from relevant organizations and their evaluation reports
3. Commissioning reports of the demonstration projects

SUPPORTING REFERENCES

- Power Research & Development Consultants Pvt. Ltd (2017). Final Report (Volume 1), Power Development Plan for year 2017 to 2026- Load Forecasting and Generation Planning. FEA
- Global Green Growth Institute (2017). Fiji's NDC Energy Sector Implementation Roadmap (2017-2030). GOF
- Data provided by DOE
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	4	1,2,3,4,5,6	5,6	
Estimated CB & TA Costs (US\$)	193,000	379,000	588,000	1,160,000
Estimated Capital Investment (US\$)	0	0	139,680,000	184,190,000
Estimated GHG Mitigation (tCO₂)	0	1,084	46,000	48,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				14,000

E6 - PROMOTION OF LITHIUM-ION BATTERIES FOR RENEWABLE ENERGY STORAGE

NO.	E6
ACTION NAME	Promotion of Sustainable Public Procurement
SUB-SECTOR	Appliances
DESCRIPTION	<p>Public procurement volume is a significant percentage of the GDP in Fiji (around 10% of GDP in 2019) and hence it can influence the market towards energy-efficient and low-carbon products. This mitigation opportunity focuses on supporting the Fiji Procurement Office, Commercial Statutory Authorities (CSA), and ministerial procurement units in integrating sustainable procurement into existing public procurement rules and guidelines. This opportunity includes technical assistance for strengthening the core government strategy for sustainable procurement and developing new sustainable procurement guidelines for high impact (high volume, carbon intensive) product categories going through public procurement. Technical assistance will also include advisory support during implementation and training of participating government and CSA staff, and the development and deployment of an online training module in cooperation with USP tailored to Fiji and PICs. This opportunity also envisions supporting cooperative procurement within the public procurement system and explores the possibility of doing the same with State Owned Enterprises (SOEs), large private organisations, and eventually other public procurement offices in other PICs. Cooperative procurement provides public procurers with greater bargaining power and help to significantly bring down the prices in the overall market for low-carbon products and services. To avoid double counting, the estimate of benefits achieved from this opportunity do not include those achieved from E3, E6 and E10.</p> <p>This initiative will be led by Fiji Procurement Office and DOE, and supported by PCREEE-SPC, Fiji Retailer Association, USP, private sector companies and other stakeholders. There is no investment proposed for this opportunity. The incremental cost for procuring more energy-efficient, low-carbon products, appliances, equipment's and services will be borne by the procuring entities.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Survey of the public procurement system completed, for prioritizing products/appliances/ services that need to be considered for sustainable public procurement • Fiji Procurement Office is supported in developing sustainable procurement core principles, strategy, plans and targets and in integrating sustainable procurement principles into the existing public procurement rules and guidelines • Sustainable procurement guidelines developed for each key product category • Cooperative procurement of low-carbon products supported • Advisory support provided to procurers to implement sustainable procurement in public procurement actions

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • GHG mitigation and lower carbon intensity of the economy • Increase in the percentage of energy-efficient and low-carbon products and services out of total annual public procurement volume • Increase in annual volume of energy-efficient and low-carbon products and services that are covered through cooperative procurement agreements • Capacity developed on sustainable procurement of key institutions and stakeholders • Lower energy intensity of the economy • Higher visibility of energy-efficiency through demonstration by government, leading to larger replications in the economy <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Reduced air pollution due to reduced supply and use of petroleum products. • Improved reliability and stability of the power grid • Delayed or avoided investments in power and oil infrastructure • Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices • This could lead to improvements in energy access
MITIGATION POTENTIAL	<p>7,000 tCO₂/year in 2030 and a total of 24,000 tCO₂ for 2020 - 2030 (actual emission reductions during 2025-2030)</p> <ul style="list-style-type: none"> • The portion of the national primary energy consumption that can be influenced by public procurement is assumed to be in direct proportion to the ratio of annual public procurement volume with respect to GDP. At around 1 billion FJD per year, this is around 10 % of GDP in 2019. Hence, sustainable public procurement is assumed to influence 10 % of the annual national primary energy consumption • As the energy savings and GHG emission reductions from the procurement of construction, appliances and equipment's in government/institutional sector will already be accounted for in other proposed mitigation opportunities on standards and labelling (E10) and on low energy/carbon buildings(E6), to avoid duplication and double counting a conservative value of 1% emission reduction is assumed, of the 10 % of primary energy consumption that is assumed to be influenced by public procurement. Again, to avoid double counting of GHG emission reductions in transport sector, the transport related energy demand is removed from the primary energy consumption value used for the estimate • The details of how the national primary energy consumption (with and without transport related energy demand) was estimated for each year is provided under mitigation opportunity E1
CO-BENEFITS/SDG LINKAGES	<ul style="list-style-type: none"> • Resulting reduction in air pollution will lead to improved health outcomes • This will result in improved reliability and stability of power grid which will enable more economic activity, as well as non-productive uses of energy • Resulting improvement in energy access will especially benefit women and people living in remote areas • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure <p>Relevant primary SDGs impacted: 7, 11, 12, 13</p> <p>Relevant secondary SDGs impacted: 3, 9, 17</p>

INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: - Investments not considered for this project, as the incremental investment needed for procuring more energy-efficient products is expected to be borne by the Fijian Government-</p> <p>Estimated development costs: US\$62,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$658,000</p> <p><i>Note this does not include all capital investments due to the limited availability of information needed to quantify activity.</i></p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15110 - Public sector policy and administrative management; 15125 - Public Procurement; 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>POTENTIAL NATIONAL IMPLEMENTING ENTITIES/STAKEHOLDERS:</p> <p>Fiji Procurement Office, DOE</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITIES/STAKEHOLDERS:</p> <p>PCREEE-SPC, Fiji Retailer Association, USP, private sector companies</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 year needed for the project/programme design</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 year to secure financing and for international implementing/development partner assessments</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: 2022 to 2025 (4 years)</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the technical assistance and capacity building package, and especially for items B to C below. B. Initiate discussions with Fiji Procurement Office, DOE and other public and private stakeholders on the scope of the proposed survey of the public procurement system to understand the scope for sustainable procurement and to identify and prioritise key product/appliance/equipment/service categories C. Develop the terms of reference for hiring experts to conduct the survey of the public procurement system and for providing advisory support to procurers to implement sustainable procurement in routine public procurement actions

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

7. Private sector Transition and Engagement

- **Objective 7.1** To enhance public and private sector engagement and alignment

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2 Energy** "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2** Transformational Strategic Thrusts
- **3.2.17** Enhancing International Trade and Foreign Relations "Expanding trade base and economic engagement in the global community"

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- 4.1 Electricity and Other Energy Generation and Use
- 4.8.3 Commercial, Industrial, and Manufacturing Sectors

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- Thematic Area 1: Building Resilience to Climate Change and Disasters
- Thematic Area 7: Energy Security

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D1: Energy Labelling and Minimum Energy Performance Standards

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

No investment is included in this project. 70% of the costs for the Technical Assistance and Capacity Building activities is expected from international donors and 30% from State Budget. The Technical Assistance and Capacity Building activities will strengthen sustainable procurement in the public procurement system. Sustainable procurement activities will lead to increased public procurement of low energy, low-carbon and environment friendly products and services which will result in cost savings across the life cycle and thus will pay back any investment made in developing and implementing this project.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

Getting the data on public procurement volume, categories etc is a challenge. Hence as part of the project, a survey would be conducted to verify the numbers and potential.

FINANCIAL SUSTAINABILITY

During the initial stages of market development for energy-efficiency, sustainable public procurement can act as a driver of demand for energy-efficient products and services, which will help confidence of the private sector and financial institutions in energy-efficiency. Through it the government can demonstrate the feasibility of such products and services, and also create confidence and opportunities for the private sector to gradually cater to that demand, as well as for financial institutions to introduce more attractive financial products.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

Investments not considered for this project, as the incremental investment needed for procuring more energy-efficient products is expected to be borne by the Fijian Government.

- Grant for development costs: US\$ 62,000
- Grant for Enabling, Capacity Building and Technical Assistance: US\$ 658,000

Note this does not include all capital investments due to the limited availability of information needed to quantify activity.

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: **SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF, UNOPS, UNEP**
- Project Implementation & Management: **SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, UNDP, EEAS, WB/IFC, UNOPS, UNEP**
- Government Budget & Taxes Incentives: MOE

**This is not a comprehensive list, as other entities are possible as well.*

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$ 658,000 (includes 15% overhead for Implementing Partner)

1. Survey of the public procurement system, for volume of public procurement and in terms of products and product categories, identification of high-volume product categories that have higher carbon intensities and prioritizing them. (US\$23,000)
2. Support the Fiji Procurement Office in developing sustainable procurement core principles, strategy, plans and targets and in integrating sustainable procurement principles into the existing public procurement rules and guidelines. (US\$23,000)
3. Develop sustainable procurement guidelines for each key product category. (US\$217,000)
4. As a capacity building activity, provide advisory support to procurers to implement sustainable procurement in procurement actions. (US\$72,000)
5. Support cooperative procurement of low-carbon products. (US\$18,000)
6. Conduct 4 trainings on sustainable procurement. 20 to 30 participants each (US\$169,000)
7. Develop a module on sustainable procurement at USP, tailored for the requirements of PICs and to be integrated into existing courses or to be offered as a standalone course. (US\$18,000)
8. Develop an online course on sustainable procurement hosted by USP, tailored for the requirements of PICs (US\$33,000)

INFORMATION AND MRV NEEDS

1. Annual volume of energy-efficient and low-carbon products and services procured through public procurement
2. Annual public procurement volume
3. Annual volume of energy-efficient and low-carbon products and services that are covered through cooperative procurement agreements

SUPPORTING REFERENCES

- Public procurement data from the Fiji Procurement Office in 2019 during consultants' Fiji mission
- Fuel import and export data obtained from Fiji Revenue and Customs Service (FRCS) in 2019 during consultants' Fiji mission
- Energy Fiji Limited (2020). 2019 Annual Report. EFL <http://www.parliament.gov.fj/wp-content/uploads/2020/05/Energy-Fiji-Limited-2019-Annual-Report.pdf>
- Power Research & Development Consultants Pvt. Ltd (2017). Final Report (Volume 1), Power Development Plan for year 2017 to 2026- Load Forecasting and Generation Planning. FEA
- National Energy Policy Review Advisory Committee (2013). Fiji National Energy Policy 2013 – 2020. Fijian Government
- Climate Change and International Cooperation Division, Ministry of Economy (2013). Republic of Fiji - Third National Communications. Ministry of Economy, Fijian Government
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	2,3,4,5,6,7,8	3,4,5,6	
Estimated CB & TA Costs (US\$)	1,14,234	4,52,140	1,54,119	7,20,493
Estimated Capital Investment (US\$)	0	0	0	0
Estimated GHG Mitigation (tCO₂)	0	1,084	22,972	24,057
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				7,063

E7 - PROGRAMME TO MANAGE PEAK DEMAND AND ENERGY SAVINGS IN FIJI

NO.	E7
ACTION NAME	Programme to manage peak demand and energy savings in Fiji
SUB-SECTOR	Power
DESCRIPTION	<p>Meeting peak demand is a challenge for EFL. The lack of reserve capacity can also become a challenge for carrying out maintenance activities. This opportunity focuses on supporting the power sector and consumers' actions to lower demand-side electricity consumption in Fiji and control peak demand of the system through various methods, including through tariff revision, through demand side management (DSM) and demand response (DR) programmes.</p> <p>Technical assistance will be provided to EFL and the Fijian Competition & Consumer Commission (FCCC) to conduct a study to support the revision of existing power tariff¹⁸⁸ regulation for industrial and larger commercial end users to incorporate Time of Day (TOD) tariff as a means to lower peak power demand in Fiji. Further technical assistance would be provided to EFL to develop and implement a demand response (DR) programme¹⁸⁹, to control peak demand and save energy. This would involve identifying key non-critical loads in the grid that can be either shifted to off-peak period operations or taken offline when there is demand driven stress on the grid, and includes identifying the means for monitoring and controlling such actions. In addition, technical assistance and financing would be provided to a public-private partnership (led by a GOF/public sector entity, ideally EFL or else DOE) to develop and implement a long-term demand side management (DSM) programme to ensure economy wide energy savings. The initial phase of the DSM programme will focus on bulk procurement of high-performance energy labelled appliances, and mass retail financing and distribution to household. Only consumers who return or dispose their old, inefficient appliances will be able to join the programme. This first phase will be done in association with the Fiji Procurement Office, national commercial importers/retailers and financial institutions. Under the first phase of the DSM programme, a financing instrument will be developed through the technical assistance component, for example where a payment mechanism may be operated through the pre-payment system at EFL. The proposed first phase of the DSM programme will help counter a potential increase in prices of these appliances through the enhanced Standards and Labelling (S&L) programme (proposed separately under E10) and increase awareness of the benefits of these appliances. Taxation changes are expected to support this opportunity. By the time the enhanced S&L programme is fully operational and effective, the first phase of the DSM programme can be gradually phased out, as the enhanced S&L programme can eliminate the low energy-efficiency products from the market over time.</p> <p>The initiative will be led by MIMS/DOE and EFL, with the support of key stakeholders such as Fiji Retailer Association, Fiji Procurement Office, FNU, PPA, PCREEE-SPC and private sector companies. The major investment requirements are for the implementation of the first phase of the DSM programme to import and supply more energy-efficient products and appliances, as well as by individual households to purchase them, and a strong public-private partnership is needed led by DOE and EFL. Investment needs to be made by importers, wholesalers and retailers for importing and supplying energy-efficient products/appliances and the decision will be influenced by the market potential and financial feasibility. Individual households will invest in these products based on their own financial backgrounds, functional requirements and perceived costs and benefits. These investment decisions can be strongly influenced by fiscal incentives, and through awareness raising about the benefits and feasibility of energy-efficient products/appliances. Investment also needs to be made by the government and other stakeholders to strengthen existing waste management infrastructure and systems for handling the old products/appliances that would be returned.</p>

EFL also needs to make relatively smaller investments for introducing the proposed time of day (TOD) tariffs and for the demand response (DR) programmes.

KEY IMPLEMENTATION MILESTONES

POLICY/TECHNICAL ASSISTANCE

- Overall DSM programme designed and a guideline on DSM programme development and implementation developed.
- The first phase of the DSM programme designed, developed, implemented and evaluated
- A financing facility set up and operated to support the first phase of the DSM programme
- A TV and social media campaign conducted to raise awareness on the first phase of the DSM programme
- The DR programme designed, developed and implemented, and a guideline developed on DR programme development and implementation
- Power tariff revised to incorporate TOD tariff

INVESTMENT NEEDS

- To introduce TOD tariff, EFL needs to install meters and software. Annual fee also needs to be paid for maintenance of the software
- As part of the first phase of the DSM programme focussing on residential consumers, bulk importers and retailers participating in the programme need to invest in importing energy-efficient products and appliances, and they need to be procured by households.
- Investment also might need to be made to facilitate the safe offshore disposal of old appliances that are returned by consumers as part of the first phase of the DSM programme.

OUTCOMES

PRIMARY OUTCOMES

- GHG mitigation and lower carbon intensity of the economy
- Significant reduction in peak demand in the grid
- Energy and cost savings for residential consumers
- Lowering of energy intensity of the economy
- EFL avoids, reduces or delays investments for adding new power generation capacity
- Capacity developed of key institutions and stakeholders for implementing DSM and DR as long term programmes

SECONDARY OUTCOMES

- Reduced air pollution due to reduced supply and use of petroleum products.
- Improved reliability and stability of the power grid
- Delayed or avoided investments in power and oil infrastructure
- Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices
- This will improve energy access

MITIGATION POTENTIAL

2589,000 tCO₂/yr in 2030. and a total of 898,000 tCO₂ for 2020 – 2030
(actual emission reductions during 2025-2030)

The benefits and investment needs due to the proposed demand response (DR) programme was not considered due to lack of data, however the investment requirements are considered less significant compared to the total estimated now.

INTRODUCTION OF TOD TARIFF

- In 2019, the peak load and base load was 199 MW and 121 MW respectively based on projections by EFL's Power Development Plan and the annual generation figures for 2019. The difference between the peak load and base load was 78 MW, which is the demand that needs to be optimized and reduced. Based on past data, assumed that the commercial and industrial consumers contribute 72% of the peak demand which corresponds to 55 MW. These figures were projected till 2030 based on electricity demand growth rate of 2% per year (the growth rate used in Fiji's NDC Roadmap).
- Introduction of TOD tariff will result in reduction in energy consumption in peak period and corresponding increase in off-peak period.
- In BAU scenario, energy consumption during off-peak period is assumed to be 40% of total and in peak period it is assumed to be 60%.
- In the alternate scenario, after implementation of the TOD tariff, the energy consumption is assumed to shift from peak period to off-peak period at YoY rate of 1.5%.
- Cost savings in terms of additional revenue to the utility is estimated based on 12-hour peak period, energy consumption during the peak period and tariff premium of 10% during the peak TOD zone compared to the off-peak tariff.
- There is no direct energy savings and corresponding GHG emission reductions due to the TOD tariff.

DSM PROGRAMME

- The utility led DSM for residential sub-sector would reduce peak load demand from residential sub-sector and reduce energy consumption.
- The most significant appliances used in households have been considered: lights, fans, refrigerators, freezers, washing machines and air-conditioners.
- The scheme consists of bulk procurement of labelled energy-efficient appliances (at a discount) and distributing it to consumers at a discount. Only consumers who return their old (non-labelled appliances or labelled appliances with low ratings), would be able to participate in this scheme.
- By this measure, there would be a peak demand savings, as well as energy savings.
- It is assumed that 60% of peak power demand by residential sub- sector would be reduced
- The total energy consumption by various appliances is estimated based on FBOS's Household and Population data on ownership of appliances/products, import/export volume from FRCS, and the rated power consumption by appliances/products. The 2019 data on stock of each appliance/product for all products considered were available, except for fans and lights. For fans it was assumed that on average there are 4 fans for each household and 6 lights were assumed per household. The average of the annual import volume of appliances/products from 2017 to 2019, was assumed to be the annual import volume for 2020. The annual import volume from 2021 to 2030 was then projected assuming it will grow in proportion to the population growth rate.

- A comparison of energy consumption between lower star rated and higher star rated products (Australian data) for various appliances has also been carried out to substantiate energy savings through energy labelling. From 2026, a switch is expected from 2.5 to 6 star rated products, which equates to a 62% saving.
- To estimate total investment, the average investment per consumer/household in 2019 is estimated at US\$2430, based on household ownership of appliances/products (from FBOS Household and Population statistics) and their current retail prices.
- The number of residential grid connections (no of private household grid connections) was estimated using EFL data for 2019 and projected for future in proportion to the historical growth rate of households (1.7% per year during 1986 to 2017, as per FBOS 2017 Population and Housing Census report)
- World Bank estimates that 14.1% of the population in Fiji are poor, and it is assumed that the poor may not participate in the DSM programme, partly because of the cost involved and partly because their energy intensity might already be very low. Hence, it is assumed that only 85% of the private households will participate in the DSM programme.

CO-BENEFITS/ SDG LINKAGES

- Reduced air pollution due to reduced supply and use of petroleum products.
- Continuous and stable power for end users, thereby improving and enabling more economic activity, as well as non-productive uses of energy
- Improved profitability for utilities managing the power and oil sectors
- Delayed or avoided investments in power and oil storage and distribution infrastructure
- Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices
- This will improve energy access, especially benefiting women and people living in remote areas

Relevant primary SDGs impacted: 7, 9, 11, 12, 13

Relevant secondary SDGs impacted: 3, 17

INVESTMENT NEEDS (USD)

Estimated capital investment needed for the physical implementation: US\$702 million

Estimated development costs: US\$280,000

Enabling, Capacity Building and Technical Assistance: US\$1 million

RIO MARKER AND CRS PURPOSE CODE(S)

RIO MARKER: Significant (1)

OECD-DAC/CRS PURPOSE CODE(S):

- 15155 – Tax policy and administration support;
- 23110 - Energy policy and administrative management;
- 23181 - Energy education/training;
- 23183 - Energy conservation and demand-side efficiency;
- 24030 - Formal sector financial intermediaries

IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS

NATIONAL IMPLEMENTING ENTITY/STAKEHOLDERS:

MIMS/DOE, EFL

POTENTIAL IMPLEMENTING SUPPORTING ENTITY/STAKEHOLDERS:

FNU, PPA, PCREEE-SPC, Fiji Retailer Association, Fiji Procurement Office, private sector companies

GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION

TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 years needed for the project/programme design

TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments

WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building programme will be during 2022 to 2030. The financing facility for the DSM programme will operate during 2025 to 2030.

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure support for the technical assistance and capacity building package, and especially for items B to F below.
- B. Initiate discussions with EFL, DOE and other key stakeholders regarding the scope and design of the overall DSM programme and its first phase
- C. Enter into discussions with supporting agencies for primary investment financing and state budget allocations for the first phase of the DSM programme.
- D. Develop the terms of reference for hiring experts for the design and development of the overall DSM programme and its first phase
- E. Develop the terms of reference for hiring experts for the design and development of the DR programme
- F. Develop the terms of reference for hiring experts for supporting tariff revisions

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

6. Sustainable Financing

- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

7. Private sector Transition and Engagement

- **Objective 7.2** To establish private-public partnerships

**5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036),
MOE (ISSUED 2017);**

- **3.1.2 Energy** “A resource-efficient, cost-effective and environmentally sustainable energy sector”
- **3.2 Transformational Strategic Thrusts**
 - » 3.2.9 Sustainable Cities and Towns “Creating vibrant and environmentally sustainable urban centres”
 - » 3.2.17 Enhancing International Trade and Foreign Relations “Expanding trade base and economic engagement in the global community”

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1 Electricity and Other Energy Generation and Use**

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 7:** Energy Security
- **Thematic Area 9:** Technology and Innovation

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Electricity Generation and Transmission:
 - » E1, E4, E7: Grid Extension and Improvements
 - Demand-side energy-efficiency
 - » D1: Energy Labelling and Minimum Energy Performance Standards
-

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY	<p>3 separate interventions are involved under this project. These interventions will impact the end users and PUB</p> <ul style="list-style-type: none"> • Tariff revisions (Introduction of Time of Day (TOD) tariff) • Demand side management (DSM) programme • Demand response (DR) programme <p>The introduction of TOD tariff will increase costs for end users if they consume more during peak periods. This will encourage them to reduce power usage during peak demand periods and shift some of the less critical usage to the off-peak periods. This behaviour will benefit EFL, as it will reduce or delay the investments that EFL needs to make in future for increasing power generation capacity to meet peak demand. It will also bring in additional revenue for EFL through the use of critical loads during peak period.</p> <p>DSM programmes will result in net benefits for the end user, through the energy cost savings through using more energy-efficient appliances. To avoid the barrier of higher initial investment for the first phase of the DSM programme, individual consumers could be provided an indirect subsidy of an individual tax credit up to 35% of the investment, or 10% individual tax credit and reduced import duty and excise -25%. Consumers would have the option to finance the appliance with equity of 100% of the investment, or via loan facility covering 50% of the investment.</p> <p>More than end users, EFL will be the main beneficiary of the DSM programme by cost savings through reduced or delayed investments that EFL needs to make in future for increasing power generation capacity. Hence DSM programmes are normally funded by the utility (EFL). Under this opportunity, for the first phase of the DSM programme it is suggested that any lending (of up to 50% of the investment) go through bulk importer/retailers, who has a consumer payment agreement with EFL. In so far, that the consumer pays for their loan via their energy bill (e.g. their prepayments for electricity). The low interest loans would need to be backed by a credit guarantee from an IFI. The indirect subsidy via tax credits...etc. will help the consumer cover their costs. To lower the cost it is recommended that one or more bulk importers/retailers be used, and these retailers may need a commercial loan to cover the cost of import of goods, and this in turn may require a credit guarantee from an IFI.</p> <p>The demand response programme would require lower investments from EFL as they mainly involve paying periodic incentives to few larger consumers who commit to the programme and smaller investments to improve the communication, monitoring and controls in the system, which will be paid back from the cost savings and delayed/reduced investments.</p>
GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS	<p>The DR programme would need better monitoring and communication infrastructure. The existing system would need to be upgraded for this.</p> <p>Both the DSM and DR programmes is a new activity for EFL/DOE and bulk importers/retailers and might appear like an added burden for them. The project will have to ensure adequate support by external consultants to ensure that EFL/DOE is not overburdened by this activity .</p>
FINANCIAL SUSTAINABILITY	<p>As the DSM programme involves increasing market share of higher efficiency energy labelled products, the average price of these products could go up. This would be partly compensated by the discounts that would be obtained through the cooperative/bulk procurement proposed. However, looking at the life cycle costs, the cost savings across the life cycle, is expected to cover the higher initial investment to be made by households.</p>

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- For implementing the TOD Tariff investment of: US\$6M
- Company equity from high energy consumers: US\$6M (100% of investment)
- Corporate investment tax credit: between 80% and 100% of the investment made
- For implementing the DSM programme investment of: US\$703M
- Private home equity from households: up to US\$703M (100% of investment)
- ALTERNATIVE Private home equity from households: up to US\$351M (50% of investment)
- ALTERNATIVE Low interest loans for households: up to US\$352M (50% of investment)
- ALTERNATIVE Credit guarantee backing the low interest loans: up to 50% of investment
- Private investment tax credit for investment: between 10% and 35% of the investment made
- Reduced import duty and excise tax: up to -25% (depending on the Private investment tax credit above)
- Grant for development costs: US\$230,000
- Grant for Enabling, Capacity Building and Technical Assistance: US\$1 million

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: **PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF**
- Project Implementation & Management: **PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantee: **GCF, ADB, Supplier EXIM Banks, EIB, WB/IFC**
- Debt & Loans: **FDB, ADB, EIB, WB/IFC, commercial loans**
- Equity: **import/retail companies, households/individuals**
- Non-Government Grants for investment: **GEF, GCF, WB/IFC, EIB, CIDCA, KOICA, EEAS, AU-DFAT, NZ-MFAT**
- Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, UNDP, UNIDO, EEAS, WB/IFC,**
- Government Budget & Taxes Incentives: **MOE**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$1 million (includes 15% overhead for Implementing Partner)

1. Design, development of the DSM (overall programme and the first phase) and DR programme, and support for revision of tariff (US\$60,000)
2. Implementation of the DSM (first phase) and DR programme. (US\$52,000)
3. 2 Training programmes on DSM and DR programme Development and implementation, 2 days each. 20 to 30 participants. (US\$ 78,000)
4. 6 half day awareness raising programme on DSM and DR programme Development and implementation, half day days each. 80 to 100 participants each. (US\$272,000)
5. A TV and social media campaign to raise awareness on the first phase of the DSM programme. (US\$44,000)
6. Development of a Guideline on DSM and DR programme development and implementation. (US\$18,000)
7. Midterm and final evaluation of the DSM (first phase) and DR programme. (US\$28,000)
8. Setting up and operating the financing facility to support the first phase of the DSM programme (US\$360,000)

INFORMATION AND MRV NEEDS

1. Energy saved during the project period and estimates till 2030
2. Avoided demand during the project period and estimates till 2030
3. Type and number of energy-efficient appliances distributed
4. Number of trainees attending the training programmes and their evaluations
5. Number of people reached out through the awareness raising programmes and TV and social media campaigns

SUPPORTING REFERENCES

- Appliances import and export data obtained from Fiji Revenue and Customs Service (FRCS) in 2019 during consultants' Fiji mission
- Energy Fiji Limited (2020). 2019 Annual Report. EFL <http://www.parliament.gov.fj/wp-content/uploads/2020/05/Energy-Fiji-Limited-2019-Annual-Report.pdf>
- 2017 Population and Housing Census, Release 1, Age, Sex, Geography and Economic Activity. FBOS, 2018 Fiji Bureau of Statistics (2018). 2017 Population and Housing Census, Release 1, Age, Sex, Geography and Economic Activity. FBOS https://sdd.spc.int/digital_library/2017-population-and-housing-census-release-1-age-sex-geography-and-economic
- Fiji Bureau of Statistics (2017). Data on Population and Household Statistics, 2017. FBOS IMF Data Mapper <https://www.imf.org/external/datamapper/PCPIPCH@WEO/OEMDC/ADVEC/WEOWORLD>
- World Bank (2020). Poverty and Equity Brief, East Asia and Pacific. World Bank Group https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_EAP.pdf
- GEMS Regulator, Department of Industry, Science, Energy and Resources (2020). Energy Calculator, E3 Program. Government of Australia <https://www.energyrating.gov.au/calculator>
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1	1,2,3,4,5,6,7,8	2,4,5,6,7,8	
Estimated CB & TA Costs (US\$)	275,000	508,000	495,000	1,279,000
Estimated Capital Investment (US\$)	0	122,152,000	580,040,000	702,192,000
Estimated GHG Mitigation (tCO₂)	0	42,000	856,000	898,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				259,000

E8 - EFFICIENT OPERATION AND MAINTENANCE OF WATER SUPPLY SYSTEMS

NO.	E8
ACTION NAME	Efficient operation and maintenance of water supply systems
SUB-SECTOR	Power
DESCRIPTION	<p>The Water Authority of Fiji (WAF) harvests, treats and reticulates water for supply to its customers and collects, transports, treats and discharges wastewater. WAF also manages 3 desalination plants. It currently supplies 131,870,000m³ of treated water. There are significant inefficiencies in the system: 32.5% technical losses for the water system (mostly leakage). 40% of the pumps in the water pumping system are of low energy-efficiency. The maintenance is mostly reactive in nature and there is a general lack of capacity and a culture that supports more efficient operation. All these significantly increases energy needed for water pumping and treatment, reduces the life of assets and increases operating costs. Water harvesting is not currently mandated, though it is expected to be incorporated under ongoing revisions to the Building Code</p> <p>This opportunity will support the Water Authority of Fiji (WAF) to initiate a programme for improving efficiency in water production, reduction in water demand, and the efficient operation and maintenance of the water distribution system. This action includes technical assistance for mass balance, energy and maintenance auditing of the water system, feasibility studies for investments, and support for procurement of infrastructure improvements. Further technical assistance will be provided to strengthen and sustain institutional knowledge and practices within WAF for improved maintenance practices to prevent water losses in the distribution system. Financing activities under this opportunity focus on replacing inefficient pumps with efficient pumps, replacing inefficient flow control devices with more efficient ones, modifications in the system to rationalise pumping pressure and to reduce pressure drops and improvements in energy-efficiency in desalination plants.</p> <p>This initiative will be led by DOE and WAF, with support from PWWA, SPC, FNU and private companies. The investments will be made in the major water supply and distribution systems under in Viti Levu and Vanua Levu. The investments involve retrofits and refurbishments of existing systems, and enhancements for new water distribution infrastructure, so as to improve energy-efficiency.</p> <p>Financing will be needed for the incremental investment needs to meet energy-efficiency requirements. These need to be integrated with the annual budgeting and business planning process of WAF. Thus, feasibility, finance, and implementation of this mitigation opportunity will need to follow this multi-year process, and be a continual activity involving multiple water supply infrastructure projects. The investments needed for normal maintenance activities that enhance energy-efficiency (e.g., plugging leakages) is expected to be fully funded by WAFs operating budget.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Water balance, energy audit and maintenance audit studies conducted for the water treatment and pumping system in Viti Levu and Vanua Levu • Guideline developed for public utilities on the proper design, installation, and the efficient operation and maintenance of water production, treatment and pumping systems • Awareness raising campaign launched on efficient use of potable water, rationale use of water and about water harvesting • A financing facility set up and operated <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Retrofits and refurbishments of existing systems, and enhancements for new water distribution infrastructure, so as to improve energy-efficiency.

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • GHG mitigation • Reduction in specific energy consumption (kWh/m³) of the water supply system • Increased life of assets • Reduced cost of operations (US\$/m³), through reduced cost of energy, maintenance and water treatment • Significant reduction in peak demand in the water supply system • WAF avoids, reduces or delays investments for adding new water pumping and treatment capacity • Significant reduction in peak demand in the power grid <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • EFL avoids, reduces or delays investments for adding new power generation capacity
MITIGATION POTENTIAL	<p>41,000 tCO₂/year in 2030 and a total of 136,000 tCO₂ for 2020 – 2030</p> <ul style="list-style-type: none"> • The annual water production was estimated based on the annual water consumption and leakage %. This was projected till 2030, in proportion to the growth in population • The specific energy consumption was estimated from WAF's annual electricity consumption and annual water production figures • 3 types of energy savings were estimated expected as project outcomes: • Savings due to a 50% reduction in water leakage • Savings due to a 20% increase in water pumping efficiency (mainly by replacing low efficiency pumps with higher efficiency pumps) • Improved energy-efficiency in the 3 desalination plants in Taveuni • Savings due to other project actions such as use of variable speed drives or other flow control devices, improved maintenance, introduction of water harvesting, improved water use efficiency etc, has not been estimated
CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Reduced air pollution due to reduced supply and use of petroleum products. • Continuous and stable power for end users, thereby improving and enabling more economic activity, as well as non-productive uses of energy • Improved profitability for utilities and companies managing the power and oil sectors • Delayed or avoided investments in power and oil storage and distribution infrastructure • Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices • This will improve energy access, especially benefiting women and people living in remote areas • Improved health and wellbeing due to improved water supply and better water quality available for a larger population <p>Relevant primary SDGs impacted: 6, 7, 11, 12, 13</p> <p>Relevant secondary SDGs impacted: 3, 9, 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$3.6 million for replacing or installing inefficient pumps and flow control devices and for energy-efficiency measures in the desalination plant.</p> <p>Estimated development costs: US\$170,000.</p> <p>Enabling, Capacity Building and Technical Assistance: US\$1.3 million.</p>

RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <p>23110 - Energy policy and administrative management; 14081 - Education and training in water supply and sanitation; 23183 - Energy conservation and demand-side efficiency; 14021 - Water supply - large systems; 14031 - Basic drinking water supply</p>
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>NATIONAL IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>DOE, WAF</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>FNU, PWWA, SPC, private sector companies</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 years needed for the project/programme design</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building programme will be during 2022 to 2029. The financing will run from 2024 to 2029.</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the technical assistance and capacity building package, and especially for items B to D below. B. Initiate discussions with WAF, DOE and other key stakeholders regarding the scope and design of the proposed water balance, energy audit and maintenance audit studies C. Develop the terms of reference for hiring experts for the proposed water balance, energy audit and maintenance audit studies D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

1. National Risk Governance

- **Objective 1.4** To improve national capacity for strategic foresight

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.1** Water and Sanitation "Clean and safe water in adequate quantities and proper and adequate sanitation for every Fijian household"
- **3.1.2** Energy "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2** Transformational Strategic Thrusts
 - » 3.2.9 Sustainable Cities and Towns "Creating vibrant and environmentally sustainable urban centres"
 - » 3.2.10 Expanding the Rural Economy "Promoting equal opportunities, access to basic services and building resilient communities"

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1** Electricity and Other Energy Generation and Use

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 6:** Freshwater Resources and Sanitation Management
- **Thematic Area 7:** Energy Security

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D3: Energy-efficiency in the Public Sector

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

Increased capacity for energy-efficiency and water savings, as well as improved maintenance systems (increasing asset life and maintenance expenses) will significantly decrease the capital and operating expenditure for WAF. However, to reduce the impact of higher initial investment needs, grant funding is proposed. 70% of the grants could be from international donors and 30% from the State Budget. The state could raise funds for this through measures such as increased water cess for water intensive industries or users.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

WAF is at a stage where it is under pressure to ensure that supply meets the rapidly increasing demand. Hence it might be difficult to prioritise efficiency and productivity improvements, unless there is a strong realisation of its significance.

FINANCIAL SUSTAINABILITY

The project will help decrease capital and operating expenses for WAF which will help WAF to undertake energy-efficiency measures beyond the project period. As WAF improves its operating capacity, financial position and credit rating through the impact of the project, more attractive financing options would also become available in future. It is also essential to make water harvesting mandatory (e.g., by including it in the Building Code), which will reduce the demand on WAF in the future.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- Grant for capital investment needed for investment: US\$3.6M
- Grant for development costs: US\$170,000
- Grant for Enabling, Capacity Building and Technical Assistance: US\$1.2M

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES**MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):***

- **Project Planning, Development & Design:** PCREEE-SPC, **UNDP**, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF
- **Project Implementation & Management:** PCREEE-SPC, **UNDP**, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantee: **GCF, ADB, Supplier EXIM Banks**, EIB, **WB/IFC**
- Debt & Loans: **FDB, ADB**, EIB, **WB/IFC, GCF**
- Equity: **WAF**
- Non-Government Grants for investment: **GEF, GCF**, AU-DFAT, NZ-MFAT, **ADB, WB/IFC**, EIB, CIDCA, KOICA, **EEAS**
- Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT, NZ-MFAT, GIZ**, CTCN, ADB, KOICA, **UNDP, UNIDO, UNEP, UNCRD, EEAS, WB/IFC**
- Government Budget & Taxes Incentives: **MOE**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

**ENABLING,
CAPACITY BUILDING
AND TECHNICAL
ASSISTANCE NEEDS**
Enabling, Capacity Building and Technical Assistance: US\$ 1.3 million

1. Water balance study for Viti Levu and Vanua Levu, and detailed energy and maintenance audit of the water treatment and pumping system in Viti Levu and Vanua Levu (US\$240,000)
2. 4 training programmes on the proper design, installation, and the efficient operation & maintenance of water production, treatment and pumping systems, 3 days each. 20 to 30 participants (US\$180,000)
3. Develop a guideline for public utilities on the proper design, installation, and the efficient operation and maintenance of water production, treatment and pumping systems. (US\$40,000)
4. Conduct 6 awareness raising workshops on the opportunities and importance of water savings and water harvesting. (US\$210,000)
5. Support the development and launch of an awareness raising campaign on efficient use of potable water, rationale use of water and about water harvesting (US\$110,000)
6. Setting up and operating a financing facility (US\$270,000)
7. Development of a training curriculum for preventative maintenance of water distribution systems, and annual 3-day training for 30 participants (US\$280,000)

**INFORMATION
AND MRV NEEDS**

1. Reduction in energy intensity of WAF, kWh/m³ of treated water supplied
2. Reduction in % leakage in the WAF system
3. Reduction in % infiltration into the WAF system
4. Reduction in non-revenue water for WAF
5. % reduction in potable water demand through water saving techniques at the end user level
6. % of total water demand that is supplied through rainwater harvesting

**SUPPORTING
REFERENCES**

- Data provided by WAF during consultants' Fiji mission in 2019
- Energy Sector Management Assistance Program (2012). A primer for energy-efficiency in Municipal Water and Wastewater Utilities. International Bank for Reconstruction and Development/World Bank Group https://www.esmap.org/sites/default/files/esmap-files/FINAL_EECI-WWU_TR001-12_Resize.pdf
- Papa, F., Radulji, D., Karney, B., & Robertson, M. (2014). Pump energy-efficiency field testing and benchmarking in Canada in the Journal of Water Supply, Research and Technology. IWA <http://hydratex.com/wp-content/uploads/2015/04/Pump-Energy-Efficiency-Field-Testing-and-Benchmarking-in-Canada-Papa-et-al-2014.pdf>
- Goldstein, R. and Smith, W. (2002). U.S. Electricity Consumption for Water Supply & Treatment—The Next Half Century. Water & Sustainability (Volume 4), EPRI <https://www.circleofblue.org/wp-content/uploads/2010/08/EPRI-Volume-4.pdf>
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1	1,2,3,4,5,6	1,6	
Estimated CB & TA Costs (US\$)	258,000	880,000	363,000	1,501,000
Estimated Capital Investment (US\$)	0	1,200,000	2,400,000	3,600,000
Estimated GHG Mitigation (tCO₂)	0	6,000	130,000	136,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				41,000

E9 - ASSESSMENT, DESIGN AND CONSTRUCTION OF LOW ENERGY/CARBON BUILDINGS

NO.	E9
ACTION NAME	Capacity building in the assessment, design & construction of low energy/carbon buildings
SUB-SECTOR	Buildings
DESCRIPTION	<p>A significant level of capacity might be needed in the longer term in the design and construction of low energy/carbon buildings and in building energy assessments, both in terms of number of experts and in terms of scope of expertise. These require a proper combination of expertise in bio-climatic design of buildings, energy-efficiency of electro-mechanical systems and thermal energy, and essential understanding of building physics. The policy and regulatory tools to support energy-efficiency in buildings have also not been developed.</p> <p>This opportunity will focus providing technical assistance to MIMS to develop guidelines for low-carbon building design and construction, an energy-efficient building code (possibly integrated within the new building code), and the development of a voluntary green building rating system. Further technical assistance will be provided to develop and deploy a certification system for building energy assessors. Training programmes would be conducted for architects and engineers, as well as new education modules for low energy/carbon buildings to be included in existing curriculum at Fiji National University (FNU) and USP. Financing activities under this opportunity will focus on providing financial incentives to address energy-efficiency measures in up to 150 government buildings and up to 17,024 households.</p> <p>This initiative will be led by DOE, and supported by SPC, USP and other stakeholders. The investments will be made in government buildings and households nationwide that commit to meet specified higher energy-efficiency requirements. Investments for retrofits and construction of government buildings are based on the annual budgeting process of the Fijian Government. Thus, feasibility, finance, and implementation of this mitigation opportunity will need to follow this multi-year process, and be a continual activity involving multiple government building projects. Investment decision for households depend on varying financial backgrounds, functional requirements and perceptions of costs and benefits, and need to be supported on a case by case basis.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Key policy tools developed such as a mandatory energy-efficiency building code (EEBC) and a voluntary green building rating system. • A certification programme developed for building energy assessors • Guidelines developed on energy-efficiency in buildings for different building typologies <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investments for retrofits and new constructions in up to 150 government buildings and up to 16,860 households, to integrate energy-efficiency considerations.

OUTCOMES**PRIMARY OUTCOMES**

- GHG mitigation and lower carbon intensity of the economy
- Reduction in the specific energy consumption of buildings (kWh/m²/year)
- An increasing number of buildings adhere to the proposed energy-efficiency building code
- An increasing number of buildings gets labelled through the proposed voluntary green building rating system
- Capacity developed of key institutions and stakeholders
- A minimum number of professionals certified for conducting building energy assessments

SECONDARY OUTCOMES

- Reduced air pollution due to reduced use of diesel for power generation.
- Improved reliability and stability of the power grid
- Delayed or avoided investments in power and oil infrastructure
- Reduced petroleum imports
- Improved energy security, less disruptions to petroleum imports and less impacts due to increases in international petroleum prices

**MITIGATION
POTENTIAL****3,000 tCO₂/year in 2030 and a total of 11,000 tCO₂ for 2020 – 2030.**

- This program impacts all buildings, but to avoid double counting, the investments, incentives and benefits have been estimated only for residential consumers, and government buildings. The impacts for hotels and commercial buildings have not been considered, to prevent overlap with another project proposal targeting hotels and commercial buildings (E7)
- The number of consumers in each of these sub-sectors (residential and government buildings) were estimated as well as the numbers that would commit themselves to the programme.
- For residential houses, data from the 2017 Population and Housing Census was used to estimate and project the population of individual houses each year during 2024 to 2030. It is also assumed that only permanent houses (using concrete masonry) would be considered for the investment component of the programme. It was assumed that 70 % of the houses are permanent. Assumed that 2 % per year of these existing permanent houses would upgrade themselves during 2024 to 2030 to meet the requirements of the EEBC (mandatory) and/or the Green Building rating system (voluntary). This is a total of 17,024 houses.
- It is assumed that there are a total of 500 medium to larger government buildings. Out of these, assumed that around 5 % will upgrade themselves per year (25 per year, total 150) during the period 2024 to 2030.
- The total investment per house to make them meet the requirements of the EEBC or the rating system is assumed to be 10,000US\$ of which 5,00 US\$ is assumed to be the incremental cost. The investment for conversion of Government buildings is assumed to be US\$ 60,000 per building, of which US\$25,000 is assumed to be the incremental cost
- Also assumed that each of the private houses that will upgrade themselves, will achieve 20% reduction in specific energy consumption (kWh/m²) and 30 % for Government buildings that participate in the programme
- The above assumptions were used for calculating the annual energy savings (MWh) and GHG emission reductions (tCO₂eq).
- Since buildings in Fiji use very little thermal energy that can be influenced by building design or better O&M practices, all the savings are estimated on electrical energy consumption.

CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Resulting reduction in air pollution will lead to improved health outcomes. Resulting reduction in air pollution will lead to improved health outcomes. Health benefits will also be obtained through better design features of buildings such as increased natural ventilation, more access to daylighting and better indoor thermal comfort conditions • This will result in improved reliability and stability of power grid which will enable more economic activity, as well as non-productive uses of energy • Resulting improvement in energy access will especially benefit women and people living in remote areas • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure <p>Relevant primary SDGs impacted: 7, 11, 13</p> <p>Relevant secondary SDGs impacted: 9, 12, 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$179M</p> <p>Estimated development costs: US\$268,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$1.1M</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15144 – National standards development; 15155 – Tax policy and administration support; 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency; 24030 - Formal sector financial intermediaries; 43932 – Urban development;
IMPLEMENTING AND SUPPORTING ENTITIES/ STAKEHOLDERS	<p>NATIONAL IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>DOE</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>SPC, USP</p>

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 years needed for the project/programme design

TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments

WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building programme will be during 2022 to 2030. The financing will be during 2024 to 2030

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure support for the technical assistance and capacity building package, and especially for items B to C below.
- B. Initiate discussions with DOE and other public and private stakeholders on the scope and process for the development of a guideline on low-carbon building design and construction for different building typologies, the energy-efficiency building code and the green building rating system. Also identify the host institution for development of the green building rating system, which is often a private sector entity or an NGO
- C. Develop the terms of reference for hiring experts for the development of a guideline on low-carbon building design and construction for different building typologies, the energy-efficiency building code and the green building rating system
- D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

1. National Risk Governance

- **Goal 3** Legislation establishes the pathway for economy-wide decarbonisation

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.1** To Increase the use and availability of domestically derived climate finance
- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

7. Private sector Transition and Engagement

- **Objective 7.2** To establish private-public partnerships
- **Objective 7.3** To create a climate-ready workforce and promote social entrepreneurship

**5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036),
MOE (ISSUED 2017);**

- **3.1.1 Water and Sanitation** “Clean and safe water in adequate quantities and proper and adequate sanitation for every Fijian household”
- **3.1.2 Energy** “A resource-efficient, cost-effective and environmentally sustainable energy sector”
- **3.2 Transformational Strategic Thrusts**
 - » 3.2.9 Sustainable Cities and Towns “Creating vibrant and environmentally sustainable urban centres”
 - » 3.2.10 Expanding the Rural Economy “Promoting equal opportunities, access to basic services and building resilient communities”

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1 Electricity and Other Energy Generation and Use**

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 7:** Energy Security
- **Thematic Area 9:** Technology and Innovation

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D4: Updated Codes and Standards for Buildings
-

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

Retrofitting energy-efficiency into a building is much more expensive than integrating energy-efficiency in a new construction. Hence, the investments made for energy-efficiency in individually owned buildings have low rate of returns. However, it is important that households are retrofitted for energy-efficiency for few reasons:

- More houses will be converted to permanent houses in the future and in a more energy intensive manner compared to the existing residences.
- Power tariffs are set to rise in the future due to the expected sharp increase in the variable renewable energy-based power installed capacity and also because EFL might be forced to increase tariffs in general to ensure cost recovery and profitability
- Buildings have a long life and inefficiencies can be locked in for a long time and vice versa.
- Having energy-efficiency demonstrated within one's own house can help in building capacity, awareness and ownership of the issue among the general population
- The houses that will receive financial incentives through this programme and comply with the EEBC and/or meet the green building rating scheme requirements, will in turn inspire replication in other existing houses and buildings, as well as such houses and buildings that might come in future. However, this indirect savings and emission reductions has not been considered in the estimates

The consumers are very price sensitive and risk averse and are unlikely to make an upfront higher investment even if it might have had paid back in future. Unless strong incentives are provided, it is unlikely that households will commit to retrofit their buildings. The role of the private sector in energy-efficiency is not well developed in Fiji due to various reasons, and this situation might not change during the period of the project intervention. Hence, at this initial stage of market development for low energy buildings, no market-based mechanisms are being proposed. Instead, the focus could be on risk reduction measures (through the Technical Assistance and Capacity Building activities), subsidies and fiscal measures.

100% of the incremental cost for retrofitting domestic buildings could be provided as a tax subsidy, which is assumed to be US\$5000 per building.

Government buildings are more energy intensive than households as some parts of these buildings are air-conditioned. Hence the investments made in Government buildings are likely to pay back faster compared to that of individual households. 80 % of the total cost of the retrofit for Government buildings could be provided as subsidy, which is assumed to be 50,000US\$ per building.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

Energy-efficiency in buildings sector has a specific challenge of split incentives in that the owners of the building who has to invest in energy-efficiency measures may not be the direct beneficiary of the cost savings in case the building is occupied by a tenant. This can be overcome through mandatory requirements like the energy-efficiency Building code, and other less common and relatively complex contractual and payment arrangements like green leasing, on-bill financing, energy-efficiency mortgages etc, which could be gradually experimented at a later stage.

FINANCIAL SUSTAINABILITY

The Technical Assistance and Capacity Building being provided will help ensure better design, procurement, installation, operation and maintenance of the buildings, thereby improving the energy-efficiency and life of the assets, and reducing the operating costs. It will also help increase the volume and attractiveness of financing products available for energy-efficiency in Buildings, by reducing the real and perceived risks associated with financing such measures.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- Estimated capital investment needed for the physical implementation: US\$179M of this US\$170M is for homes and US\$9M is for government buildings
- Private home equity from 16,860 owner investment: US\$85M (50% of investment)
- Private investment tax credit for investment: between 50% and 100% of the investment made
- Low interest loans for 16,860 homeowners for investment: US\$ 85M (50% of investment)
- Credit guarantee backing the low interest loans: up to 50% of investment
- Government equity/state budget for 150 buildings investment: US\$1.8M
- Grant for 150 buildings investment: US\$7.2M
- Grant for development costs: US\$245,000
- Grants for Enabling, Capacity Building and Technical Assistance: US\$ 1.1M

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- Project Planning, Development & Design: **SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF, WB/IFC**
- Project Implementation & Management: **SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA, WB/IFC**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- Credit Guarantee: **GCF, ADB**, Supplier EXIM Banks, EIB, **WB/IFC**
- Debt & Loans: **FDB, ADB, EIB, WB/IFC, GCF, commercial banks**
- Equity: **Households/Persons, private sector companies**
- Non-Government Grants for investment: **GEF, GCF, ADB, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS**
- Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, UNDP, UNIDO, EEAS, WB/IFC, UNESCO, UN Habitat**
- Government Budget & Taxes Incentives: MOE

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$1.1 million (includes 15% overhead for Implementing Partner)

1. 4 Training programmes on “Low-carbon Buildings: Design, operation and assessment”, 4 days each. 20 to 30 participants (US\$194,000)
2. Development of a module on “Low-carbon Buildings: Design, operation and assessment” to be integrated into existing courses in FNU (especially architecture and civil engineering curriculum) and USP, to be provided as a standalone short-term course. (US\$23,000)
3. Develop a guideline on low-carbon building design and construction for different building typologies. (US\$123,000)
4. Development of the energy-efficiency building code for, by integrating the essential minimum requirements for energy-efficiency in buildings, into the existing building code. (US\$135,000)
5. Support development of a voluntary green building rating system, including identification of a host institution to administer it. (US\$48,000)
6. Develop a certification system for low-carbon building assessors, including identification of host institutions, rules and framework for the certification system, syllabus and content for training and exams, system for administering the exams and certification. (US\$35,000)
7. Setting up and operating a financing facility (US\$420,000)

INFORMATION AND MRV NEEDS

1. % of new constructions per year that comply with the energy-efficiency Building code
2. Number of existing and new buildings per year that have applied for a Green building rating
3. Number of existing and new buildings per year that have obtained a higher Green building rating
4. Specific energy consumption of different types of buildings (kWh/m²)
5. Total number of certified building energy assessors in the country
6. Number of trainees attending the training programmes and their evaluation of the training

SUPPORTING REFERENCES

- National Energy Policy Review Advisory Committee (2013). Sustainable Energy for All (SE4All): Rapid Assessment and Gap Analysis. Department of Energy, Fijian Government https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-Fiji_Sustainable%20Energy%20for%20All_Rapid%20Assessment%20and%20Gap%20Analysis.pdf
- Energy Fiji Limited (2020). 2019 Annual Report. EFL <http://www.parliament.gov.fj/wp-content/uploads/2020/05/Energy-Fiji-Limited-2019-Annual-Report.pdf>
- Power Research & Development Consultants Pvt. Ltd (2017). Final Report (Volume 1), Power Development Plan for year 2017 to 2026- Load Forecasting and Generation Planning. FEA
- National Energy Policy Review Advisory Committee (2013). Fiji National Energy Policy 2013 – 2020. Fijian Government <https://policy.asiapacificenergy.org/sites/default/files/Fiji%20National%20Policy%202013-2020%20%28Final%20Draft%29.pdf>
- Fiji Bureau of Statistics (2018). 2017 Population and Housing Census, Release 1, Age, Sex, Geography and Economic Activity. FBOS https://sdd.spc.int/digital_library/2017-population-and-housing-census-release-1-age-sex-geography-and-economic
- Fiji Bureau of Statistics (2017). Data on Population and Household Statistics, 2017. FBOS
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	3,4,5,6	1,2,3,4,5,6,7	1,5,7	
Estimated CB & TA Costs (US\$)	377,000	534,000	457,000	1,368,000
Estimated Capital Investment (US\$)	0	57,846,000	121,394,000	179,240,000
Estimated GHG Mitigation (tCO₂)	0	500	10,000	10,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				3,000

E10 - SUSTAINABLE CITIES PROGRAMME

NO.	E10
ACTION NAME	Sustainable Cities programme
SUB-SECTOR	Buildings
DESCRIPTION	<p>The main focus of this opportunity will be to support 10 cities and towns in Fiji, to develop climate change mitigation targets and action plans, and to mainstream these within the existing strategic plans and town planning schemes. The first phase of the technical assistance activities will focus on supporting the ongoing efforts to develop master plans for Suva, Lautoka, Sigatoka, and Nadi. This technical assistance will also include capacity building of staff from MLG and the various municipal councils. In addition, FRA will receive technical assistance and financing support to shift all remaining non-LED streetlights into LED and explore how LED streetlighting can contribute to non-lighting revenue generation and for the implementation of smart city functions.</p> <p>The proposed project will ensure that climate change mitigation, especially energy-efficiency, will be integrated into the Master Plan, and proposed revisions to town planning schemes. It will also speed up the transition of streetlights to LEDs, and thereby also contributing to the potential transition to a smart city</p> <p>This initiative will be led by MLG and FRA, and supported by DOE, USP, SPC and other stakeholders. The only investments proposed under this opportunity are for immediate conversion of all remaining non-LED streetlights under FRA to LED streetlights, and this will have to follow the business planning and operation and maintenance procedures of FRA. The financial feasibility of using LEDs is very strong, while technical feasibility needs to be considered for each type of application (eg, streetlighting for highways, city centre, side roads, lanes, tunnels etc).</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Energy balance, GHG inventory and water balance developed for 10 towns and cities • GHG emission reduction and water conservation targets and roadmaps, investment plans, and action plans developed for each of the 10 towns and cities. • Household energy survey conducted for Suva, Lautoka and Nadi • Handbook on urban energy planning relevant for Fiji and PICs developed • Twinning programme (with cities in other countries) on climate change initiated for all the 10 towns and cities • Major street lighting related corporate policies and standards of FRA updated, so as to integrate LEDs into it • Feasibility study conducted of using the LED based streetlighting infrastructure as a backbone for the smart city network and for non-lighting revenue generation <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investment will need to be made by FRA for replacing all existing non-LED streetlights into LED based streetlights

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Energy-efficiency is considered and mainstreamed in urban planning • Capacity developed of key institutions and stakeholders at the central and local government level to consider energy-efficiency in urban planning • Lower energy intensity of ten towns/cities in Fiji (MJ/US\$ contribution to the GDP) • Lower water consumption intensity of ten towns/cities in Fiji (ML/US\$ contribution to the GDP) • Most of the urban street lighting in Fiji is converted into LED lighting <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • A strategy developed to make use of LED street lighting for developing future smart city functions
MITIGATION POTENTIAL	<p>44,000 tCO₂/year in 2030 and a total of 150,000 tCO₂ for 2020 – 2030 (actual emission reduction occurring during 2024 to 2030)</p> <p>FOR ESTIMATIONS, 2 SETS OF SAVINGS HAVE BEEN CONSIDERED:</p> <p>Integrating energy-efficiency into urban planning</p> <ul style="list-style-type: none"> • As per 2004 data, 14 % of the total primary energy consumption is for domestic/residential sector and 22 % is for the commercial sector¹⁹¹. In the absence of recent data, it is being assumed that the same pattern is true now. • Assumed that 60% of domestic/residential primary energy consumption is in urban areas and 100% of commercial primary energy consumption in urban areas. To avoid double counting with the savings that might be captured under other project proposals, assumed a conservative savings of 1% of the domestic/residential and commercial primary energy consumption that can be attributed to urban areas • The details of how the primary energy consumption has been estimated is given under mitigation opportunity E1 <p>REPLACING EXISTING STREETLIGHTS WITH LEDS</p> <p>In addition, the savings from converting streetlights to LEDs have also been considered under this project, as over 85 % of the streetlights are in urban areas. It has been estimated as follows:</p> <ul style="list-style-type: none"> • FRA is already procuring LED streetlights for new installations and for replacing non-LED lights when they fail. • The total number of streetlights is 12492 of which 52% is non-LED and can be replaced with LED streetlights. • Energy consumption for BAU case and Alternate case is estimated assuming 150W per non-LED and 90W for an LED luminaire.

**CO-BENEFITS/
SDG LINKAGES**

- Reduced air pollution due to reduced supply and use of petroleum products.
- Continuous and stable power for end users, thereby improving and enabling more economic activity, as well as non-productive uses of energy
- Improved profitability for utilities and companies managing the power and oil sectors
- Delayed or avoided investments in power and oil storage and distribution infrastructure
- Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices
- This will improve energy access, especially benefiting women and people living in remote areas

Relevant primary SDGs impacted: 7, 9, 11, 13

Relevant secondary SDGs impacted: 12, 17

**INVESTMENT
NEEDS (USD)**

Estimated capital investment needed for the physical implementation: US\$1.44M for replacing the remaining non-LED streetlights to LED

Estimated development costs: US\$268,000

Enabling, Capacity Building and Technical Assistance: US\$4.2 million

Note this does not include all capital investments due to the limited availability of information needed to quantify activity.

**RIO MARKER AND
CRS PURPOSE
CODE(S)**

RIO MARKER: Significant (1)

OECD-DAC/CRS PURPOSE CODE(S):

- 15144 – National standards development;
- 15155 – Tax policy and administration support;
- 23110 – Energy policy and administrative management;
- 23181 – Energy education/training;
- 23183 – Energy conservation and demand-side efficiency;
- 24030 – Formal sector financial intermediaries;
- 43932 – Urban development;

**IMPLEMENTING
AND SUPPORTING
ENTITIES/
STAKEHOLDERS****NATIONAL IMPLEMENTING ENTITY/STAKEHOLDERS:**

MLG, FRA

POTENTIAL IMPLEMENTING SUPPORTING ENTITY/STAKEHOLDERS:

DOE, USP, SPC,

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 year needed for the project/programme design

TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments

WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building programme will be during 2022 to 2026 (5 years). The financing will run from 2024 to 2026.

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure support for the technical assistance and capacity building package, and especially for items B to F below.
- B. Initiate discussions with MLG, DOE and other public and private stakeholders on the scope and process for the development of energy balance, GHG inventory and water balance for 10 towns and cities and the selection of the 10 towns and cities.
- C. Initiate talks with city officials from the 10 towns and cities that have been selected, on the scope and process the development of energy balance, GHG inventory and water balance
- D. Develop the terms of reference for hiring experts for the development of energy balance, GHG inventory and water balance in the 10 towns and cities.
- E. Initiate discussions with MLG, DOE, FRA and other public and private stakeholders on the scope and process for conducting the feasibility study of using LED based streetlighting infrastructure as a backbone for future smart city network and for non-lighting revenue generation
- F. Develop the terms of reference for hiring experts for conducting the feasibility study of using LED based streetlighting infrastructure as a backbone for future smart city network and for non-lighting revenue generation
- G. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

1. National Risk Governance

- **Objective 1.4** To improve national capacity for strategic foresight

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
 - » Sub-objective 4.1.1 To decarbonise Fiji's transport sector
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals
- **Objective 4.3** To preserve and enhance Fiji's natural carbon sinks and carbon reservoirs

5. National Capacity Development

- **Objective 5.1** To improve data availability, analytical-capacity, risk communications and awareness
- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.1** To Increase the use and availability of domestically derived climate finance
- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2 Energy** "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2 Transformational Strategic Thrusts**
 - » 3.2.7 Manufacturing and Commerce "Building sustainable and globally competitive manufacturing and commerce"
 - » 3.2.9 Sustainable Cities and Towns "Creating vibrant and environmentally sustainable urban centres"

**POLICY/PLAN LINK
CONT'D**
MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 1:** Develop mechanisms to enhance coordinated planning for infrastructure development
- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1** Electricity and Other Energy Generation and Use
- **4.7** Waste Sector
- **4.8.2** Tourism Sector
- **4.8.3** Commercial, Industrial, and Manufacturing Sectors

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 2:** Waste Management
- **Thematic Area 6:** Freshwater Resources and Sanitation Management
- **Thematic Area 7:** Energy Security
- **Thematic Area 10:** Greening Tourism and Manufacturing Industries

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Electricity Generation and Transmission:
 - » E1, E4, E7: Grid Extension and Improvements
 - » E2, E5, E8: RE Power Generation
 - » E2, E5, E8: Increased Sustainable Biomass for fuel use
- Demand-side energy-efficiency
 - » D1: Energy Labelling and Minimum Energy Performance Standards
 - » D2: Energy-efficiency in the Business Community (incl. Sustainable Tourism)
 - » D3: Energy-efficiency in the Public Sector
 - » D4: Updated Codes and Standards for Buildings
- Fiji Tourism 2021 (issued 2017)
 - » Strategy 21: promote climate resilient infrastructure and energy-efficiency

DRAFT FIJI TECHNOLOGY NEEDS ASSESSMENT REPORT: MITIGATION (ISSUED 2019)

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

The major focus of this initiative is on Technical Assistance and Capacity Building which will enable longer term energy savings for multiple energy sectors and sub-sectors operating in urban areas in both supply and demand side, such as EFL, building owners, hotels and restaurants, public transport, private vehicles, Water Authority of Fiji, etc.

The proposed investment for installing LED's in streetlights will reduce the operating cost for FRA due to the energy savings and the longer life of LED's. However, the higher initial investment needs are a barrier that could delay the conversion to LED's and hence subsidies are proposed.

70 % of the funding is expected from international donors and 30 % from the State Budget. The potential to use the service of Energy Serving Companies for LED retrofits could also be explored, who would then take responsibility for the initial investment needs.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

There are many actors relevant to urban planning and their participation is necessary to make sure that all forward planning and mainstreaming of climate change mitigation is relevant and owned. Capacity on climate change mitigation of local government officials is important, as most implementation has to be done by them. Local governments in Fiji have not got as much opportunity to be involved in Climate Change related initiatives, and hence not much capacity might exist at present. For this advocacy, sensitisation and capacity building is needed. The project will have activities to fill in these gaps

There are various objectives for urban planning and climate change mitigation might not be always a high priority. There are also opposing views on how urban planning should be done- for example, some prefer to spread out cities and decentralisation, and some prefer more densified approach. The final approach or consensus might not be the most optimum for climate change mitigation

Funding is a major challenge and private sector participation is essential for scaling up. The project would recommend financial support for FRA for the LED retrofit initiative

FRA's Road Lighting Design Guide and Standard might need to be updated, to ensure that adequate lighting is provided in an efficient manner for different kind of road lighting. At present Road Lighting Design Guide and Standard does not indicate the lighting density, which could lead to either excessive or poor lighting. LED lights, apart from its energy-efficiency and increased lifetimes, have different photometric properties compared to other traditional lights.

FINANCIAL SUSTAINABILITY

The Technical Assistance and Capacity Building will enable better and systematic urban energy planning, leading to longer term energy and cost savings for multiple energy sectors and sub-sectors operating in urban areas in both supply and demand side, such as EFL, building owners, hotels and restaurants, public transport, private vehicles, Water Authority of Fiji, etc.

LED retrofits will give direct cost saving for FRA and will also delay capital investment needs due to longer lifetime of LED's. LED's in streetlighting also provide opportunities that will be explored through the project to generate revenues from non-lighting functionalities such as through signages and electric vehicle charging infrastructure.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- **Estimated capital investment needed for the physical implementation:** US\$1.44M for replacing the remaining non-LED streetlights to LED
- **Multi-government/state budget for investment:** US\$ 220,000 (15% of investment)
- **Grant for investment:** US\$1.22M (85% of investment)
- **Grant for development costs:** US\$274,000
- **Grant for Enabling, Capacity Building and Technical Assistance:** US\$4.2 million

Note this does not include all capital investments due to the limited availability of information needed to quantify activity

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design: PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF, UNESCO, UN Habitat**
- **Project Implementation & Management: PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDC**

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Equity: FRA, ESCOs**
- **Non-Government Grants for investment: GEF, GCF, ADB, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS**
- **Grants for Technical Assistance & Capacity Building: GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, UNDP, UNIDO, EEAS, WB/IFC, UNESCO, UN Habitat**
- **Government Budget & Taxes Incentives: MOE**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$4.2 million (includes 15% overhead for Implementing Partner)

1. Preparation of energy balance, GHG inventory and water balance for 10 towns and cities. (US\$961,000)
2. Development of GHG emission reduction and water conservation targets for each of the 10 towns and cities. Development of roadmaps, investment plans, and action plans for achieving the emission reduction and water conservation targets for each of the 10 towns and cities, including consultation workshops (US\$1.6 million)
3. Conduct a household energy survey for Suva, Lautoka and Nadi (US\$144,000)
4. Develop a handbook on urban energy planning relevant for Fiji and PICs (US\$65,000)
5. Conduct 4 Training programmes on "Urban energy planning", 4 days each, 30 participants (US\$199,000)
6. Conduct 6 half-day awareness raising workshops on climate change mitigation at urban scale (US\$199,000)
7. Development of a twinning programme on Climate Change for all the 10 towns and cities, tying up each of these towns and cities with a partnering city or town from other similar countries where Climate Action has progressed significantly (US\$282,000)
8. Review and update major corporate policies and standards of FRA so as to integrate LEDs into it, such as FRA's Road Lighting Design Guide and Standard, procurement guideline etc (US\$36,000)
9. Conduct a study on the feasibility of using the LED based streetlighting infrastructure as a backbone for the smart city network and for non-lighting revenue generation, including identifying investment needs (US\$150,000)

INFORMATION AND MRV NEEDS

1. Ratio of tonnes of GHG emissions from urban areas of Fiji to the GDP
2. Progress reports of the 10 cities and towns on achieving the emission reduction targets
3. % of total streetlights that are LEDs
4. Street lighting energy density (watts/m²) for different kinds of roads

SUPPORTING
REFERENCES

- Data provided by FRA during consultants' Fiji mission in 2019
- National Energy Policy Review Advisory Committee (2013). Sustainable Energy for All (SE4All): Rapid Assessment and Gap Analysis. Department of Energy, Fijian Government. https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-Fiji_Sustainable%20Energy%20for%20All_Rapid%20Assessment%20and%20Gap%20Analysis.pdf
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- Fiji Bureau of Statistics (2018). 2017 Population and Housing Census, Release 1, Age, Sex, Geography and Economic Activity. FBOS https://sdd.spc.int/digital_library/2017-population-and-housing-census-release-1-age-sex-geography-and-economic
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- Climate Change and International Cooperation Division, Ministry of Economy (2013). Republic of Fiji - Third National Communications. Ministry of Economy, Fijian Government
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Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,9	1,2,3,4, 5,6,7,8,9	5,7	
Estimated CB & TA Costs (US\$)	721,000	3,517,000	229,000	4,468,000
Estimated Capital Investment (US\$)	0	961,000	480,000	1,441,000
Estimated GHG Mitigation (tCO₂)	0	7,000	143,000	150,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				44,000

E11 - SUPPORTING THE IMPLEMENTATION OF THE GREEN PORTS MASTER PLAN

NO.	E11
ACTION NAME	Action Name Supporting the implementation of the Green Ports Master Plan
SUB-SECTOR	Buildings
DESCRIPTION	<p>Fiji Ports owns and carries out maritime operations in the four main ports of Suva, Lautoka, Levuka and Malau, and also administer the second-tier ports of Wairiki and Rotuma. It handles around 140,000 TEU per year, and approximately 25kg CO₂-eq is emitted per TEU. The main energy users at the Port are the ships, machinery (shore cranes, reach stackers, top lifters), vehicles, reefer boxes, lighting (tower lights, flood lights, etc), incinerator. The Port started looking at environmental issues since 2011. During 2016-18, an energy audit was conducted, the lighting at Muaiwalu House was converted to LEDs, office air conditioning was upgraded, and power factor correction was done. An energy management action plan has been developed and Data tracking of electricity is being done. Through the actions taken so far, approximately US\$190,000 is being saved annually and around 62 tonnes of GHG emission reduction per year is being achieved. In 2019, a Green Port Master Plan was developed, in-line with the 2019 -2023 Strategic Plan and covering the ports of Suva, Lautoka and Levuka. Some of the proposed actions include: major redevelopment or construction to adopt green port guidelines; by 2022 to have smart water metering; by 2020/2021 implement energy and environmental management systems; by 2023 become carbon neutral with respect to its use of electricity.</p> <p>This mitigation opportunity will support the continued efforts of Fiji Ports Corporation Limited (FPCL) in implementing its Green Ports Master Plan during 2019-2023 for the four main ports for Suva, Lautoka, Levuka and Malau. Apart from supporting the ambitions as stated in the Green Ports Master Plan, this opportunity includes the conduct of energy, water and maintenance audits of the ports at Suva, Lautoka, Levuka and Malau, and support for implementing the recommendations.</p> <p>This initiative will be led by FPCL and DOE. The investments proposed under this opportunity are for implementing the recommendations of the energy, water and maintenance audits of the 4 ports at Suva, Lautoka, Levuka and Malau. The investments will need to follow the business planning process of FPCL.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Energy, water and maintenance audits conducted for the ports at Suva, Lautoka, Levuka and Malau • Corporate policies of FPCL updated in order to integrate climate change mitigation • Technical advisory support provided for implementation of the recommendations of the energy, water and maintenance audit • Awareness raising toolkit on climate change mitigation developed • Communication and knowledge exchange web-portal on climate change mitigation set up for FPCL <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Investment will need to be made by FPCL to implement the recommendations of the energy, water and maintenance audits and the targets under the Green Port Master Plan

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • Green Ports Master Plan further developed and implemented • Reduction in the specific energy consumption and specific GHG emissions of Fiji Ports (MJ/TEU and Tonnes CO₂/TEU) <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Capacity developed of Fiji Ports Limited on climate change mitigation
MITIGATION POTENTIAL	<p>5,000 tCO₂/year in 2030. and a total of 19,000 tCO₂ for 2020 – 2030 (actual emission reduction occurring during 2024 to 2030)</p> <ul style="list-style-type: none"> • In 2019, FPCL handled cargo of 140,000 TEU. The cargo handled was projected till 2030 based on GDP growth rate • The specific GHG emission factor at FPCL was reported to be 25 Tonnes of CO₂/TEU. • As a result of implementing the Green Ports Master Plan and the recommendations of the proposed energy, water and maintenance audits, it was assumed that around 15 % of the GHG emissions would be reduced. ternate case is estimated assuming 150W per non-LED and 90W for an LED luminaire.
CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Reduced air pollution due to reduced supply and use of petroleum products. • Continuous and stable power for end users, thereby improving and enabling more economic activity, as well as non-productive uses of energy • Improved profitability for utilities and companies managing the power and oil sectors • Delayed or avoided investments in power and oil storage and distribution infrastructure • Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices • This will improve energy access, especially benefiting women and people living in remote areas • Improved profitability for FPCL <p>Relevant primary SDGs impacted: 7, 9, 11, 12, 13</p> <p>Relevant secondary SDGs impacted: 3, 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$3M</p> <p>Estimated development costs: US\$43,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$715,000</p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15144 – National standards development; 15155 – Tax policy and administration support; 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency; 24030 - Formal sector financial intermediaries; 43932 – Urban development;

IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS

NATIONAL IMPLEMENTING ENTITY/STAKEHOLDERS:

FPCL, DOE

POTENTIAL IMPLEMENTING SUPPORTING ENTITY/STAKEHOLDERS:

PCREEE-SPC, USP

GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION

TIME NEEDED FOR DEVELOPMENT: 6 months needed for the project/programme design

TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments

WHEN WILL THE PROJECT/INVESTMENT START AND END: Technical Assistance and Capacity Building programme will be during 2022 to 2026. The financing will run from 2024 to 2026

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure support for the technical assistance and capacity building package, and especially for items B to C below.
- B. Initiate discussions with FPCL and DOE on the scope and process for the energy, water and maintenance audits to be conducted at the 4 ports
- C. Develop the terms of reference for hiring experts for conducting the energy, water and maintenance audits to be conducted at the 4 ports
- D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
 - » Sub-objective 4.1.1 To decarbonise Fiji's transport sector
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

6. Sustainable Financing

- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2 Energy** “A resource-efficient, cost-effective and environmentally sustainable energy sector”

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1** Electricity and Other Energy Generation and Use

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 7:** Energy Security

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D3: Energy-efficiency in the Public Sector

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

The implementation of the Green Ports Master Plan provides an opportunity to showcase the viability of energy-efficient and low-carbon measures. Hence, the investments for implementing the Green Ports Master Plan is proposed to be fully subsidised, 70% from international sources and 30% from State Budget.

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

Some of the major emission reduction measures have a higher initial investment and funding is a challenge for FPCL.

There is a lack of capacity within FPCL to carry out all these actions and so capacity building is needed.

There is also the need to mainstream GHG emission reductions into existing system and practices, and this will need some effort.

FINANCIAL SUSTAINABILITY

The implementation of the Green Ports Master Plan will result in energy and water savings and reduced maintenance expenses. The longer-term reduction of these operating expenses could help FPCL make continuous improvements in its energy performance.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- **Company equity from FPCL for investment:** US\$600,000 (20% of investment)
- **Grant for investment:** US\$2.4M (80% of investment)
- **ALTERNATIVE low interest loan for investment:** US\$2.4M (80% of investment)
- **ALTERNATIVE Credit guarantee for investment:** up to 80% of investment
- **Grant for development costs:** US\$43,000
- **Grants for Enabling, Capacity Building and Technical Assistance:** US\$715,000

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** PCREEE-SPC, UNDP, UNIDO, GIZ, GGGI, NDC-Hub, ADB, IUCN, CTCN, PRIF
- **Project Implementation & Management:** PCREEE-SPC, UNDP, UNIDO, GIZ, GGGI, NDC-Hub, ADB, IUCN, CIDCA

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantee:** GCF, ADB, Supplier EXIM Banks, EIB, WB/IFC
- **Debt & Loans:** FDB, ADB, EIB, WB/IFC
- **Equity:** private sector companies, Energy Service Companies
- **Non-Government Grants for investment:** GEF, GCF, ADB, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS
- **Grants for Technical Assistance & Capacity Building:** GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, UNDP, UNIDO, EEAS, WB/IFC
- **Government Budget & Taxes Incentives:** MOE

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$715,000 (includes 15% overhead for Implementing Partner)

1. Conduct energy, water and maintenance audits for the ports at Suva, Lautoka, Levuka and Malau and develop a prioritised list of recommendations and investment options (US\$225,000)
2. Review and update corporate policies in order to integrate climate change mitigation, including the Green Ports Master Plan, procurement guidelines, financial rules and regulations, standard operating procedures, operation and maintenance guidelines for major machineries etc (US\$135,000)
3. Provide technical advisory support for implementation of all the GHG emission reduction measures, including setting up energy and environmental management systems (US\$54,000)
4. Conduct two detailed training programmes on energy-efficiency for technical staff. 3 days each. (US\$60,000)
5. Conduct two detailed training programmes on the design, operation and maintenance of Solar PV systems, aimed at technical staff. 3 days each. (US\$60,000)
6. Conduct two, training programme on sustainable procurement, for the procurers. 2 days each. (US\$ 60,000)
7. Organise 6 half day awareness raising workshops on GHG emission reduction opportunities, 2 in each of the 3 ports (US\$108,000)
8. Support the development of a toolkit in English that could easily be modified, adapted and used for awareness raising at the four ports, including in local languages. These will include posters of different sizes, animations, video clips, audio clips, power points, electronic materials that could be uploaded on website, etc. (US\$18,000)
9. Support the development and setting up of a communication and knowledge exchange web-portal on climate change mitigation,, that could be used by FPCL staff and stakeholders, and linked to the FPCL main website. (US\$23,000)

**INFORMATION
AND MRV NEEDS**

1. Annual energy consumption/TEU
2. Annual GHG emissions/TEU
3. Annual water consumption/TEU
4. performance figures of major energy intensive machinery (efficiency or effectiveness of the equipment, capacity utilization, mean time between failure (MTBF), unscheduled maintenance related downtime, scheduled maintenance related downtime, maintenance cost/output)

**SUPPORTING
REFERENCES**

- The Pacific Community (2019). Pacific ports 2030-2050: A vision of resilient, green and clean ports in the Pacific Islands region. Fourth Pacific Regional Energy and Transport Workshop, Samoa, 16-20 September 2019 http://prdrse4all.spc.int/sites/default/files/t6_-_green_and_resilient_port_0.pdf
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,4	1,2,3,4,5	3,7	
Estimated CB & TA Costs (US\$)	180,000	504,000	73,000	757,000
Estimated Capital Investment (US\$)	0	2,000,000	1,000,000	3,000,000
Estimated GHG Mitigation (tCO₂)	0	2,000	17,000	19,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				5,000

E12 - EFFICIENT OPERATION AND MAINTENANCE OF WASTEWATER TREATMENT SYSTEMS

NO.	E12
ACTION NAME	Sustainable Cities programme
SUB-SECTOR	Power
DESCRIPTION	<p>WAF harvests, treats and reticulates water for supply to its customers and collects, transports, treats and discharges wastewater. It currently discharges 30 Million Litre per Day of treated wastewater (during dry weather). There are significant inefficiencies in the system: storm water infiltration into the wastewater system is around 83 %. Most of the pumps are of low energy-efficiency. The maintenance is mostly reactive in nature and there is a general lack of capacity and a culture that supports more efficient operation. All these significantly increases energy needed for wastewater pumping and treatment, reduces the life of assets and increases operating costs.</p> <p>This opportunity will focus on continuing improvements in the wastewater system managed by WAF in Viti Levu and Vanua Levu islands, including the 11 wastewater plants. This action includes technical assistance for a water and mass balance study of the wastewater system, identifying major wastewater sources, and determining the amount and location of major infiltrations into the system. This study will complement a review to be conducted of the National Liquid Waste Management Strategy and Action Plan, as well as progress in implementing it, leading to recommendations to systematically reduce wastewater flows into the wastewater system. In addition, a detailed energy and maintenance audit will be conducted of the wastewater system, and a prioritised investment list will be developed for energy-efficiency improvements. Further technical assistance will be provided to strengthen and sustain institutional knowledge and practices within WAF for improved operation and maintenance practices of the wastewater system. Financing activities under this opportunity focus on replacing inefficient pumps with efficient pumps, replacing inefficient flow control devices with more efficient ones, modifications in the system to rationalise pumping pressure and to reduce pressure drops, and improvements in energy-efficiency in treatment processes at plants.</p> <p>This initiative will be led by DOE and WAF, with support from PWWA, SPC, FNU and private companies. The investments will be made in the wastewater system in Viti Levu and Vanua Levu, including the 11 wastewater treatment plants. The investments involve retrofits and refurbishments of existing systems, and enhancements for new wastewater infrastructure, so as to improve energy-efficiency.</p> <p>Financing will be needed for the incremental investment needs to meet energy-efficiency requirements. These need to be integrated with the annual budgeting and business planning process of WAF. Thus, feasibility, finance, and implementation of this mitigation opportunity will need to follow this multi-year process, and be a continual activity involving multiple wastewater infrastructure projects. The investments needed for normal maintenance activities that enhance energy-efficiency (eg, reducing infiltration) is expected to be fully funded by WAFs operating budget.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Water and mass balance, energy audit and maintenance audit studies conducted for the wastewater system in Viti Levu and Vanua Levu • National Liquid Waste Management Strategy and Action Plan reviewed, as well as progress in implementing it, with a special focus on reducing the load on the wastewater treatment plants of WAF • A financing facility set up and operated <p>INVESTMENT NEEDS</p> <ul style="list-style-type: none"> • Retrofits and refurbishments of existing system, and enhancements for new wastewater infrastructure, so as to improve energy-efficiency.

OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • GHG mitigation • Reduction in specific energy consumption (kWh/m³) of the wastewater treatment system • Increased life of assets • Reduced cost of operations (US\$/m³), through reduced cost of energy, maintenance and wastewater treatment • Significant reduction in peak demand in the wastewater treatment system • WAF avoids, reduces or delays investments for adding new wastewater treatment infrastructure • Significant reduction in peak demand in the power grid <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • EFL avoids, reduces or delays investments for adding new power generation capacity
MITIGATION POTENTIAL	<p>1,000 tCO₂/year in 2030 and a total of 4,000 tCO₂ for 2020 – 2030</p> <ul style="list-style-type: none"> • Present capacity of wastewater treatment plant is 30 MLD and the average specific energy consumption is 0.35 kWh/m³. Storm water infiltration is 83%. It is also assumed that only 10 % of the total wastewater generated is managed by WAF. Based on this information the operation load (wastewater handled and the energy consumption) of the wastewater treatment plant was estimated. • 2 types of energy savings were estimated expected as project outcomes: • Savings due to a 50% reduction in storm water infiltration • Savings due to a 20% increase in water pumping efficiency (mainly by replacing low efficiency pumps with higher efficiency pumps) • Savings due to other project actions such as use of variable speed drives or other flow control devices, improved maintenance, energy recovery, potential reduction in effluents etc, has not been estimated
CO-BENEFITS/ SDG LINKAGES	<ul style="list-style-type: none"> • Reduced air pollution due to reduced supply and use of petroleum products. • Continuous and stable power for end users, thereby improving and enabling more economic activity, as well as non-productive uses of energy • Improved profitability for utilities and companies managing the power and oil sectors • Delayed or avoided investments in power and oil storage and distribution infrastructure • Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices • This will improve energy access, especially benefiting women and people living in remote areas • Improved health and wellbeing due to improved wastewater treatment, more coverage of the wastewater system and reduced amount of effluents being generated <p>Relevant primary SDGs impacted: 6, 7, 9, 11, 12, 13</p> <p>Relevant secondary SDGs impacted: 3, 14, 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$4.8 million</p> <p>Estimated development costs: US\$172,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$1.6 million</p>

RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <p>23110 - Energy policy and administrative management;</p> <p>14081 - Education and training in water supply and sanitation;</p> <p>23183 - Energy conservation and demand-side efficiency;</p> <p>14022 - Sanitation - large systems;</p> <p>14031 - Basic drinking water supply</p>
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>NATIONAL IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>DOE, WAF</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>FNU, PWWA, SPC, private sector companies</p>
GENERAL TIMELINE FOR DEVELOPMENT, FINANCING, IMPLEMENTATION, AND OPERATION	<p>TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 years needed for the project/programme design</p> <p>TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments</p> <p>WHEN WILL THE PROJECT/INVESTMENT START AND END: The Technical Assistance and Capacity Building programme will be during 2022 to 2029. The financing will run from 2024 to 2029.</p> <p>IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:</p> <ul style="list-style-type: none"> A. Secure support for the technical assistance and capacity building package, and especially for items B to C below. B. Initiate discussions with WAF, DOE and other key stakeholders regarding the scope and design of the proposed water and mass balance, energy audit and maintenance audit studies, and the proposed review of the National Liquid Waste Management Strategy and Action Plan C. Develop the terms of reference for hiring experts for the proposed water and mass balance, energy audit and maintenance audit studies, and for the proposed review of the National Liquid Waste Management Strategy and Action Plan D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals

5. National Capacity Development

- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.1 Water and Sanitation** "Clean and safe water in adequate quantities and proper and adequate sanitation for every Fijian household"
- **3.1.2 Energy** "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2 Transformational Strategic Thrusts**
 - » 3.2.9 Sustainable Cities and Towns "Creating vibrant and environmentally sustainable urban centres"

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1** Electricity and Other Energy Generation and Use
- **4.7** Waste Sector

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 2:** Waste Management
- **Thematic Area 6:** Freshwater Resources and Sanitation Management
- **Thematic Area 7:** Energy Security

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D3: Energy-efficiency in the Public Sector

POTENTIAL BUSINESS MODEL AND FINANCING STRATEGY

Increased capacity for energy-efficiency and improved maintenance systems (increasing asset life and maintenance expenses) will significantly decrease the capital and operating expenditure for WAF. However, to reduce the impact of higher initial investment needs, grant funding is proposed. 70 % of the grants could be from international donors and 30 % from the State Budget. GOF could raise funds for this through measures such as increased wastewater cess for industry and through increasing import duties on polluting process technologies and products, while lowering duties and taxes on cleaner technologies and products

GAPS & BARRIERS TO IMPLEMENTATION, INCLUDING PROPOSED ENABLING MECHANISMS

WAF is under pressure to ensure that the wastewater treatment system meets the rapidly increasing demand, and the need to serve underserved areas. Hence it might be difficult to prioritise efficiency and productivity improvements, unless there is a strong realisation of its significance.

FINANCIAL SUSTAINABILITY

The project will help decrease capital and operating expenses for WAF which will help WAF to undertake energy-efficiency measures beyond the project period.

As WAF improves its operating capacity, financial position and credit rating through the impact of the project, more attractive financing options would also become available in future.

Fiscal measures such as increased wastewater cess for industry and through increasing import duties on polluting process technologies and products could support financial sustainability.

- The project will also contribute to reducing effluents (quantity and toxicity) by reviewing the National Liquid Waste Management Strategy and its implementation and making recommendations. This will contribute to reduced wastewater loading in the future on the wastewater system which will further reduce the capital and operating requirements for WAF, apart from providing various other economic benefits for the country related to better water quality.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS

- Grant for capital investment needed for investment: US\$4.8M
- Grant for development costs: US\$172,000
- Grant for Enabling, Capacity Building and Technical Assistance: US\$1.6M

POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES

MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*

- **Project Planning, Development & Design:** **PCREEE-SPC**, **UNDP**, GIZ, GGGI, NDC-Hub, **ADB**, IUCN, CTCN, PRIF
- **Project Implementation & Management:** PCREEE-SPC, **UNDP**, GIZ, GGGI, NDC-Hub, **ADB**, IUCN, CIDCA

POTENTIAL FINANCING PARTNERS/SOURCES:*

- **Credit Guarantee:** **GCF**, **ADB**, **Supplier EXIM Banks**, EIB, **WB/IFC**
- **Debt & Loans:** **FDB**, **ADB**, EIB, **WB/IFC**, GCF
- **Equity:** **WAF**
- **Non-Government Grants for investment:** **GEF**, **GCF**, AU-DFAT, NZ-MFAT, **ADB**, **WB/IFC**, EIB, CIDCA, KOICA, EEAS
- **Grants for Technical Assistance & Capacity Building:** **GEF**, **GCF**, **AU-DFAT**, **NZ-MFAT**, **GIZ**, CTCN, ADB, KOICA, **UNDP**, **UNIDO**, **UNEP**, UNCRD, EEAS, **WB/IFC**
- **Government Budget & Taxes Incentives:** **MOE**

*This is not a comprehensive list, as other entities are possible as well.

Partners known to recently support this type of action in Fiji and PICs are indicated in **BOLD**.

ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS

Enabling, Capacity Building and Technical Assistance: US\$1.6 million (includes 15% overhead for Implementing Partner)

1. For each of the major water treatment systems in Viti Levu and Vanua Levu, conduct a water and mass balance study, and identify major wastewater sources, and the amount of infiltration and leakage from the system. Conduct a detailed energy and maintenance audit of each of these wastewater treatment systems. Develop a prioritised list of measures for improvement with investment needs, and areas for more detailed study (US\$888,000)
2. Conduct a review of the National Liquid Waste Management Strategy and Action Plan, as well as progress in implementing it, with a special focus on reducing the load on the wastewater treatment plants of WAF. Make recommendations for any revisions to the strategy and action plan, as well as sector specific actions that need to be carried out (US\$61,000)
3. Develop and implement 4 training programmes for staff of WAF on the design and efficient operation and maintenance of wastewater treatment and disposal systems. (US\$178,000)
4. Setting up and operating a financing facility (US\$270,000)

INFORMATION AND MRV NEEDS

1. Reduction in wastewater loading per unit of GDP and per unit coverage of WAF
2. Reduction in energy intensity of WAF, kWh/m³ of wastewater treated
3. Reduction in % infiltration into the WAF system

SUPPORTING REFERENCES

- Data provided by WAF during consultants' Fiji mission in 2019
- Energy Sector Management Assistance Program (2012). A primer for energy-efficiency in Municipal Water and Wastewater Utilities. International Bank for Reconstruction and Development/World Bank Group https://www.esmap.org/sites/default/files/esmap-files/FINAL_EECI-WWU_TR001-12_Resized.pdf
- Papa, F., Radulji, D., Karney, B., & Robertson, M. (2014). Pump energy-efficiency field testing and benchmarking in Canada in the Journal of Water Supply, Research and Technology. IWA <http://hydratex.com/wp-content/uploads/2015/04/Pump-Energy-Efficiency-Field-Testing-and-Benchmarking-in-Canada-Papa-et-al-2014.pdf>
- Goldstein, R. and Smith, W. (2002). U.S. Electricity Consumption for Water Supply & Treatment—The Next Half Century. Water & Sustainability (Volume 4), EPRI <https://www.circleofblue.org/wp-content/uploads/2010/08/EPRI-Volume-4.pdf>
- Ministry of Environment, Fijian Government (2007). Fiji National Liquid Waste Management Strategy and Action Plan. SPREP https://www.sprep.org/att/publication/000556_IWP_PTR48.pdf
- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	1,2,3,4	3,4	
Estimated CB & TA Costs (US\$)	525,000	925,000	329,000	1,780,000
Estimated Capital Investment (US\$)	0	1,600,000	3,200,000	4,800,000
Estimated GHG Mitigation (tCO₂)	0	0	4,000	4,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				1,000

E13 - DEVELOPING THE MARKET FOR BAMBOO AS A CONSTRUCTION MATERIAL

NO.	E13
ACTION NAME	Developing the market for bamboo as a construction material
SUB-SECTOR	Buildings
DESCRIPTION	<p>Most construction in Fiji is concrete masonry based or traditional, and cement is produced in Fiji. bamboo as a construction material could be a more sustainable and viable alternative for Fiji and the Pacific, replacing construction material, timber, steel and plastics in some cases. It could also help to restore degraded lands, prevent deforestation, and provide some form of resilience, while offering an important source of rural employment and income for local communities. bamboo is a native (and introduced) species across the Pacific and is now a US\$60 billion US\$ industry globally. This opportunity will include efforts in Fiji (and potentially other PICs) to develop the bamboo industry and supply chain and support further work in partnership with the Fiji bamboo Centre and its partners. Product minimum standards for building materials for bamboo and composites for use in construction in Fiji will be developed through the ongoing initiative of the MCTTT (through its Standards Unit) in association with the World Bank.</p> <p>This will be led by MIMS/DOE, and supported by PIDF, USP, PCREEE-SPC and the Fiji Commerce and Employers Federation. The only investment supported by this initiative is for the establishment of a centre of excellence on bamboo, which could be used by all PICs. The various stakeholders in the supply/value chain of bamboo would need to invest in modifying or upgrading their systems and facilities.</p>
KEY IMPLEMENTATION MILESTONES	<p>POLICY/TECHNICAL ASSISTANCE</p> <ul style="list-style-type: none"> • Resource mapping study conducted for bamboo, to ascertain production potential in Fiji • Market study conducted for bamboo industry in Fiji, especially its use in construction • Technical guidelines developed on the use of bamboo and bamboo composites as a construction material in the different conditions experienced in Fiji • Use of bamboo and bamboo composites in construction is integrated in the Building Code • A regional Centre of Excellence for the bamboo industry is set up in Fiji
OUTCOMES	<p>PRIMARY OUTCOMES</p> <ul style="list-style-type: none"> • GHG mitigation • Reduction in the usage of more carbon and energy intensive construction materials such as cement • The bamboo supply chain in Fiji is developed • The feasibility of using bamboo for construction is demonstrated in different conditions in Fiji • Consumer confidence improved in bamboo for construction • Capacity developed of key institutions and stakeholders <p>SECONDARY OUTCOMES</p> <ul style="list-style-type: none"> • Restoration of degraded lands • Reduction in deforestation • Improved resilience against impacts of climate change and extreme weather events • Increase in rural employment and income through participation in the bamboo supply chain

MITIGATION POTENTIAL	<p>2,000 tCO₂/year in 2030 and a total of 6,000 tCO₂ for 2020 – 2030 (actual emission reduction occurring during 2025 to 2030)</p> <ul style="list-style-type: none"> Increased use of bamboo for construction might have largest impact on cement used for construction (for concrete, concrete bricks/blocks, plastering etc). Hence, GHG emission reductions have been estimated based on the estimate for reduction in cement consumption The existing cement production in Fiji is around 400,000 Tonnes per year¹⁹². Specific electricity consumption for cement production has been assumed as 35kWh/tonne.¹⁹³ By using bamboo for construction, it was assumed that there would be a 5% reduction in cement consumption, and thereby the energy consumption for cement production. The grid emission factor for 2019 was estimated as 0.328Kg CO₂/kWh, which was used to estimate GHG emission reductions for each year
CO-BENEFITS/SDG LINKAGES	<ul style="list-style-type: none"> Increased carbon storage due to more cultivation of bamboo Reduced land degradation due to more cultivation of bamboo Reduced air pollution due to reduced supply and use of petroleum products. Continuous and stable power for end users, thereby improving and enabling more economic activity, as well as non-productive uses of energy Improved profitability for utilities and companies managing the power and oil sectors Delayed or avoided investments in power and oil storage and distribution infrastructure Improved energy security, less disruptions to oil imports and less impacts due to increases in international oil prices This will improve energy access, especially benefiting women and people living in remote areas: <p>Relevant primary SDGs impacted: 7, 9, 11, 12, 13</p> <p>Relevant secondary SDGs impacted: 17</p>
INVESTMENT NEEDS (USD)	<p>Estimated capital investment needed for the physical implementation: US\$2M for setting up a centre of excellence on bamboo, which could be used by all PICs</p> <p>Estimated development costs: US\$172,000</p> <p>Enabling, Capacity Building and Technical Assistance: US\$908,000</p> <p><i>Note this does not include all capital investments due to the limited availability of information needed to quantify activity.</i></p>
RIO MARKER AND CRS PURPOSE CODE(S)	<p>RIO MARKER: Significant (1)</p> <p>OECD-DAC/CRS PURPOSE CODE(S):</p> <ul style="list-style-type: none"> 15144 – National standards development; 15155 – Tax policy and administration support; 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency; 24030 - Formal sector financial intermediaries; 43932 – Urban development;
IMPLEMENTING AND SUPPORTING ENTITIES/STAKEHOLDERS	<p>NATIONAL IMPLEMENTING ENTITY/STAKEHOLDERS:</p> <p>MIMS/DOE</p> <p>POTENTIAL IMPLEMENTING SUPPORTING ENTITY/STAKEHOLDERS:</p> <p>PIDF, USP, PCREEE-SPC, Fiji Commerce and Employers Federation</p>

**GENERAL
TIMELINE FOR
DEVELOPMENT,
FINANCING,
IMPLEMENTATION,
AND OPERATION**

TIME NEEDED FOR DEVELOPMENT: 1 to 1.5 year needed for the project/programme design

TIME NEEDED FOR SECURING FINANCE: 1 to 1.5 years to secure financing and for international implementing/development partner assessments

WHEN WILL THE PROJECT/INVESTMENT START AND END: Technical Assistance and Capacity Building programme will be during 2022 to 2026 (5 years).

IMMEDIATE STEPS (NEXT 12 MONTHS) UNDER THIS OPPORTUNITY INCLUDE:

- A. Secure support for the technical assistance and capacity building package, and especially for items B to C below.
- B. Initiate discussions with MIMS/DOE, PIDF and other partners and stakeholders on the scope for the resource mapping study for bamboo production in Fiji, and for the market assessment for bamboo industry in Fiji
- C. Develop the terms of reference for hiring experts for the conduct of the resource mapping study for bamboo production in Fiji, and for the market assessment for bamboo industry in Fiji
- D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

POLICY/PLAN LINK

- The climate change mitigation targets under Fiji's Nationally Determined Contribution (issued 2015)
- Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan (draft updated 2017)
- Draft Fiji Technology Needs Assessment Report: Mitigation (issued 2019)
- The Republic of Fiji National Climate Change Policy 2018-2030 (issued 2019);

POLICY OBJECTIVES AND STRATEGIES

2. Leadership and Global Climate Action

- **Objective 2.1** To limit global average temperature rise to 1.5°C

4. Climate change mitigation and Resilient Development

- **Objective 4.1** To derive 100% of national electricity production from renewable energy sources by 2030 and achieve net zero annual greenhouse-gas emissions by 2050
- **Objective 4.2** To prioritise greenhouse-gas mitigation initiatives that increase national resilience and help achieve the Sustainable Development Goals
- **Objective 4.3** To preserve and enhance Fiji's natural carbon sinks and carbon reservoirs

5. National Capacity Development

- **Objective 5.1** To improve data availability, analytical-capacity, risk communications and awareness
- **Objective 5.2** To invest strategically in human and technological capacity-building for climate-resilient development

6. Sustainable Financing

- **Objective 6.2** To leverage internationally derived climate-finance for transformative outcomes

7. Private sector Transition and Engagement

- **Objective 7.1** To enhance public and private sector engagement and alignment
- **Objective 7.3** To create a climate-ready workforce and promote social entrepreneurship

5 YEAR AND 20-YEAR NATIONAL DEVELOPMENT PLAN TRANSFORMING FIJI (2017-2036), MOE (ISSUED 2017);

- **3.1.2 Energy** "A resource-efficient, cost-effective and environmentally sustainable energy sector"
- **3.2 Transformational Strategic Thrusts**
 - » 3.2.6 Micro, Small and Medium Enterprises Development "Promoting entrepreneurial culture through sustainable micro, small and medium enterprises"
 - » 3.2.7 Manufacturing and Commerce "Building sustainable and globally competitive manufacturing and commerce"
 - » 3.2.10 Expanding the Rural Economy "Promoting equal opportunities, access to basic services and building resilient communities"
 - » 3.2.14 Forestry "Sustainable management and development of forestry resources"

POLICY/PLAN LINK
CONT'D

MOIT STRATEGIC DEVELOPMENT PLAN 2019-2022 (ISSUED 2019);

- **Goal 2:** Development of a base level modernization plan for infrastructure (including Energy, transportation, meteorological services and disaster management as services).

LOW EMISSION DEVELOPMENT STRATEGY 2018-2050 (ISSUED 2018)

- **4.1** Electricity and Other Energy Generation and Use
- **4.8.3** Commercial, Industrial, and Manufacturing Sectors

THE GREEN GROWTH FRAMEWORK FOR FIJI (ISSUED 2014)

- **Thematic Area 1:** Building Resilience to Climate Change and Disasters
- **Thematic Area 7:** Energy Security
- **Thematic Area 9:** Technology and Innovation
- **Thematic Area 10:** Greening Tourism and Manufacturing Industries

FIJI'S NDC ENERGY SECTOR IMPLEMENTATION ROADMAP (2017-2030):

- Demand-side energy-efficiency
 - » D2: Energy-efficiency in the Business Community (incl. Sustainable Tourism)
 - » D4: Updated Codes and Standards for Buildings

POTENTIAL
BUSINESS
MODEL
AND FINANCING
STRATEGY

No investment is proposed. 70% of the grant needed for Technical Assistance and Capacity Building activities and for establishing the Centre of Excellence on bamboo could be through international sources and 30% from the State Budget. These investments would be paid back through cost savings through reduction in cement production and usage, as well as avoidance of all externalities related to it.

GAPS & BARRIERS TO
IMPLEMENTATION,
INCLUDING
PROPOSED
ENABLING
MECHANISMS

The lack of recognition of bamboo as a reliable building material in the country's building code, is a major barrier. This disregards the large advances in the bamboo industry, where bamboo is no longer to be viewed as just a material for light construction use but as a serious construction material that has extreme versatility with use in construction and civil engineering (<http://greenbusiness.solutions/bamboo-engineering/>)

There is currently no data collected for bamboo in Fiji. Up till now bamboo grows wild and harvested when and if needed for traditional purposes, or when someone has a demand for the resource.

The technical properties of bamboo are not available readily, that construction professionals can use while designing buildings

Other challenges include the raising of the resource's profile in the country and training in the use of bamboo for its multitudinous uses.

FINANCIAL
SUSTAINABILITY

The project will focus on removing major barriers and risks for developing the market for bamboo in construction, which will help reduce various real and perceived risks involved with this industry and strengthen the supply chain. In the longer term this will also lead to improve the confidence of financial institutions which will increase the availability of attractive financial products to support the bamboo industry.

POTENTIAL FINANCING AND NEED FOR FINANCIAL SUPPORT AND/OR FINANCIAL INSTRUMENTS	<p>US\$2 million for setting up a Centre of Excellence on bamboo, which could be used by all PICs.</p> <ul style="list-style-type: none"> • Multi-government/state budget for investment: US\$300,000 (15% of investment) • Grant for investment: US\$1.7M (85% of investment) • Grant for development costs: US\$172,000 • Grant for Enabling, Capacity Building and Technical Assistance: US\$908,000 <p><i>Note this does not include all capital investments due to the limited availability of information needed to quantify activity.</i></p>
POTENTIAL SUPPORTING AND FINANCING PARTNERS/SOURCES	<p>MANAGEMENT PARTNER (ASSISTING WITH ACCESS TO FINANCE):*</p> <ul style="list-style-type: none"> • Project Planning, Development & Design: PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, UNIDO, IUCN, CTCN, PRIF • Project Implementation & Management: PCREEE-SPC, UNDP, GIZ, GGGI, NDC-Hub, ADB, UNIDO, IUCN, CIDCA <p>POTENTIAL FINANCING PARTNERS/SOURCES:*</p> <ul style="list-style-type: none"> • Equity: FRA, ESCOs • Non-Government Grants for investment: GEF, GCF, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, KOICA, EEAS • Grants for Technical Assistance & Capacity Building: GEF, GCF, AU-DFAT, NZ-MFAT, GIZ, CTCN, ADB, KOICA, IEA, UNDP, UNIDO, EEAS, WB/IFC • Government Budget & Taxes Incentives: MOE <p><i>*This is not a comprehensive list, as other entities are possible as well.</i></p> <p>Partners known to recently support this type of action in Fiji and PICs are indicated in BOLD.</p>
ENABLING, CAPACITY BUILDING AND TECHNICAL ASSISTANCE NEEDS	<p>Enabling, Capacity Building and Technical Assistance: US\$908,000 (includes 15% overhead for Implementing Partner)</p> <ol style="list-style-type: none"> 1. Map the existing production in Fiji of various species of bamboo, assess the potential for increasing the production, the barriers and recommendations for the enabling environment (US\$53,000) 2. Conduct a market study of the bamboo industry in Fiji, focusing on its use as a construction material, covering the value chain for the various market segments, as well as existing or potential trade. The study will identify the potential for the market, the barriers for reaching the potential and recommendations for enabling Public and Corporate policy (US\$61,000) 3. Develop a technical guideline on the use of bamboo and bamboo composites as a construction material in the different conditions experienced in Fiji (bio-climatic, topographical, urban/rural, small/large constructions), including all the technical properties of bamboo, and the business case for using it (US\$141,000) 4. Support the integration of bamboo and bamboo composites in the Building Code (US\$103,000) 5. Conduct 4 Training programmes for architects/engineers/developers/contractors on the use of bamboo for construction, 4 days each, 30 participants (US\$199,000) 6. Conduct 4 hands-on Training programme for skilled workers (masons, carpenters, electricians, plumbers etc) on the use of bamboo for construction, 4 days each, 30 participants (US\$199,000) 7. Development of an online course on bamboo as a construction material tailored for the situation in PICs, to be hosted by FNU (US\$33,000)
INFORMATION AND MRV NEEDS	<ol style="list-style-type: none"> 1. Annual turnover of bamboo industry in the construction sector in Fiji 2. Production of construction grade bamboo in Fiji

**SUPPORTING
REFERENCES**

- Task Force on National Greenhouse Gas Inventories (TFI) of the Intergovernmental Panel on Climate Change (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

Phased Approach for Development, Implementation, and Investment

	2020 - 2022	2023 - 2025	2026 - 2030	TOTAL
Proposed CB & TA Needs (No.)	1,2	2,3,4,5,6,7	4,5,6	
Estimated CB & TA Costs (US\$)	279,000	651,000	150,000	1,080,000
Estimated Capital Investment (US\$)	0	2,000,000	0	2,000,000
Estimated GHG Mitigation (tCO₂)	0	0	6,000	6,000
Estimated Annual GHG Mitigation In 2030 (tCO₂/yr)				2,000

ANNEX B

ALIGNMENT WITH POLICIES, STRATEGIES, AND PLANS

There are several climate change specific policies, strategies, and roadmaps defined by the Fijian Government which are relevant to the mitigation options and potential for their finance as defined in this NDC Investment Plan, where the most relevant key national level policies, strategies, and plans consist of the following:

- The Republic of Fiji National Climate Change Policy 2018 – 2030 (NCCP) [issued 2018];
- Fiji's NDC Implementation Roadmap 2017-2030 (NDC Roadmap) [issued 2017];
- Fiji's Low Emission Development Strategy 2018 – 2050 (LEDS) [issued 2018];
- The Green Growth Framework for Fiji (GGFF) [issued 2014];
- Climate Change Act 2021.

THE REPUBLIC OF FIJI NATIONAL CLIMATE CHANGE POLICY 2018 – 2030 (NCCP)

The NCCP is the key national policy document for Fiji, and defines an overall national vision for 2050 and detailed vision for 2030 for climate action under one national policy, to ensure a resilient development pathway for Fiji in the future. The NCCP has policy objectives and strategies for seven key themes, of which relevant to this assignment are: climate change mitigation, national capacity development, sustainable financing, and private sector transition and engagement. Key to this are the sub-objectives to reach 100% renewable electricity generation and net zero GHG emissions (including energy-efficiency, demand side management, and clean transport), and to decarbonise Fiji's transport sector (decarbonise domestic aviation, low-zero carbon transport, public transport, non-motorised transport, and low-carbon maritime transport). In addition, the NCCP has an extensive description of the policy implementation arrangements and governance structure.

FIJI'S INTENDED NATIONALLY DETERMINED CONTRIBUTION (1ST NDC)

Fiji's Intended Nationally Determined Contribution (INDC) is considered to be the 1st NDC of the Republic of Fiji under the Paris Agreement of the United Nations Framework Conventions on Climate Change (UNFCCC). In principle, the mitigation component of the NDC focus only on the energy and forestry sectors for the period of 2020 to 2030. However, the baseline for energy sector emissions is defined as Business-As-Usual (BAU) scenario starting in 2013. Within the energy sector, the 30% of GHG emissions mitigation target is expected to be achieved by approaching 100% grid-connected renewable energy power generation, and a 10% improvement in energy-efficiency economy wide. The interpretation of economy wide energy-efficiency effectively encompasses both demand-side electricity use and (maritime and land) transport. The NDC indicated that one-third (10%) of reductions is expected to be achieved unconditionally, and two-thirds conditionally.

FIJI'S NDC IMPLEMENTATION ROADMAP 2017-2030 (NDC ROADMAP)

Fiji's NDC Roadmap has the sole focus on reducing GHG emission from energy use, and provides a description of a bottom-up pathway of mitigation actions in the electricity generation and transmission, demand-side energy-efficiency, and transport sectors, to meet the current NDC targets. The NDC Roadmap quantifies the mitigation potential of each mitigation action and the approximate capital investment needed for implementation. Also included are overall needs in each sector for capacity building and technical assistance, a high-level logical framework for implementation, linkage to the SDGs, and the general MRV framework. The NDC Roadmap has comprehensive mitigation actions for electricity/energy generation, but does not have a comprehensive actions for demand-side energy-efficiency and transport.

FIJI'S LOW EMISSION DEVELOPMENT STRATEGY 2018 – 2050 (LEDS)

The LEDS focuses on Fiji's aim/vision to reach net zero carbon emissions by 2050 across all sectors of its economy, and details four scenarios leading to different levels of GHG mitigation across the sectors. There are seven sectors addressed in the LEDS which include electricity/energy generation, land transport, maritime transport, domestic aviation, AFOLU, coastal wetlands, and waste. In addition, it addresses synergies between mitigation and adaption, highlights capacity building needs and provides a governance structure and monitoring and evaluation framework. The LEDS includes indicative overall mitigation actions in the land transport, maritime transport, domestic aviation sub-sectors, but there is limited information on demand-side energy-efficiency even though it is mentioned as an essential action alongside renewable energy. In addition, the LEDS includes fuel switching, for example for cooking.

THE GREEN GROWTH FRAMEWORK FOR FIJI (GGFF)

The GGFF forms a critical basis for the mitigation commitment of Fiji, and as stated in the NDC, implementation of the GGFF is expected to achieve a 10% unconditional commitment in mitigation. This unconditional commitment is linked to the target of 99% share in renewable energy power generation, and a 22% reduction in imported fossil fuels from transport target, both defined in the GGFF. The GGFF also defines key challenges for meeting the goals and offers a proposed way forward and actions to address these challenges.

CLIMATE CHANGE ACT 2021

The CC Bill has broad application to the domestic environment, anthropological activities, people, and companies in Fiji. The CC Bill provides a framework by which Fiji can develop and implement clear and long-term climate change measures and policies that will safeguard the future of Fiji and its people in the face of the climate emergency. It enables Fiji to meet its international obligations under the Convention and the Paris Agreement and to implement Fiji's NDC. It also facilitates the achievement of regional commitments and aspirations relating to climate change including the Suva Declaration on Climate Change. The CC Bill establishes institutional and governance structures for its implementation and facilitates evidence-based consideration of climate change issues in specified areas of government and private sector decision making and means of related regulation.

There are a number of other national and sectoral strategies, policies and, plans which provide inputs to the above climate change related policy and planning documents, and to this NDC Investment Plan, and they amongst others include:

- **MOIT Strategic Development Plan 2019-2022** *[issued 2019]*
- **5yr and 20yr National Development Plan Transforming Fiji (2017-2036)** *[issued 2017]*
- **Greater Suva Transportation Strategy 2015 – 2030** *[issued 2014]*
- **Maritime and Land Transport Policies** *[issued 2015]*
- **Fiji Tourism 2021** *[issued 2017]*
- **The Draft National Energy Policy 2013 - 2020 and its Strategic Action Plan** *[draft updated 2017, and undergoing current review in 2020]*
- **Draft Fiji Technology Needs Assessment Report: Mitigation** *[issued 2019]*
- **Electricity Act 2017** *[effective from 30th Sep. 2019]*

It is also noted that several recent and available studies within the sectors have been reviewed in the course of preparing this NDC Investment Plan.

ANNEX C

SECTORAL KEY STAKEHOLDERS AND CURRENT ACTIONS BY SECTOR

LAND TRANSPORT – KEY STAKEHOLDERS AND CURRENT AND FUTURE NDC RELATED ACTIONS/PROJECTS

STAKEHOLDER	ROLES WITHIN THE SECTOR	CURRENT & FUTURE NDC RELATED ACTIONS/PROJECTS ¹⁹⁴
Ministry of Commerce, Trade, Tourism, and Transport (MCTTT)	MCTTT oversees the Land Transport Authority (LTA) and addresses transport-related policy and regulation relating to vehicles and fuels in Fiji. MCTTT also oversees the Fijian Competition Consumer Commission (FCCC), which is responsible for price controls and tariff rates on fuel and electricity supply.	<ul style="list-style-type: none"> • (C) Given the new organization of the ministerial portfolio, consideration of the Green Growth Framework (GGF) 2015, the National Development Plan (NDP), and the Low Emission Development Strategy (LEDS) guide NDC-related actions/projects. • (C/F) New strategic planning documents have yet to be formulated since the formation of this ministry and its acquisition of the transport portfolio
Ministry of Infrastructure and Meteorological (MIMS)	Oversees energy planning and policy and transport infrastructure throughout Fiji and is the presiding line ministry of Fiji Roads Authority (FRA), Energy Fiji Limited (EFL), and Water Authority of Fiji (WAF).	<ul style="list-style-type: none"> • (C) The 2019-2022 Strategic Plan was designed in consideration of the Green Growth Framework (GGF) 2015, the National Development Plan (NDP), and the Low Emission Development Strategy (LEDS).
Ministry of Economy (MOE)	Oversees all climate change-related commitments, including development of the NDC and LEDS, as well as purview over the Fiji Revenue & Customs Service, Fiji Development Bank, and Reserve Bank of Fiji. FBOS is also part of the MOE.	<ul style="list-style-type: none"> • (C) MOE led the development of the LEDS and NDC Roadmap, which are now being implemented through this investment plan and programme pipeline. • (F) The Climate Change Act will allow for some regulatory provisions with regards to the land transport sub-sector, especially in regards to obtaining domestic information needed for national reporting under UNFCCC obligations.
Energy Fiji Limited (EFL)	EFL is the grid electricity utility (covering generation, transmission and distribution) in Fiji.	<ul style="list-style-type: none"> • (C/F) EFL has established a goal of setting economically justified feed-in tariffs and a revised pricing framework (price differential system) including studies to provide incentives for production of electricity from various renewable energy sources, which may contribute towards cost-effectiveness for the EV transition.
Fiji Competition & Consumer Commission (FCCC)	This agency is responsible for setting price controls on a variety of products, inclusive of fuel, electricity tariffs, and consumer goods.	<ul style="list-style-type: none"> • (C) FCCC revises fuel prices on a quarterly basis, which provides opportunity for both raising finances and fostering market shifts through price controls. • (C) Electricity Tariff Methodology has been developed¹⁹⁵, which may be built upon for EV charging rates if desired to incentivize a shift towards electrification of the sub-sector.

Fiji Revenue & Customs Service (FRCS)	FRCS is responsible for customs and tax compliance, inclusive of all imports of all vehicles, parts, tools, and equipment associated with the transport sector, as well as taxation on goods & services provided domestically through the sector.	<ul style="list-style-type: none"> • (C) Bio-fuel production tax incentives are in place at three capital investment thresholds; FJ\$250,000, FJ\$1m, and FJ\$2m. • (C) Duty concessions for equipment, chemicals, and feed stocks associated with biodiesel and ethanol are in place. • (C) Electric vehicle charging stations are granted a seven-year tax holiday and 5% subsidy for investments over FJ\$100,000, with duty/excise concessions on renewable energy charging systems and storage.
Fiji Roads Authority (FRA)	FRA is responsible for capital development and maintenance of the land transport infrastructure (as well as jetties).	<ul style="list-style-type: none"> • (C) Bicycle lanes have been installed along Kings Road, and are planned for further carriageway upgrades, alongside inclusion of footpaths in new areas to encourage active transport.
Land Transport Authority (LTA)	National enforcement agency with purview including licensing of drivers, as well as registration and regulation of all motor vehicles.	<ul style="list-style-type: none"> • (C) Guidelines have been instituted for establishing quality standards on the importation of vehicles and confiscating vehicles for illegal modifications, which may reduce localized emissions.
Fiji Development Bank (FDB)	Provides lending under a variety of financial products which may be utilized for land transport investment.	<ul style="list-style-type: none"> • (C/F) FDB is currently drafting a GCF proposal to launch a US\$10m pilot programme introducing electric busses to the Fijian transit market.
Reserve Bank of Fiji (RBF)	RBF addresses monetary policy and regulation in Fiji, including the provision of liquidity in local currency (FJ\$), and the regulation/accreditation of insurance and finance facilities (in cooperation with national banks).	<ul style="list-style-type: none"> • (C/F) RBF FPCL can play a key role in providing monetary lending regulation to national banks for financing low-carbon technologies, and for the expansion of existing market supervision and monitoring operated by RBF.
Private Sector Banks & Credit Facilities	A range of lending institutions, under license and oversight of the RBF as regulator, provide commercial and household finance to the businesses and general population of Fiji.	<ul style="list-style-type: none"> • (C/F) Private Sector Banks & Credit Facilities may be engaged in financing a variety of decarbonisation-related investments by individual and commercial land transport operators across the various pipeline projects.
Fiji Police Force (FPF)	The Fiji Police Force provides enforcement around moving violations and accident response through the Traffic Division, which supplements LTA's enforcement division.	<ul style="list-style-type: none"> • (C/F) No specific policies are being undertaken by the Fiji Police Force in regard to emission reductions from the land transport sub-sector.
<p>Independent Businesses :</p> <p>Fiji Bus Operators Association (FBOA)</p> <p>Road Haulage Association (RHA)</p> <p>Fiji Commerce & Employers' Federation (FCEF)</p>	Includes a range of industry-specific associations (FBOA, FMTA, and RHA listed above), as well as taxi and minibus operators, the Fiji Commerce & Employers' Federation (FCEF), other independent businesses, and the commercial financing institutions.	<ul style="list-style-type: none"> • (C) RHA has undertaken a sectoral assessment to determine impacts of haulage vehicles on roadways, and has recommended revised gross vehicle and dimension limits to improve loading efficiency and reduce required trips per tonne (and associated emissions).

MARITIME TRANSPORT – KEY STAKEHOLDERS AND CURRENT AND FUTURE NDC RELATED ACTIONS/PROJECTS

STAKEHOLDER	ROLES WITHIN THE SECTOR	CURRENT & FUTURE NDC RELATED ACTIONS/PROJECTS ¹⁹⁶
Transport Planning Division (TPD) (MCTTT)	Government Department responsible for transport planning, regulation and enforcement, under which various GCSAs MICs (e.g. MSAF, GSS, FPCL, FSHIL, FPTL) and FMA sit.	<ul style="list-style-type: none"> • (C) Passenger rights initiatives (2019-20 budget) • (C) Shipping Franchise Scheme (2019-20 budget) • (C) Host country and key stakeholder in MTCC • (F) RE vessel trials/incentives including water taxi/ferry pilots, outboard motor studies and incentives to improve fuel efficiency of larger vessels and outboard motors (SDP, Roadmap, NEP) • (F) National Action Plan – lead • (F) Outboard motor transition – lead • (F) Lautoka integrated land and maritime transport decarbonisation plan – lead
Government Shipping Services (GSS)	SOE Owner/operator. Provision of shipping services for government departments and ministries to deliver outer island projects, private charters, navigational aids and jetty/mooring maintenance.	<ul style="list-style-type: none"> • (C) Own/operate 14 existing vessels and various wharf/shore side facilities • (C) New vessel purchase (pax/cargo) purchase and (2019-20 budget) • (C) New vessels (special purpose for medical and navigational aids work) purchase (SDP) • (C) Walu Bay wharf and slip upgrades (2019-20 budget) • (C) Apprentice programme • (F) Retrofit of boss fin propeller cap on GSS vessel (MTCC pilot) • (F) New vessel (pax/cargo) Neoliner or similar prototype trials • (F) Inclusion of GHG emissions reduction in vessel operations and procurement decisions
Commercial Shipping Companies	Commercial vessel owner/operators (includes tourism, fishing, pax/cargo, and specialised vessels) and land-based maritime services (chandlery, boat building, marine engineering, surveyors, etc.)	<ul style="list-style-type: none"> • (C) Various initiatives including low/zero carbon maritime tourism, new 100% RE marina developments¹⁹⁷, water taxis¹⁹⁸, low-carbon vessel manufacture, service, maintenance and supply.¹⁹⁹ • (F) Electric ferry trials in Suva Harbour and Nadi/Mamanuca waters²⁰⁰
Fiji Maritime Academy (FMA) Fiji National University (FNU) FIT College (FIT) University of the South Pacific - Pacific Technical and Further Education (Pacific TAFE)	Training and education providers, R&D, Vessel owner	<ul style="list-style-type: none"> • (C) National certificates, diplomas, bachelors in marine engineering and nautical science, undergraduate courses in renewable energy for shipping and post-graduate research • (C) FMA own a yacht used for teaching cadets how to sail. • (F) Low/zero carbon marine engineering and technology (including electric outboard motors) courses – including trials on FMA vessels • (F) Awareness raising and capacity development training of the workforce. • (F) Cadet placement on GSS and other vessels trialling low/ carbon measures to reduce emissions

Fiji seafarers and ship owners & agents, marina industry associations	Industry and workers representatives	<ul style="list-style-type: none"> • (C) Input to public debate on issues of concern from the perspective of local ship owners and seafarers, and maritime support service industries through social media platforms, meetings, etc. • (F) Awareness raising and capacity development vehicle to outreach to a wider audience from the local industry and workers.
Fiji Ports Corporation Limited (FPCL)	Owns and carries out maritime operations in the four main ports of Suva, Lautoka, Levuka and Malau, and also administer the second-tier ports of Wairiki and Rotuma.	<ul style="list-style-type: none"> • (C) Pacific Green Ports Initiative • (C) Ports Master Plan (enhancing transshipment)²⁰¹ • (F) National Action Plan – incentives for green international ships calling at Fiji's international seaports • (F) Lautoka Port RE trials as part of integrated land and maritime transport decarbonisation plan for Lautoka
Fiji Development Bank (FDB) Reserve Bank of Fiji (RBF)	Financing	<ul style="list-style-type: none"> • (C) Reporting on fuel imports and usage • (C) Foreign investment regulation/control • (C) Commercial loan facilities e.g. for new and second-hand vessels carrying freight²⁰² and for fishing²⁰³ • (C) Green banking (accredited entity) facility²⁰⁴ • (F) Concessional revolving loans for private sector and individual uptake of RE technologies/vessels • (F) Outboard motor transition
Fiji Revenue & Customs Service (FRCS)	Taxation, Import duties	<ul style="list-style-type: none"> • (C) VAT exemptions for import of vessels licensed under the Maritime Transport Act and hybrid and electric ships²⁰⁵ and concessionary duty incentives for public transport including inter-island shipping • (C) Free import duties for some RE componentry²⁰⁶ • (C) Data on imports of vessels, motors, etc. • (F) Fiscal and excise incentives for outboard motor transition and rollout of other RE vessel trials
Fiji Competition & Consumer Commission (FCCC)	Promotes effective competition, encourages fair trading, protects consumers and businesses from restrictive practices, and controls prices of regulated industries and other markets	<ul style="list-style-type: none"> • (C) Set fuel prices including premix • (F) Input to development of outboard motor transition pilot
Fiji Roads Authority (FRA) Ministry of Local Government Town and City Councils	Jetty maintenance upgrade and new builds	<ul style="list-style-type: none"> • (C) Design of new jetties, existing jetty inspections/audits and maintenance (2019-20 budget) • (F) Involvement in development of National Action Plan and Lautoka City Pilot
Fiji Police Force	Vessel owner/operator	<ul style="list-style-type: none"> • (C) 16 vessels registered to the Police Force • (C) Purchase of boats and outboard motors for border management (for Tukavesi, Lakeba, Levuka and Korolevu) (2019-20 budget) • (F) Inclusion of GHG emissions reduction in vessel operations and procurement decisions
Fiji Navy	Vessel owner/operator	<ul style="list-style-type: none"> • (C) Own/operate 6 vessels • (F) Inclusion of GHG emissions reduction in vessel operations and procurement decisions and crew training

Ministries of Health & Education/ Schools	Vessel owner/operator	<ul style="list-style-type: none"> • (C) 23 boats registered to Ministry of Health • (C) Many schools already own boats and outboard motors • (C) New vessel and outboard motor purchase (2019-20 budget) • (F) Inclusion of GHG emissions reduction in vessel operations and procurement decisions
Ministry of Agriculture, Fisheries	Vessel owner/operator	<ul style="list-style-type: none"> • (C) 31 vessels registered to various sections of MAFF • (C) Coastal fisheries development project on outboard motor use data collection and repair (2019-20 budget) • (C) New vessel and 500HP motor purchase for fisheries compliance (Western Division) (2019-20 budget) • (F) Inclusion of GHG emissions reduction in vessel operations and procurement decisions
Bureau of Statistics	Data collection and analysis	<ul style="list-style-type: none"> • (C) Fuel consumption data collection • (C) National data collection (e.g. census) • (F) National Action Plan • (F) Outboard motor transition – data collection and analysis
Micronesian Centre for Sustainable Transport (MCST)	Specialist research and advisory centre (part of global academic network working on shipping decarbonisation)	<ul style="list-style-type: none"> • (C) Research on Pacific shipping and decarbonisation, and international shipping decarbonisation • (C) Policy and technical advice in pipeline project development • (C) Cerulean Project (low-carbon freighter) with Swire Shipping • (F) Potential support in monitoring and reporting for pilot projects • (F) Scholarship placements for post-graduate research on low/zero carbon transport
Pacific Global Maritime Technology Cooperation Centre (MTCC)	Specialist research and advisory centre (part of IMO Global Maritime Network)	<ul style="list-style-type: none"> • (C) Domestic shipping fuel use and GHG emissions data collection²⁰⁷ • (F) Retrofit of GSS vessel with propeller boss fin cap

STAKEHOLDER	ROLES WITHIN THE SECTOR	CURRENT & FUTURE NDC RELATED ACTIONS/PROJECTS ²⁰⁸
Ministry of Economy (MOE)	Ministry of Economy has oversight over national budgeting, as well as thresholds for lending between government-owned entities.	<ul style="list-style-type: none"> • (C) The LEDS and NDC Roadmap are now being implemented through this investment plan and programme pipeline. • (F) The Climate Change Act will allow for some regulatory provisions with regards to the aviation transport sub-sector, especially in regards to obtaining domestic information needed for national reporting under UNFCCC obligations.
Department of Civil Aviation (DCA)	This Department has oversight over the entire aviation sector, primarily executed through CAAF, with FALFAL and ATS servicing the airlines.	<ul style="list-style-type: none"> • (C) Domestic aircraft must be licensed through the Air Transport Licensing Board, which means passing inspections and meeting compliance requirements for performance and safety – emission-related standards may be strengthened through this mechanism.
Civil Aviation Authority of Fiji (CAAF)	Regulator for the aviation sector, Fiji Airways/Fiji Link, FALFAL, and ATS. CAAF deals with both international and domestic aviation sectoral concerns, including ICAO compliance and national-level GHG inventory reporting.	<ul style="list-style-type: none"> • (C) The core work of CAAF prioritizes operational efficiency and technical performance of all inspected aircraft – emission-related standards may be strengthened through CAAF's regulatory oversight activities.
Fiji Airways/Fiji Link	Fiji Airways and Fiji Link are managed by different focal points – these businesses serve as the nationally owned international/ domestic air carrier.	<ul style="list-style-type: none"> • (C) At the holistic level, Fiji Airways is in the process of implementing its basket of measures, inclusive of. • Replacement of the airway's aging aircraft, exploring alternative fuels, improving air traffic management, improving pre-flight, start-up, taxiing, and in-flight procedures, and training personnel on carbon emissions.
Fiji National Provident Fund (FNPF)	The national superannuation fund has provided capital lending to Fiji Airways for re-fleeting since 2014.	<ul style="list-style-type: none"> • (C) FNPF lending has facilitated the investment of Fiji Airways in achieving replacement of aging aircraft (primarily at the international aviation level.)
Fiji Revenue & Customs Service (FRCS)	FRCS is responsible for recording national fuel import statistics for all aviation fuel and track the value and composition of all other purchases related to the sector.	<ul style="list-style-type: none"> • (C) Tax-free regions in the Northern Division, Rotuma, Kadavu, Levuka, Lomaiviti, Lau, and Nausori airport through Ba for investments of at least FJ\$250,000 may support aviation sector development – mechanisms for sustainable development need to be included in the future to encourage decarbonisation as the sub-sector grows.
Fiji Airports Limited (FAL)	Fiji Airports Limited operates the various airport facilities around the country.	<ul style="list-style-type: none"> • (C) Fiji Airports has a Carbon Management Policy in place, aiming to: • Conduct relevant research and data collection to identify and control activities of Fiji Airports that generate carbon; • Develop plans to monitor carbon emitting activities and develop a baseline; • Ensure a third party can review and verify data; • Consider low-carbon alternatives; • Create awareness; and, • Work closely with all stakeholders and airlines.

Air Terminal Services Limited (ATSL)	Handling operations at Nadi International Airport, port-side efficiencies will rest in part with ATS.	<ul style="list-style-type: none"> • (C) Operational efficiency in provision of terminal activities is prioritized, which may result in on-the-ground emission reductions, but consideration of the NDCs is not a separately identified priority.
Private Sector	Inclusive of private companies providing domestic aviation services (Northern Air, Pacific Island Air, Sunflower Aviation, HeliPro, Island Hoppers, and SkyDive Fiji , as well as flight schools (Advance Aviation Training and Pacific Flying School), and private aircraft operated by Kokomo Island, Laucala, Turtle Island, Vatuvara, and Wakaya resorts.	<ul style="list-style-type: none"> • (C) Efficient aviation operations are necessary to achieve cost savings and improve private sector margins, so emission reduction measures are considered best practice. However, no specific formal commitment to NDC implementation exists with private air carriers.

POWER & UTILITIES – KEY STAKEHOLDERS AND CURRENT AND FUTURE NDC RELATED ACTIONS/PROJECTS

STAKEHOLDER	ROLES WITHIN THE SECTOR	CURRENT & FUTURE NDC RELATED ACTIONS/PROJECTS ²⁰⁹
Energy Fiji Limited (EFL)	EFL is the electricity utility in Fiji, covering generation, transmission and distribution	<ul style="list-style-type: none"> • (C) EFL has been leading the charge on renewable energy based power projects and has significant plans and targets to expand use of renewables. EFL is directly responsible for energy-efficiency in the power supply side, and can indirectly influence energy consumption and demand in the demand side. • (F) EFL will have to play the lead role for all demand side management (DSM) and demand response (DR) programmes being proposed in the NDC investment plan.
Department of Energy (DOE) at MIMS	DOE has the mandate to plan and support the energy sector in Fiji	<ul style="list-style-type: none"> • (C) DOE is central for energy-efficiency actions in all sub-sectors. • (F) It is also anticipated to take the lead role for a more integrated and systematic energy planning process
Fiji Competition & Consumer Commission (FCCC)	This agency is responsible for setting price controls on a variety of products, inclusive of fuel, electricity tariffs, and consumer goods.	<ul style="list-style-type: none"> • (F) Introduction of Time of Day (TOD) tariff for power and any rebates for energy-efficiency, which is proposed under the NDC Investment Plan, would have to be considered by the FCCC. • (F) FCCC, through its periodic review processes, is also key to removing any direct and indirect subsidies for fossil fuels and transferring such benefits towards energy-efficiency and renewables.
The Water Authority of Fiji (WAF)	They are in charge of water supply and wastewater treatment and disposal. They are the largest consumer of EFL	<ul style="list-style-type: none"> • (C) WAF is responsible for energy performance of the water supply and wastewater system. • (F) WAF would have to play a major role in the 2 projects proposed in the NDC Investment Plan on efficient operation and maintenance of the water supply and wastewater systems
Fiji Bureau of Statistics (FBOS)	Collects household, plus micro- and macro- data in Fiji	<ul style="list-style-type: none"> • (F) A well-developed energy statistics system is crucial for energy planning, preparation of national energy balance and national GHG inventory and various types of environmental accounting. Energy statistics is not well developed in Fiji and the Fiji Bureau of Statistics is key in proposed efforts to develop capacity on Energy Statistics. They will also have a key role in the urban energy survey being proposed.
Ministry of Infrastructure and Meteorological Services (MIMS)	Oversees the electricity and transport infrastructure throughout Fiji	<ul style="list-style-type: none"> • (F) A major portion of energy-efficiency efforts have to be led by MIMS, as key departments such as DOE, EFL, FRA and WAF reports to MOIT. MOIT's 2019-2022 Strategic Plan was designed in consideration of the Green Growth Framework 2015, the National Development Plan (NDP), and the Low Emission Development Strategy (LEDS)
Ministry of Economy (MOE)	Oversees all climate change-related commitments, including development of the NDC and LEDS	<ul style="list-style-type: none"> • (C) Key departments and institutions relevant to energy efficiencies, such as the FRCS, FDB, Reserve Bank of Fiji and FBOS are under MOE. MOE led the development of the LEDS and NDC Roadmap, which are now being implemented through this investment plan and programme pipeline. • (F) The Climate Change Act will allow for some regulatory provisions with regards to the land transport sub-sector, especially in regards to obtaining domestic information needed for national reporting under UNFCCC obligations.

Department of Environment (under the Ministry of Waterways and Environment)	Promotes the sustainable use and development of Fiji's environment and efficient implementation of policies, legislation and programs. Also, in charge of fulfilling Fiji's Obligation under regional and international environment related conventions and treaties.	<ul style="list-style-type: none"> • (C) Many energy-efficiency and climate change mitigation initiatives are currently led by the Department of Environment.
Ministry of Women, Children and Poverty Alleviation (MWCPA)	Cross-sectoral role, supporting families without income support, children at risk, empowering women; and to improve services to both disabled and older persons.	<ul style="list-style-type: none"> • (C) MWCPA is in charge of energy for cooking. • (F) The Ministry will have a role to link energy planning activities with poverty alleviation
Fiji Revenue & Customs Service (FRCS)	FRCS is responsible for customs and tax compliance, including taxation on goods & services	<ul style="list-style-type: none"> • (F) FRCS will have a role to play in developing and implementing fiscal incentives and penalties in favour of energy-efficient products and services

CITIES & BUILDINGS – KEY STAKEHOLDERS AND CURRENT AND FUTURE NDC RELATED ACTIONS/PROJECTS

STAKEHOLDER	ROLES WITHIN THE SECTOR	CURRENT & FUTURE NDC RELATED ACTIONS/PROJECTS ²¹⁰
Department of Energy (DOE) at MIMS	DOE is in charge of planning and coordination for the energy sector	<ul style="list-style-type: none"> • (C) DOE is central to all energy-efficiency actions. • (F) DOE is currently playing a key role in further development of the Building Code
Ministry of Local Government, Housing, and Community Development (MGHCD)	MGHCD is responsible for the formulation and implementation of local governance, urban planning, housing and environmental policies and programs.	<ul style="list-style-type: none"> • (C) Apart from its traditional key role in urban management, MGHCD is playing a leading role in the ongoing development of the Master Plans for Suva, Lautoka and Nadi. • (F) MGHCD will be the key national stakeholder for the proposed project on sustainable cities, and assisting with integration of energy-efficiency in city/town planning.
Fiji Development Bank (FDB)	National Development Bank with experience in implementing lending facilities.	<ul style="list-style-type: none"> • (C) Green tourism opportunities are being explored by the FDB and a financing package is being prepared in the context of a pipeline for 20MW worth of investment across 93 tourism operators surveyed under a recent GGGI project. • (F) The FDB has the opportunity for commercial lending to the private sector for building energy-efficiency actions.
Government Architect at MIMS	The Government Architect responsible for the team in MIMS that designs government buildings and oversees construction & refurbishment.	<ul style="list-style-type: none"> • (C/F) The Government Architect is keen on energy-efficiency and is trying to integrate it within ongoing urban planning processes, as well as into the future Building Code.
Fiji Hotel and Tourism Association (FHTA)	The Association is proactive and continues to address major issues of concern to the Hotel and Tourism Industry in Fiji.	<ul style="list-style-type: none"> • (F) FHTA can be a lead partner for addressing the hotels sub-sector under the project on promoting green tourism and help coordinate best practices and the use of fiscal incentives.
Ministry of Commerce, Trade, Tourism and Transport (MCTTT)	MCTTT formulates and implements policies and strategies to facilitate growth in industry, investment, trade, tourism, co-operative businesses, micro and small enterprises, and enhance standards, and consumer protection.	<ul style="list-style-type: none"> • (C) The Standards Unit under MCTTT is leading the review of the Building Code with support from the • (F) MCTTT will be a key national stakeholder to integrating energy-efficiency into the Building Code, as well as in facilitating the developing and implementing the proposed project to promote green tourism.
Local Governments/ Municipalities	Local Governments/ Municipalities in Fiji are responsible for the city and town planning, development, and enforcement of building and construction regulations.	<ul style="list-style-type: none"> • Local Governments/Municipalities will be central to the implementation of the green city opportunity and the enforcement of the new building code.
Fiji Roads Authority (FRA)	Manages and develops Fiji's road network, as well as street lighting.	<ul style="list-style-type: none"> • (C) FRA is already involved in converting the street lighting infrastructure into LED based ones, when new streetlights are installed. • (F) FRA will have a lead implementer role to play for the conversions of existing streetlights into LED based ones (E8).

Pacific Islands Development Forum (PIDF)	Participatory platform for coordinating development in the PICs, and on the Green Economy	<ul style="list-style-type: none"> • (C) The PIDF has been leading efforts to develop the market for Bamboo, including for construction. PIDF had developed a sustainable cities/islands concept initially for Ovalau, Taveuni, and Kadavu, but is now being refocused on Beqa. (9 villages – focus on energy, transport, agriculture, water management, etc. – working with FLMMA, and Pacific Blue Foundation) • (F) PIDF would have a key role to play in the project proposed for developing the market for Bamboo in construction. They will also have an interest in the proposed sustainable cities opportunity, including transferring lessons learned to other PICs.
Fiji Bureau of Statistics (FBOS)	Collects and analyses household and micro- and macro- level anthropological, economic, and environmental data in Fiji	<ul style="list-style-type: none"> • (C) FBOS completed the household 2017 survey, and had an operating group for environmental statistics. • (F) FBOS can conduct an urban household energy use survey in Fiji which could provide a lot of useful information needed for energy planning. Fiji Bureau of Statistics could play a key role in the urban household energy data needed to make the green cities and buildings opportunities for effective and efficient.
Fiji Commerce and Employers Federation (FCEF)	FCEF is Fiji's National Private Sector Organization under the umbrella of the Pacific Islands Private Sector Organization.	<ul style="list-style-type: none"> • (F) FCEF has expressed interest in supporting energy-efficiency measures and could help ensure participation of their member companies involved in the design, construction, operation, maintenance of buildings in proposed initiatives in energy-efficiency and sustainability in construction and construction materials, hotels/commercial buildings and urban planning.

APPLIANCES, GOVERNMENT, AND INDUSTRY

KEY STAKEHOLDERS AND CURRENT AND FUTURE NDC RELATED ACTIONS/PROJECTS

STAKEHOLDER	ROLES WITHIN THE SECTOR	CURRENT & FUTURE NDC RELATED ACTIONS/PROJECTS ²¹¹
Fiji Procurement Office at MOE Other ministries procurement offices	Procurement of goods and services for the Fijian Government.	<ul style="list-style-type: none"> • (C) Fiji Procurement Office performs half of public procurement of goods and services in Fiji, except for state-owned companies. The other ministries procurement offices procure the other half of goods and services for Fijian Government in Fiji. • (F) Fiji Procurement Office is keen on sustainable procurement (SP) and are now developing a framework on sustainable procurement. They are willing to take the lead on sustainable public procurement and cooperative procurement initiatives, including for any potential regional initiatives.
Ministry of Commerce, Trade, Tourism and Transport (MCTTT)	Formulates and implements policies and strategies to facilitate growth in industry, investment, trade, tourism, co-operative businesses, micro and small enterprises; and enhance metrology, standards, and consumer protection.	<ul style="list-style-type: none"> • (C) MCTTT is Being in charged with setting standards for appliance and consumer protection, as well as regulating trade. • (F) MCTTT will have a lead role to play in the standards and labelling programme for products being proposed, including developing and setting up the quality assurance and control system and the setting up of product testing facilities. Being in charge of industrial policy, MITT would be a key stakeholder on all actions being proposed on industrial energy-efficiency
Fiji Retailer Association	Association of retailers. Key to developing and implementing the various energy-efficiency measures related to appliances and equipment's	<ul style="list-style-type: none"> • (F) The Fiji Retailer Association would have a major role to play in ensuring participation of various retailers in the product standards and labelling initiative and the sustainable public procurement initiative, and in associated capacity building and awareness raising activities
Fiji Commerce and Employers Federation (FCEF)	Fiji's national private sector organization under the umbrella of the Pacific Islands Private Sector Organization.	<ul style="list-style-type: none"> • (F) FCEF has expressed interest in supporting the inclusion of energy-efficiency measures and could help ensure participation of their member companies involved in trading and servicing of products and appliances in the product standards and labelling initiative and the sustainable public procurement initiative, and in associated capacity building and awareness raising activities. • FCEF has also expressed interest in supporting energy-efficiency in industry, especially through ensuring participation of their member companies. They have in the recent supported an initiative in industry led by UNESCAP and ILO.
Fiji Chamber of Commerce and Industry (FCCI)	FCCI provides a forum for businesses and other organizations to examine and better comprehend the nature and significance of the major shifts taking place in the Fijian economy.	<ul style="list-style-type: none"> • (F) FCCI could support participation of industry in the proposed initiative on energy-efficiency in industry
Fiji Sugar Corporation (FSC) Tropik Wood Industries Ltd (TWI) Pacific Fishing Company Ltd (PAFCO)	These SOEs, are heavy industry producers for good for export and two are Independent Power Producer	<ul style="list-style-type: none"> • (F) FSC, TWI, and PAFCO have the potential to implement industrial energy-efficiency measures, and can participate in capacity building efforts.
Other Large and medium industry companies	Individual large and medium industry companies who consume a reasonable amount of energy	<ul style="list-style-type: none"> • (F) These companies have the potential to implement industrial energy-efficiency measures and can participate in capacity building efforts.

ANNEX D

AGGREGATED CO-BENEFITS AND LINKAGE TO THE SDGS

The following table shows the results of a general qualitative assessment for positive potential impacts (co-benefits) for the deployment and implementation of the interventions and technologies in the different proposed mitigation opportunities in this NDC Investment Plan. Further elaboration, including a more detailed quantitative/qualitative assessment, is needed during the development and implementation stages of the different proposed mitigation opportunities to determine the exact impacts, and relate these to indicators needed to track progress.

POTENTIAL CO-BENEFITS CONTRIBUTED TO:	TRANSPORT SECTOR OPPORTUNITIES				ENERGY-EFFICIENCY SECTOR OPPORTUNITIES			
	Land	Maritime	Aviation	Power & Utilities	Buildings & Cities	Appliances & Government	Industry & Facilities	
HEALTH & SAFETY								
Improves health and fitness	✓	✓						
Improves air quality via reduced pollutants	✓			✓	✓	✓	✓	
Improves safety by reduced accidents and violence	✓	✓	✓					
ENVIRONMENT								
Reduces risk of pollution of water and land	✓	✓						
Increase availability of land	✓							
ACCESS TO SERVICES								
Improves access to transport services (incl. mobility)	✓	✓	✓					
Improves access to and availability of energy services				✓	✓	✓	✓	
Improves access to goods and trade		✓		✓		✓		
Improves national disaster response capabilities		✓	✓	✓				
SOCIAL & ECONOMIC IMPACTS								
Reduces household impact of global energy prices	✓	✓	✓	✓	✓	✓		
Reduces impact on national financial reserves	✓	✓	✓	✓	✓	✓	✓	
Improves vocational training/skills	✓	✓	✓	✓	✓	✓	✓	
Improves access to and additional employment	✓	✓	✓		✓	✓	✓	
Promotes additional economic development	✓	✓		✓	✓			
Promotes sustainable use of resources (incl. RRR)	✓				✓			
Promotes green tourism	✓	✓		✓	✓	✓	✓	
Contributes to additional international agreements		✓	✓					

The following table shows the results of a general qualitative assessment for potential SDGs linkages based on the broadly known impacts for the deployment and implementation of transport interventions and technologies in the different proposed mitigation opportunities in this NDC Investment Plan. Further elaboration, including a more detailed quantitative/qualitative assessment, is needed during the development and implementation stages of the different proposed mitigation opportunities to determine the exact aligned with national level SDG indicators and tracking of progress. This may include choosing to track only a few key SDG indicators to limit the need for use of government resources.

TRANSPORT OPPORTUNITIES CONTRIBUTIONS TO THE SDGS																		
NO. AND SDG ²¹²	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18
1 No Poverty	✓		✓		✓	✓		✓		✓		✓	✓		✓		✓	
2 Zero Hunger																		
3 Good Health and Well-Being				✓			✓		✓		✓		✓			✓		✓
4 Quality Education	✓	✓	✓			✓		✓				✓			✓		✓	
5 Gender Equality											✓		✓		✓			✓
6 Clean Water and Sanitation									✓							✓		✓
7 Affordable and Clean Energy	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓		✓✓	✓	✓		✓		✓	✓✓	
8 Decent Work and Economic Growth	✓		✓	✓	✓	✓✓	✓	✓	✓	✓	✓	✓✓	✓	✓✓	✓	✓	✓	✓
9 Industry, Innovation and Infrastructure				✓	✓	✓✓	✓		✓✓			✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
10 Reduced Inequalities						✓			✓		✓	✓	✓	✓	✓✓		✓	✓
11 Sustainable Cities and Communities		✓✓		✓	✓✓	✓	✓		✓		✓✓	✓	✓✓	✓	✓✓	✓✓	✓	✓✓
12 Responsible Consumption and Production	✓		✓			✓✓		✓	✓	✓	✓	✓✓	✓	✓✓	✓	✓	✓	
13 Climate Action	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
14 Life Below Water	✓✓		✓✓		✓			✓✓		✓✓	✓		✓			✓	✓	
15 Life on Land				✓			✓		✓✓		✓		✓			✓		✓
16 Peace, Justice and Strong Institutions																		
17 Partnership for the Goals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

(blank) is not needed, (✓✓) primary/most appropriate, (✓) secondary/possible impact

The following table shows the results of a general qualitative assessment for potential SDGs linkages based on the broadly known impacts for the deployment and implementation of energy-efficiency interventions and technologies in the different proposed mitigation opportunities in this NDC Investment Plan. Further elaboration, including a more detailed quantitative/qualitative assessment, is needed during the development and implementation stages of the different proposed mitigation opportunities to determine the exact aligned with national level SDG indicators and tracking of progress. This may include choosing to track only a few key SDG indicators to limit the need for use of government resources.

ENERGY-EFFICIENCY OPPORTUNITIES CONTRIBUTIONS TO THE SDGS													
NO. AND SDG ²¹³	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13
1 No Poverty													
2 Zero Hunger													
3 Good Health and Well-Being	✓		✓			✓	✓	✓				✓	
4 Quality Education				✓							✓		
5 Gender Equality													
6 Clean Water and Sanitation								✓✓				✓✓	
7 Affordable and Clean Energy	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
8 Decent Work and Economic Growth													
9 Industry, Innovation and Infrastructure	✓✓	✓✓	✓✓	✓✓	✓	✓	✓✓	✓	✓	✓✓	✓✓	✓✓	✓✓
10 Reduced Inequalities													
11 Sustainable Cities and Communities	✓✓	✓✓	✓✓	✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
12 Responsible Consumption and Production	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓✓	✓✓	✓✓
13 Climate Action	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
14 Life Below Water												✓	
15 Life on Land													
16 Peace, Justice and Strong Institutions													
17 Partnership for the Goals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓	✓	✓

(blank) is not needed, (✓✓) primary/most appropriate, (✓) secondary/possible impact

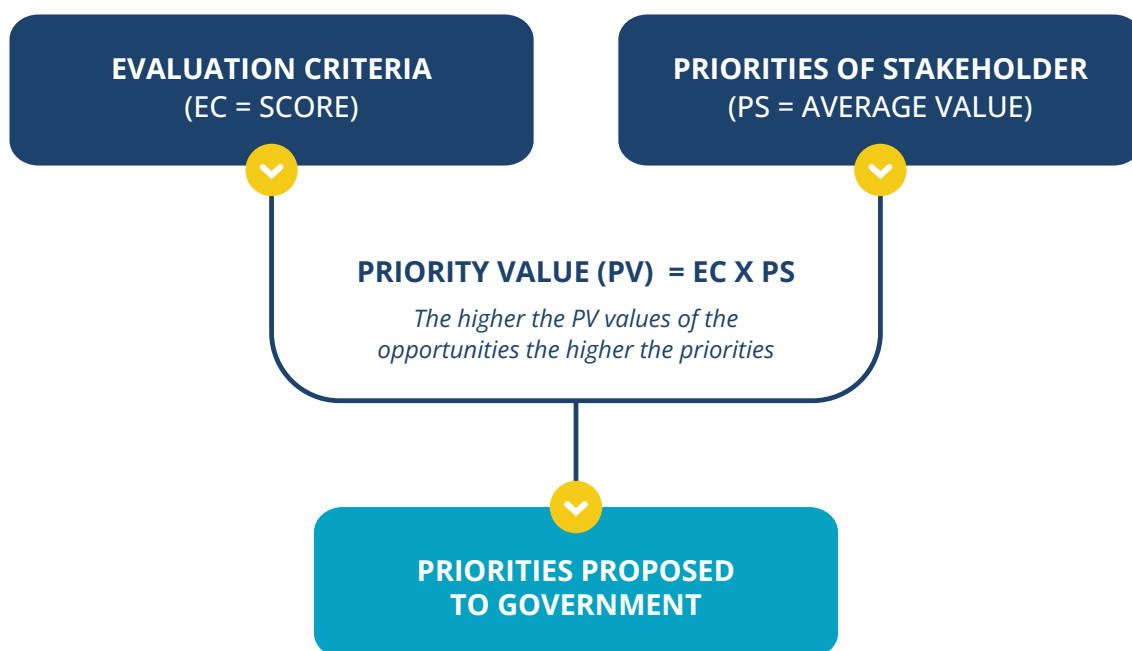
PRIORITY OF OPPORTUNITIES - EVALUATION CRITERIA AND MATRIX

The prioritisation of the mitigation options for both energy-efficiency and transport are based on two components as depicted in the figure below. These two components are:

1. Evaluation Criteria (EC = Score) which is a combined score of the comparative quantitative/qualitative evaluation of the consultants/technical experts for seven different impacts of the mitigation opportunities.
2. Priorities of Stakeholders (PS = Average Value) which is the average of the prioritisation score given by stakeholders to the mitigation opportunities. Stakeholders gave a score of 1 to 5, where 1 was the lowest priority of 5 was the highest priority for implementation the mitigation opportunity.

The final scores of each the Evaluation Criteria (EC) and Priorities of Stakeholders (PS) are then multiplied to give a Priority Value (PV). The mitigation opportunities are then ranked based on these Priority Values. The matrices and results for both the energy-efficiency and transport prioritisation are given in this section.

PRIORITY OF OPPORTUNITIES - EVALUATION CRITERIA AND MATRIX



EXPLANATION OF THE EVALUATION CRITERIA (EC = SCORE)

A comparative quantitative/qualitative evaluation for the initial prioritisation of the realistic intervention options for each sub-sector was performed by the consultants. This prioritization identifies the options for mitigation opportunities (actions) and interventions which have the most positive impacts, and limited burden. The comparative quantitative/qualitative evaluation matrix considers four basic/positive criteria and two risk/negative criteria. These criteria are based on the viewpoint of the Fijian Government, insofar as to the options: impacts to the state budget, ability to achieve mitigation goals, level of private sector participation (in investment), positive social and economic impacts, incremental financial needs, technology availability and environmental impacts. The criteria and scoring are described below:

POSITIVE CRITERIA (POSITIVE POINTS GAINED BASED ON LEVEL OF APPLICABILITY)

A. Approximate investment level required to implement those interventions.

The level of investment capital required for implementation is a foremost consideration for sectoral stakeholders and Fijian Government. The many mitigation options presented have a wide range in investment capital requirements, but experience shows that certain levels of capital are easier to access in Fiji, and the scoring below reflects this access.

[Scoring: selection one from +5 pts for < US\$ 1m, +4 pts for US\$ 1m – 5m, +3 pts for US\$ 5m – 25m, +2 pts for US\$ 25m – 50m, +1 pts for US\$ 50m – 100m, +0 pts for > US\$ 100m]

B. Mitigation potential in Fiji.

The many mitigation options presented have a wide range in potential for annual GHG mitigation, and the scoring below reflects this range.

[Scoring: selection one from +5 pts for > 100k tCO₂e/yr., +4 pts for 100k – 50k tCO₂e/yr., +3 pts for 50k – 10k tCO₂e/yr., +2 pts for 10k – 3k tCO₂e/yr., +1 pts for 3k – 1k tCO₂e/yr., +0 pts for < 1k tCO₂e/yr.]

C. Level of private sector financial participation.

The level of private sector financial participation potentially reflects the need for Fijian Government finances and support (incl. international support). This criterion is set to select options which reduce or eliminate the impact on Fijian Government finances and support (e.g. reduced FG revenues and needs for Fijian Government/international support).

[Scoring: selection one from +5 pts for 100%, +4 pts for 80%, +3 pts for 60%, +2 pts for 40%, +1 pts for 20%, +0 pts < 20%]

D. Potential for positive social-economic impact on the population.

Fiji has various social-economic considerations at a political level, and many of these are reflected in both urban and rural development in Fiji. This criterion reflects the potential for reducing the household costs in these communities, as well as the ability for the mitigation actions to improve broader access to the technologies being implemented. This criterion weights a higher emphasis on the rural community in Fiji.

[Scores: sum those as applicable +1 pts reduced costs to urban community, +1 pts improves access to urban community, +2 pts reduced costs to rural community, +2 pts improves access to rural community]

E. Level of incremental financial needs (as increase above BAU case).

Incremental financial need is the amount of investment capital, or ongoing financial support needed during operation, which leads the GHG mitigation action being of similar economic value to the stakeholder (who bares the economic burden) as the alternative option not leading to GHG mitigation. Typically, incremental financial need will be supported by the Fijian Government through fiscal policy or through international support provided by various financial instruments. The higher the incremental financial need the less likely the need will be met through Fijian Government or international support.

[Scoring: selection one from +5 pts for 0%, +4 pts for 20%, +3 pts for 40%, +2 pts for 60%, +1 pts for 80%, +0 pts > 80%]

NEGATIVE CRITERIA (NEGATIVE POINTS GAINED BASED ON LEVEL OF APPLICABILITY)

F. Level of national or regional technology inclusion.

The technologies applied in GHG mitigation actions are not always available at the national, regional, or global levels. This criterion removes points from the evaluation based on the national, regional, or global availability of the underlying technology in 2020.

[Scoring: selection one from -0 pts for widely available in Fiji, -1 pts for marginally available in Fiji, -2 pts available in the AP region but not Fiji, -3 pts only available in developing countries, -4 pts under scaling up internationally, -5 pts under development internationally]

G. Potential for negative environmental impact.

The environmental impact (and the management of this impact) is an important component in decision making. Negative and unmanaged environmental impacts of GHG mitigation actions will negate the environmental integrity of implementing the actions. This criterion removes points from the evaluation based on the perceived relative net environmental impact of the mitigation action.

[Scores: sum those as applicable 0 pts measurable but very controllable ecological impact, -1 pts measurable but minor ecological impact, -2 pts medium ecological impact, -3 pts large ecological impact, -4 pts large and unrecoverable ecological impact]

No.	Intervention Action	Criteria A	Criteria B	Criteria C	Criteria D	Criteria E	Criteria F	Criteria G	Final Score
1	Intervention								
2	Intervention								
3	Intervention								
4	Intervention								
5	Intervention								
6	Intervention								

Example scoring matrix for the comparative quantitative/qualitative evaluation

EVALUATION FOR PRIORITIES FOR MITIGATION OPPORTUNITIES UNDER ENERGY-EFFICIENCY

Priority Rank	Action/Item	Starting	Investment	GHG Mitigation	Private Participation	Social Economic Impacts	Incremental Finance Needs	Technology Inclusion	Environmental Impacts	Evaluation Criteria (EC) Score	Stakeholders Priority (SP) Score	Combined Score
1	E1 Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji	2022	5	4	5	1	1	-2	0	14	4.33	60.62
2	E2 Programme to Promote Enhanced Green Tourism	2022	3	0	5	4	3	-1	-1	13	4.41	57.33
3	E3 Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS)	2022	3	3	4	1	4	-1	-1	13	4.12	53.56
4	E4 Capacity Building in Energy-efficiency in Industry	2022	3	3	5	1	4	-2	-1	13	4.08	53.04
5	E5 Promotion of Lithium Ion Batteries for Renewable Energy Storage	2022	0	3	5	5	4	-1	-1	15	3.33	49.95
6	E6 Promotion of Sustainable Government Procurement	2023	3	2	3	3	4	-2	-1	12	4.12	49.44
7	E7 Programme to Manage Peak Demand and Energy Savings in Fiji	2022	0	5	3	2	4	-1	-1	12	3.79	45.48
8	E8 Efficient Operation and Maintenance of Water Supply Systems	2022	4	3	3	2	1	-2	0	11	4.08	44.88
9	E9 Assessment, Design and Construction of Low Energy/Carbon Buildings	2022	0	1	4	3	4	-1	-1	10	4.47	44.7
10	E10 Sustainable Cities Programme	2022	3	4	2	2	2	-2	0	11	3.94	43.34
11	E11 Supporting the Implementation of the Green Ports Master Plan	2022	4	2	3	0	1	-2	0	8	4.06	32.48
12	E12 Efficient Operation and Maintenance of Wastewater Treatment Systems	2022	4	0	3	2	1	-2	0	8	4.00	32
13	E13 Developing the Market for Bamboo as a Construction Material	2022	4	1	2	2	1	-2	-2	6	2.94	17.64

EVALUATION FOR PRIORITIES FOR MITIGATION OPPORTUNITIES UNDER TRANSPORT

Priority Rank	Action/Item	Starting	Investment	GHG Mitigation	Private Participation	Social Economic Impacts	Incremental Finance Needs	Technology Inclusion	Environmental Impacts	Evaluation Criteria (EC) Score	Stakeholders Priority (SP) Score	Combined Priority Score
1	T1 National Maritime Action Plan	2021	5	0	4	6	0	-2	0	13	4.29	55.77
2	T2 Alternative Fuels in Land and Maritime Transport	2023	2	5	4	2	4	-2	-1	14	3.60	50.40
3	T3 Outboard Motor Transition	2023	0	3	3	6	3	-1	-1	13	3.82	49.66
4	T4 Vehicle Replacement Program for Cars and Taxis	2020	0	5	4	3	3	-2	-1	12	3.56	42.72
5	T5 Lautoka Zero Carbon Transport Challenge/Strategy	2026	4	0	4	3	3	-1	-1	12	3.50	42.00
6	T6 Aviation Operational Training Programme	2022	4	2	4	0	4	-2	0	12	3.40	40.80
7	T7 Vehicle Replacement Program for Lorries and Buses	2021	0	4	4	3	3	-2	-1	11	3.69	40.59
8	T8 Sail-powered Cargo/Passenger Ferry	2026	2	2	4	6	2	-4	0	12	3.12	37.44
9	T9 End-of-Life Vehicle Programme	2022	4	1	4	1	2	-2	-1	9	3.73	33.57
10	T10 Zero Carbon Passenger Ferry Trials	2024	3	0	4	3	2	-2	0	10	3.35	33.50
11	T11 Bicycle/E-Bike Financing Initiative	2021	3	2	0	6	0	-1	-1	9	3.69	33.21
12	T12 Aircraft Re-Fleetting Programme	2024	0	2	4	6	3	-2	0	13	2.50	32.50
13	T13 Traffic Congestion Reduction Measures	2022	2	5	0	3	1	-2	-1	8	4.00	32.00
14	T14 Airport & Airfield Infrastructure Upgrades	2021	4	1	4	0	4	-2	-2	9	3.44	30.96
15	T15 Bus Network Information Transport System (ITS)	2022	1	3	2	3	2	-2	-1	8	3.50	28.00
16	T16 Electric Vehicle Network Development	2023	0	5	3	1	4	-2	-2	9	3.07	27.63
17	T17 Sustainable Aviation Fuel Integration Initiative	2023	3	2	4	0	4	-4	-1	8	3.30	26.40
18	T18 Land Transport Infrastructure Upgrade for Non-motorised Transport	2021	0	3	0	3	4	-2	-2	6	3.63	21.78

CONSTRAINTS AND OPPORTUNITIES FOR ENABLING ENVIRONMENT

CONSTRAINTS AND ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES IN LAND TRANSPORT		
CONSTRAINT/ BARRIER	STRENGTHENING OPPORTUNITIES	POTENTIAL IMPLEMENTING ENTITY
Market structure	<ul style="list-style-type: none"> Revise tax structure around vehicles and establish lending mechanisms to support a more rapid transition to new land transport technology. Explore technology transfer and trade facilitation with nations manufacturing next-generation land transport technology. Engage with MOE and build inter-ministerial mechanisms for bulk ordering arrangements to bring down per unit costs when procuring government vehicles. Revise vehicle registration pricing to more steeply reflect the relative efficiency of the vehicles being registered. Create concessions at both registration and taxation level for zero-emission transport (both electric and non-motorized items) and mass transit vehicles. 	<ul style="list-style-type: none"> MOE, MCTTT, MIMS, LTA, FRCS, FCCC Development Partners Private Sector
Data accuracy and disclosure	<ul style="list-style-type: none"> Segregate fuel use data distributed to petrol stations to determine emissions attributable to land transport activities. Establish reporting requirements for PSVs and the commercial sector to record and update odometer data to evaluate travel distances across the national vehicle fleet. 	<ul style="list-style-type: none"> FRCS, MCTTT, MIMS, LTA Private Sector
Committed Investment	<ul style="list-style-type: none"> Incorporate new infrastructure and design standards into existing capital investment and maintenance schedule and budget. Procedurally expand active transport capacity as unsealed roads are sealed. Develop incentives for the appropriate decommissioning of assets at the end of their lifecycle. 	<ul style="list-style-type: none"> MOE, MCTTT, MIMS, EFL, FRA Development partners
Awareness	<ul style="list-style-type: none"> Deploy campaign on personal accountability for land transport behaviour choices, emphasizing potential emission reductions. Reinforce co-benefits of land transport behavioural shift with other sectors (health, fitness, poverty reduction, etc.) 	<ul style="list-style-type: none"> MOE, MOH, MCTTT, MIMS, FCCC, FRCS Fiji Police Force Private Sector CROPs (e.g. SPC, SPREP, USP, etc.)
Land Use	<ul style="list-style-type: none"> Incorporate both green space/vegetation and land transport infrastructure (EV charging stations/parking, cycling racks, bus stands, etc.) into zoning and policy guidance. Explore inland and coastal waterway opportunities for reduction of land transport congestion Incentivize the removal of derelict vehicles to reclaim the currently unused/ degraded land footprint. Focus decarbonisation initiatives in areas where committed investment is not prohibitive (i.e. – Lautoka City Decarbonisation Challenge.) 	<ul style="list-style-type: none"> MOE, MCTTT, MIMS, FRA Development Partners Private Sector

CONSTRAINTS AND ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES IN MARITIME TRANSPORT

CONSTRAINT/ BARRIER	STRENGTHENING OPPORTUNITIES	POTENTIAL IMPLEMENTING ENTITY
Financing	<ul style="list-style-type: none"> Blended financing package which provides for the specific needs of each within the sector, recognising that the financing needs for businesses operating inter-island ferries on uneconomic routes are different to those servicing the tourist sector which are different to the individual household using boats for personal use and fishing. 	<ul style="list-style-type: none"> FDB, FRCS, MFED, RBF, ADB
Insurance/Risk Mitigation	<ul style="list-style-type: none"> Underwriting of risk, especially important for the 'first mover' 	<ul style="list-style-type: none"> FDB, MFED, RBF, ICF
Data	<ul style="list-style-type: none"> MSAF could amend vessel survey requirements to include GHG emissions and fuel use data collection and reporting, and require commercially operating vessels to develop and implement a vessel/fleet decarbonisation plan as part of a mandatory SEMP Consolidation of data collection within the maritime transport sector (e.g. MSAF, Fisheries, TPD, FRCS, BOS) 	<ul style="list-style-type: none"> TPD, FRCS, MSAF, BOS, RBF
Coordination	<ul style="list-style-type: none"> Internal government co-ordination and cooperation. Existing stakeholder workshops and meetings, e.g. Transport Consultative Forum 	<ul style="list-style-type: none"> TPD
Human capacity	<ul style="list-style-type: none"> MCST and MTCC are both in process of developing online courses specifically focused on shipping emissions and low-carbon transition. Government scholarships and livelihood programmes can be expanded to prioritise skills relevant to maritime decarbonisation. Existing FMA, FNU and USP TVET training curriculum can be expanded. 	<ul style="list-style-type: none"> USP, FNU, FMA, MTCC, France
Awareness	<ul style="list-style-type: none"> Existing forums, both run by government and private sector organisations already have been raising awareness on the challenge of decarbonising shipping.²¹⁴ Specific targeted public information campaigns on vessel safety could be expanded to incorporate energy-efficiency and emissions reduction. Hosting of green shipping expo/trade event opportunities could be explored. 	<ul style="list-style-type: none"> TPD, MSAF, MCST, MTCC Industry Associations

CONSTRAINTS AND ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES IN AVIATION

CONSTRAINT/ BARRIER	STRENGTHENING OPPORTUNITIES	POTENTIAL IMPLEMENTING ENTITY
Data availability	<ul style="list-style-type: none"> Reporting requirements for aviation operators can be strengthened to improve domestic GHG inventory and accounting efforts either in line with CORSIA standards or using a separate domestic methodology. Airworthiness certification may be tied to reporting mechanisms for monitoring, reporting, and verification of fuel use by domestic aviation operators. 	<ul style="list-style-type: none"> FAL, ATS, CAAF Dept. of Civil Aviation Private Sector
Infrastructure scaling	<ul style="list-style-type: none"> Scoping and siting for the accommodation of larger aircraft may be undertaken at all airports and airfields beyond Nadi International Airport. Preparation for new fuel/power sources (RE capacity, bunkering of new fuel blends, etc.) to power next generation aircraft will enable wider service to outer islands. 	<ul style="list-style-type: none"> FAL, CAAF Development Partners
Subsidies and Incentives	<ul style="list-style-type: none"> New aircraft design and performance standards may be incentivized in the upcoming budget to improve the fleet profile and increase efficiency. The differences in cost between biofuels and standard aviation fuel inputs may be in excess of the offset pricing in the international market. 	<ul style="list-style-type: none"> MOE Dept. of Civil Aviation FRCS, CAAF Private Sector
GHG Accounting & Methodology	<ul style="list-style-type: none"> The CORSIA methodology to be agreed upon by ICAO for international aviation may be robust enough to adapt to domestic GHG accounting. Identifying means of applying measures to reduce emissions while minimizing cost burden to the aviation industry will be an issue to resolve, requiring more data and analysis of both the socio-economic costs and benefits of compliance for Fiji. 	<ul style="list-style-type: none"> Dept. of Civil Aviation CAAF Development Partners CROPS Private Sector
Human Capacity & Training	<ul style="list-style-type: none"> Technical assistance will need to be provided at both a regulator and operator level to deliver the necessary range of training measures to ensure operational performance and safety are ensured. Publicly available certification/qualification courses may be scheduled for both Fiji Airways/Fiji Link and the rest of the private sector. 	<ul style="list-style-type: none"> Dept. of Civil Aviation FAL, ATS, CAAF Development Partners CROPS Private Sector

CONSTRAINTS AND ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES IN POWER & UTILITIES

CONSTRAINT/ BARRIER	STRENGTHENING OPPORTUNITIES	POTENTIAL IMPLEMENTING ENTITY
Lack of Integrated Energy Planning procedure and capacity	<ul style="list-style-type: none"> Capacity building is essential for all the major stakeholders such as EFL, DOE, MOE, MWCPA, TPD, Land Transport Authority, Department of Civil Aviation, FBOS Capacity also needs to be built for collecting the basic energy statistics that is needed for the energy planning process The institutional planning and implementation structure for these also needs to be set up. (this is a common issue for most PICS, and a joint initiative is possible) 	<ul style="list-style-type: none"> CROPS (USP, SPC, SPREP) DOE, EFL ADB, UNDP, GIZ
Management of peak demand	<ul style="list-style-type: none"> Support for introducing Time of Day tariff for medium to large industrial and commercial users. Support for introducing demand reduction measures such as demand side management and demand response programmes (this is a common issue for most PICS, and a joint initiative is possible) 	<ul style="list-style-type: none"> EFL, DOE ADB, UNDP, GIZ, PPA
Water supply and wastewater management	<ul style="list-style-type: none"> Support WAF to assess and improve energy-efficiency in the water supply system, and to build their capacity on this issue Support WAF to assess and improve energy-efficiency in the wastewater system and to build their capacity on this issue 	<ul style="list-style-type: none"> WAF, EFL, FNU ADB, GIZ
Improving supply side efficiency	<ul style="list-style-type: none"> Support stakeholders such as Fijian Government, EFL, traders to develop the market for Li Ion battery for variable renewable energy power storage application, to replace lead acid batteries (this is a common issue for most PICS, and a joint initiative is possible) 	<ul style="list-style-type: none"> EFL DOE UNDP, GIZ, PPA

CONSTRAINTS AND ENABLING ENVIRONMENT STRENGTHENING OPPORTUNITIES IN CITIES & BUILDINGS

CONSTRAINT/ BARRIER	STRENGTHENING OPPORTUNITIES	POTENTIAL IMPLEMENTING ENTITY
Policy and regulatory tools	<ul style="list-style-type: none"> Support could be provided to develop the energy-efficiency building code and a green building rating system. 	<ul style="list-style-type: none"> DOE CROPS (USP, SPC, SPREP) World Bank, ADB, UNDP, IUCN
Professional Capacity	<ul style="list-style-type: none"> Capacity building of relevant professionals in the design, construction, operation and assessment of energy-efficient buildings, development of certification procedure for building energy assessors. Support the development of low-carbon building design and construction guidelines for different building typologies 	<ul style="list-style-type: none"> FNU DOE, CROPS (USP, SPC, SPREP) World Bank, ADB, UNDP, GIZ, FDB, IUCN
Availability of energy-efficient products and materials	<ul style="list-style-type: none"> Support for strengthening and expand the existing standards and labelling programme Support for a sustainable public procurement and cooperative procurement programme will help to develop the market for energy-efficient products, appliances, materials and services Supporting the development of a market for sustainable construction materials like bamboo which could partially replace ore energy intensive building materials 	<ul style="list-style-type: none"> DOE, Fiji Procurement Office, PIDF CROPS (USP, SPC, SPREP) ADB, UNDP, GIZ
Consideration of energy-efficiency in urban planning	<ul style="list-style-type: none"> Support for implementing a comprehensive sustainable cities programme which will help major cities and towns in Fiji to develop targets and action plans to reduce GHG emissions, energy consumption and water consumption, and link with a potential transition to smart cities. 	<ul style="list-style-type: none"> MLG, DOE, Fiji Chamber of Commerce and Industry CROPS (USP, SPC, SPREP) ADB, UNDP, GIZ
Energy-efficiency in the tourism sector	<ul style="list-style-type: none"> Support for implementing a Green Tourism programme, with focus on integrating energy-efficiency in large hotels and commercial buildings 	<ul style="list-style-type: none"> MITT, DOE, Fiji Hotel and Tourism Association, Fiji Chamber of Commerce and Industry ADB, UNDP, GIZ

FINANCIAL INSTRUMENTS AND SOURCES OF FINANCE

POTENTIAL FINANCIAL INSTRUMENTS AND SOURCES OF FINANCE IN LAND TRANSPORT		
TYPE OF FINANCIAL INSTRUMENT	DESCRIPTION OF THE FINANCIAL INSTRUMENT	POTENTIAL SOURCES OF FINANCE
Finance Grants	Financial grants will be of particular use in the co-financing of infrastructure projects supported in part by concessional loans (such as the Active Transport Infrastructure Upgrade or Bus Network Information Transport System).	ADB, WB, PRIF, bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.)
Technical Assistance and Capacity Building Grants	Technical assistance and capacity building grants will be essential for ensuring monitoring and evaluation of emission reduction interventions are undertaken by local ministerial and agency personnel and are effective in both supporting emission reduction activities and documenting their effectiveness. This will be useful in establishing a strengthened local technical foundation for all projects in the pipeline.	ADB, WB, EU, GGGI, GIZ, JICA, etc.
Concessional Loans	Concessional loans will likely be packaged with any infrastructure investment supported by the multilateral development banks. This will be pertinent for the active transport infrastructure upgrade and solar streetlight network, as well as getting a multi-modal transit initiative up and running.	ADB, WB, EIB
Commercial & Retail (Personal) Loans, Revolving Loans	Any commercial and retail loan facilities set up to support decarbonised land transport activities will be more attractive if packaged as revolving funds which are dedicated accounts to replenish themselves through continued participation and payback on the principal lending amount. This will be particularly useful for EV network development (both vehicles and charging systems) and bicycle/e-bike financing.	FDB, Commercial Banks, IFC
State Budget	State budgetary considerations will come into play regarding both considerations around revenue from taxation that may be lost, and ministerial/programmatic budgets to support social initiatives throughout the country. State budget will likely be mobilized to co-finance ODA and concessional loans, as in the previous road rehabilitation project. ²¹⁵	MOE
Taxes: Duty/Excise, corporate, personal...	In order to motivate a transition towards decarbonisation in the market, the government will have the opportunity to adjust tax rates at each stage of collection to incentivize certain land transport-related products and make products with greater carbon intensity less attractive. This will be instrumental in the EV network development, as well as taxation around transit vehicles and bicycles/e-bikes.	MOE, FRCS
Personal Savings, Income, and Remittances	Whatever available liquidity in the market will need to be leveraged for spending by the general public at a business and household level. How people allocate their cash towards land transport spending will depend heavily on the options provided to them and the mobility provided for cost – this will be pertinent in the context of EV uptake and the bicycle/e-bike financing initiative.	Private sector
Insurance	The liabilities associated with exacerbating climate change may be incorporated into insurance mechanisms. This may apply to securitizing infrastructure assets, as well as the range of vehicles which will be introduced. Loss & Damages and insurance were significant components of Fiji's COP23 president, so mechanisms to deliver this should be considered.	IFC, WB, GCF, private sector, bilateral funds
Guarantees	Lending instruments may be made more attractive through guarantees (for debt and payment) provided by multilateral funding institutions to offset risk associated with any project in the pipeline.	ADB, WB, GCF

Special Commercial Loans	Special commercial loans will be of relevance in making larger purchases (such as heavy industrial equipment, buses, EV charging systems, etc.) and certain emissions/performance standards can be established to make low emission investments have more attractive payback rates.	FDB, Commercial Banks, IFC
Monetary intelligence	Monetary intelligence is relevant in the context of both national planning decision-makers and general behavioural economics as observed in the general public. Shifting from the BAU scenario will involve promoting recognition of the cost factors associated with fossil fuel dependence for land transport at both a national and household/business level if deviation from the LEDS projection is expected.	RBF, UN, CROPS (USP, SPC, SPREP) WB, IFC

POTENTIAL FINANCIAL INSTRUMENTS AND SOURCES OF FINANCE IN MARITIME TRANSPORT

TYPE OF FINANCIAL INSTRUMENT	DESCRIPTION OF THE FINANCIAL INSTRUMENT	POTENTIAL SOURCES OF FINANCE
Finance Grants	<p>Grants for trials to retrofit RE technologies on existing Government (and SOE) assets and infrastructure. Grants for trials of government (and SOE) owned/operated new build RE vessels, assets, infrastructure and approaches, for example pilot trial for GSS vessel Neoliner and other trials of low/zero carbon measures on Government vessels.</p> <p>Grants to provide co-financing for private sector projects to trial zero carbon shipping approaches (as a significant but not major share of total project cost)</p>	ADB, WB, IFC, PRIF, GEF, GCF, bilateral partners, MTCC and other IMO initiatives
Technical Assistance and Capacity Building Grants	<p>Technical assistance to prepare and adopt reports, studies, plans as needed e.g. National Action Plan, Lautoka integrated transport decarbonisation, Outboard motor data collection and analysis, review of fiscal policies, etc.</p> <p>Grants for building capacity of Fiji stakeholders to access financing, administer and monitor trials, and to coordinate an integrated programme of transport decarbonisation</p> <p>Scholarships (bonded) for seafarers, maritime transport planning, maritime tourism, RE/low-carbon shipping, surveying, naval architecture, marine engineering, etc.</p>	ADB, WB, PRIF, GEF, GCF, GGGI, IMO
Loans	Revolving concessional low interest loans for private sector for retrofit of energy-efficiency and purchase of new vessels involved in inter-island transport and fishing, and for households/individuals for purchase of the most energy-efficient outboard motors or deployment of demonstrated solutions to reduce or remove fossil fuel use in domestic shipping	FDB, IFC, WB, Investment banks,
Guarantees	Lending instruments may be made more attractive through guarantees (for debt and payment) provided by multilateral funding institutions to offset risk associated with any project in the pipeline.	ADB, WB, GCF
Import-excise/duties	<p>Review and amendment of existing fiscal policies to better align with emissions reduction e.g. removal of tax and import duties on lithium ion accumulators (rechargeable batteries) and highly energy-efficient motors, sails, machinery and equipment (e.g. electric outboard motors and recharging equipment), spare parts etc.</p> <p>Incremental increase in tax and duties of imported vessels and motors (e.g. 2 stroke and 4 stroke outboards) and spares reliant on fossil fuels over time (phased implementation).</p>	MOE, FRCS
Corporate taxes	Tax holidays for corporate investment in shipping decarbonisation initiatives including land-based RE electric recharging and maintenance facilities for e-outboards. ECAL earmarking of maritime transport decarbonisation (mitigation) projects. ²¹⁶	MOE, FRCS

Insurance/ Underwriting	Underwriting of commercial and personal loans to reduce the risks being taken by private sector and individuals in taking loans and investing in low/zero carbon sea transport.	Insurance Companies, Donor Partners
State budget	Allocation for additional costs to incorporate GHG emissions reduction potential in purchase of new vessels and motors. Allocation for preparation of GHG mitigation vessel plans and guidelines (including operations) for government owned boats. Prioritisation of maritime emissions mitigation skills development for government scholarship allocations. Inclusion of decarbonisation of transport into other local government planning processes. Additional allocation for dedicated staff positions for GHG emissions reduction for maritime transport sector.	MCTTT, Navy, Police, MAFF, Education, Health
FCCC - indirect subsidies (price setting)	Increasing prices for premix and ADO over time. ²¹⁷	Consumers
MCTTT – Shipping Franchise Scheme and Sea Route Licenses	Amendment of contracts/licences with companies to deliver services on economic and uneconomic routes to include: requirement to submit vessel/fleet emission reduction plans in line with 40% reduction by 2030 and 100% by 2050 and requirement to report annual progress based on annual fuel use data and GHG emissions analysis	National budget
Port fees/ levies	E.g. review of levies and port fees charged on visiting international cruise liners and other ships based on their GHG emissions profile.	Consumers
Personal Savings, Income, and Remittances	How the general public at a business and household level decide to spend their money will depend heavily on the options and information provided to them. This is particularly relevant in regard to outboard motor purchasing decisions.	Private sector Households/individuals

POTENTIAL FINANCIAL INSTRUMENTS AND SOURCES OF FINANCE IN AVIATION

TYPE OF FINANCIAL INSTRUMENT	DESCRIPTION OF THE FINANCIAL INSTRUMENT	POTENTIAL SOURCES OF FINANCE
Finance Grants	Financial grants may contribute particularly towards the investment need to upgrade the 13 domestic airports (as well as expectations for the Labasa-based Vanua Levu airport to be upgraded to international status), as the international airport upgrades are expected to be undertaken with grant support.	ADB, WB, bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.)
Technical Assistance and Capacity Building Grants	CAAF certification and inspection criteria will require updates in accordance with new technology, and training for the sector around this would most appropriately be facilitated with technical assistance and capacity building grants.	ADB, WB, EU, GGGI, GIZ, JICA, etc.
Concessional Loans	Given the role of the national airline, concessional loans will likely be the most readily available mechanism for obtaining financing for re-fleeting with new aircraft, and access must be broadened to the private sector through either sub-leasing arrangements or other secondary loan instruments.	ADB, WB, EIB, GCF.
Special Commercial Loans	FNPF has already been drawn upon to finance the re-fleeting of Fiji Airways' international service aircraft. A similar arrangement may be expected for domestic aircraft given the prompt payback schedule for the previous loans.	FNPF, FDB
Guarantees	Guarantees may be provided to reduce the risk associated with investing in high-value assets such as aircraft, particularly if spending is budgeted by the Ministry of Economy.	WB, ADB, EIB
State Budget	Expenditures for Dept. of Civil Aviation may be supplemented through the State budget, and the CAAF operation budget may be assumed to come from the State budget in its entirety, which will be essential for providing regulatory oversight of the aviation sub-sector and M&E on associated emissions. This may also involve tax waivers/concessions to the private operators for making efficiency improvements.	MOE, FRCS

POTENTIAL FINANCIAL INSTRUMENTS AND SOURCES OF FINANCE IN POWER & UTILITIES

TYPE OF FINANCIAL INSTRUMENT	DESCRIPTION OF THE FINANCIAL INSTRUMENT	POTENTIAL SOURCES OF FINANCE
Finance Grants	<p>For households and EFL currently using lead acid Batteries, a minimum subsidy for replacing it with Li Ion is being proposed.</p> <p>For EFL for implementing the TOD tariff, a subsidy on the cost for new meters and software and for software maintenance expenses.</p> <p>For households participating in the DSM programme, a minimum subsidy to purchase energy labelled appliances</p> <p>Fully subsidy of the cost of physical investments being proposed to be made by WAF in the water supply system and in the wastewater treatment system.</p> <p>Support for setting up proper systems for safe disposal of Li Ion battery.</p>	<ul style="list-style-type: none"> • ADB, EU, WB, IFC • GEF, GCF • Bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.) • GIZ, UNDP (may come from above)
Technical Assistance and Capacity Building Grants	<p>Grant funding of at least 70 % of the cost of the capacity building and technical assistance needs for all the energy-efficiency projects being proposed.</p>	<ul style="list-style-type: none"> • ADB, EU, WB, IFC • GEF, GCF • Bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.) • GIZ, UNDP, GGGI, UNESCAP, IRENA (may come from above)
Concessional Loans (and mezzanine loans)	<p>Low interest loans for funding:</p> <ul style="list-style-type: none"> • Households for replacing lead acid with Li Ion batteries for off-grid applications • EFL for replacing lead acid with Li Ion batteries for on-grid storage and for new installations • Commercial importer/traders for bulk procurement of energy-efficient appliances and lighting products for distribution through DSM programme • Households for purchasing energy-efficient appliances under the DSM programme 	<ul style="list-style-type: none"> • ADB, WB, IFC, EIB, FDB • GEF, GCF
Guarantees	<p>Debt and/or payment guarantees can be used to secure debt for all the larger concessional loan programmes being proposed such as the purchases of Li Ion battery energy storage systems (BESS) or appliances under the DSM programme.</p>	<ul style="list-style-type: none"> • ADB, IFC, GCF, EIB, EXIM banks
Monetary Liquidity	<p>The DSM programme is cash heavy requiring US\$ hundreds of millions to implement, and there may need to be a targeted liquidity injection of FJ\$ to facilitate the investment in the financial market (and financial products). As well since nearly all DSM investments will require imports, the US\$ reserve of Fiji should be closely monitored (but this may be offset by lower energy imports).</p>	<ul style="list-style-type: none"> • RBF
State Budget	<p>30% of the initial investments would be needed for the following, which is in proportion to Fiji's unconditional commitment under the NDC:</p> <ul style="list-style-type: none"> • Technical Assistance and Capacity Building through in-kind contributions, for all the proposed projects • Setting up of proper systems for safe disposal of Li Ion battery 	<ul style="list-style-type: none"> • Fijian Government

Insurance	<p>Special purpose insurance may be required for the scale of on-grid Li Ion battery energy storage systems (BESS) envisioned, as these are technically non-revenue generating assets, and are susceptible to be damaged from fire, severe weather, and improper maintenance.</p> <p>Insurance is also proposed for the product testing facilities to be established under the Standards and Labelling programmes, especially for the more sophisticated instruments and machinery that might be procured.</p>	<ul style="list-style-type: none"> • Private Sector Provider (ADB, WB, IFC, EIB, FDB)
Taxes: Excise, corporate, personal... etc.	<p>In general, in order to motivate a transition towards efficient equipment/technology the Government can lower and/or remove excise/duties on imported high energy-efficient appliances and equipment. As well as provide corporate and/or personal tax rebates/deductions for the investment in energy-efficient appliances and equipment.</p> <p>For the DSM programme, 25 % of indirect subsidy (lower import duty and taxes) could be provided on specified energy labelled appliances under the DSM programme which will be passed on to households through traders (wholesalers/retailers)</p>	<ul style="list-style-type: none"> • Fijian Government
Personal Savings, Income, and Remittances	<p>The liquidity in the market will provide a basis for spending by the general public at a business and household level. How people allocate their cash towards their homes and businesses will depend heavily on the options provided to them.</p>	<ul style="list-style-type: none"> • Private sector

POTENTIAL FINANCIAL INSTRUMENTS AND SOURCES OF FINANCE IN CITIES & BUILDINGS

TYPE OF FINANCIAL INSTRUMENT	DESCRIPTION OF THE FINANCIAL INSTRUMENT	POTENTIAL SOURCES OF FINANCE
Finance Grants	<p>80% of the initial investment needs of the Government to retrofit existing government buildings, to meet the requirements of the proposed EEBC (mandatory) and the Green Building rating schemes (voluntary)</p> <p>100% of the incremental cost of households to retrofit existing buildings and houses for meeting the requirements of the proposed EEBC (mandatory) and green building rating system (voluntary)</p> <p>70% of the initial investment needed by FRA for converting existing streetlights to LED based streetlights</p> <p>70% of the initial investment for establishing a centre of excellence on bamboo for its use in the construction sector.</p> <p>70% of the initial investment by FPCL for improving energy-efficiency in the various ports under its control.</p>	<ul style="list-style-type: none"> • ADB, EU, WB, IFC • GEF, GCF • Bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.) • GIZ, UNDP (may come from above)
TA/CB Grants	<p>70% of the funding for the capacity building and technical assistance needs for developing policy and technical tools, stakeholder capacities, awareness raising, support for procurement and technical advisory support...etc.</p>	<ul style="list-style-type: none"> • ADB, EU, WB, IFC • GEF, GCF • Bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.) • GIZ, UNDP, GGGI (may come from above)
Concessional Loans (and mezzanine loans)	<p>Low interest loans for funding for the cost of physical investments in private sector building retrofits, and for the initial investment by FRA for retrofitting existing streetlights with LED lights.</p>	<ul style="list-style-type: none"> • ADB, WB, IFC, EIB, FDB • GEF, GCF
Guarantees	<p>Debt and/or payment guarantees can be used to secure debt for all concessional loans being proposed</p>	<ul style="list-style-type: none"> • ADB, IFC, GCF, EIB

State Budget	<p>20% of the initial investments (retrofit) being proposed for Government owned buildings and infrastructure that meet the requirements of the EEBC and/or the green building rating system.</p> <p>30% of the initial investment needed by FRA for converting existing streetlights to LED based streetlights</p> <p>30% of the initial investment for establishing a centre of excellence on bamboo for its use in the construction sector.</p> <p>30% of the initial investment by FPCL for improving energy-efficiency in the various ports under its control.</p>	<ul style="list-style-type: none"> • Fijian Government
Taxes: Excise/duty, corporate, personal, stamp... etc.	<p>In order to motivate a transition towards decarbonisation in the building sector, the Government has an opportunity to adjust tax rates at each stage of collection in the sector to incentivize certain construction and retrofitting to make low-carbon practices more attractive.</p> <p>This can be to lower and/or remove excise/duties on imported high energy-efficient materials and equipment. As well as provide corporate and/or personal tax rebates/deductions for the investment in energy-efficient materials and equipment, as well as lowering the stamp duty for building meeting high energy-efficiency ratings.</p> <p>Indirect subsidy for hotels and commercial buildings participating in the proposed project E7, in the form of partial reimbursement of the ECAL levy</p>	<ul style="list-style-type: none"> • Fijian Government
Personal Savings, Income, and Remittances	<p>The liquidity in the market will provide a basis for spending by the general public at a business and household level. How people allocate their cash towards their homes and businesses will depend heavily on the options provided to them in construction materials, building code enforcement.</p>	<ul style="list-style-type: none"> • Private sector

POTENTIAL FINANCIAL INSTRUMENTS AND SOURCES OF FINANCE IN APPLIANCES, GOVERNMENT, AND INDUSTRY

TYPE OF FINANCIAL INSTRUMENT	DESCRIPTION OF THE FINANCIAL INSTRUMENT	POTENTIAL SOURCES OF FINANCE
Finance Grants	Grant funding for 70% of the investment needs for establishing product testing facilities for 5 products as part of the Standards and Labelling programme	<ul style="list-style-type: none"> • ADB, EU, WB, IFC • GEF, GCF • Bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.) • GIZ, UNDP (may come from above)
Technical Assistance and Capacity Building Grants	<p>Grant funding for 70% of the capacity building and technical assistance needs for enhancing the Standards and Labelling (SL) under the project titled "Strengthening and expanding the standards and labelling programme for appliances in Fiji" as well as, for the project titled "Promotion of sustainable procurement in Fiji".</p> <p>Grant funding for 70% of the cost for capacity building and technical assistance needs for industrial energy audits, planning and implementation, as well as for other capacity building efforts, including setting up a certification process for energy auditors.</p>	<ul style="list-style-type: none"> • ADB, EU, WB, IFC • GEF, GCF • Bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.) • GIZ, UNDP, GGGI (may come from above)

Special Purpose Commercial & Retail (Personal) Loans, Revolving Loans	<p>Commercial and retail loan facilities set up to support energy-efficient appliances for the private sector. This can build upon the existing FDB and commercial bank lending programmes.</p> <p>Any commercial and retail loan facilities set up to support energy-efficient equipment for the private sector. This can build upon the existing FDB and commercial lending programmes.</p>	<ul style="list-style-type: none"> • FDB, IFC, Commercial Banks
Concessional Loans	Concessional loans for 60% of the initial investment needed for energy-efficiency measures be provided for 50 industrial facilities that will participate in the proposed energy-efficiency programme for industries (E13)	<ul style="list-style-type: none"> • ADB, EU, WB, IFC GEF, GCF
Guarantees	Debt and/or payment guarantees for commercial loans, or revolving loan facilities.	<ul style="list-style-type: none"> • ADB, IFC, GCF, EIB
State Budget	<p>30% of the cost for capacity building and technical assistance needs for all projects proposed</p> <p>30% of the initial investment needs for establishing product testing facilities for 5 products as part of the support programme for Standards and Labelling (E11)</p>	<ul style="list-style-type: none"> • Fijian Government
Taxes: Import/Excise, corporate, personal, etc.	<p>In order to motivate a transition towards energy-efficient products/appliances the Government may lower taxes/duties/excise on energy-efficient products/appliances and increase the same on less efficient appliances.</p> <p>In order to motivate a transition towards energy-efficient technology the Government may lower taxes/duties/excise on technology and increase the same on less efficient equipment.</p> <p>A proven means for encouraging energy-efficiency in any sector is to provide a policy package involving incentives, penalties and awareness raising, e.g. allowing for ECAL tax rebates for companies investing in energy-efficiency, increasing rebates for good power factor, including larger and energy intensive industries under a Time of Day Tariff, increasing penalties for crossing peak demand and for low power factor, etc .</p>	<ul style="list-style-type: none"> • Fijian Government
Private equity, Personal Savings, Income, and Remittances	<p>The liquidity in the market will provide a basis for spending by the general public at a business and household level. How people allocate their cash towards their homes and businesses will depend heavily on the options provided to them in appliances.</p> <p>The liquidity in the market will provide a basis for spending by the businesses. Businesses allocate equity towards investment based on the options provided to them in other financial instruments and their understanding of energy savings.</p>	<ul style="list-style-type: none"> • Private sector

ENERGY-EFFICIENCY SECTOR PRIMARY MITIGATION OPTIONS	ANNUAL MITIGATION IN 2030 (tCO ₂ /YR)	TOTAL	MITIGATION IN 2030	TOTAL	2020 - 2022		2026 - 2030	
					CB & TA	INVEST	CB & TA	INVEST
E1 Capacity Building for Integrated Energy Planning and Energy Statistics in Fiji	75,000	-	0.12	-	0.32	-	0.04	-
E2 Programme to Promote Enhanced Green Tourism	1,000	-	0.49	-	2.78	1.80	0.92	3.20
E3 Strengthening and Expanding the Minimum Energy Performance and Labelling Standards (MEPLS)	41,000	-	0.30	-	0.89	7.50	0.25	2.50
E4 Capacity Building in Energy Efficiency in Industry	15,000	-	0.29	-	2.88	1.80	0.89	3.20
E5 Promotion of Lithium Ion Batteries for Renewable Energy Storage	14,000	-	0.19	-	0.38	44.51	0.59	139.68
E6 Promotion of Sustainable Government Procurement	7,000	-	0.30	-	0.89	-	0.25	-
E7 Programme to Manage Peak Demand and Energy Savings in Fiji	259,000	-	0.28	-	0.51	122.15	0.50	580.04
E8 Efficient Operation and Maintenance of Water Supply Systems	41,000	-	0.26	-	0.88	1.70	0.36	2.40
E9 Assessment, Design and Construction of Low Energy/Carbon Buildings	3,000	-	0.38	-	0.53	57.85	0.46	121.39
PRIMARY OPTIONS TOTAL COSTS (US\$M)	-	1,106.12	2.60	-	10.06	236.81	4.24	852.41
PRIMARY OPTIONS TOTAL MITIGATION (tCO₂)	456,000	1,586,000	-	-	77,000	-	1,509,000	-
ENERGY-EFFICIENCY SECTOR SECONDARY MITIGATION OPTIONS								
E10 Sustainable Cities Programme	1,000	-	0.72	3.52	0.96	0.23	-	0.48
E11 Supporting the Implementation of the Green Ports Master Plan	2,000	-	0.18	0.50	2.00	0.07	-	1.00
E12 Efficient Operation and Maintenance of Wastewater Treatment Systems	-	-	0.53	0.93	1.60	0.33	-	3.20
E13 Developing the Market for Bamboo as a Construction Material	52,000	-	0.78	0.65	2.00	0.15	-	-
SECONDARY OPTIONS TOTAL COSTS (US\$M)	-	19.33	1.71	5.60	6.56	0.78	-	6.68
SECONDARY OPTIONS TOTAL MITIGATION (tCO₂)	55,000	180,000	-	9,000	-	171,000	-	-

TRANSPORT SECTOR PRIMARY MITIGATION OPTIONS	ANNUAL	TOTAL	TOTAL		2020 - 2022		2026 - 2030	
	MITIGATION IN 2030 (tCO ₂ /YR)		MITIGATION IN 2030		CB & TA	INVEST	CB & TA	INVEST
T1 National Maritime Action Plan	-	-	0.22	-	0.17	-	0.25	-
T2 Alternative Fuels in Land and Maritime Transport	42,000	-	0.20	-	0.88	26.00	0.08	10.00
T3 Outboard Motor Transition	16,000	-	0.17	18.57	0.09	59.65	0.10	36.34
T4 Vehicle Replacement Program for Cars and Taxis	59,000	-	0.83	239.49	0.08	149.94	0/13	135.49
T5 Lautoka Zero Carbon Transport Challenge/ Strategy	-		-	-	0.80	-	0.20	-
T6 Aviation Operational Training Programme	7,000	-	2.00	-	0.32	-	0.18	-
T7 Vehicle Replacement Program for Lorries and Buses	36,000	-	0.60	38.65	0.08	38.70	0.13	57.06
T8 Sail-powered Cargo/ Passenger Ferry	8,000	-	-	-	0.55	35.00	0.80	-
T9 End-of-Life Vehicle Programme	2,000	-	0.35	4.00	0.04	0.38	0.06	0.63
T10 Zero Carbon Passenger Ferry Trials	1,000	-	0.11	-	0.01	9.20	-	-
T11 Bicycle/E-Bike Financing Initiative	8,000	-	1.13	0.75	1.69	1.71	-	2.78
PRIMARY OPTIONS TOTAL COSTS (US\$M)	-	875.52	5.60	301.45	4.69	320.07	1.92	241.79
PRIMARY OPTIONS TOTAL MITIGATION (tCO ₂)	179,000	1,186,000	123,000	-	259,000	-	804,000	-
TRANSPORT SECTOR SECONDARY MITIGATION OPTIONS								
T12 Aircraft Re-Fleeting Programme	5,000	-	1.04	-	1.15	46.00	2.30	230.00
T13 Traffic Congestion Reduction Measures	7,000	-	4.36	5.16	5.85	7.74	9.75	12.89
T14 Airport & Airfield infrastructure Upgrades	2,000	-	0.97	-	1.29	18.56	0.71	30.94
T15 Bus Network Information Transport System (ITS)	18,000	-	2.10	23.15	2.57	30.32	4.28	51.11
T16 Electric Vehicle Network Development	30,000	-	3.88	55.14	2.97	180.26	4.95	356.78
T17 Sustainable Aviation Fuel Integration Initiative	16,000	-	0.46	4.00	-	2.60	-	-
T18 Land Transport Infrastructure Upgrade for Non-motorised Transport	3,000		279.20	-	568.75	1,067.57	51.74	2,668.93
SECONDARY OPTIONS TOTAL COSTS (US\$M)	-	5,739.45	292.01	87.45	582.57	1,353.05	73.73	3,350.66
SECONDARY OPTIONS TOTAL MITIGATION (tCO ₂)	81,000	537,000	36,000	-	138,000	-	363,000	-



REFERENCE

ENDNOTES

1. Fiji's Intended Nationally Determined Contribution, Republic of Fiji, 2015.
2. Does not include all capital investments due to the limited availability of information needed to quantify activity and the investment costs for some of the mitigation opportunities.
3. The investment costs do not include the cost of finance.
4. The investment costs do not include the cost of finance.
5. [Value of FJ\$10.73B = US\$5.26B] FBOS (2019) "Fiji's Gross Domestic Product (GDP) 2018" Release No: 72, 2019, Fiji Bureau of Statistics.
6. [Value of FJ\$3.67B = US\$1.8B] Government of Fiji (2020) "Hon. Aiyaz Sayed-Khaiyum's 2020-2021 National Budget Address" 17th July 2020. <https://www.Fiji.Gov.Fj/media-centre/speeches/hon-aiyaz-sayed-khaiyum-s-2020-2021-national-budge>
7. Rating: Fiji Credit Rating, 2020: <https://countryeconomy.com/ratings/fiji>
8. Fiji Country Profile, CIA Factbook. <https://www.cia.gov/library/publications/the-world-factbook/geos/fj.html>
9. 2017 Population and Housing Census – Release 3, Fiji Bureau of Statistics, 2018
10. [Value of FJ\$10.73B = US\$5.26B] FBOS (2019) "Fiji's GROSS DOMESTIC PRODUCT (GDP) 2018" Release No: 72, 2019, Fiji Bureau of Statistics. Fiji Bureau of Statistics (2020) "Statistical News". <https://secureservercdn.net/72.167.241.46/4f6.bca.myftpupload.com/wp-content/uploads/2020/01/FBoS-Rel-No.-02-2020-Provisional-Visitor-Arrivals-2019.pdf>
11. Third National Communication, Republic of Fiji, 2020.
12. Fiji's Intended Nationally Determined Contribution, Republic of Fiji, 2015.
13. A Green Growth Framework for Fiji, Republic of Fiji, 2014.
14. "Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement", 18/CMA.1, UNFCCC: 2019.
15. Note that only CO₂ emissions, and no other GHGs, are addressed in this NDC Investment Plan because the energy sector targets in Fiji's (Intended) NDC only include CO₂ emissions.
16. A few examples of partial lack of accurate data or unknown level of activity are: a current economy wide and bifurcated energy balance, record of individual energy use by companies in industry and commercial/hospitality operations, distribution of derelict vehicles that need to be removed from the environment, and detailed count of operational out-board motors.
17. The assumptions for each mitigation opportunity are found in Annex A: Programme Pipeline - Concept Notes.
18. These include but are not limited to improving energy and transport statistics via individual studies/surveys or further inclusions in population/household census, improved categorisation of customs data, improved disaggregation of fuels use, transport behaviour studies... etc.
19. Where there is a higher level of error in the raw data, there is a corresponding higher level of error in the estimated costs. The majority of data made available for the determining activity, mitigation, and investment does not have a corresponding level of error provided. Assumptions made for activity, mitigation, and investment are included in Annex A: Programme Pipeline - Concept Notes.
20. The cost of financing is not included in the estimated investment and support needs. The costs for financing are highly variable across the Pacific Region and dependent on the specific financial instruments and financing partners chosen. In addition, this technical assistance activity does not include a financial analysis of the mitigation opportunities.
21. It is noted that there are some additional secondary policies, strategies, and plans not listed.
22. Pacific Blue Shipping Partnership Concept Note, https://mcst-rmiusp.org/images/Projects/PBSP2019/PBSP_Concept_Note_Feb_2020.pdf
23. COP23 (2019), "We all know that a healthy and functioning ocean is the single most important factor influencing climate." – PM Frank Bainimarama's Remarks at the High-Level Panel on a Sustainable Ocean Economy." <https://cop23.com.fj/we-all-know-that-a-healthy-and-functioning-ocean-is-the-single-most-important-factor-influencing-climate/>
24. MCTTT (2020) "Decarbonising Domestic Shipping Industry: Pacific Blue Shipping Partnership".

<https://www.mcttt.gov.fj/publications-resources/press-release/decarbonising-domestic-shipping-industry-pacific-blue-shipping-partnership/?fbclid=IwAR1mBCPHoXyfVr5ExJqb-NGe5Y9hPrNR0LU8Q325BiObPO42uvsY0VY1sGo>

25. PCREEE Website, <https://www.pcreee.org/>
26. Pacific Appliance Labelling and Standards Programme Evaluation Report, http://prdrse4all.spc.int/sites/default/files/final_pals_evaluation_report.pdf
27. See for example “#17 Miniseries on COVID-19 and Inequality: Responses from the Pacific Ocean”, Global Research Programme on Inequality (GRIP). <https://gripinequality.org/2020/05/17-miniseries-on-covid-19-and-inequality-responses-from-the-pacific-ocean/>
28. “The Hybrid Revolution” Dr. Sakul Kundra and Dr Mumtaz Alam, Fiji National University: 2018. <https://www.fnu.ac.fj/new/uncategorised/2531-the-hybrid-revolution>
29. See Section 1.3.3
30. “Fiji Airways takes delivery of its first of two A350 XWBs”, Airbus: 2019. <https://www.airbus.com/newsroom/press-releases/en/2019/11/fiji-airways-takes-delivery-of-its-first-of-two-a350-xwbs.html>
31. Republic of Fiji – Staff Report for the 2018 Article IV Consultation, pg. 23, IMF: 2019 <https://www.imf.org/en/Publications/CR/Issues/2019/02/15/Fiji-2018-Article-IV-Consultation-Press-Release-and-Staff-Report-46614>, Table 7 page 115 <http://www.parliament.gov.fj/wp-content/uploads/2020/07/Economic-and-Fiscal-Update-Supplement-to-the-2020-2021-Budget-Address.pdf> and <https://tradingeconomics.com/fiji/imports-by-category>
32. Republic of Fiji – Staff Report for the 2018 Article IV Consultation, pg. 35, IMF: 2019 <https://www.imf.org/en/Publications/CR/Issues/2019/02/15/Fiji-2018-Article-IV-Consultation-Press-Release-and-Staff-Report-46614>
33. <https://www.adb.org/countries/fiji/main>
34. See Newell, A. (in press) Covid-19 and Cyclone Harold – Lockdown in the Pacific in Chapter 4 Covid-19: Lessons learned from first hand experiences. Experience of SIDS: Small island developing states in the Pacific, Review of Maritime Transport. UNCTAD, Geneva.
35. “LAND TRANSPORT ACT 1998” Republic of Fiji, http://www.pacii.org/fj/legis/num_act/Ita1998180/Ita1998180.html
36. Annual Report 2016, Fiji Roads Authority: 2016 <http://www.fijiroads.org/annual-report-2016/>
37. LTA vehicle registration data for 2018, Land Transport Authority (LTA): 2019
38. Import of vehicles 2017 – 2019, Fiji Revenue and Customs Service (FRCS): 2020
39. Ministry of Economy is also seeking to become a direct access entity of the GCF.
40. Accurately quantifying land transport activities for vehicles (Including the number of each vehicle type, emissions by type, distance travelled, etc.) and future infrastructure needs, in the sub-sector continues to prove difficult in Fiji due to a lack of detail and/or disaggregated information.
41. Number (T#) is the priority of the opportunity within the transport sector.
42. For total sub-sector mitigation in 2030 and from 2020-2030, 75% of the actual total values are used, this is because several of the land transport opportunities have a degree of interdependent impacts on each other’s emissions reduction.
43. List of Legislation, MASF: 2020, <https://msaf.com.fj/legislation/>
44. List of Legislation, MASF: 2020, <https://msaf.com.fj/legislation/>
46. <https://www.frsc.org.fj/wp-content/uploads/2019/06/2019-2020-Summary-of-Revenue-Policies-Final.pdf>
47. MSAF (pers comm). Data provided here combines vessels registered as at September 2016, plus ships registered between January 2017- December 2019. Note: A Registry – is generally “for life” of the vessel, where B Registry – vessels are required to re-register every 5 years (Jan 2020). Fiji Naval vessels have been added to this compilation.
48. ‘Pleasure craft’ are those vessels which are owned and used for personal purposes, e.g. vessels not being used in commercial or public shipping services.
49. About the MTCC-Pacific Project: 2020 <http://mtccpacific.spc.int/about-the-project/>
50. Micronesian Center for Sustainable Transport (MCST): 2020 <https://www.mcst-rmiusp.org/>

51. Maritime Transport Policy 1.1.16 General policy for CSO funding directs how funding decisions are to be made in regards to maritime transport funding for CSO purposes. These could be amended to include decarbonisation/energy-efficiency criteria.
52. Visitor Arrivals, FBOS: 2019. <https://www.statsfiji.gov.fj/latest-releases/tourism-and-migration/visitor-arrivals>
53. <http://www.civilaviation.gov.fj/domestic.php>
54. https://www.caaf.org.fj/index.php?option=com_jdownloads&Itemid=999999&task=finish&cid=1202&catid=281
55. <https://corporate.southpacificislands.travel/newly-renovated-nadi-airport-officially-opened/>
56. <https://fijisun.com.fj/2019/12/15/nadi-international-airport-to-undergo-3-billion-expansion/>
57. Fiji Link, Northern Air, Pacific Island Air, Sunflower Aviation, HeliPro, Island Hoppers, and SkyDive Fiji, as well as flight schools (Advance Aviation Training and Pacific Flying School), and private aircraft operated by Laucala, Turtle Island, Vatuvara, and Wakaya resorts.
58. Number (T#) is the priority of the opportunity within the transport sector.
59. Energy Fiji Limited (2020). Annual Report 2019: <http://efl.com.fj/about-us/company-information/company-reports/>
60. Ministry of Economy, Government of Fiji, Fiji Low Emission Development Strategy 2018-2050, 2018
61. Water Authority of Fiji, Waste Water Treatment Plants, 2020: <http://www.waterauthority.com.fj/en/waste-water-treatment-plants>
62. Stakeholder interview with WAF, 2019.
63. US EPA (2020) "Energy-efficiency for Water Utilities". <https://www.epa.gov/sustainable-water-infrastructure/energy-efficiency-water-utilities#:~:text=As%20much%20as%2040%20percent,months%20to%20a%20few%20years.>
64. Number (E#) is the priority of the opportunity within the energy-efficiency sector.
65. The Time of Day tariff will compose of a higher tariff during the peak period, compared to the off-peak period, thereby encouraging end users to shift non-critical consumption to off-peak period or to use less during peak period.
66. The DR programme will identify certain class of consumers and equipment usually from among industrial and commercial consumers that can be organised to operate flexibly, so that stress on the grid is avoided and peaks of the grid load curve can be smoothened. In mature power markets, utilities will provide an incentive to those end users who commit to this programme. The utility will send out a curtailment request when they feel there is a stress on the system and provide an additional payment to those end users who curtails their consumption. The project would support EFL to build capacity on DR and EFL could launch it later on its own.
67. 2017 Population and Housing Census – Release 3, Fiji Bureau of Statistics, 2018: <https://www.statsfiji.gov.fj/index.php/census-2017/census-2017-release-3>
68. The two (2) cities are Suva and Lautoka; the eleven (11) incorporated towns are Lami, Nasinu, Nausori, Nadi, Ba, Tavua, Rakiraki Sigatoka, Labasa, Savusavu and Levuka; and the eight (8) unincorporated towns are Vatukoula, Matei, Korovou, Navua, Pacific Harbour, Nabouwalu, Naqara and Seaqaqa.
69. UN Habitat, Highlights Publications, 2020: <https://unhabitat.org/fiji>
70. Master Planning Exercise Project for Suva, Nadi and Lautoka with the Father of Urban Planning underway, Fiji Village, 2019: <https://fijivillage.com/news/Master-Planning-Exercise-Project-for-Suva-Nadi-and-Lautoka-with-the-Father-of-Urban-Planning-underway-k95sr2>
71. Introduction to Energy-efficiency and Renewable Energy in Hotels in Fiji, SPC-GIZ, 2016: https://www.pacificclimatechange.net/sites/default/files/documents/CCCPIR-Fiji_Energy%20Efficiency%20and%20Renewable%20Energy%20for%20Hotels.pdf Energy-efficiency Guidelines for Hotels in the Pacific, IIEC, 2015: http://prdrse4all.spc.int/system/files/energy_efficiency_guidelines_for_hotels_in_the_pacific.pdf
72. Benchmark Study on Energy Consumption of Commercial Building and Manufacturing Sector, Fiji Department of Energy, 2019.
73. 2018 – 2019 Tax and Customs Incentives, Fiji Revenue & Customs Service, 2018: <https://www.frscs.org.fj/incentives/>
74. Number (E#) is the priority of the opportunity within the energy-efficiency sector.

75. Procurement above 50,000 FJD is done directly by the Fiji Procurement Office. The remaining procurement, below 50,000 FJD is done by the Ministries/Departments with approval by the respective Permanent Secretaries (with oversight by the Fiji Procurement Office).
76. Benchmark Study on Energy Consumption of Commercial Building and Manufacturing Sector, Fiji Department of Energy, 2019.
77. Number (E#) is the priority of the opportunity within the energy-efficiency sector
78. The higher the score the higher the priority for the mitigation opportunity.
79. The higher the score the higher the priority for the mitigation opportunity.
80. Note that this includes the uncertainly discussed in Sections 1.3.1 and 4.1.
81. Costs of financing are not included
82. Note that this includes the uncertainly discussed in Sections 1.3.1 and 4.1 (and assumes existing levels of renewable energy power generation in the BAU baseline).
83. Costs of financing are not included.
84. Rating: Fiji Credit Rating, 2020: <https://countryeconomy.com/ratings/fiji>
85. [value of FJ\$ 10.73B = US\$ 5.26B] FBOS (2019) "FIJI'S GROSS DOMESTIC PRODUCT (GDP) 2018" Release No: 72, 2019, Fiji Bureau of Statistics
86. [value of FJ\$ 3.67B = US\$ 1.8B] Government of Fiji (2020) "HON. AIYAZ SAYED-KHAIYUM'S 2020-2021 NATIONAL BUDGET ADDRESS" 17th July 2020. <https://www.fiji.gov.fj/Media-Centre/Speeches/HON-AIYAZ-SAYED-KHAIYUM-S-2020-2021-NATIONAL-BUDGE>
87. See IMO papers to Marine Environment Protection Committee in April 2020 for adoption which encourages development of National Action Plans as agreed by IMO ISWG GHG 6 in November 2019 <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/26-ISWG-GHG.aspx>.
88. See for example <https://www.greenport.com/news101/Projects-and-Initiatives/incentive-schemes-that-promote-green-shipping>
89. FPCL and FSHIL have already undertaken energy audits and other planning in regards greening of the Fiji Ports focused on the Suva and Lautoka international sea ports. Other initiatives identified include scoping of shore-side power for vessels to plug into whilst berthed, etc.
90. See for example <https://www.gov.uk/government/news/government-backs-cutting-edge-tech-to-drive-down-shipping-emissions> and <https://www.eeca.govt.nz/news-and-events/media-releases/marine-electrification-fund-recipients-announced/>
91. There is a proposal currently being considered by the IMO to establish an international maritime research fund to support global transition to decarbonised shipping based on an initial \$2/t bunker levy.
92. France and Norway could be primary candidates given the bilateral relationship between France and Fiji to collaborate on IMO GHG shipping emissions and Norway and Fiji to collaborate on Oceans (<https://www.fiji.gov.fj/Media-Centre/News/NORWAY-PACIFIC-PARTNERSHIP-OPENS-ADVANCED-RESEARCH>).
93. Most of the key regional and international institutions involved in maritime transport and financing who are listed in the pipeline project table as potential sources of either project management and implementation or as sources of financing are already contributing to or are in discussions with the co-chairs and working groups set up to support the development of the PBSP. As the partnership is based on an 'all willing partners' approach, and is still in establishment phase, more of the banks, technical agencies and development partners are expected to join the PBSP as proposals for funding are refined and developed. As Fiji is co-chair of the partnership, the PBSP provides for a coordinated programme of pilot projects in participating countries, taking advantage of the efforts being put in to programme development, and thinking around improving implementation and governance structures by Fiji, neighbouring countries and the supporting regional experts.
94. Fiji is participating in MTCC led fuel use data collection programme for domestic ships but no information is publicly available to date <https://gmn.imo.org/pilot-project/example-pilot-project/>
95. 10 yr loan with 5% interest, 20/80 equity/debt split, 13% combined O&M and margin for SOE (without tax), no financial fees or insurance are included.

96. Analysis of GHG emissions in 2016 from Fiji's domestic fleet (LEDS) has the "small boats" (i.e. those <15m not classed as "fishing", "tourism" or "other") emitting 21,670 tCO₂. However due the categorization of boat by use (e.g. "fishing" and "tourism") and not by motor type, it can be assumed that many of these boats are powered by outboards so realistically emissions from outboard motors would be considerably higher.
97. With 90% of vessels registered being <15m.
98. See for example <https://www.in-fisherman.com/editorial/2-vs-4-cycle-outboard-motors/153421#:~:text=Fuel%20And%20Oil%20Economy,than%20typical%20%2Dstroke%20outboards.>
99. Based on 2016 data used for Fiji LEDS (2018) with 7915 small boats with annual emissions of 21,670 tCO₂.
100. No accurate data is available to determine the fossil fuel used in outboard motors, nor the number of outboard motors owned and operated in Fiji with various existing data sets varying significantly. 2017 data of outboard motor ownership by province records 7,668 individuals owning outboards (but not total number of outboards owned) and the 2017 census recorded 4,205 small boats owned by households; whilst MSAF data records show 1,325 vessels registered in 2016 and 1,342 vessels registered between 2017-2019 using outboard motors, and over 3,000 vessels using outboards registered in 2019. RMI estimated emissions from vessels <15m powered by outboards represent 40% of maritime transport emissions (PRIF (2018)), and Fiji Government estimates 12% of maritime emissions are from outboards from small boats <15 (not including those involved in fisheries or tourism) but it could be much higher (large margin of error in data) Fiji Low Emission Development Strategy 2018 - 2050 - <https://www.frsc.org.fj/wp-content/uploads/2019/06/2019-2020-Summary-of-Revenue-Policies-Final.pdf>
Vaahs et al (2019) ("Technical and Operational Options Catalogue: Proposal for technical and operational options to reduce fuel consumption and emissions from inter atoll transport and inside lagoon transport" University of Applied Sciences Emden-Leer) in their calculations assume outboard motor fuel consumption of 0.55 l/h/HP noting that real fuel consumption is subject to many factors, such as engine type, hull shape, maintenance, currents, wind, wave conditions, etc. and that fuel costs can be cut by 100% by use of traditional wind powered canoes. They estimate that 31.1 litres petrol (1x25 HP 2-stroke outboard) would be used on a fishing trip of 31 km (17 km fishing speed and 14 km travel speed) and assuming one fishing trip/week, calculate use of traditional sailing canoe would save 1,617 litres of petrol (US\$3,852) a year.
101. Emissions calculations for RMI Government vessel tenders with outboards found annual emissions from 8 outboard motors of 72.63 tonnes of CO₂ (averaging >9 tCO₂/yr per motor) and used 23.06 tonnes of petrol in 2017 (outboard motors 6 x 45 HP and 2 x 25 HP Yanmar Enduros). R. Held (2018) Bachelor Thesis "Transitioning to Low-carbon Shipping: A Survey on the fleet within the inter-island shipping in the Republic of the Marshall Islands with special regard to CO₂ emissions and their reduction potential" submitted to Universities of Applied Sciences Flensburg and Emden-Leer and PRIF (ibid) calculated that total consumption of outboard motors in RMI was about 1,277,000 litres of petrol equivalent to 3,038 tCO₂ in 2017.
102. See for example Fiji Sun 19 Feb 2020 p.24 reintroduction of sailing canoes to support local marine management <https://fijisun.com.fj/2020/02/19/trust-delivers-five-camakau-canoes-brings-joy-to-villagers-of-nasesara/>
103. Anecdotal reports of artisanal fishers catching more fish than needed for personal consumption, for sale to cover their fuel costs for outboards.
104. This is based on 2020 prices for outboard purchase (see below).
105. Of popular brands used in Fiji. Torqueedo motors are available through Greenco in Nadi.
106. For example, a new 40HP motor which is one of the most popular size outboard engines used in Fiji costs US\$ 3,300 (2-stroke) and US\$ 6,000 (4-stroke) including taxes compared to an equivalent electric at US\$23,000 (including motor, 2 x Li batteries, charger, etc. but excluding taxes).
107. https://www.researchgate.net/figure/Valley-of-death-for-technology-providers-in-shipping_fig6_289995860

108. A concessionary loan facility is a key component of the PBSP which all participating countries would be able to access PBSP_Concept_Note_Feb_2020 https://mcst-rmiusp.org/images/Projects/PBSP2019/PBSP_Concept_Note_Feb_2020.pdf
109. Assumes that by 2029 3,950 2-strokes will have been replaced with electric outboards (US\$23,000/unit) and that by 2025 3,950 will have been replaced by 4-strokes (US\$6,000/unit) for 40HP motor (there are a wide range of motors with wide ranging prices, but 40HP is a popular and often used size of motor and is used as example for purposes of these calculations).
110. See PBSP Concept Note Feb 2020 (ibid). https://mcst-rmiusp.org/images/Projects/PBSP2019/PBSP_Concept_Note_Feb_2020.pdf
111. The 2020-21 Budget includes reduction of fiscal duty on import of sails and Lithium Ion batteries from 32% to 5%; and removal of the 5% fiscal duty on all types of vessels, marine diesel or semi-diesel engines.
112. Most of the key regional and international institutions involved in maritime transport and financing who are listed in the pipeline project table as potential sources of either project management and implementation or as sources of financing are already contributing to or are in discussions with the co-chairs (RMI and Fiji) and working groups set up to support the development of the PBSP. As the partnership is based on an 'all willing partners' approach, and is still in establishment phase, more of the banks, technical agencies and development partners are expected to join the PBSP as proposals for funding are refined and developed. As the PBSP provides for a coordinated programme of pilot projects in participating countries, it is logical that Fiji should first consider using the partnership to take advantage of the efforts being put in to programme development and thinking around improving implementation and governance structures.
113. Assumptions for cars and taxis (Average costs: US\$8,000 for ICEs - Euro IV/VI diesel/petrol used, US\$10,000 for hybrid used). Total substitution is 43,100 for ICEs and is 18,000 for Hybrids to the end of 2030.
114. Updating FRCS customs registry system for imported vehicles, updating registry system for LTA for registered vehicles. Expected to cost US\$ 70,000 in TA (incl. training) and US\$ 30,000 in software changes in years one, and US\$ 25,000 in annual training and updates. For a total of US\$ 350,000 between 2020 and 2030.
115. <https://fijivillage.com/news/Master-Planning-Exercise-Project-for-Suva-Nadi-and-Lautoka-with-the-Father-of-Urban-Planning-underway-k95sr2>
116. Singapore Corporation Enterprise is already assisting with development of mater plan for Lautoka area.
117. Total investment needed to decarbonise Lautoka City transport in an integrated way is yet to be determined and would need to be based on more detailed studies and feasibility assessments.
118. The operational training will not be focused on capital expenditures, but if best practices require new technology, such as ATM systems, there will be an associated investment cost.
119. Including development and administration of training programme in coordination with national stakeholders in Fiji and supporting institutions.
120. The National Development Plan tertiary support programme has 25 scholarships allocated, and various operational staff will need shorter, less expensive certification courses, US\$1.25m for scholarships (US\$50,000*25) should be matched with at least US\$5,000*250 aviation sector personnel training budgets.
121. Assumptions for lorries (Average costs: US\$ 15,000 for ICEs - Euro IV/VI diesel/petrol used), buses (Average costs: US\$ 100,000 for ICEs - Euro IV/VI diesel/petrol used, US\$ 135,000 for hybrid used), and mini-buses (Average costs: US\$ 12,000 for ICEs - Euro IV/VI diesel/petrol used). Total substitution is 5,500 lorries, 420 buses, and 200 min-buses between 2020 and 2030.
122. Updating FRCS customs registry system for imported vehicles, updating registry system for LTA for registered vehicles. Expected to cost US\$ 70,000 in TA (incl. training) and US\$ 30,000 in software changes in years one, and US\$ 25,000 in annual training and updates. For a total of US\$ 350,000 between 2020 and 2030.

123. Neoline claim "The Neoline transport solution will reduce GHG emissions by up to 90% on an ocean crossing, and eliminate SOx and NOx emissions." <https://www.neoline.eu/en/the-neoline-solution/#neoliner>
124. Most of the key regional and international institutions involved in maritime transport and financing who are listed in the pipeline project table as potential sources of either project management and implementation or as sources of financing are already contributing to or are in discussions with the co-chairs and working groups set up to support the development of the PBSP. As the partnership is based on an 'all willing partners' approach, and is still in establishment phase, more of the banks, technical agencies and development partners are expected to join the PBSP as proposals for funding are refined and developed. As Fiji is co-chair of the partnership, the PBSP provides for a coordinated programme of pilot projects in participating countries, taking advantage of the efforts being put in to programme development, and thinking around improving implementation and governance structures by Fiji, neighbouring countries and the supporting regional experts.
125. 2019-20 national budget includes FJ\$3m for new GSS vessel purchase. 2020-21 Budget was announced on 17 July does not include this item.
126. 2012 FBOS vehicle total of 176,598 – 92,943 vehicles registered with LTA in 2012 = $92,943 \times 4.36\%$ growth/yr $\times 8$ yrs = 130,764 vehicles
127. The calculation of maximum area available for sequestration use the base value methodology detailed in T18 – Road Infrastructure Upgrade for Non-Motorised Transport. The sequestration rates are based upon area-based carbon contained in vegetation biomass estimated by the FAO (>11.7 tCO₂ per hectare/yr or 1.17kg CO₂ per m²/yr). Given the average vehicle footprint (4.5m² for automobiles, 30m² for trucks/buses), potential annual sequestration value on land reclaimed from derelict vehicles and rehabilitated as greenspace is estimated based upon vehicles removed. Site-specific costs for establishment of a vehicle scrapyards and processing facility will need to be scoped – warehouse, baler, loading equipment, etc. – inclusive of cutting equipment to dismantle vehicles on outer islands for easier transport back to Suva/Lautoka/Labasa.
128. Site-specific costs for establishment of a vehicle scrapyards and processing facility will need to be scoped – warehouse, baler, loading equipment, etc. – inclusive of cutting equipment to dismantle vehicles on outer islands for easier transport back to Suva/Lautoka/Labasa.
129. Establishing the financial mechanism to remove derelict vehicles will involve structuring of a penalty system to discourage abandoning vehicles and improper disposal. Designing a revenue model which tracks local costs/payments to global commodity prices for ferrous/non-ferrous metals will be required.
130. Training on disassembling vehicles and occupational health & safety for a range of new dismantling equipment and machinery will be necessary for personnel in the sector.
131. Personnel training through CB/TA estimated at 6% of investment cost for initial set-up & public awareness efforts.
132. There is already interest expressed by several existing companies (South Seas Cruises, Greenco, Rakola, Goundar Shipping, Pacific Ferries, etc.) in trialling of electric motors and/or harbour ferries for passenger transport purposes in both Suva and in the west of Viti Levu, as well as existing and planned boat building facilities capable of building the vessels, depending on the design. Other companies are also known to be interested in investing in Fiji in this area (Deva De Silva, IFC pers. com. 12 February 2020).
133. See for example <https://www.regjeringen.no/contentassets/2ccd2f4e14d44bc88c93ac4effe78b2f/the-governments-action-plan-for-green-shipping.pdf> and <https://www.eeca.govt.nz/news-and-events/media-releases/marine-electrification-fund-recipients-announced/>

134. Blinkhorn (2016) modelled peak power savings of 24% (Flettner rotor) and 14% (towing kite) if retrofitted on the Southern Pearl (a 5234 GRT cargo ship carrying 511 TEU) on various routes between Fiji, Wallis & Futuna, Tuvalu, Kiribati and RMI. Vahs et al (ibid) calculate at least 50% efficiency savings from retrofit and operational changes for MV Kwajalein. New builds can be expected to between 50-80% efficiency improvements. Operations (speed, route planning, etc) and maintenance (e.g. hull coating, hull cleaning, propeller polishing), as well as weather conditions and other factors play a major role in reducing emissions. IEA (2009, Transport, Energy and CO2, Moving Toward Sustainability. Chapter 8) estimate 30% emissions reduction can be achieved from improved new build vessel designs, 20% from improved maintenance and technical retrofit, and 40% from operational improvements (<http://www.iea.org/w/bookshop/add.aspx?id=365>). SV Kwai Voyage 39 data evaluation (collected over 77 days, 40.4 days at sea and 36.6 at anchor in 2017) and fuel use calculated fuel savings from having retrofitted soft sails of 6,911 litres on sea passages and 2,316 litres on inter-island passages saving US\$6,735 in fuel. Searcy (2017) projected savings of 10-15% fuel savings from retrofit of Flettner rotor on a 31m design cargo/pax vessel on Fiji routes (Searcy (2017) Harnessing the wind: A case study of applying Flettner rotor technology to achieve fuel and cost savings for Fiji's domestic shipping industry. Marine Policy 86(2017) 164-172. Trials of retrofitting Flettner rotor on the Fehn Pollux (a 4,250 tonne coastal freighter) saw 10-20% energy savings <https://www.dnvgl.com/expert-story/maritime-impact/ECO-FLETTNER-rotor-sail-stands-the-test.html>.
135. Most of the key regional and international institutions involved in maritime transport and financing who are listed in the pipeline project table as potential sources of either project management and implementation or as sources of financing are already contributing to or are in discussions with the co-chairs and working groups set up to support the development of the PBSP. As the partnership is based on an 'all willing partners' approach, and is still in establishment phase, more of the banks, technical agencies and development partners are expected to join the PBSP as proposals for funding are refined and developed. As Fiji is co-chair of the partnership, the PBSP provides for a coordinated programme of pilot projects in participating countries, taking advantage of the efforts being put in to programme development, and thinking around improving implementation and governance structures by Fiji, neighbouring countries and the supporting regional experts.
136. Transition from other modes, such as privately operated vehicles and taxis, would provide additional savings beyond this component, and as such, the stated figures represent a conservative estimate for replacing at least 0.6% of emissions over the 2020-2030 period.
137. US\$1.24m for supporting infrastructure (bicycle racks/parking facilities, etc.) and investment facility for bicycle-based businesses/employment initiatives with private sector contribution making up the >US\$3m (at average US\$300 per bicycle) for >9,987 additional bicycles replacing additional growth in motorcycle emissions from 2021-2030.
138. To design, establish, administer, and promote financial mechanisms across the private sector and within existing financial institutions (such as FDB, and commercial banks).
139. To promote cross-sectoral awareness and training initiatives for bicycle/e-bike uptake at a national level, including mechanic training and entrepreneurship support.
140. Provided in the LifeCycle project document developed by the Fiji LifeCycle Steering Committee in 2014.
141. Over US\$118.8m in aircraft assets directly attributable to the current domestic fleet.
142. To develop financing mechanisms and market access structures. (Assuming 0.5% of capital costs.)
143. For ground crew and flight crew training across the sector, inclusive of certification of relevant personnel across the private sector to operate new hybrid/electric and electric aircraft technology and supporting infrastructure. (Assuming 1% of capital costs.)

144. With a clear picture of the Fiji Link fleet of six aircraft (inclusive of two ATR 72-600, which list at US\$26m, one ATR 42-600, listed at US\$19.5m, and three Viking Air DHC-6-400 Twin Otters, listed at US\$5.9m each - US\$89.2m total), the Northern Air fleet of six aircraft (inclusive of one Britten Norman Islander – US\$3m, one Britten Norman Trilander BN2 – US\$3m , and four Embraer Banderaintes – US\$700,000 each, for US\$8.1m total), and the Sunflower Aviation/Skydive Fiji/Pacific Flying School fleet of 11 aircraft (Britten Norman Islander – US\$3m, Beechcraft BE76 Duchess – US\$127,500 , Cessna 172 – US\$307,500 , and Cessna 182 – US\$515,000), to deliver an equitable level of service and capacity with new tech, it is expected the investment cost for the replacement of the existing fleet will clearly exceed the estimated >US\$118.8 million for re-fleeting of the listed planes at present value, with additional operators likely bringing the total re-fleeting cost to at least \$276m. The Britten Normans, Embraer Banderaintes, and Beechcraft aircraft are no longer in production and likely due for replacement imminently. Supporting infrastructure will accrue additional costs beyond the capital expenditure made on the aircraft alone.
145. 5% fiscal duty, 9% VAT
146. Training and certification will need to be diffused across the entire domestic aviation industry.
147. Training requirements will extend beyond the operational needs of Fiji Link and FAL to include CAAF and Dept. of Civil Aviation staff to acquire the necessary expertise for policy and regulatory oversight involving new aviation technology and MRV for performance of the fleet and GHG accounting.
148. https://www.researchgate.net/publication/46438209_Real-World_CO2_Impacts_of_Traffic_Congestion
149. There are 13 points of entry to the Suva Peninsula, ranging from small lanes to main traffic arteries. At an estimated US\$4,000 per unit to install, ANPR cameras may be set up for US\$52,000. Traffic signal improvements last received a budget of ~FJ\$234,000 for traffic signal improvements, but the GSTS offers traffic signal linking a project for around US\$6m and integration of pedestrian spaces in new housing developments which may involve traffic calming infrastructure and car-free zones (US\$6.5m) and Suva CBD pedestrian facilities upgrade program (US\$13m)
150. Project development will entail design and consultation around the structure and implementation plan for congestion reduction measures and the administration of their enforcement.
151. The GSTS budgeted for CBD road network review and modelling, as well as pedestrian network development, a blackspot programme to manage traffic in high-risk areas with the Police Map Database (crash statistics) to prioritise future intersection upgrades. This will need to run concurrently with the Traffic Data Collection Programme and ANPR training, as both will be used to gather crucial data on traffic flows and bottlenecks in the network (which are exacerbated by accidents.)
152. <https://www.fijiroads.org/279-2/>
153. CB & TA costs derived from budgeted activities in the GSTS Overall Staging Plan, 2015-2030
154. As per the 2016-2017 budget announcement, FJ\$150,000 was set aside for the extension of Matei Airport in Taveuni, and FJ\$200,000 set aside for the Vanua Levu airport development. Yielding an average of FJ\$175,000 for the remaining 11 airstrips, FJ\$1,925,000 may be estimated to come from Government of Fiji budget (approximately US\$900,000), so it may be inferred this is money allocated, and co-financing from development partners may be sought to complete airstrip upgrades to accommodate ATR 72-600-sized aircraft. The Nadi terminal upgrade ended up costing FJ\$105m (around US\$50m), so assuming the same level of investment is spread across the 11 airports/airstrips in need of upgrade, each would require around US\$4.5 million to scale up terminals and runways.
155. Scoping and siting activities would need to be conducted, including EIA activities and review by both the government of Fiji and donors/partners financing the infrastructure developments.
156. Depending on how the infrastructure development is contracted, external firms may be employed for construction, and would be expected to have the capacity needed to deliver the projects in order to win any bids. If local capacity is to be employed either solely or in conjunction with external contractors, costs would rise dependent upon the scale of upskilling required.

157. As of the most recent FRA Corporate Plan (2016), FJ\$759,000 was budgeted for new bus stops and shelters, but in the corresponding 2016 Annual Report, only FJ\$41,096 in expenditures were reported for under this budget line. Given the absence of statistics on the total number of bus stops/shelters already constructed in Fiji, an estimate of 2 per km for travel in each direction may be assumed for “urban and peri-urban areas, supported by 1,707km of sealed roads, with ITS having emissions mitigation impacts in areas where congestion leads to efficiency loss. Assuming 6,828 bus stops/shelters (inclusive of terminals) would require ITS upgrades to provide passenger information systems (~US\$12,500 per unit for ten years’ operation), alongside an estimated 1,793 buses operating in Fiji in 2020, reaching 2747 by 2030 (since last reported at 1622 in 2017, based upon commercial registration growth rates) requiring GPS tracking systems to be installed (~US\$7,000 for GPS receiver, destination display, and odometer upgrades).
158. Project development will entail design of technical specifications and service requires alongside administration of a tender process for arrangement of a long-term service contract over the 2020-2030 period, inclusive of structuring the terms of a PPP.
159. The tracking and fleet management response for well over a thousand buses will require technical training for a team of regulatory specialists. This will also involve significant regulatory revisions to accommodate the new operating state of the transit network. The GSTS budgeted for regulatory enhancements, along with a bus driver training scheme and network monitoring programme, as well as a Bus stop rationalization programme, all of which are necessary elements of upgrading the transit system with ITS.
160. CB & TA costs derived from budgeted activities in the GSTS Overall Staging Plan, 2015-2030.
161. <https://lta.com.fj/docs/default-source/lta-publications/lta-factsheets/factsheet-1-total-vehicle-registrations-final.pdf?sfvrsn=6>
162. Installed costs of Level 2 chargers (at US\$7,100/unit*15,962 vehicles) could include the significant corresponding renewable energy uptake necessary to decarbonise for the same cost as DCFC installations accommodating additional EVs.
163. Low-end EVs range from just under US\$25,000-\$35,000 per unit (averaging US\$30,000), with total projected cost of 25% of additional vehicles for the 2022-2030 period (15,962 vehicles). FRCS’ 2017-2019 post-tax vehicle total for Fiji is listed as FJ\$2,077,137,183 (~US\$1b).
164. Scoping and administrative facilitation of network development should vary little regardless of the charging technology selected.)
165. Training will be necessary for all relevant government staff (MIMS, MCTTT, FRA, LTA, EFL, etc.), as well as direct training for existing mechanics in the private sector across the country.
166. Preparatory costs are expected to make up a small portion of the total CB/TA needs, and this only includes government EV fleet.
167. EVSE training will be substantial for both private sector and public sector in infrastructure management.
168. Equally relevant is the training in maintenance and repair of the EVs themselves.
169. Disaggregated fuel data for domestic/international aviation is still needed to update the estimates to appropriately evaluate the emission reduction potential of mitigation activities, as projections are based upon assumptions made during the LEDS process.
170. This could range from US\$0 (capital investment will only be relevant in the event SAFs employed are not “drop-in” fuels which utilize the same storage facility standards as other aviation fuels) up to US\$6.6m if non-compatible SAFs are used which require additional storage – inclusive of four large-scale terminal storage tanks located on Viti Levu (two at Nadi, two at Nausori) estimating US\$1,000,000 each, and 13 storage tanks at US\$200,000 each distributed across each of the outer island air fields.
171. Market assessment, due diligence, budgeting, tender, and supplier selection process given the supply constraints and variety of SAF options emerging globally.
172. Depending on the funding pipeline, both national-level and bilateral support would likely come within budget programming.

173. The integration of SAFs may begin as soon as the financial structure of paying increased costs for fuel has been arranged, and the supply chain has been established through fuel distributors, regulated by CAAF, operating in coordination with FAL, ATS, and the private sector domestic aviation operators.
174. Forfeited tax revenue from Fiscal Tax (US\$0.21/l) and VAT (9%), on 174,955,599 l of Jet A-1 and AvGas from 2022-2030.
175. Bioswales are linear, vegetated channels designed to concentrate and convey stormwater runoff while removing debris and pollution.
176. $448,000\text{m} \times 1.5\text{m}^2 \times 1.17\text{kg CO}_2 \text{ per m}^2/\text{yr} = 786.24\text{t CO}_2 \text{ per/yr}$
177. Based upon the per km costs for the recent ADB/World Bank financed Transport Infrastructure Investment Sector project (US\$150 million for 30km of roads, 30 bridges, and four jetties) and ADB's Fiji's Third Road Upgrading Project, which yielded a cost of US\$ 1.36M per kilometre under a total project cost of US\$168.83m for 125.45km of road work. The longer-term total 5,818km of roads may cost at least US\$ 7.9 billion through 2036. For the 2024 through 2030 implementation period this is 2750 km at a per km cost of US\$ 1.36M, leading to a total of US\$ 3,736.5M.
178. US\$17.9 million of the US\$168.83 million in the Third Road Upgrading Project – 10.6% – were attributed to Road Design & Supervision, Asset Management, and the Project Management Unit. Relative management costs based upon the scaling of the project should come in far lower than 10.6% of capital investment cost.
179. Based upon the US\$2.9m of the US\$168.83m – 1.7% – spent on Technical Services in the Third Road Upgrading Project.
180. <https://www.adb.org/sites/default/files/project-document/174126/28261-023-pcr.pdf>
181. Based upon the relative costs associated with the previous Third Road Upgrading Project Technical support budget.
182. Few of these challenges are: a) determining future energy demand that is needed to meet the national growth and development targets, including priority requirements of specific regions and sectors ; b) choosing the mix of energy sources to meet the future energy demand, at the least cost possible, including consideration of renewable energy sources and non-commercial fuel sources; c) conserving energy resources and reducing waste; d) diversifying energy supply sources and reducing import dependence; f) ensuring energy access and meeting energy needs of the poor; f) ensuring energy prices are stable; c) ensuring macro-economic priorities are met such as low unemployment, inflation control, conserving foreign exchange reserves etc; d) raising sufficient revenues from energy sales to enable energy sector development; e) meeting national security and defence requirements; e) meeting environmental and climate change objectives; g) reducing water consumption.
183. Energy sources can be substituted between them up to certain limits, though the overall convenience and cost-benefits are different. This can also lead to competition between energy sources, such as: coal, oil, gas and renewables for power production; diesel, gasoline or power for transport; kerosene and electricity for lighting; kerosene and wood fuel for cooking etc.
184. Since 2011, there might be drivers that decrease the energy intensity and those that increase it. Energy intensity might have come down due to improvements in energy-efficiency, increased use of renewable energy and due to structural changes in the economy such as increasing contribution of the less energy intensive service sector to the GDP. Energy intensity could have increased due to more aggregate demand especially for more energy intensive products/equipment's/appliances/ services and more economic activity. In this case., it is being assumed that both these forces were in balance and the energy intensity has remained the same
185. Cost figure based on informal consultation with relevant government departments in other countries like Bangladesh.
186. Sustainable Energy for All (SE4All): Rapid Assessment and Gap Analysis. DOE
187. A battery's Depth of Discharge (DoD) indicates the percentage of the capacity of the battery that has been or can be discharged relative to the overall capacity of the battery. Depending on the type of battery technology, battery manufacturers specify a maximum recommended DoD for optimal performance and life of the battery. A higher DoD means we can use more of the energy being stored in the battery, however it is generally not recommended to discharge a battery entirely or beyond the recommended DoD, as that will dramatically shorten the useful life of the battery.

188. The Time of Day tariff will compose of a higher tariff during the peak period, compared to the off-peak period, thereby encouraging end users to shift non-critical consumption to off-peak period or to use less during peak period.
189. The DR programme will identify certain class of consumers and equipment usually from among industrial and commercial consumers that can be organised to operate flexibly, so that stress on the grid is avoided and peaks of the grid load curve can be smoothened. In mature power markets, utilities will provide an incentive to those end users who commit to this programme. The utility will send out a curtailment request when they feel there is a stress on the system and provide an additional payment to those end users who curtails their consumption. The project would support EFL to build capacity on DR and EFL could launch it later on its own.
190. World Bank (2020). Poverty and Equity Brief, East Asia and Pacific.
191. Page 11, National Energy Policy Review Advisory Committee (2013). Sustainable Energy for All (SE4All): Rapid Assessment and Gap Analysis. Department of Energy, Government of Fiji.
192. <https://fijisun.com.fj/2017/07/18/pacific-cement-to-acquire-new-machines-to-improve-production/#:~:text=Pacific%20Cement%20has%20the%20capacity,lot%20of%20cement%20is%20required>.
193. Based on typical performance figure for cement grinding in Indian cement plants. Energy consumption for clinker production has not been considered.
194. C = Current and F = Future
195. https://fcc.gov.fj/wp-content/uploads/2019/10/Electricity-Tariff-Methodology_Public-Version-2.pdf
196. C = Current and F = Future
197. Including at Vuda, Nadi and Savusavu <https://www.mailife.com.fj/nawi-island-development-on-track-gann/>, <https://www.fijimarinas.com/vuda-fiji-expansion-super-yacht/>, <https://www.fbcnews.com.fj/business/expansion-plans-for-port-denarau-marina/>, <http://www.fantasyfiji.com/index.php/106-development/309-fiji-s-largest-marina-opening-soon>
198. https://fijisun.com.fj/2020/02/10/fijis-first-vuda-nadi-water-bus-launches-today/?fbclid=IwAR3pDfmUECAZNaUvxKEKjxqb_SsTWGwodw7ZFuwCBwb2ZsJPS9WZ4i36qxE
199. There are already boat builders in Fiji who can build vessels, but only a handful of naval architects. There are also various private sector business and services involved in the yachting industry, which is already a “wind propulsion/solar” focused market that has existed for years in Fiji and which is expanding.
200. Several private businesses are already investigating the potential for electric vessels including e-outboards e.g. South Sea Cruises and GreenCo e-outboard project.
201. ADB funded project (\$1m grant) to improve port facilities, including a new purpose built cruise liner terminal. GHG emissions reduction measures should be included in these planned port projects.
202. <https://www.fdb.com.fj/transport-freight-purposes/>
203. Excludes purchase of second hand outboard motors <https://www.fdb.com.fj/transport-freight-purposes/>
204. <https://www.fdb.com.fj/green-banking/>
205. <https://www.frsc.org.fj/wp-content/uploads/2019/06/2019-2020-Summary-of-Revenue-Policies-Final.pdf>
206. There are import duties on some componentry required for electric motors for boats, for example there was a 32% fiscal duty on lithium-ion accumulators (rechargeable batteries) despite none being manufactured in Fiji until July 2020 when taxation changes brought in under the 2020-21 National Budget dropped this to 5%. Uptake of electric motor retrofits would benefit greatly from removal of such import/fiscal duties.
207. The status of the existing MTCC pilot projects in Fiji are currently unknown.
208. C = Current and F = Future
209. C = Current and F = Future
210. C = Current and F = Future
211. C = Current and F = Future
212. <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>
213. <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

214. See for example the [Pacific Islands Transport Forum & Expo](#) hosted by Fiji in November 2018 at USP.
215. <https://www.adb.org/projects/44281-013/main>
216. Currently ECAL funds are not explicitly earmarked for mitigation initiatives. See discussion on “greening” of the ECAL (p.62) <https://www.spc.int/sites/default/files/wordpresscontent/wp-content/uploads/2016/12/Greener-taxes-and-subsidies-in-PICTs.pdf>
217. Fuel prices are already controlled by FCCC. There are benefits and negatives associated with fuel pricing (ibid p.65)



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