Kiribati
NDC Investment Plan

2021

Investment Planning in Kiribati
for the Transport and Energy
Efficiency Sectors

Investment Planning in Kiribati for the Transport and Energy Efficiency Sectors

IMPLEMENTING PARTNERS

REGIONAL PACIFIC NDC HUB

GGGI

WITH FINANCIAL SUPPORT FROM

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Technical Oversight and Guidance

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Disclaimer

This NDC Investment Plan is prepared for the Government of Kiribati based on best available information and stakeholder consultations results gained between November 2019 and November 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 document may not necessarily represent those of the Regional Pacific NDC Hub and its implementing partners, including the implementing partners member states.

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Abbreviations and Acronyms

ADB	Asian Development Bank
ANZ	Australia & New Zealand Banking Corporation, Kiribati
ATS	Air Terminal Services Limited
AUD / AU$	Australian Dollar
AU-DFAT	Australian Department of Foreign Affairs and Trade
BAU	Business as Usual
CAAK	Civil Aviation Authority of Kiribati
CIDCA	China International Development Cooperation Agency
CROP	Council of Regional Organisations of the Pacific
CTCN	Climate Technology Centre and Network
DBK	Development Bank of Kiribati
DSM	Demand Side Management
EE	Energy Efficiency
EEAS	European Union External Action
EIB	European Investment Bank
EU	European Union
EV	Electric Vehicles
GCF	Green Climate Fund
GEF	Global Environment Facility
GGGI	Global Green Growth Institute
GHG	Greenhouse Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOK	Government of Kiribati
IFC	International Finance Corporation
IMO	International Maritime Organisation
IRENA	International Renewable Energy Agency
JICA	Japan International Cooperation Agency
KHA	Kiribati Highway Authority
KIC	Kiribati Insurance Corporation
KIER	Kiribati Integrated Energy Roadmap 2017-2025
KLTA	Kiribati Land Transport Authority
KNSL	Kiribati National Shipping Line Limited (previously Kiribati Shipping Service Ltd – KSSL)

KNTO	Kiribati National Tourism Office
KOIL	Kiribati Oil Co. Ltd
KOICA	Korea International Cooperation Agency
KPA	Kiribati Ports Authority
KV20	the Kiribati Vision 20
MCST	Micronesian Centre for Sustainable Transport
MD	Marine Division
MDCC	MICTTD Development Coordinating Committee
MELAD	Ministry of Environment, Lands and Agricultural Development
MOFED	Ministry of Finance and Economic Development
MFMRD	Ministry of Fisheries and Marine Resource Development
MICTTD	Ministry of Information Communication, Transport and Tourism Development
MISE	Ministry of Infrastructure and Sustainable Energy
MLPID	Ministry of Line and Phoenix Islands Development (under MOFED)
MSP	MICTTD & SOEs Ministry Strategic Plan 2020-2023[1]
MTC	Maritime Training Centre Kiribati
MTCC	IMO Global Marine Network – Maritime Technology Cooperation Centre Pacific (SPC/SPREP)
MRV	Measurement, Reporting and Verification
NAP	National Action Plan (under IMO auspices in regards shipping)
NDC	Nationally Determined Contribution
NM	Nautical Mile
NZ-MFAT	New Zealand Ministry of Foreign Affairs and Trade
OB	Office of the President
PBSP	Pacific Blue Shipping Partnership
PIC	Pacific Island Country(s)
PIO	PIPA Implementing Office
PIPA	Phoenix Islands Protected Area
PRIF	Pacific Region Infrastructure Facility
PUB	Public Utilities Board
PVU	Plant and Vehicle Unit
SIDA	Swedish International Development Cooperation Agency

1 https://www.micttd.gov.ki/sites/default/files/FINAL%20MICTTD%20MSP%202020-2023%20PRINT2.pdf

SOE	State Owned Enterprise
SREP	Scaling Up Renewable Energy In Low Income Countries (SREP) Investment Plan for Kiribati (2018)
SPC	the Pacific Community formerly Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme formerly South Pacific Regional Environmental Programme
SL	Standards and Labelling
SNC	Kiribati's Second National Communication
tCO_2 / tCO_2e	Metric tons of carbon dioxide (equivalents)
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

Table of Contents

List of Figures

List of Tables

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Executive Summary

Introduction

This NDC Investment Plan, and included Project 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 to the Government of Kiribati, private sector, State-Owned Enterprises, Non-Governmental Organisations in Kiribati, 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 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 Kiribati. Initial results of this NDC Investment Plan were presented through a workshop with applicable stakeholders in Kiribati consisting of a broad representation of government entities, education institutions, financial institutions, private sector, NGO, State-Owned Enterprises, and development partners. The outcomes of the initial results and the valued feedback from the consultation were used to strengthen information regarding the 24 identified mitigation opportunities and narrowed these down to 15 "primary mitigation opportunities". The NDC Investment Plan was then validated through a final consultation meeting attended by key national stakeholders in the transport and energy efficiency sectors.

It is noted that from the context of reducing GHG emissions, the primary mitigation opportunities defined in this NDC Investment Plan fall within both the existing boundary of the unconditional and conditional mitigation targets of Kiribati's (Intended) NDC issued in 2016. The mitigation opportunities also address the Kiribati 20-Year Vision 2016-2036. In this context this NDC Investment Plan, along with the NDC Roadmap, can be used as tools to enhance the transparency of the physical implementation and financial pathways of how Kiribati can reach its NDC targets with support gained through the means of implementation (e.g. capacity building, technology transfer, and finance).

Kiribati's (Intended) NDC issued in 2016 estimates the energy sector Business-as-Usual (BAU) scenario emissions will reach 78,300 tCO_{2e} in 2030. The (Intended) NDC has an unconditional commitment to reduce GHG emissions from this BAU scenario by approximately 13% in 2030 (10,090 tCO_{2e}), and a conditional commitment to reduce a further 49% (38,420 tCO_{2e}). This is a combined commitment to reduce 62% of GHG emissions from the energy sector BAU scenario, which is an estimated total mitigation of 48,510 tCO_{2e} in 2030.[2]

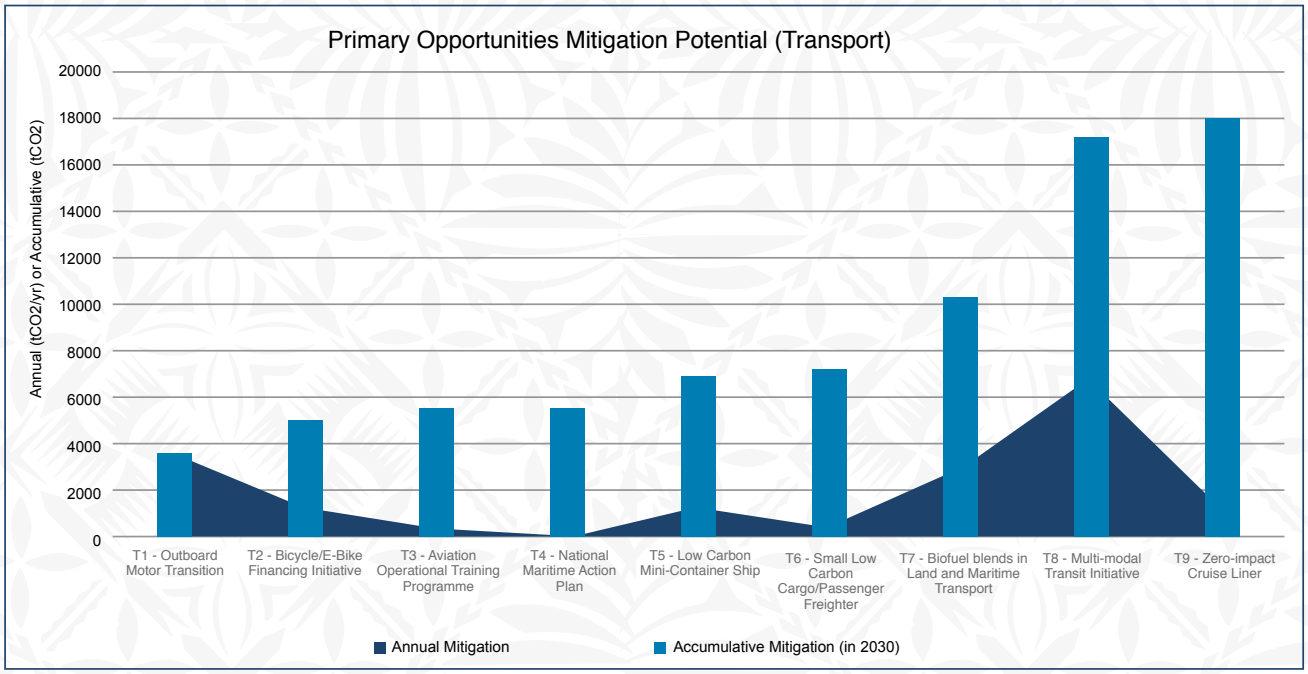
The 15 primary mitigation opportunities presented in this NDC Investment Plan consist of 9 opportunities in the transport sector, and 6 opportunities in the energy efficiency sector to be implemented from 2020 to the end of 2030. Information is also provided for 9 secondary mitigation opportunities. The consolidated temporal financing pathway of the primary mitigation opportunities in both transport and energy efficiency lead to an estimated need for US$ 210.5M in total investment in the sectors. This includes US$ 15.5M in capacity building and technical assistance needs, and US$ 195M in capital investments.[3]

2 Kiribati's Intended Nationally Determined Contribution, Republic of Kiribati, 2016

3 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.

Transport sector mitigation opportunities

The primary mitigation opportunities, as indicated in Section 4.1, for the transport sector during the period of 2020 through 2030 have a total indicative cost of US$ 163M, with a total indicative need for US$ 11.5M in capacity building & technical assistance, and an indicative need for US$ 151.5M in investment capital. These primary mitigation opportunities have the potential to reduce 115,400 tCO_2 in the 2020 through 2030 period, and to reach a mitigation potential of 18,200 tCO_2/yr in 2030. This is a potential mitigation of 23% of the estimated BAU baseline in 2030 as defined in the (Intended) NDC from 2016.[4] This leads to a combined potential mitigation cost of 1,400 US$/$tCO_2$. The figure below indicates the annual mitigation potential of each primary mitigation opportunity individually in 2030 (in dark blue), and the total mitigation potential in 2030 of all opportunities as accumulated from left to right (in light blue).

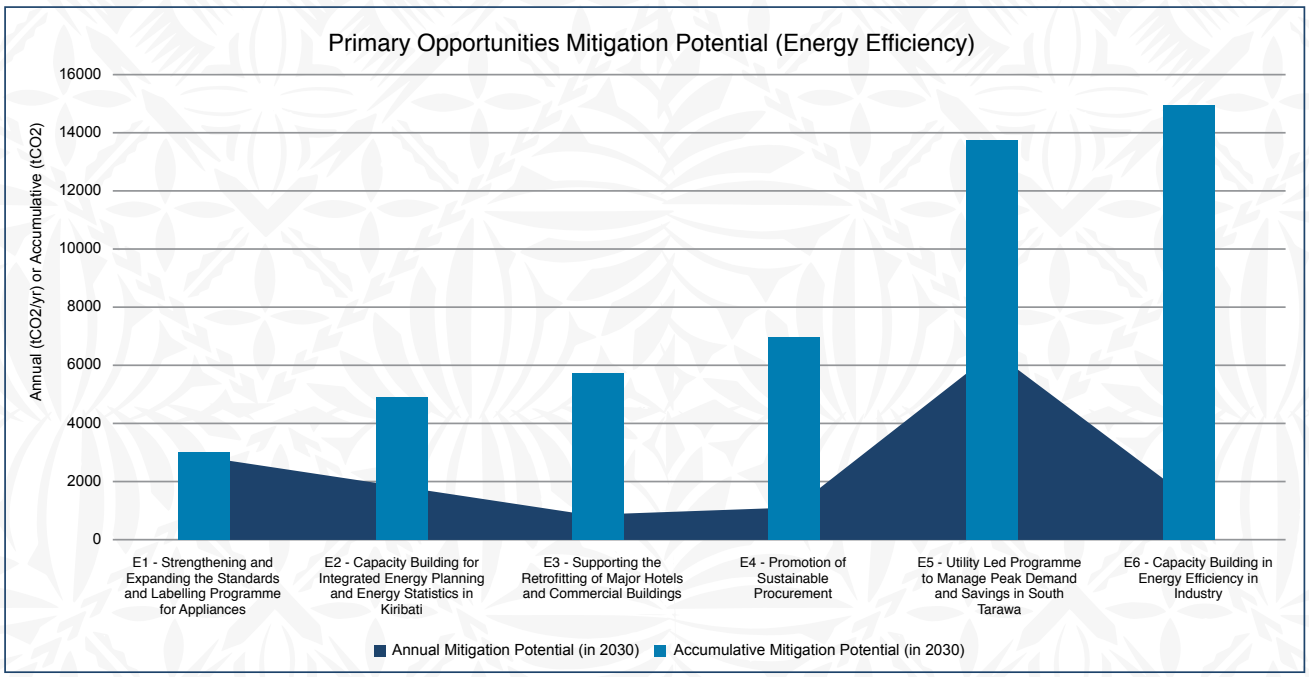


Energy Efficiency Sector Mitigation Opportunities

The primary mitigation opportunities, as indicated in Section 4.1, for the energy efficiency sector during the period of 2020 through 2030 have a total indicative cost of US$ 47.5M, with a total indicative need for US$ 4.0M in capacity building & technical assistance, and an indicative need for US$ 43.5M in investment capital. These primary mitigation opportunities have the potential to reduce 62,500 tCO_2 in the 2020 through 2030 period, and to reach a mitigation potential of 14,900 tCO_2/yr in 2030. This is a potential mitigation of 19% of the estimated BAU baseline in 2030 as defined in the (Intended) NDC from 2016.[5] This leads to a combined potential mitigation cost of 760 US$/$tCO_2$ for the primary opportunities during the period of 2020 through 2030. The figure below indicates the annual mitigation potential of each primary mitigation opportunity individually in 2030 (in dark blue), and the total mitigation potential in 2030 of all opportunities as accumulated from left to right (in light blue).

4 Note that this includes the uncertainly discussed in Sections 1.3.1 (and assumes existing levels of renewable energy power generation in the BAU baseline).

5 Note that this includes the uncertainly discussed in Section 1.3.1 (and assumes existing levels of renewable energy power generation in the BAU baseline).



Financing the Mitigation Opportunities

Kiribati has one of the smallest economies in the PICs, and it cannot support all the transitional changes needed to ensure low carbon transport and energy efficiency. The private sector (households and businesses) has experience with small levels of use of equity and retail & commercial lending, and the public sector (Government of Kiribati entities) has reliable experience in the use of the state budget and grants, and in some cases limited use of other special financial instruments such as lending guarantees. The estimated US$ 210.5M in investment needed to implement the primary mitigation opportunities in the NDC Investment Plan, is equivalent to 112% of Kiribati's Real GDP in 2018,[6] and 138% of the Government of Kiribati's state budget for 2018.[7]

Due to past financial sector activities, stakeholders in Kiribati have limited experience with the implementation of a significate portion of the financial instruments needed to finance the primary mitigation opportunities. Existing limitations are mainly due the scale of finance need for the financial instruments and complexity of this (including blended finance). 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. Financing of all primary mitigation opportunities will include grants, and a few include 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. The table below indicates the financial instrument types needed to implement the primary mitigation opportunities and the potential sources for financing these financial instruments.

6 [value of US$ 188M] World Bank (2020) Kiribati. https://data.worldbank.org/country/KI
7 [value of AU$ 196M = US$ 152M] Government of Kiribati (2017) "2018 Budget" Dec. 2017.

Financial Instrument Types	Potential Sources of Finance*
Private Equity from Households	Households
Private Equity from Businesses	Companies, Island Councils, SOEs
Grants for Capacity Building and Technical Assistance	GEF, AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, WB/IFC, KOICA, CIDCA, EEAS, EIB,SIDA, UNDP, UNESCAP, UN Habitat, UNESCO, UNIDO, GIZ, JICA
Non-Government Grants for Finance	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, DBK
Retail Loans**	ANZ, DBK
State Budget & SOEs	MOFED & SOEs
Taxation: import duties & excise, corporate, personal	MOFED
Insurance: Performance and Loss/Damage	ADB, WB, IFC, EIB

** This is a primary list of potential sources of finance who are active in the recent past in the PICs/Kiribati, the list is not exhaustive and does not include partners who implement other organisations funding, and additional finance sources are or 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, are a set of broad short-term sectoral activities which can encourage the broader implementation of the NDC Investment Plan for the transport and energy efficiency sectors, and these five recommended broad short-term activities are indicated in the table below.

Broad Short-term Activities	Description	Potential Lead National Stakeholders*
1. Organise and hOold 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 funding criteria of each individual development partner. It is recommended to hold two development partner forums in Q1 and Q3 of 2021 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 Kiribati. Special focus can be placed on the inclusion in multi-country efforts / programmes, along with direct support to Kiribati.	OB MISE MOFED
2. Build capacity for blended financing of mitigation actions.	The financial sector in Kiribati has experience with grants, and some experience with lending, but very limited experience in blended finance (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 a few of the primary mitigation opportunities. Especially those that require commercial and/or retail lending.	OB MOFED DBK ANZ
3. Secure the technical assistance for and implement the opportunities for (T4) National Maritime Action Plan and (E2) Capacity Building for Integrated Energy Planning and Energy Statistics in Kiribati.	The effectiveness of the primary mitigation opportunities in maritime transport and energy efficiency are directly or indirectly dependent on the outcomes of T4 and E2. The outcomes of T4 and E2 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.	MISE MICTTD MOFED
4. Analysis for jumpstarting the opportunities for (T1) Outboard Motor Transition, (T2) Bicycle/E-Bike Financing Initiative, (E3) Supporting the Retrofitting of Major Hotels and Commercial Buildings, (E6) Capacity Building in Energy Efficiency in Industry through tax policy changes within the next four years	The primary mitigation opportunities T1, T2, E3, and E6 are all dependent on tax policy changes. The economic impacts and recommended taxation changes can be investigated in the short term (Q2 and Q3 2021), and some may be potentially enacted for fiscal year 2022/2023, especially for T1 and T2. It is noted that T1, T2, E3, and E6 do require other financial instruments for full implementation, but some organic implementation is expected to happen with only the taxation changes.	MOFED
5. Further quantify the investment needs for implementation of (E1) Strengthening and Expanding the Standards and Labelling Programme for Appliances, (E2) Capacity Building for Integrated Energy Planning and Energy Statistics in Kiribati, (E4) Promotion of Sustainable Procurement, and (T8) Multi-modal Transit Initiative	The primary mitigation opportunities E1, E2, E4, and T8 have the potential for significant GHG mitigation. However, there is currently not enough adequate and reliable background information available to ascertain a high level of accuracy for 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 feasibility studies and straightening of information.	MISE MICTTD

* 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.

1. Introduction

This ***Nationally Determined Contribution (NDC) Investment Plan*** for Kiribati is prepared as a part of the assignment for the "Preparation of an NDC Roadmap and NDC investment plans and project pipeline (in Kiribati) in the transport and energy efficiency sectors". This activity is delivered by the Regional Pacific NDC Hub for the Government of Kiribati (GOK) through the Global Green Growth Institute (GGGI). The Pacific NDC Hub is implemented through a partnership between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, GGGI, Pacific Community (SPC), and Secretariat of the Pacific Regional Environment Programme (SPREP). The Regional Pacific NDC Hub has financial support from the German, United Kingdom, New Zealand, and Australian Governments.

This NDC Investment Plan, and included Project Pipeline, and related NDC Roadmap, have the purpose to provide essential information on opportunities for GHG mitigation and their potential means for financing in the transport (land, maritime, and aviation) and energy efficiency sectors. This information is directed towards the GOK, the private sector and State-Owned Enterprises (SOEs) in Kiribati, 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.[8]

Context of Kiribati and GHG Emissions

Kiribati is an island country in the Pacific Ocean that comprises 33 atolls and reef islands, with an Exclusive Economic Zone (EEZ) of 3,550,000 km^2. Close to 60% of Kiribati's total population of over 110,000 people resides on South and North Tarawa islands, and close to 6,500 people reside on Kiritimati Island, representing the largest population centres. Where the remaining population are divided between 20 other populated islands.[9] In addition, Kiribati has one of the smallest economies in the world with an estimated GDP of US$ 188m and a per capita GNI of US$ 3,140 in 2018.[10]

Kiribati's Second National Communications (SNC) on Climate Change indicated total national GHG emissions of 64,000 tCO_2e in 2008. The approximate GHG emissions of 63,000 tCO_2e in 2014 reported in Kiribati's (Intended) NDC issued in 2016 represents approximately 0.0002% of global emissions. Kiribati's (Intended) NDC issued in 2016 has an unconditional commitment to reduce GHG emissions by approximately 13% in 2030, and a conditional commitment to reduce GHG emissions by 49% in 2030, based on a Business-as-Usual (BAU) scenario. With the BAU GHG emissions estimated to be 78,300 tCO_2e in 2030. As shown in the Figure 1 below. This is a combined commitment to reduce roughly 62% of GHG emissions by 2030 based on the BAU scenario. These commitments under Kiribati's (Intended) NDC issued in 2016 cover the 1st (2020-2025) and 2nd (2026-2030) commitment periods under the Paris Agreement. The mitigation in GHG emissions under (Intended) NDC issued in 2106 are expected to come from the reduction in fossil fuels use in the energy sector and carbon storage in the ocean ecosystem, and lead to a projected total reduction in GHG emissions of approximately 48,500 tCO_2e in 2030. In this context, Kiribati's (Intended) NDC issued in 2106 has a 2030 goal to reduce approximately 12,500 tCO_2 annually from transport, and approximately 13,000 tCO_2 annually from the maximum use of renewable energy and energy efficiency[11], which is a total of 25,500 tCO_2 annually in 2030.[12]

8 Office of the President (OB), Ministry of Infrastructure and Sustainable Energy (MISE), Tax Unit - Ministry of Finance and Economic Development (MOFED), Office of Statistic - Ministry of Finance and Economic Development (MOFED). Development Bank of Kiribati (DBK), ANZ Bank, National Economic Planning Office (MOFED), Plant & Vehicle Unit (MISE), Highway Authority, Civil Aviation Authority, Kiribati National Shipping Line, Kiribati Police, KOIL, Kiribati Chamber of Commerce, Marine Division (MICTTD), Asian Development Bank (ADB), Public Utility Board (PUB), and Kiribati Institute of Technology (KIT).

9 National Statistics Office, Ministry of Finance (2016) '2015 Population and Housing Census'

10 World Bank (2020) Kiribati. https://data.worldbank.org/country/KI

11 There is no indication in the NDC how much tCO_2 is expected to be reduced from energy efficiency separately.

12 Republic of Kiribati (2016) "Intended Nationally Determined Contribution" https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Kiribati%20First/INDC_KIRIBATI.pdf

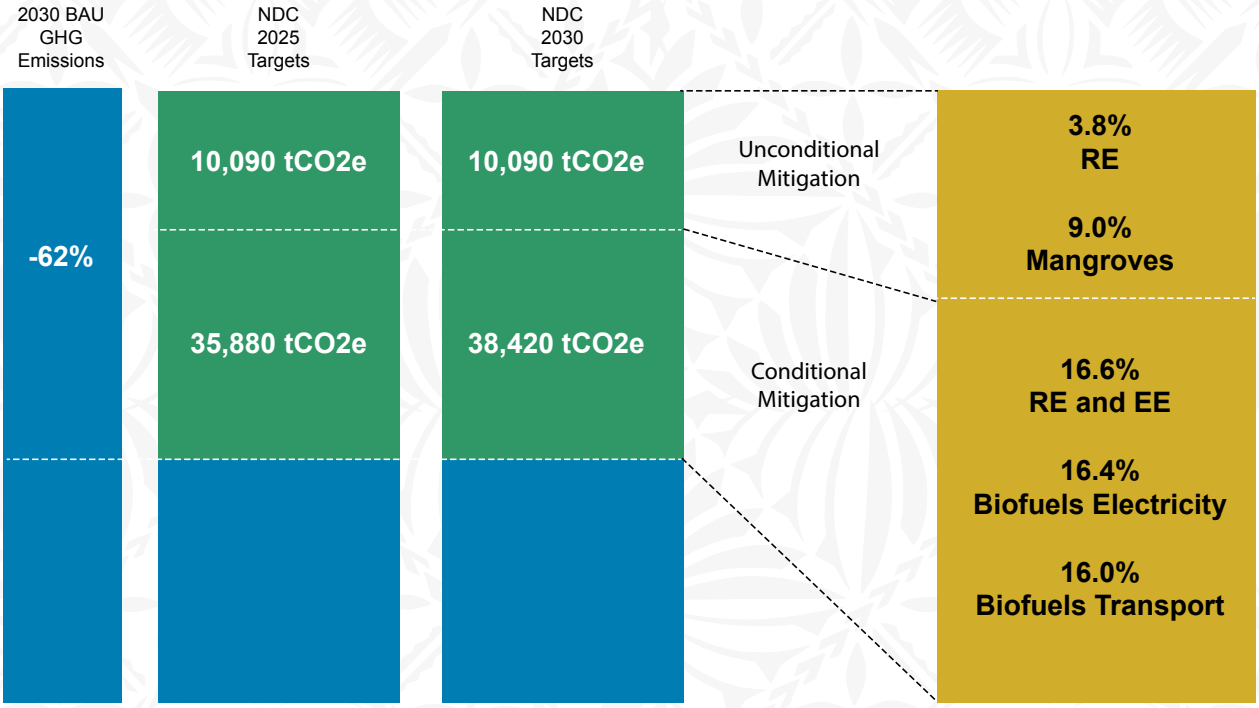


Figure 1: Depiction of the mitigation commitments under the (intended) NDC

The Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati estimates 61% of national energy consumption is contributed to the residential sector and 4% contributed to government, industry, and commercial sectors. This means that energy efficiency in production and demand side of these defined sectors can lead to reliable savings and GHG mitigation. The same report estimates a total energy consumption in the transport (aviation land, and maritime) sector of 27%, which can also lead to reliable GHG mitigation.[13]

The above description provides the national and sectoral context for mitigation actions in the transport (land, maritime, and aviation) and energy efficiency sectors, and this NDC Investment Plan further elaborates the sectoral context and mitigation opportunities, and the indicative investment needs and potential means of finance.

1.1 Context of the NDC Investment Plan

This NDC Investment Plan, and included Project Pipeline, presents the same mitigation opportunities which are used as the basis for the NDC Roadmap for the transport and energy efficiency sectors prepared under the same technical assistance activity.

13 Republic of Kiribati (2018) "Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati" https://www.climateinvestmentfunds.org/country/kiribati

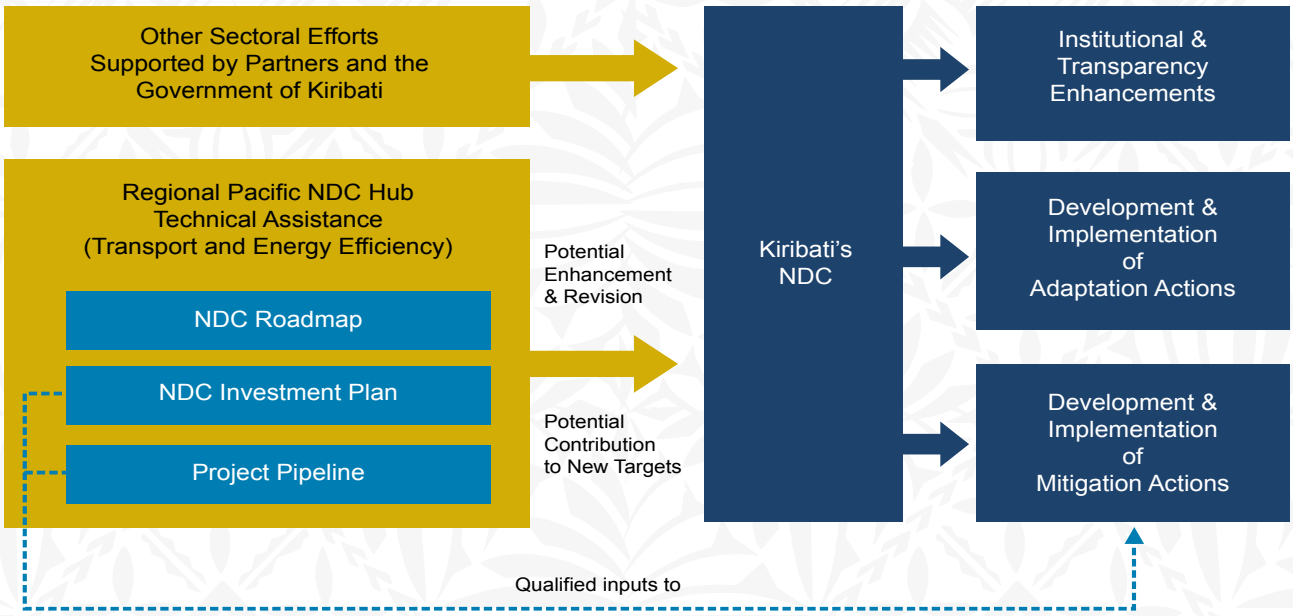


Figure 2: Diagram for the alignment of the NDC Investment Plan with the NDC

As seen in Figure 2 above, there are mitigation and adaptation opportunities which may potentially contribute to Kiribati's NDC targets, and their potential inclusion may consist of contributing to the existing or enhanced mitigation targets and/or additional desired national adaptation outcomes. To enhance transparency, these targets and outcomes should be qualified by information on the actions to be taken and the national and international support needed to develop and implement the underlying actions. This NDC Investment Plan, included Project Pipeline, and NDC Roadmap provides this information as qualified inputs for the development and implementation of mitigation opportunities within the transport and energy efficiency sectors.

1.2 Goal and Objectives of the NDC Investment Plan

This NDC Investment Plan, and included Project Pipeline, has the overall goal to enhance the GOK's ability to implement mitigation actions in the transport (land, maritime, and aviation) and energy efficiency sectors contributing to its NDC targets. To meet this goal, the NDC Investment Plan includes several objectives which will provide a strategic blueprint laying out a clear approach to financing the mitigation opportunities which are presented within the NDC Investment Plan, with included Project Pipeline, and NDC Roadmap. These objectives include the following:

Objective 1: To provide stakeholders, including potential financial partners, with a general description of the status of the transport and energy efficiency sectors. Including basic information on the sectors' current development, market structures, existing planning, and actions, along with a list of the key stakeholders operating within 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 mitigation opportunities which will contribute to the NDC targets and their investment needs.

Objective 4: To present the overall needs for financial products and instruments which can support financing in the sectors, as well as identify potential partners for financial cooperation and a pathway to implement new financing in the sector.

1.3 Summary Information of Primary Mitigation Opportunities

This NDC Investment Plan presents 15 primary mitigation opportunities, and 9 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 9 opportunities in the transport sector, and 6 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 3 below. Figure 3 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 the concept notes in Annex A.

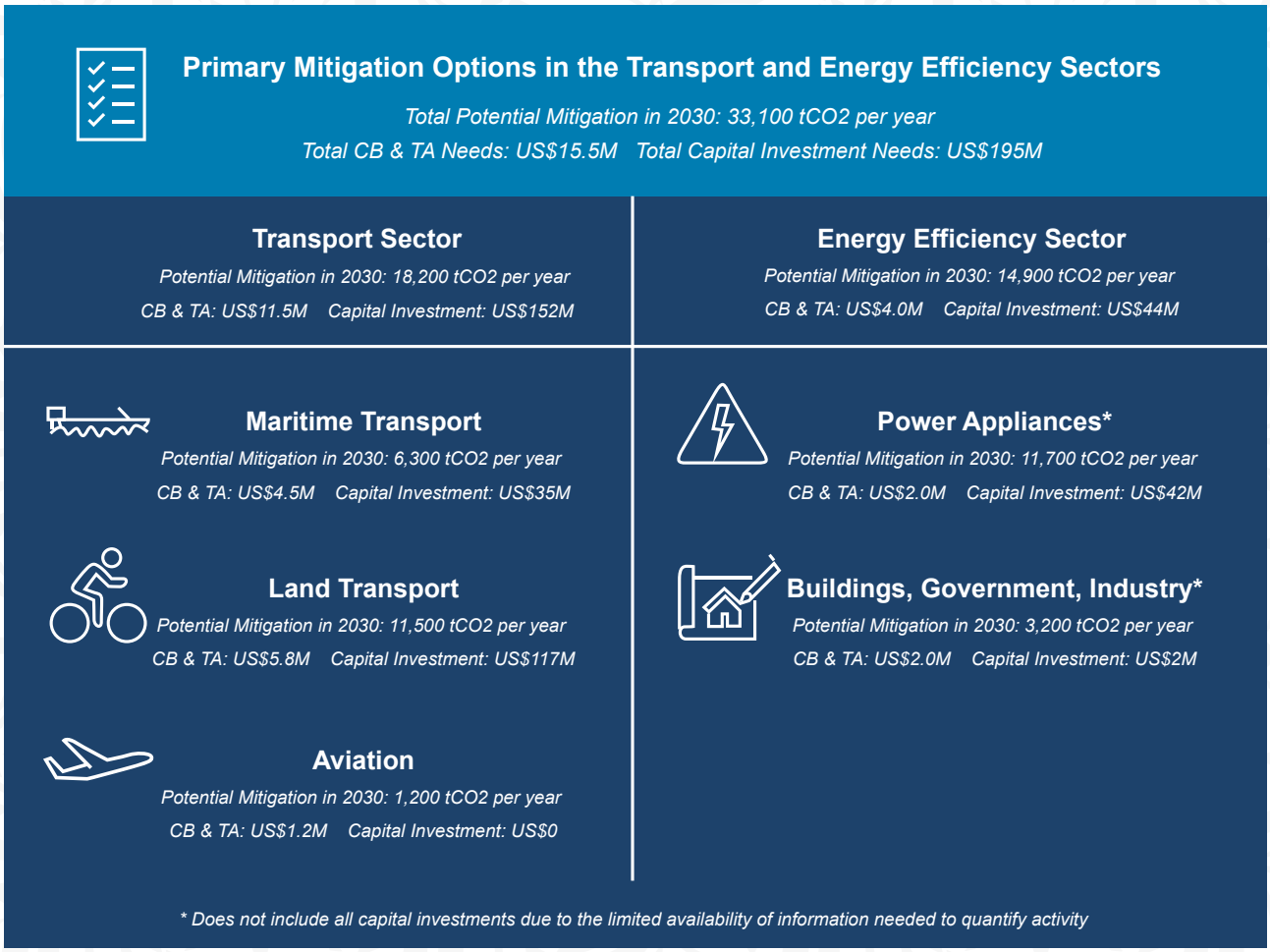


Figure 3: Summary of mitigation and finance needs for primary mitigation opportunities.

1.3.1 Determination of GHG mitigation, investment, and support needs

Determination of GHG Mitigation

The CO_2 mitigation potentials[14] provided in this document are determined based on the available information gained from stakeholders in Kiribati, applicable international sources, and the most applicable conservative methodologies available which 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 most of mitigation opportunities. Where applicable data was not available, the mitigation potentials are estimated based on various qualified assumptions. Improving the accuracy of the mitigation potentials 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 technical assistance 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 opportunities.[15] The mitigation potentials do however, provide sufficient information for Kiribati 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 hundred, and key assumptions for each mitigation opportunity can be found in the Concept Notes of the Project Pipeline.

14 Note that only CO_2 emissions, and no other GHGs, are addressed in this NDC Investment Plan because the energy sector targets in Kiribati's (Intended) NDC only include CO_2 emissions.

15 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 data on the disaggregation of fuels use, a top-down total disaggregated energy balance, transport behaviour studies…etc.

In addition, between 2014 and 2019, Kiribati has imported significantly more fossil fuels than in the period prior to 2014, but the (Intended) NDC BAU baseline is based on data prior to 2014. This assessment is based on fossil fuels imported from 2014 and after, therefore the baseline of the assessment does not match that of the (Intended) NDC.

Determination of investment and support needs

The investment and support needs (which include project & programme development, capacity building, and technical assistance) costs are determined in 2019 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 potential level of error. In addition, the impact of external factors, such as but not limited to the global economic downturn caused by the COVID-19 pandemic, recent energy and commodity price swings, means that the cost estimates should be seen as indicative.[16] More accurate costs will need to be determined during the development and technical assistance activities of each individual mitigation opportunity chosen for implementation.

1.3.2 Alignment of the NDC Investment Plan to national policies / strategies / plans

The GOK 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 nine primary policies, strategies, and plans divided into the following three categories shown in the figure below: Multi-Sector National, Multi-Sector Climate Change, and Energy & Transport Sectors.[17] Further analysis of the alignment of this NDC Investment Plan with the primary policies, strategies, and plans can be found in Annex B.

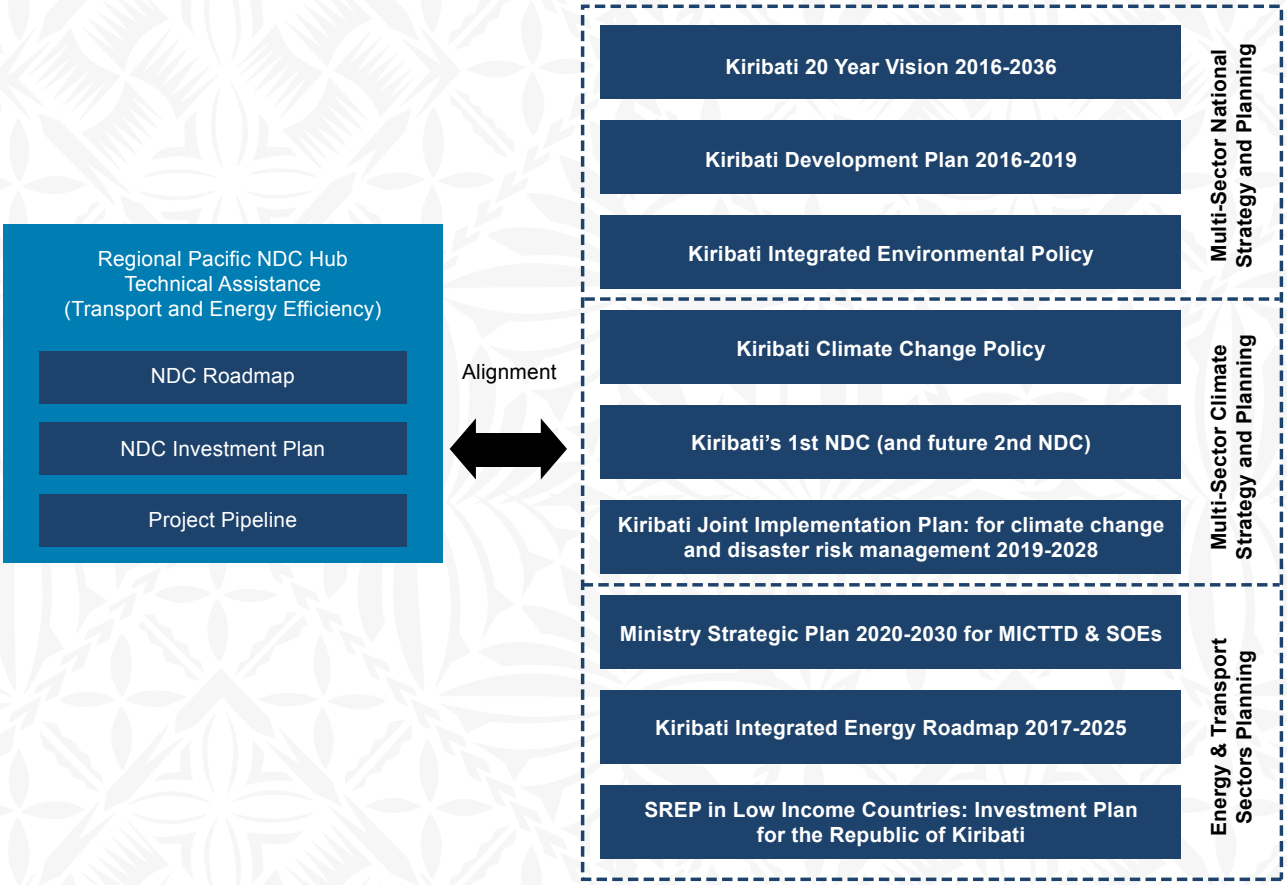


Figure 4: NDC Investment Plan alignment with national strategy and planning

16 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.

17 It is noted that there are some additional secondary policies, strategies, and plans not listed.

This NDC Investment Plan was developed after the above policies, strategies, and plans and is thus aligned with them. The nature of the planning cycle in Kiribati means there is the opportunity to integrate chosen mitigation opportunities of the NDC Investment Plan into the national and sectoral planning in the future.

1.3.3 Consideration of multi-country efforts & lessons from emergencies

Multi-Country Efforts

Kiribati is one of the smaller Pacific Island Countries (PICs) facing the same common challenges as other PICs in the development, implementation, and financing of climate change and social and economic development. This reality of common challenges has significant potential to be addressed in the PICs through multi-country efforts to increase effectiveness and efficiency, guided by a country driven process. Currently there are dozens of development partners operating in the PICs who are often competing for funds, and are applying their efforts through individual projects and programmes, sometimes with conflicting priorities or approaches. In addition, there is also a proliferation of "Centres" performing duplicate and overlapping support tasks to PICs for 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 should be emphasised via single coordinating entities, to optimise shared resources, ensure a coordinated and collective effort, and capitalise on economies of scale. It is important to note that the Government of Kiribati, and the governments of other PICs, do not currently have the capacity to finance, host, and coordinate Multi-Country Efforts.

An example of a Multi-Country Effort via a single coordinating entity for the Maritime Transport sector is the *Pacific Blue Shipping Partnership (PBSP)*[18] 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.[19] 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.[20] 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)*[21] 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)[22] between 2012-2019, which also targeted Kiribati, 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 of Emergencies

Kiribati does not lie within the general pathway of Pacific cyclones and does not face the same severe weather events as some PICs, but Kiribati suffers from the impact of other emergency challenges such as that of COVID-19, sea-level rise, periodic heavy rains and drought. In this context, COVID-19 has provided an opportunity to reset PICs priorities towards decarbonisation in economic sectors through green economic recovery and inter-island and multi-country reciprocity in trade. Decarbonisation in economic sectors addresses the two following current emergency challenges faced by PICs:

18 Pacific Blue Shipping Partnership Concept Note, https://mcst-rmiusp.org/images/Projects/PBSP2019/PBSP_Concept_Note_Feb_2020.pdf

19 COP23 (2019), "'We all know that a healthy and functioning ocean is the single most important factor influencing climate.' – PM Frank Bainimararma'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/

20 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=IwAR1mBCPHoXyfVr5ExJqbNGe5Y9hPrtNR0LU8Q325BiObPO42uvsY0VY1sGo

21 PCREEE Website, https://www.pcreee.org/

22 Pacific Appliance Labelling and Standards Programme Evaluation Report, http://prdrse4all.spc.int/sites/default/files/final_pals_evaluation_report.pdf

1. Integration of Green Recovery and Green Jobs creation should be coupled with COVID-19 response and recovery to enhance the implementation of sectoral mitigation actions and the achievement of NDC targets. This offers a key opportunity in the PICs to include “Green” in their economic recovery, especially for jobs creation and related vocational and professional training needed for supporting 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 and future demand for power generation.

2. COVID-19 has led to restrictions on the availability and movements of goods (including food) in the Pacific, an impact which some PICs such as Kiribati are feeling more than others. Critical thinking has identified that culture and community are core strengths of Pacific Islanders and have been fundamental to their resilience in the past.[23] Inter-island and multi-country 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 place environmental sustainability and resilience above pure economic development.

Photo credit: https://www.flickr.com/

1.4 Using the NDC Investment Plan and Project Pipeline

This NDC Investment Plan and its annexes are meant to support each other in terms of communicating to stakeholders certain information regarding the sector, sub-sector, and detailed information for individual mitigation opportunities in Kiribati. 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 into each of the aspects presented in the body of the NDC Investment Plan, and the Project 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 5 presents what information is found within the NDC Investment Plan and the annexes.

23 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/

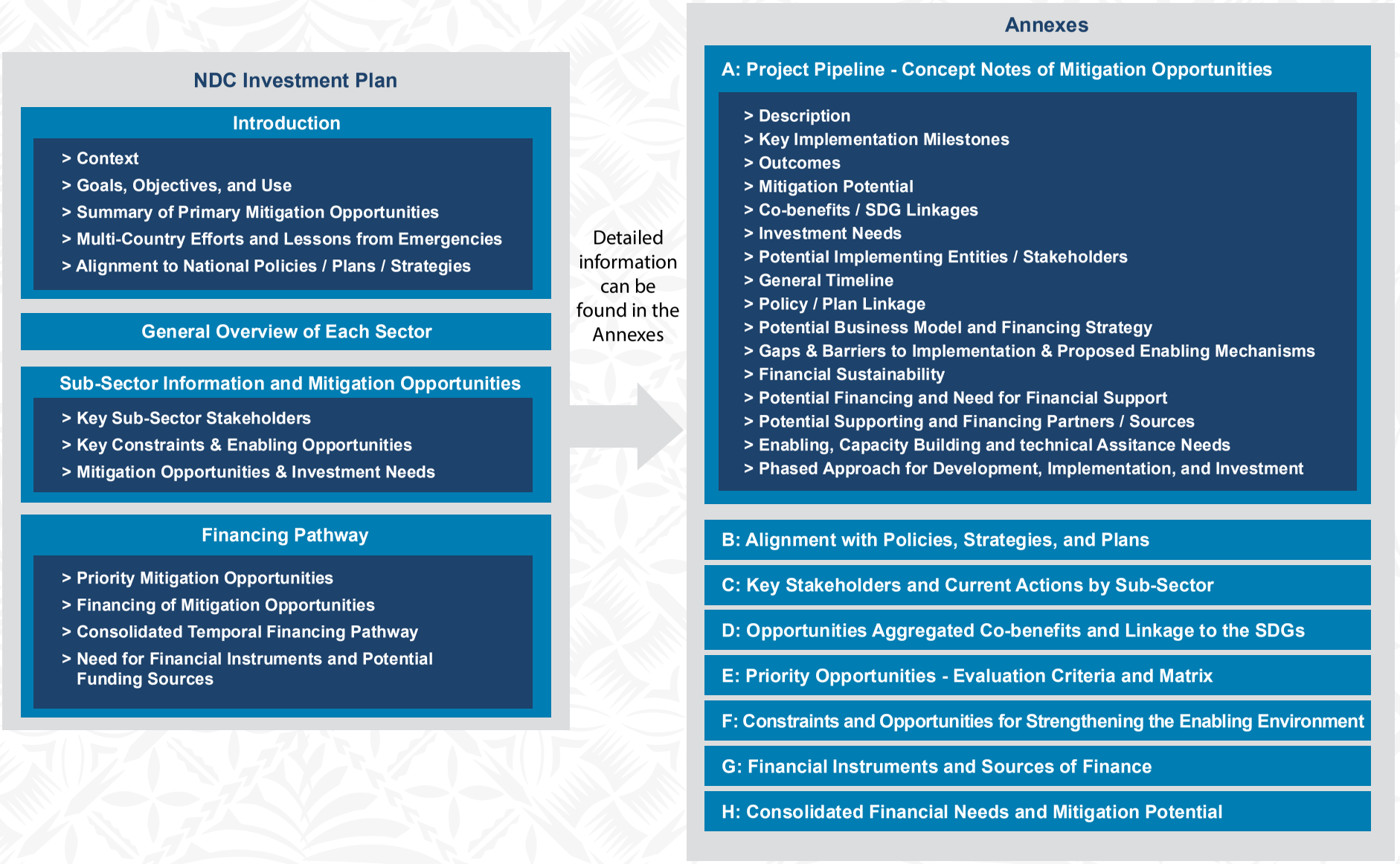


Figure 5: Diagram for information found in the NDC Investment Plan and Project Pipeline

2. NDC Investment Planning for Transport (Land, Maritime, Aviation)

The GOK plays a predominant role in the transport sector in Kiribati, in terms of regulation, enforcement of safety standards, and through its SOEs responsible for aviation and maritime transport services (including infrastructure). The private sector involved in the transport sector in Kiribati is small and primarily land transport focussed. There are only a handful of companies operating only one or two ships on a limited number of domestic routes in the maritime sector for example. However, individuals/households and island/community groups are also key stakeholders as owners and operators of small maritime vessels and land transport vehicles.

Kiribati does not have what most would consider as a 'market' economy, and this influences the makeup of the transport sector with the government taking a much more dominant role in service delivery than would be normal within a market economy. Such government intervention is essential to maintain basic goods and service delivery to marginalised and remote communities. Kiribati faces enormous challenges with regards to transport, especially for maritime and aviation sub-sectors. These challenges include a small population scattered across a huge EEZ with limited land resources and relatively high costs associated with finance and insurance.[24] Depending on the mode of transport, the balance shifts widely between public and private operations. All registered aircraft operating domestically are owned by the national air carrier, Air Kiribati. Sea transport services are provided by a number of privately owned ships, supplemented by the Kiribati National Shipping Line (KNSL), which operates a small fleet. In land transport, while there are many vehicles owned and operated by the various government ministries, most land transport operations for the general public are conducted by private operators, with no municipal or national public transit system established.

To date, the driving forces behind investment in the transport sector have been economic and social development and adaptation to climate change, not mitigation, so emission reduction has not been an important consideration. The GOK (supported by international development partners) has already invested significantly in improving the transport sector, and this investment needs to be built upon and leveraged to maximise the benefits that could accrue from transitioning to low carbon transport. There are also opportunities for Kiribati to benefit from participating in global initiatives to raise its profile amongst global partnerships focused on sustainable transport.[25]

The GOK has set the NDC conditional target to reduce approximately 12,500 tCO_2e annually from transport by 2030.[26] Key constraints for low or zero carbon development in the transport sector for Kiribati are similar to those faced by the region and are well-documented.[27] These include barriers associated national policy, financing, data availability and reliability, lack of a supporting regional policy landscape, and lack of awareness of available options for a low carbon transition.

The above situation is changing however, due in large part to the efforts of a few Pacific organisations[28] collaborating since 2012, to raise awareness and political prioritisation of the transition of the transport (particularly maritime) sector away from fossil fuels. Coupled with greater priority being given to decarbonisation of transport at an international level through UNFCCC, IMO and ICAO processes. The regional policy landscape is now starting to shift focus and look at transitioning away from fossil fuels. Pacific leaders are now far more aware of the need for the transport sector to transition from fossil fuels, and that awareness and commitment[29] will result in greater priority being given to this challenge in the future. Kiribati's capacity to apply for and access a greater level of finance needs to be built in order for the country to capitalised on this changing priority.[30] Other PICs (e.g. RMI and Fiji) have targets and plans in place to decarbonise their transport sector, Kiribati can take advantage of this increased interest, data, research and action to formulate its own initiatives.[31]

24 In particular, the Government, as all other governments and many private operators in the Pacific, self-risks their assets in the maritime sector. Meaning that vessels and maritime infrastructure are uninsured and the government accepts the risk of loss or damage caused by storms, etc.

25 See for example Sustainable Mobility For All Global. Tracking Framework 2.0 (accessed August 2020) http://sum4all.org/global-tracking-framework, SLOCAT Partnership. Promoting sustainable, low carbon transport for 10 years (accessed August 2020) http://www.slocat.net/

26 Republic of Kiribati (2015) "Intended Nationally Determined Contribution" https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Kiribati%20First/INDC_KIRIBATI.pdf

27 see for example Goundar, A. et al (2017) King Canute Muses in the South Seas: Why aren't Pacific Islands transitioning to low carbon sea transport futures? Marine Policy Volume 81, July 2017, Pages 80-90 http://dx.doi.org/10.1016/j.marpol.2017.02.012

28 E.g. USP, IUCN, WWF, PIDF - see for example Sustainable Sea Transport Talanoa (2012 presentations (accessed August 2020)) https://www.mcst-rmiusp.org/index.php/resources/symposium/1st-sustainable-sea-transport-talanoa-2012

29 See for example the Laucala Declaration on decarbonisation of Pacific Islands Transportation (2019) https://mcst-rmiusp.org/images/Laucala_Declaration/Laucala_Declaration_on_Pacific_Islands_Transport.pdf

30 Transport projects made up about 14% of aid/development to the region in 2017. See for example Radio New Zealand (28 Jan 2020) ADB to spend $US2b on Pacific energy and transport projects (accessed August 2020) https://www.rnz.co.nz/international/pacific-news/408324/adb-to-spend-us2b-on-pacific-energy-and-transport-projects

31 For example, ADB funded baselines for GHG emissions for RMI domestic fleet Oxley, M. (2018) Establishing Baseline Data to Support Sustainable Maritime Transport Services focused on the Republic of the Marshall Islands Final Report. Pacific Regional Infrastructure Facility https://www.theprif.org/documents/republic-marshall-islands-rmi/transport-maritime/prif-rmi-shipping-baseline-data-report and the Options Catalog for maritime transport decarbonisation are relevant to Kiribati Vahs, M. et al (2019) Technical and Operational Options Catalog: Proposal for Technical and Operational Options to reduce Fuel Consumption and Emissions from "Inter-Atoll Transport" and "Inside-Lagoon Transport" Transitioning to Low Carbon Sea Transport in the Republic of the Marshall Islands. University of Applied Sciences Emden-Leer

Financing (and underwriting of risk/insurance) continue to be primary constraints for the transport sector in Kiribati, where most transport infrastructure and larger asset projects are donor/development partner funded. Climate change is exacerbating the need for external financing, as repairing damage to existing transport infrastructure and assets caused by natural disasters takes up more and more of the national budget, leaving little available for investment in transport decarbonisation initiatives.

2.1 Land Transport Sub-Sector

The land transport sub-sector in Kiribati includes both private and public vehicles. The private sector and public largely purchase second-hand vehicles from Japan, while the Plant and Vehicle Unit (PVU) and other ministries departments procure, operate, and maintain GOK vehicles, which are typically purchased new from Japan or South Korea.

The Kiribati Highway Authority (KHA) accounts for 7,114 vehicles listed by manufacturer in Tarawa. Based on customs data from 2015 to 2019 and expected vehicle lifetimes for the different modes of transport there are an estimated 30,400 motorised and non-motorised vehicles active throughout Kiribati. Of these 58% are bicycles, 30% motorbikes, 9% cars, 2% trucks, and 1% minibuses.[32]

The Kiribati Insurance Company (KIC) is the sole body through which motor vehicle insurance is provided.[33] There is only one commercial bank present in the country – ANZ, which can provide vehicle finance. The fuels market is serviced by only the national fuel supplier, Kiribati Oil Co. Ltd. (KOIL), which distributes to various petrol stations around the nation.

Vehicles carrying more than 10 passengers incur a 25% duty, motorbikes under 100cc incur 30%, goods vehicles incur 35%, motorbikes over 100cc incur an 80% duty, and private vehicles have a duty range from 55-75%. Special purpose vehicles (e.g. ambulances, etc.) are duty free, as are bicycles. There are currently no incentives for electric vehicles. Fees and charges in the registration of vehicles are paid recognizing different classes of vehicles (A through G) and capacity of engine size which are listed on the Ministry of Information, Communications, Transport, and Tourism Development (MICTTD) website.[34] Exemptions for fees and charges are extended to government vehicles, and many of these fall under the responsibility of the PVU.

2.1.1 Key sector stakeholders and existing planning in Land Transport sub-sector

The land transport sub-sector in Kiribati is administered under the MICTTD and Ministry of Infrastructure and Sustainable Energy (MISE).[35] PVU falls under the responsibility of MISE, while MICTTD is responsible for KOIL and KHA. Current legislation governing the sector includes the Traffic Act 2017[36], KHA serves as the licensing authority under this Act. Roadworthiness and penalties are both regulated by the Commissioner of the Kiribati Police Service. The Island Councils are delegated the responsibility of administering fees and charges in locations beyond Tarawa. The Public Highways Protection Act 2018[37] established the Kiribati Land Transport Authority (KLTA), under which is delegated management of the land transport infrastructure. Land transport in Kiribati, beyond South Tarawa, is regulated on an island-by-island basis, which means cohesive implementation of national-level policy is complicated by the different enforcement and management practices employed by island councils with road users. Existing land transport planning is mainly focused on infrastructure and centred around national economic development and long-term resilience.

Key stakeholders and their roles are listed below, and additional information on key stakeholders and existing planning and actions in Land Transport can be found in Annex C.

https://www.mcst-rmiusp.org/images/Projects/TLCSeaT_HEL_TechnicalAndOperationalOptionsCatalog.pdf as is the Cerulean Project

32 Import data provided by Kiribati Customs, and registered vehicles from KHA

33 Republic of Kiribati (1981), Insurance Act 1981. http://www.paclii.org/ki/legis/num_act/ia1981116/

34 MICTTD (2020), Fees and Charges for Vehicle (accessed August 2020). https://www.micttd.gov.ki/article/highway-authority/fees-and-charges-vehicle

35 MICTTD (2020), Highway Authority (accessed August 2020). https://www.micttd.gov.ki/about-us/highway-authority

36 Republic of Kiribati (2017), Traffic Act 2017. http://www.paclii.org/ki/legis/num_act/ta201777/

37 Republic of Kiribati (2018), Public Highway Protection Act. https://www.micttd.gov.ki/sites/default/files/Public%20Highway%20Protection%20Act%202018.pdf

Table 1: Key Stakeholders in Land Transport

Key Stakeholder	Roles within the sector
Ministry of Infrastructure and Sustainable Energy (MISE)	Oversees the electricity infrastructure throughout Kiribati and roadway infrastructure on Tarawa atoll, particularly through the Energy Planning Unit, as well as serving as line ministry for the Plant & Vehicle Unit. MISE will play a key role in enabling transport road infrastructure, EV charging networks, facilities for vehicle scrapping, and public transport depots/stops.
Ministry of Information Communication, Transport and Tourism Development (MICTTD)	Oversees regulation of the transport sector (inclusive of land, marine, and aviation), serving as the line ministry for KHA. MICTTD will play a key role as the regulatory entity for implementing necessary EV standards, e-bike and bicycle policy, scrapping requirements, and oversight of the public transit system.
Kiribati Highway Authority (KHA)	Tarawa licensing and registration is handled by the KHA. Under MICTTD, EV, e-bike, deregistration, and public transit vehicles will all be regulated by KHA.
Kiribati Insurance Corporation (KIC)	The sole national provider of insurance for motor vehicles (and other coverage.) All land transport vehicles will be subject to KIC insurance requirements.
Kiribati Oil Company (KOIL)	National fuel importer, with storage facilities, and distributor to all transport users. KOIL will address fuel import standards and operate storage facilities and distribute biofuels under implementation.
Kiribati Police Service (KPS)	Police conduct physical inspections upon first registration, and upon expiration of licenses, as well as provide enforcement around all moving violations and accidents. KPS will regulate and enforce vehicle worthiness and usage by land transport users.
Kiribati Institute of Technology (KIT)	Post-secondary school for technical / mechanics training. KIT will provide training and knowledge of various repair and maintenance protocols for EVs, e-bikes, buses, and bicycles.
Island Councils	Island Councils are responsible for both vehicles and roadways in areas outside of Tarawa. Island Councils beyond Tarawa will regulate and manage land transport infrastructure and vehicles.
Plant & Vehicle Unit (PVU)	Handles import, operations, and maintenance of most new government vehicles. During implementation PVU can set a precedent for the national fleet through selective purchase of efficient government vehicles.
Private Sector	Largely represented by the Kiribati Chamber of Commerce & Industry (KCCI), there are a number of businesses engaged in transport of goods between islands, as well as haulage of goods and carrier transport of passengers by land. ANZ also operates as the sole commercial bank which finances land transport-related investments. Households also own vehicles and small vessels. The Private Sector will be the driving force in public support and compliance with the various land transport decarbonisation initiatives, and finance to purchase vehicles and small vessels.

2.1.2 Key constraints and opportunities to strengthen the enabling environment in the Land Transport sub-sector

In order to encourage low-carbon land transport, the market requires clear cost-competitive alternatives to the BAU scenario. Currently, most motorised vehicles are second-hand purchases and largely imported from Japan. There are currently no incentives in place to encourage alternatives to the existing paradigm, either in regard to the cost of importation and taxation, or the cost of registration and roadworthiness. The strengthening opportunities indicated below, and explored through the different mitigation opportunities proposed, may provide a sufficient base to encourage change. The strengthening opportunities focus on information, regulation, and finance to encourage the shift from the currently available range of vehicles to modes of transportation with lower emissions as defined in the mitigation opportunities (more information on the enabling environment can be found in Annex F).

Table 2: Key Constraints and opportunities in Land Transport

Constraint / Barrier	Enabling environment strengthening opportunities
Limited Market and Financing Options	• Establish a more risk-averse lending mechanism to support a more rapid transition. • Explore clean technology transfer and EXIM financing options. • Engage with government in bulk procurement of vehicles, including possible bus operators.
Limited Incentive/ Penalty Structure	• Revise vehicle registration pricing to one based on GHG emissions (g CO2/km). • Adjust duties and excise taxes to favour more efficient (or zero-carbon) modes of transport. • Include more stringent vehicle emission standards on imports.
Lack of human Capacity	• Continue expanding regulatory mandate and enforcement of KHA, KPS, and Customs. • Institute public awareness campaigns to encourage modal shifts. • Increase capacities for maintenance of hybrids, EVs, buses, and bicycles/e-bicycles.
Information Availability and Reliability	• Expand vehicle registration to include age and emissions standard for vehicles. • Survey the total number of derelict/de-registered vehicles. • Centralize Island Council vehicle data for outer islands with KHA. • Improve disaggregated customs data for the different modes of transport. • Undertake traffic survey and analysis on South Tarawa and Kiritimati for modal shifts.
Land Management	• Incorporate both green space and land transport infrastructure into budget and planning. • Utilize multi-storey designs for parking and potential charging infrastructure. • Incentivize the removal and resource export of derelict vehicles.

Mitigation Example: Policy and Regulations Encouraging Expansive Bicycle use in Denmark

Denmark's first Traffic Law, in 1923, allowed cyclist to use the 1m shoulder of roads to cycle, and this 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. In 1933 this had increased to 342 km 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 cycling infrastructure planning and for the 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 and is a symbol of equality and freedom within the Danish population and is estimated to mitigate GHG emissions by 20,000 tCO_2 per year. The city of Copenhagen has extensive planning and regulations for cycling infrastructure and in 2021 plans to increase its related spending to US$ 28M (DKK 178M) from an annual average of US$ 13M (DKK 87M) 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 both national and municipal government funds (from taxes), where the over 673,000 bicycles in the city are privately and commercially financed. These investments will increase the percentage of person-trips in the city from the current value of 28%, which already exceed the 2025 target of 25%.

To implement similar actions in Kiribati under T2 and T15, the new regulation and standards for bicycle lanes for roads and pathways will need to be enacted. Then planning activities for new (upgraded) infrastructure and the increase of bicycles will be needed, and 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 sub-sector

There are six mitigation opportunities which focus on Land Transport. Together, these have the potential to reduce 111,200 tCO_2 in emissions by the end of 2030, with an annual mitigation potential of 18,800 tCO_2/yr. in 2030. This annual mitigation potential is approximately equal to 24% of the projected BAU emission in 2030. The estimated capital investment costs needed to reach the mitigation potential is US$ 792.7M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US$ 29.8M. The breakdown of support and investment needs is given in the table below, followed by a short description of each mitigation option. More information on mitigation opportunities can be found in the concept notes in Annex A.

Table 3: Aggregated Information for Land Transport Mitigation Opportunities

Opportunities	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 (tCO2/yr.)	Total Mitigation 2020-2030 (tCO_2/yr.)
T2 – Bicycle/E-Bike Financing Initiative***	0.8	20.3	2,700	1,400	7,900
T7 – Biofuel blends in Land and Maritime Transport	1.2	7.0	400	3,100	18,600
T8 – Multi-modal Transit Initiative***	3.9	89.4	1,800	7,000	51,800
T11 – Electric Vehicle Network Development***	3.1	102.5	3,500	6,500	29,800
T13 – Whole-of-Lifecycle Vehicle Programme****	0.8	1.5	5,000	100	500
T15 – Land Transport Infrastructure Upgrade for Non-motorized Transport**	20.0	572	227,000	700	2,600
Total Mitigation Potential of all[38]	29.8	792.7.4		18,800	111,200

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

** This includes the investment in new roads, and GHG mitigation is from sequestration (AFOLU)

*** This includes the investment of consumer and company purchases of vehicles and charging stations as applicable.

**** GHG mitigation is from sequestration (AFOLU)

- *T2 – Bicycle/E-Bike Financing Initiative*: This mitigation opportunity enhances the access and use of bicycles and/or e-bicycles in Kiribati, which continue to be more popular in Kiribati compared to other PICs. This opportunity involves the inclusion of 7,000 standard bicycles and 7,000 e-bicycles imported into Kiribati and replacing 60% of the motorbikes expected to enter the market in Kiribati under BAU conditions. Ensuring bicycle use as a primary source of transport for people of all ages (reducing reliance on motor vehicle use and associated fuel consumption) can strengthen household cost savings, GHG emission reductions, and provide potential health benefits for the population of Kiribati. This opportunity also includes capacity building for the maintenance of standard bicycles and e-bicycles, and the provision of initial spare parts, as a means to encourage sustainability of this type of transport.

- *T7 – Biofuel Blends in Land and Maritime Transport*: A range of sustainable fuels are in use globally, which can be suitable alternatives for vehicles in Kiribati. This opportunity involves the import and use of biofuel blends for diesel and petrol, and the construction of necessary infrastructure to enable the use of these fuels. The applicability, appropriateness, and financial viability of this option is likely dependent on the scale of use of biofuel blends in other PICs, such as Fiji and Samoa. Biofuel blends would need to be shipped from Singapore to fuel transfer hubs in Fiji or directly to Kiribati. Technology piloting in the maritime sector is ongoing, but biofuel blends in land transport, especially biodiesel and ethanol blending, are already used and mandated extensively in Brazil, Europe, North America and Indonesia.

38 These values are highly dependent on the future growth of fuels use and land transport activity.

- *T8 – Multi-modal Transit Initiative*: Public transport in Kiribati is not organized under a formal state-structured system or a robust licensed commercial operator system found in other PICs. Congestion and increases in single-occupancy travel are placing a strain on the road network, which is comprised of a single two-lane road through most of South and North Tarawa while other roads are largely unpaved roads elsewhere in Kiribati. This mitigation opportunity would provide technical assistance, capacity building, and investment in motorised, transit services (e.g. buses), which will offer more passenger capacity per vehicle for transit between communities. This opportunity includes establishing Public Private Partnerships (PPPs) to operate up to 132 buses in Kiribati and the operational infrastructure. In addition to reducing GHG emissions, this opportunity will increase mobility and equity for those in society without driver's licenses, improving options for women, youth, elderly, disabled persons, low-income travellers, and other vulnerable groups.

- *T11 – Electric Vehicle Network Development*: Technical assistance and financial support for the development and introduction of up to 2,800 Electric Vehicles (EV) and a network of Level-2 chargers in Kiribati. This will include both market instruments to facilitate the introduction of EV technology and the planning for the allocation of infrastructure to create a sufficient charging network across first the public, and then the private sector locations. Unlike the existing paradigm, in which individuals and households primarily purchase second-hand vehicles, the lack of maturity in the EV market means a robust second-hand EV market (including battery warranty / life-cycle concerns) is not readily available to replace the second-hand internal combustion engines vehicle imports. Thus, new EVs will be required until the global second-hand market matures. This option does not include the costs of additional power generation and distribution, which will be necessary to facilitate a large-scale introduction of EVs.

- *T13 – Whole-of-Lifecycle Vehicle Programme*: Derelict vehicles are a common sight around Tarawa. The current preponderance of second-hand vehicles in Kiribati means that the vehicles are being imported at nearer the end of their operational lifespans, and disposal is not addressed in Kiribati. It is estimated that there are 10,000 derelict vehicles across the nation, as no mechanism for disassembling, consolidating, and exporting scrapped vehicles currently exists (a previous scrap mechanism ended years ago). The opportunity for government intervention, as well as potential private sector operators, in the collection and export of scrap materials from recovered vehicles can be addressed through technical assistance and investment to develop and establish public-private partnerships or service contract/licensing arrangements. This would not only create economic opportunity (and employment), but also address the underlying environmental problem of past and future derelict vehicles. Mitigation under this option is achieved via carbon sequestration gained from the planting of vegetation in areas where there are previous derelict vehicles.

- *T15 – Land Transport Infrastructure Upgrade for Non-motorized Transport*: The design and implementation of enhanced land transport infrastructure will support decarbonisation based on the availability of infrastructure designed to prioritize use of non-motorized transport (e.g. - cycling and walking). To encourage decarbonisation, by reinforcing non-motorized transport through deliberate inclusion of separated green space between vehicle lanes and protected infrastructure for foot and bicycle traffic along 370 km of dedicated roadways yet to undergo paving/upgrading. Technical assistance and the financing of both the design and infrastructure will guide how carriageway and bridges are partitioned, and the allocation of space between motorized and non-motorized transport will encourage GHG mitigation via non-motorised transport. Mitigation under this option is achieved via carbon sequestration gained from the planting of vegetation in separation areas.

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 and this led to over 4,000 hybrids passenger cars being imported by the end of 2017, which leads to an estimated minimum annual GHG mitigation of 3,400 tCO_2 assuming that all hybrid imports substituted and traditional ICE vehicle. This was a successfully 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 vehicle imports increasing more than planned in 2016-2017, which can potentially contribute to a net GHG emissions increase beyond the BAU baseline. Due to the large number of imports, the excise fees waiver changed in the following years to only apply to new hybrid vehicles.

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 higher cost of introducing EVs and no supply of second-hand EVs which can be imported.

2.2 Maritime Transport Sub-Sector

The maritime sector regulations and legal frameworks in place in Kiribati are focused on the registration of and safety requirements for domestic vessels operating within Kiribati waters as well as the training and certification of seafarers. There are no current regulations in place which address GHG emissions from vessels within Kiribati's EEZ. Globally, and in Kiribati, maritime transport can be considered as having two physical components: sea-based (boats/ships) and land-based infrastructure (e.g. wharves, ports, shipyards/slips, maritime suppliers and service providers, training facilities). This NDC investment plan focuses on the sea-based component.[39]

In terms of the domestic fleet in Kiribati, in 2019 there were 41 registered vessels (see the table below) with anecdotal evidence of several hundred small boats (<15m) that were unregistered.[40]

In 2005 a study found that on the island of Marakei alone, 31% of the households owned canoes, and two additional boats/skiffs were used for fishing in both the surrounding ocean and inner lagoon of Marakei.[41]At the national level, household survey data from 1995 recorded 565 skiffs and 3,968 canoes in the country[42], and by 2015 the total number of these smaller vessels (skiffs and canoes) had increased to over 4300 in total, of which 2100 are expected to be motorised.[43]

Table 4: Number of Registered Vessels by Ownership and Length (2019)

Vessel Owner	>30m	<30m
GOK: Kiribati National Shipping Line (KNSL) x 2 and Ministry of Fisheries & Marine Resource Development (MFMRD) x 3	5	0
Individuals	4	8
Community (churches, Island Councils, etc)	1	4
Private Companies	11	8
TOTAL	21	20

KNSL reports that their existing fleet (two landing craft) is insufficient to meet current demand, and additional vessels are required. To meet this demand KNSL identify the need for a new tug and barge (250-300 DWT), a small landing craft (18m), a small container ship (80 TEU), and a passenger/cargo ship (~50m)[44]. Future demand is expected to remain the same, dependent on GOK support to retain populations on outer islands[45].

The domestic maritime regulatory environment, similar to that of aviation, is influenced strongly by what happens at the international regulatory level. The 2018 adoption of the 'Initial IMO Strategy on reduction of GHG emissions from ships' caused a much greater focus on CO_2 emissions within the global shipping industry and this is in large part due to the influence of PICs, including Kiribati. Under the Initial IMO Strategy, the shipping industry is to reduce carbon intensity through the Energy Efficiency Design Index (EEDI), and other efforts, from a baseline in 2008 to reduction in carbon intensity by at least 40% in 2030, and 70% in 2050 to reduce total annual shipping global emissions by at least 50% by 2050 and pursue efforts to phase them out on a pathway consistent with the Paris Agreement temperature goals[46]. This shift at the international level will have a large impact on shipping regulations at the domestic level in Kiribati, in part due the requirement on the IMO to pay particular attention to SIDS and LDCs which will result in the opportunity for Kiribati to apply for capacity development and pilot project funding via the IMO. The IMO regulations will also have an impact on Kiribati, particularly on the Marine Division and KPA with Flag[47] and Port State control obligations as the new IMO regulations come into force.

The SREP identifies maritime transport as comprising 2% of total national GHG emissions. However, data provided

39 In strict terms of GHG emissions accounting, the mitigation of emissions from shoreside infrastructure is not accounted for under transport budgets but under buildings and infrastructure.

40 With regards to international ships. Kiribati houses an open registry (see footnote 26 above). In 2019 there were 66 international ships which were flagged to Kiribati although these vessels may never visit Kiribati and are unlikely to be owned by anyone from Kiribati. These vessels are not considered further in this NDC Investment Plan as they will unlikely contribute to domestic GHG emissions.

41 Uriam, K. (2011) "Island reports: Issues in relation to Climate Change". T-Makei Services, Government of Kiribati http://repository.usp.ac.fj/7182/1/Island_reports.pdf

42 Gillet, R. (2003) ("Aspects Of Sea Safety In The Fisheries Of Pacific Island Countries", FAO http://www.fao.org/tempref/docrep/fao/006/y5121e/Y5121e00.pdf

43 Republic of Kiribati (2016) "2015 POPULATION AND HOUSING CENSUS"

44 KNSL PowerPoint presentation (November 2019)

45 GOK currently actively encourages populations remaining on outer islands through subsidies and incentives. Whilst there has been a trend of "urban drift" in recent years, the impact of the global pandemic may see a reduction in this phenomenon.

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by MISE and KOIL are deemed to be more accurate in terms of national fuel use from 2010-2018[48]. Using the data recorded for 2014 maritime transport emissions are estimated to be as high as 23% of total national GHG emissions[49]. Combined "fisheries" and "sea transport" varied between 60-80% of total unleaded petrol (ULP) used and "sea transport" 5-10% of total diesel (ADO) used[50]. It is noted that the value of 23% of total emissions is more in line with the emissions calculations for the neighbouring Marshall Islands which has sea transport as contributing 20% of national GHG emissions[51]. The discrepancy between the information sources highlights a lack of data or inadequate bifurcation of fuel use within the transport sector.

Since the 1980s there has been very little investment in the Pacific regional maritime transport sector which focused on GHG emissions reduction and implementing low-carbon technology in proportion to total sector investment. The trial projects that were done during this time included the design and building of wind powered sailing boats of various sizes for artisanal fishing focused on improving safety of vessels (including a Food and Agriculture Organisation – FAO project), other projects included retrofit of Fiji government vessels (focused on saving fuels). Those trials proved that achieving 40% GHG emissions reduction by 2030 is possible for certain classes vessels. Other findings from these pilots indicated that the lack of capacity in local boat builders and surveyors resulted in problems with unsafe vessels being built, and a need to introduce naval architecture criteria for proper construction of vessels. The FAO project also found reducing use of fuel (and so reducing costs) was the key determining factor for artisanal fishers to use sails. At a larger scale, the continued operation of the SV Kwai in the Pacific which services the Line Islands proves fuel savings of approximately 60% can be achieved from soft sails vessels.[52] This type of transition to low-carbon technology is supported by a strong sailing culture and heritage in Kiribati.

Financing and Implementing Partner Example: Pacific Blue Shipping Partnership (PBSP)

The Pacific Blue Shipping Partnership (PBSP) is a Pacific Island Countries (PICs) driven framework which is being developed to allow PICs access to blended finance and capacity building at a large-scale, with the purpose to catalyse 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 between 2020 and 2030 work to facilitate US$ 500m of finance into the maritime sectors of the participating PICs, 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.

2.2.1 Key sector stakeholders and existing planning in Maritime Transport sub-sector

There are very limited land-based maritime transport services in Kiribati, for example slip/boat yard facilities are only able to service small boats, and most larger vessels must travel to Fiji for servicing/maintenance. Land-based maritime transport has a mix of both public and private operation, with Kiribati Ports Authority (KPA) running the two international ports, Kiribati Marine Training Centre (MTC) and Kiribati Institute of Technology (KIT) providing different types of education/training, and private companies selling safety gear and undertaking boat and marine engine repairs, etc.

48 Boanareke Fatali pers comm. 11 Dec 2019 (excel spreadsheet of MISE data on vessel ownership and ADO and ULP use by consumer)
49 This could be considerably higher as Government vessel fuel use is included separately in combined "Government" fuel use, as is fuel used by households in outboard motors.
50 2018 total ULP use 9,260,398 litres (government/industrial 20,800; residential 67,504; land transport (bus owners/KOIL use) 2,770,799; fishing 5,670,295, sea transport (KSSL & other vessels) 123,200) and total ADO use 14,299,928 litres (community & social services 239,482; land transport (bus owners/KOIL use) 5,476,529; commercial (KOIL use) 35,710; electricity (PUB/Tank 5) 7,191,710; sea transport (KSSL & other vessels) 1,356,497)
51 Estimates for Fiji have sea transport contributing approximately 12% of national GHG emissions.
52 Sailing Vessel Kwai, Sailing with KWAI: Providing shipping options in the South Pacific (accessed August 2020)http://svkwai.com/

The government, through both its Marine Division and the SOEs KNSL and KPA, plays a key role in domestic maritime transport. Not only are they responsible for regulation and enforcement and certification of seafarers, they also own and operate the ports and wharves, and two landing craft[53] which provide transport connectivity for outer island communities. Other government departments of relevance include MFMRD who also own and operate three fisheries vessels, and MISE in regard to energy use and reporting. Island Councils also own and operate other inter-island vessels.

The private sector in the maritime sub-sector is very small when compared to most other nations. There are only a handful of private shipping companies that own and operate vessels in Kiribati, mostly providing inter-island passenger and cargo services on the more profitable routes, with one dredger being the exception. Shore-based stakeholders include a small number who sell marine related machinery, spares, safety equipment, etc., and the boat building/repair facilities such as BSL.

Households and Individuals own and operate the vast majority of vessels in Kiribati, albeit these are small vessels. However, collectively the emissions from outboard motors are likely to comprise the single largest source of maritime emissions for Kiribati, and so individual households are a key stakeholder.

The current planning in maritime transport remains silent on reducing GHG emissions and prioritises improving connectivity, purchase of new vessels[54], repair and maintenance of existing vessels, KPA yard expansion and new offices (Betio and Kiritimati ports), introduction of energy saving management practices at KPA facilities, and new yacht marinas in S. Tarawa and Kiritimati. There are also plans in place and in the pipeline for projects which address inter-island connectivity, such as development of jetties and boat ramps, dredging and navigational works to improve inter-island connectivity, as well as the Government / ADB / World Bank funded Outer Islands Infrastructure Project.[55] Again these projects do not specifically address reduction of GHG emissions. Kiribati is also a participating country in the IMO's Global Maritime Network Pacific Maritime Technology Cooperation Centre (MTCC) coordinated by SPC and SPREP. The proposals by KNSL for new offices do include provision of solar PV for buildings.

Key stakeholders and their roles are listed below, additional information on key stakeholders and existing planning and actions in maritime Transport can be found in Annex C.

Table 5: Key Stakeholders in Maritime Transport

Stakeholder	Roles within the sector
Ministry of Information Communication, Transport and Tourism Development (MICTTD)	MICTTD is responsible for transport planning, regulation and enforcement, under which sit KNSL and MTC. Also, MDCC plays an oversight and coordination role. MICTTD is the main regulatory entity for implementing changes in planning, regulation, and enforcement for low-carbon activities.
Kiribati National Shipping Line (KNSL)	KNSL is the SOE responsible for operation of government vessels (currently landing craft) and port buildings KNSL can play a key role in trials of electric outboard motors and recharging as well as lead for trials and operations of low carbon vessels proposed.
Kiribati Port Authority (KPA)	SOE responsible for management and operations of Ports of Betio (Tarawa) and Ronton (Kiritimati) KPA is a key stakeholder in development of National Action Plan in regards incentivising greener ships through favourable port fees, for example.
Betio Shipyard Ltd	Ship repair/retrofits BSL may play a role in development of the National Action Plan
Ministry of Fisheries & Marine Resource Development (MFMRD)	Ship owner/operator MFMRD plays a role in transition of outboard motors to 4-stroke then electric.
Island Councils	Ship owner/operator Island Councils play a role in transition of outboard motors to 4-stroke then electric.

53 LC Linnix (327 GRT) and LC Aratobwa (507 GRT)
54 Includes multi-purpose vessel for navigational work and SOLAS training vessel (see section 9.2 of MSP).
55 $30m World Bank (March 12 2020) Kiribati – Outer Islands Transport Infrastructure Investment Project (accessed August 2020) https://www.worldbank.org/en/news/loans-credits/2020/03/12/kiribati-outer-islands-transport-infrastructure-investment-project

Kiribati Marine Training Centre (MTC) Kiribati Institute of Technology (KIT)	Seafarer training post-secondary school Mechanic training post-secondary school The training institutions play a key role in development and delivery of training to seafarer/ engineering cadets on low carbon alternatives.
Ministry of Finance & Economic Development (MOFED)	Taxation, Investment and financing, development project management/oversight. MOFED plays major role in implementation of policy to drop costs of more energy efficient outboard motors and increasing cost of less efficient outboards.
Ministry of Infrastructure and Sustainable Energy (MISE)	Energy and GHG emissions calculations and data analysis and NDC reporting. MISE is key stakeholder in MRV for all trials of low/zero carbon vessel and outboard motor pilot projects.
Private sector – commercial ship owners and operators	Own and operate vessels Private sector plays key role in roll out of more energy efficient vessels of successful trials, including outboard transition, as well as development of National Action Plan
Private sector – shore based	Provide support services such as marine parts, boat repairs, etc. Plays a key role in roll out of outboard motor transition through sales and servicing of more energy efficient motors.
Household/Individuals	Own vast majority of small boats, also customers of commercial and government vessels Individuals play key role in implementing outboard motor transition through replacement of 2-strokes with more energy efficient motors.

2.2.2 Key constraints and opportunities to strengthen the enabling environment of the Maritime Transport sub-sector

Key constraints and challenges to low carbon maritime transport have existed for years and have proved difficult to overcome in Kiribati. In addition to this is the fact that the existing infrastructure and fleet is insufficient to meet current needs (reflecting the "build, neglect, rebuild" syndrome)[56]. Issues of poor maintenance, poor ship safety, and unsuitability of vessels for the operating environment, linked to lack of finance and awareness/capacity, are all challenges that need to be addressed. Whilst investment in low carbon maritime transport has been virtually non-existent in the region since the 1980s, that situation is now changing[57] with focus on the issue being driven by both international[58] and regional debates and there are opportunities for Kiribati to access new finance and technologies becoming available. The key constraints and opportunities below identify the additional information needed for sound public / private sector decision-making, an encouraging enabling regulatory environment, and opportunities to finance the use of low-carbon technology (more information can be found in Annex F).

Table 6: Key Constraints and opportunities in Maritime Transport

Constraint / Barrier	Enabling Environment Strengthening opportunities
Access to Financing	• Prepare a low carbon National Maritime Action Plan and lodge it with IMO...etc. • Participate in existing PICs multi-country funding initiatives (PBSP, MTCC, MCST…). • Develop financing mechanisms to support domestic commercial and household deployment of low/ zero carbon technologies.
Insurance /Underwriting	• Champion with other PICs the discussion on insurance and underwriting needs. • Participate in initiatives[59] which look to also address insurance/underwriting e.g. PBSP.

56 See for example Howes, S & Dornan, M. (2019) Moving Beyond Grants: Questions about Australian Infrastructure Financing for the Pacific https://devpolicy.org/publications/reports/MovingBeyondGrants.pdf and Asian Development Bank (2020) Pacific Economic Monitor Series July 2020 (accessed August 2020) www.adb.org/pacmonitor

57 See for example the Cerulean Project, a joint USP and Swire Shipping project to design and build a low carbon freighter capable of serving routes between Fiji and Marshall Islands including Kiribati, and the German funded Low Carbon Sea Transport Transition Project in Marshall Islands.

58 See for example recent UMAS study estimating R&D needs for decarbonisation of international shipping Global Maritime Forum. The scale of investment needed to decarbonize international shipping (accessed August 2020) https://www.globalmaritimeforum.org/news/the-scale-of-investment-needed-to-decarbonize-international-shipping

59 See for example International Bank for Reconstruction and Development (2015) Pacific Catastrophe Risk Insurance Pilot: From design to implementation, some lessons learned. World Bank (accessed August 2020) https://www.gfdrr.org/sites/default/files/publication/Pacific_Catastrophe_Risk_Insurance-Pilot_Report_140715%281%29.pdf

Human capacity	• GOK to coordinate and oversee integrated transport decarbonisation for Kiribati. • Continue GOK scholarships in maritime transport (incl. zero/low carbon shipping). • Enhance training offered by MTC and KIT to include zero/low carbon shipping. • Participate in international and regional forums such as IMO to build GOK capacity.
Information availability and reliability	• Carry out a household survey of small boat and outboard motor ownership and use. • Continue to work with vessel owners and operators to collect fuel use data. • Enhance capacity of GOK/ SOEs to collect, analyse, and report maritime transport data. • Disseminate information on the use and financial savings of low carbon technology.
Limited Incentive/Penalty structure	• Use existing GOK/SOE vessels and infrastructure to demonstrate low carbon options. • Institute minimum performance standards into new purchases for maritime transport. • Utilise taxation mechanisms (such as import and fiscal duties) to reach cost parity for low carbon technology.

2.2.3 Mitigation opportunities and investment needs in Maritime Transport sub-sector

There are five mitigation opportunities which focus on Maritime Transport. Together, these have the potential to reduce 34,100 tCO_2 emission by the end of 2030, with an annual mitigation potential of 6,200 tCO_2/yr. in 2030. This annual mitigation potential is approximately equal to 8% of the projected BAU emission in 2030. The estimated capital investment costs needed to reach the mitigation potential is US$ 34.8M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US$ 4.5M.

It is also important to note that there are proposals for three new vessels included in this NDC Investment Plan based on needs identified by KNSL. Therefore, mitigation potential is based on the decision to purchase new, purpose built low emissions vessels in comparison to purchase of a fossil-fuel powered conventional vessel, and not reduction in emissions from the existing commercial fleet. The breakdown of support and investments needs is given in the table below, followed by a short description of each mitigation option. More information on each mitigation option can be found in the concept notes in Annex A.

Table 7: Aggregated Information for Maritime Transport Mitigation Opportunities

Opportunities	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.)
T1 – Outboard Motor Transition	0.8	20.8	1,100	3,600	19,900
T4 – National Action Plan for Decarbonising Maritime Transport*	0.3	NA	NA	NA	NA
T5 – Low Carbon Mini-Container Ship	1.0	5.0	700	1,400	8,400
T6 - Small low carbon cargo/passenger freighter	1.0	2.0	1,100	400	2,700
T9 – Zero Impact Cruise Liner	1.4	7.0	2,700	800	3,100
Total Mitigation Potential of all	4.5	34.8		6,200	34,100

* Sectoral policy and planning action do not lead to direct mitigation

- *T1 – Outboard Motor Transition*: This opportunity would replace 2,010 of the 2-stroke outboard motors used in Kiribati with either 4-stroke motors (1,560) or electric outboards (450) by 2030. The opportunity would include a capacity building and training programme for maintenance and operation of the alternative outboard motors for boat operators and mechanics. 4-stroke outboards are considerably more energy efficient than 2-stroke motors, which are likely the single largest source of GHG emissions for the Kiribati domestic maritime sector. Electric outboards (assuming that recharging is from renewable sources) require no fossil fuels. This opportunity would result in reduced GHG emissions by reducing fossil fuel consumption in the maritime sector.

- *T4 – National Action Plan for Decarbonising Maritime Transport*: This opportunity calls for the provision of technical assistance for the preparation and implementation of a coordinated national level action plan for decarbonising maritime transport, including for lodging with the International Maritime Organisation (IMO).[60] The plan would address means to encourage decarbonisation of international ships visiting Kiribati's ports, ships flagged to Kiribati, and all other domestic vessels. It will include a set of policies, and incentives, and proposed investments to support the transition to zero-carbon domestic shipping (the other mitigation opportunities proposed will form a part of this this national action plan). Implementation of this plan, once developed and approved, would support and guide investment towards low-carbon options rather than BAU, which would reduce GHG emissions by 40% by 2030 and 100% by 2050[61] from the maritime transport sector.

- *T5 – Low Carbon Mini-Container Ship*: This opportunity includes investment in a mini container ship of 80 twenty-foot equivalent unit (TEU) capacity to be operated by KNSL. Because maintaining essential sea connectivity is a core priority of the GOK, this vessel would be government owned and operated. The vessel design would incorporate space for limited domestic passenger transport between the three island groups. Depending on an options assessment and feasibility, the vessel would be either a low carbon new-build (preferred) or a second-hand vessel retrofitted with a range of emissions abatement measures. Under the new build scenario GHG emissions would be minimised through advanced hull and propeller design; wind-hybrid main propulsion, solar/wind/biofuel auxiliaries, low energy berths and maximised operational efficiencies.

- *T6 – Small Low Carbon Cargo/Passenger Freighter*: This opportunity includes investment in a freighter of approximately 200 tonnes, with some passenger capacity, to be operated by KNSL. This would serve as a general service vessel primarily to smaller atolls to maintain basic supply routes outgoing and copra/primary produce coming inward. The vessel would be similar to the low carbon freighter being designed under the Cerulean Project but with additional allowance for some domestic passenger capacity. A low-tech, low carbon, low-cost approach to design would be undertaken. Assuming a new build is purchased, GHG emissions will be minimised through advanced hull and propeller design; wind-hybrid main propulsion, solar/wind/biofuel auxiliaries, low energy hotel services and maximised operational efficiencies.

- *T9 – Zero-impact cruise liner, Phoenix Islands*: This opportunity involved the implementation of a pilot 'zero impact' small scale cruise liner with capacity of 40-50 passengers operating from Tarawa to the Phoenix Islands Protected Area (PIPA), the largest designated Marine Protected Area (MPA) in the world.[62] The vessel, would be a true blue-water vessel capable of self-sufficiency throughout routes of up to 2,500 NM with near-zero impact on the maritime or terrestrial environment, and with a zero carbon operating footprint. The design may include wind/electric hybrid propulsion, RE (biofuel/solar/wind) for auxiliary hotel load[63], advanced hull design and battery support. The cruise liner would support GOK objective to develop PIPA as the core component of a niche, zero-impact tourism industry, which can generate employment opportunities and foreign currency for the country. As a zero-carbon investment, the opportunity would result in zero GHG emissions.

60 The Marine Environment Protection Committee (MEPC) of IMO held in November 2019 agreed a draft resolution supporting IMO Member States to prepare National Action Plans to complement the IMO Initial Strategy for reduction of GHG emissions from international shipping, and for such plans to be submitted to IMO to enable collaboration and sharing of information (see IMO: National Action Plans and Strategies (accessed 2020) http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/RELEVANT-NATIONAL-ACTION-PLANS-AND-STRATEGIES.aspx)

61 Kiribati NDC does not include a specific target for decarbonisation of the maritime transport sector. The targets provided here are those agreed to work towards by the Pacific Transport Ministers in September 2018 (see 24.II Pacific Regional Energy & Transport Ministers Meeting (Sept 2018) Final Outcomes Statement https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/a9/a9cb5b2fbed4b66a9f2ac346ef1b8876.pdf?sv=2015-12-11&sr=b&sig=e0rC%2Bt87Bt7g6n796kIU%2FUjFGOzxw5eRLK6p%2FM4gTdM%3D&se=2021-02-03T00%3A31%3A11Z&sp=r&rscc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsct=application%2Fpdf&rscd=inline%3B%20filename%3D%224_PRETMM_MINISTERS_Outcome_Statement_FINAL.pdf%22)

62 Conservation International. Phoenix Islands Protect Area project (accessed August 2020) https://www.conservation.org/projects/phoenix-islands-protected-area

63 Energy used on ships for anything other than propulsion is defined as "hotel load" and includes lighting, air conditioning, communications, refrigeration, water desalination, and entertainment.

Mitigation Example: SV Kwai Retrofit

The SV Kwai cargo vessel, 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 cost savings resulting 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 so reducing fuel use. Crewed mainly by Kiribati seafarers, the Kwai provides a well-known 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 similar pipeline project would likely need to be sourced from a mix of grants and loans depending on the target vessel owner.

Other examples of soft sail retrofit include the 1980's trials in Fiji on the Mataisau and Cagidonu, GSS vessels, which showed fuel savings of 23% overall and up to 37% if all sails were used, 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) Southamption, and Clayton, 1987, Wind-Assisted Ship Propulsion Physics in Technology 18 53, UK).

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

2.3 Aviation Transport Sub-Sector

Kiribati currently maintains 19 domestic airports/airfields under Airports Kiribati, with Kiritimati and Bonriki Airports classified as International Airports. There are currently fewer than seven aircraft registered with Civil Aviation Authority of Kiribati (CAAK) to operate in Kiribati, all operated by Air Kiribati. In the context of targeting emission reductions, domestic aviation has not been incorporated into the existing strategic planning and policy documents. Noting that under the SREP Investment plan, it is estimated domestic aviation accounts for only 4% of national emissions. KOIL is the sole provider of aviation fuel for Air Kiribati and international carriers in Kiribati. There are currently no guidelines or policies in Kiribati prohibiting or incentivizing the inclusion of more efficient aircraft or the use of biofuel inputs to supplement conventional jet fuels.

In order to achieve emission reductions while simultaneously improving air transport services, operational and infrastructural activities must improve efficiency, increase passenger density (per km of aircraft travelled), and reduce energy demands within the airport facilities. Technological solutions enabling biofuel blends are slowly becoming commercially available and operational internationally, but zero-emission aircraft (hybrid-electric and fully electric aircraft) are not expected to be accessible to globally until the 2025-2035 period.

2.3.1 Key sector stakeholders and existing planning in Aviation Transport sub-sector

The regulation of aviation activities and infrastructure in Kiribati fall under the mandate of CAAK, which reports to the MICTTD as its line ministry. Under the CAAK, Air Kiribati and Airports Kiribati handle airline and airport/airfield operations, respectively. MOFED also has bearing on the industry, as financing for new aircraft is all conducted as a State exercise, and as such is considered within the national budgeting process. Of the three transport sub-sectors, domestic aviation is the most centralized, with only Air Kiribati operating domestic aircraft in the country as of 2020. Current planning only includes the GOK purchase of new medium-range (<100 passenger) aircraft to be used for international routes and one domestic route (Tarawa - Kiritimati) and upgrading of airports/airfields.

Key stakeholders and their roles are listed below, and additional information on key stakeholders and existing planning and actions in aviation transport can be found in Annex C.

Table 8: Key Stakeholders in Aviation Transport

Stakeholder	Roles within the sector
Ministry of Information Communication, Transport and Tourism Development (MICTTD)	Regulates the transport sector (inclusive of land, marine, and aviation), serving as the line ministry for the Civil Aviation Authority. MICTTD, as the regulator, will be responsible for applying standards to the industry and training regulators, who apply training the rest of the SOEs managing the aviation sector.
Ministry of Line and Phoenix Islands Development (MLPID)	Regulates the administration and socio-economic development of the Line and Phoenix island groups. MLPID Addresses outer-island compliance (particularly in regard to airfields and scheduling) must be managed and communicated across MLPID with MICTTD.
Civil Aviation Authority of Kiribati (CAAK)	Regulator for the SOEs, Air Kiribati and Airports Kiribati, CAAK deals with both international and domestic aviation sectoral concerns, including ICAO compliance and national-level GHG inventory reporting. CAAK will ensure both aviation fuel and aircraft standards are compliant with national regulations, and ensure national regulations meet international standards.
Air Kiribati	Air Kiribati operates the aircraft fleet. Air Kiribati will be responsible for managing, operating, and maintaining aircraft assets through the re-fleeting process.
Kiribati Oil Limited (KOIL)	National fuel importer, storage facility, and distributor to all transport users. KOIL will be responsible for facilitating import, storage, and distribution of any SAFs introduced to the Air Kiribati fleet.
Airports Kiribati	Airports Kiribati operate the various airport facilities around the country. Airports Kiribati will be responsible for operational performance and infrastructure upgrades.
Island Councils	Island Councils are responsible for administrative management of issues concerning outer island constituencies served by the aviation sector. The Island Councils will be responsible for facilitating and maintaining airfield improvements on their respective islands.

2.3.2 Key constraints and opportunities to strengthen the enabling environment in the Aviation Transport sub-sector

Aviation faces a different set of limitations than maritime and land transport in Kiribati, as the entire market is consolidated under the national air carrier, Air Kiribati. There are currently no private sector aircraft operating independently of the state-owned airline, which constrains the market and leaves the maritime sector to meet the needs of lower-cost travel domestically.

Both aviation-related infrastructure and the aircraft themselves require significant capital investment, as well as higher operational and maintenance costs per weight and volume transported than other modes. The service schedule for domestic aviation is also subject to a variety of market and external factors which impact efficiency, depending on occupancy, cargo loading, environmental conditions, and operational performance of both the flight and ground crew, as well as the aircraft themselves.

To improve GHG emissions there is a need to accommodate larger aircraft on outer island airstrips in line with the planning targets to ensure all 19 domestic airports can handle Dash-8 planes by 2023. Additionally, hybrid/electric and electric aircraft, as well as a biofuel supply of sufficient quality at a competitive cost, are not yet widely available in the commercial aviation market. In addition, training and capacity development of both aviation professionals and regulators will be needed to ameliorate the existing human resource gaps across the industry.

Improved performance of the air transport sub-sector is considered of high priority by GOK. The Kiribati Aviation Investment Project, which recently upgraded the runways of the Bonriki and Cassidy international airports, has illustrated the value of aviation infrastructure in allowing larger aircraft to land, which has associated benefits in reducing fuel consumption on a per passenger basis. Size and quality of airport runways is a recognized constraint for the additional 19 domestic airfields in operation. The need to rapidly improve these facilities is also tied to the investment in re-fleeting for Air Kiribati's domestic operations, as decisions around replacement aircraft will be made based in part upon which airports those aircraft will be able to provide with regular service. This will extend beyond the runway length and corresponding allowance of larger aircraft sizes to include considerations around the capacity and source of electricity generation which may be needed for electrically powered aircraft.

The key constraints and opportunities identified below provide the additional information for sound public / private sector decision-making, an encouraging enabling regulatory environment, and opportunities to finance the use of low-carbon technology (more information can be found in Annex F).

Table 9: Key Constraints and opportunities in Aviation Transport

Constraint / Barrier	Enabling Environment Strengthening opportunities
Technology Transfer	• Accessing and use of biofuel blends in aviation. • Accessing future proven hybrid/electric and electric aircraft. • Trade facilitation with bilateral diplomatic/donor partners
Financing	• Enhance bilateral and multi-lateral cooperation to secure greater availability of finance. • Possible inclusion of results-based-finance for carbon trading / offsets under CORSIA.
Human capacity	• Technical assistance and training of both Air Kiribati and Airports Kiribati personnel. • Enhance ground operational requirements and safety protocols for aircraft handling.
Insufficient Infrastructure	• Expanding outer island airport facilities to be able to accommodate larger aircraft. • Enhance fuel storage and loading facilities to allow for use of biofuel blends. • Improving the construction quality of the airstrips to prevent closure and delays.

2.3.3 Mitigation opportunities and investment needs in Aviation Transport sub-sector

There are four mitigation opportunities which focus on Aviation Transport. Together, these have the potential to reduce 16,300 tCO_2 in emissions by the end of 2030, with an annual mitigation potential of 2,900 tCO_2/yr. in 2030. This annual mitigation potential is approximately equal to 4% of the projected BAU emissions in 2030. The estimated capital investment costs needed to reach the mitigation potential is US$ 238.8M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US$ 10.1M. The breakdown of support and investments needs is given in the table below, followed by a short description of each mitigation option. More information on the mitigation opportunities can be found in the concept notes in Annex A.

Table 10: Aggregated Information for Aviation Transport Mitigation Opportunities

Opportunities	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.)
T3 – Aviation Operational Training Programme	1.2	0	400	400	3,000
T10 – Aircraft Re-Fleeting Programme	4.5	201.0	37,000	1,400	5,600
T12 – Sustainable Aviation Fuel Integration Initiative	1.2	5.8	1,000	1,000	6,900
T14 – Airport & Airfield infrastructure upgrade	3.2	32.0	43,000	100	800
Total Mitigation Potential of all	***10.1***	***238.8***		***2,900***	***16,300***

- *T3 – Aviation Operational Training Programme*: This opportunity calls for providing technical assistance for re-training the Air Kiribati and Airports Kiribati staff, and is expected to yield minor emissions reductions through improved on-the-ground and in-flight systems management, air traffic management, and associated operational efficiency measures. This will not necessarily necessitate any specific changes in technology: it can be behavioural change and integration of best practices to realise the energy efficiency gains made through better us of technology centric measures. Introduction and training on use of emerging technology will be included when available in the market.

- *T10 – Aircraft Re-Fleeting Programme*: The process of renewing the Air Kiribati (domestic) fleet of six small aircraft provides a suitable opportunity for continual improvements in aircraft performance. The means also mainstreaming low-emissions technology in addition to the expected energy (fuel) efficiency gains realized with iterative improvements upon previous aircraft designs (including aerodynamic efficiency, lighter weight construction, and improved taxiing and in-flight mechanical and electric systems). Given the potential service life of an aircraft – an average of 25 years – the scheduled phase-out of the existing fleet should include the most robust technology available to meet the decarbonisation targets set. Depending upon the maturity of each technology as current aircraft are phased out and replaced, emission reductions of between 15% and 100% may be realized. However, aircraft are still not commercially available for the higher levels of emission reductions potential.

- *T12 – Sustainable Aviation Fuel Integration Initiative*: Integration of biofuels - sustainable aviation fuel (SAF) - into the Air Kiribati operational fuel mixture provides an opportunity for immediate reductions in emissions for all compatible aircraft and flights utilizing the fuel. SAF is slowly becoming commercially available from various sources, and various types of aviation-grade biofuels are developed across the private sector. However, the supply of SAF is currently limited in the international market, and cost premiums remain substantial. This will also require dedicated infrastructure in Kiribati for SAF storage and transfer.

- *T14 – Airport & Airfield infrastructure upgrade*: Under the current and previous MSP, MICTTD has identified several recommended improvements to infrastructure supporting the aviation sub-sector. These include facilitating efficient and effective air service as well as supporting safer and more secure operations domestically and internationally. Aviation infrastructure customarily consists of runways and taxiways, airport buildings and service facilities, and ground support equipment. Design and construction of infrastructure is a large factor in lifecycle GHG emissions for assets, but these emissions are not currently being captured under the domestic aviation category (e.g. included in energy and industry calculations). Runway upgrades, however, may enable larger aircraft to conduct domestic travel, possibly reducing the emissions per passenger/km travelled on individual flights.

3. NDC Investment Planning for Energy Efficiency (Power, Appliances, Buildings, Government, Industry)

Kiribati's energy mix is dominated by imported petroleum and domestic coconut oil. The residential sector is the largest consumer of energy (53%) followed by transport (28%) and fishing (12%), while commercial buildings, government buildings and industries together consume around 4%.[64] Power generation from Public Utilities Board (PUB) is estimated to lead to emission of approximately 19,000 tCO_2 in 2018[65], approximately 20% of the national GHG emissions for 2019.[66]

Kiribati is in its initial stages in implementing energy efficiency and the GOK is currently taking several measures to progress in this area. The draft Energy Bill that has been presented for approval, has a strong focus on energy efficiency. In addition, efforts are being made to integrate energy efficiency in the building code, further implement product energy standards and labelling (S&L) programme for refrigerators and freezers, and energy audits are being carried out in some Government buildings.[67]

Kiribati faces many challenges in terms of energy efficiency, the most significant being a lack of capacity to assess the situation of energy use and identify solutions for improving energy efficiency. Other challenges are characteristic of SIDS and some of them are characteristic of energy efficiency itself. Energy efficiency is decentralised in its implementation and more difficult to measure and monitor than mitigation in power generation, and hence there are needs for an adequate number of trained energy professionals, of which Kiribati currently lacks. From the point of view of financial institutions, the difficulty in measuring energy efficiency makes it appear to be a risky investment and thus increases the cost of financing. Gaining investment capital for financing energy efficiency is also difficult as the assets that are built through energy efficiency often are not of high value, are spread over many locations or are not easily transferable making it difficult to be used as

64 Information shared by MISE during this assignment.
65 Estimate based on data shared by MISE during this assignment.
66 Estimate based on GHG inventory for 2019 prepared using data on fuel data shared by KOIL during this assignment, and information on renewable energy and non-commercial fuel from National Task Force, 2018, Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati, GOK.
67 Information shared by MISE during this assignment.

collateral for debt. The small size of the market in Kiribati also makes it a less attractive market for energy efficient products or technologies, and for financial instruments which traditionally support the financing of these products or technologies. Energy efficiency in buildings has another specific challenge of a split incentive in that the owners of the buildings who must invest in energy efficiency measures may not be the direct beneficiary of the cost savings in case the building is occupied by a tenant purchase the energy, which is the case of the few larger buildings in Kiribati.

3.1 Power and Appliances Sub-Sectors

The power sector mainly relies on power from diesel generator (DG) sets supplemented by renewable based power, which is mainly solar PV. PUB manages the power system in South Tarawa, including generation, transmission and distribution. As of January 2020, PUB has a total of 6 DG sets distributed between two power stations, the Bikenibeu power station, and the Betio power station, for a total of 6.85 MW. The Betio power station is used for peak load operations and has two diesel generators, one with a nominal capacity of 625 kW and another with a capacity of 823 kW. Various operational parameters of these DG sets are being recorded and data is available on a monthly basis. The total installed capacity of solar PV in the Gilbert islands is 1955 kWp, of which 1570 kWp is in South Tarawa where 503 kWp is off-grid. Distribution of electricty is via a 11 kV of moslty underground cables, where the montly monitored Power Factor is ragnes between 0.90 to 0.95.[68]

PUB charges consumers fixed power tariffs for domestic, commercial, and industrial use. There is no fixed schedule in Kiribati for the revision of tariffs, which have been hisotrically changed on an as needed basis. The last revision of tariffs was in 2017 in which the only change made was to move from a fixed/flat tariff for domestic consumers, to a block tariff. Mainly of the tariffs are set below cost-recovery, and this is one of several reasons for PUB's poor financial performance.[69]

The Kiritimati electricity sector has now been organised into three separate grids from the previously existing several isolated load centres.[70] Outer Islands with larger populations are served with diesel micro-grids that often incorporate PV generation. Smaller islands often depend upon individual diesel generators with no grid and/or solar home systems that provide minimal services like lighting.[71]

Based on data from 2014, residential buildings consumed the highest amount of electricity (40%), followed by government and industrial buildings (35%).[72] In residences, the use of cooling electric appliances, such as fridge and fans, consumes the highest amount of electricity (40%), followed by devices for heating (35%) such as iron and electric water kettles and then lighting use (around 15%).

An urban energy survey undertaken in Kiribati (South Tarawa and Kiritimati) in 2016, reveals how appliances are used in urban residences as shown in the table below.[73]

Table 11: Ownership of household appliances (end use survey results)

Appliance	Percent of Households*	Comments
Dedicated Electric Lighting	70%	Mostly fluorescent tube
Refrigerators	10%	65% rate 2.5 out of 6 stars or lower based on AS/NZ standard (0 is lowest and 6 highest)
Freezers	40%	55% rate 2.5 out of 6 stars or lower based on AS/NZ standard (0 is lowest and 6 highest)
Fans	70%	
Airconditioning units	limited	
Cooking with Kerosene	NA	Main source in South Tarawa
Cooking with wood	NA	Main source in Kiritimati
Televisions	30%	
DVD players	80%	

* approximate percentages

68 Information shared by PUB during this assignment.
69 National Task Force, 2018, Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati, GOK.
70 National Task Force, 2018, Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati, GOK.
71 Information shared by PUB during this assignment.
72 IRENA,SPC & PPA, 2017, Kiribati Integrated Energy Roadmap 2017-2025, GOK
73 UNDP, 2017, "Kiribati 2016 Urban Household Electrical Appliances, Lights, and End-use Survey".

3.1.1 Key sector stakeholders and existing planning in Power and Appliances sub-sectors

The Energy Policy of 2009 is the major policy document that guides the development of the power sector. The Kiribati Integrated Energy Roadmap (KIER) is a medium-term strategy document to guide the energy sector from 2016 to 2025. The KIER, and the (Intended) NDC, sets a target for reduction of fossil fuel consumption through energy efficiency of greater than 16% in Kiritimati, Outer Islands and Tarawa.

Key Public Sector stakeholders relevant for energy efficiency in the power sector are PUB, MISE, KOIL and MOFED. The private sector, especially from outside Kiribati, have a significant role in improving energy efficiency in the power supply and distribution side, as the services of foreign suppliers and service providers are used for machinery supply and for major technical assessments and maintenance activities.

Kiribati participated in the Pacific Appliance Labelling and Standards Programme (PALS), led by PCREE-SPC and now intends to initiate a product standards and labelling programme for air-conditioners, refrigerators and lighting products. A draft regulation proposed under the Consumer Protection Act, is awaiting Cabinet approval. Awareness raising activities have been carried out for customs officials. However, the design or costing of the S&L programme has not been done and there is lot of work remaining[74].

MISE and MOFED have a significant role in the appliances sub-sector. From the private sector, the Kiribati Chamber of Commerce and various suppliers and service providers would also have a significant role in terms of developing the market for energy efficient products and appliances. Owners and individual users of appliances also play a key role, in terms of making right choices in procurement and also in terms of efficient operation and maintenance.

Key stakeholders and their roles are listed below, additional information on key stakeholders and existing planning and actions in Land Transport can be found in Annex C.

Table 12: Key Stakeholders in Power and Appliances

Stakeholder	Roles within the sector
Public Utilities Boards (PUB)	PUB manages the power system in South Tarawa, including power generation, transmission and distribution. PUB will be key to ensure efficient operation and maintenance of existing assets such as diesel power plants and transmission and distribution systems, in designing and procuring new power generation systems that are energy efficient, including Li Ion battery for energy storage, and in special activities that influence energy efficiency like setting up and operating demand side management (DSM) and demand response (DR) programmes. They would also be key for any revision of tariffs needed to control demand as well as proper pricing of electricity that could affect energy efficiency initiatives. They would be a significant stakeholder in improved energy planning process
Ministry of Infrastructure and Sustainable Energy (MISE)	The Energy Planning Unit (EPU) of MISE has the overall responsibility of power and energy sector planning. MISE is the key agency responsible for all energy efficiency activities and hence would play a major role in energy efficiency project development and implementation, fund raising, and the development and implementation of policies and regulations related to energy efficiency
Kiribati Oil Company Limited (KOIL)	KIOL is the majority state-owned enterprise that serves as the main fuel importer and distributor in Kiribati. It operates the main fuel terminal on South Tarawa and a smaller bulk fuel terminal on Kiritimati. KOIL will be a significant stakeholder to lead the integrated energy planning being proposed (project E1). They would also be key for gradual phasing out of any fossil fuel subsidies and proper pricing of petroleum products, all of which could affect energy efficiency initiatives.
Ministry of Finance and Economic Development (MOFED)	MOFED is responsible for budgeting, managing fiscal expenditure, and donor outlays for energy sector projects. The Central Procurement Unit of MOFED is in charge of public procurement and will be the key player to promote sustainable public procurement. MOFED will have a major role in supporting energy efficiency investments through the State Budget and through fiscal incentives

74 They have to develop and design the Minimum Energy Performance Standard (MEPS) and the energy labelling system and set up the institutional structure for administering it. They also need to develop a testing protocol and decide how product tests would be carried out. There is no appliance testing facility in Kiribati and in such case, they may have to rely on testing facilities outside the country which might increase the cost of the programme.

Pacific Community (SPC)	SPC is the CROP leading energy efficiency technical assistance in the PICs. SPC would have a major role in implementing the proposed project to build capacity in integrated energy planning, standards, and training.
Kiribati Institute of Technology (KIT) University of South Pacific (USP)	KIT is the premier institute in Kiribati focussing on vocational education. KIT will have a major role in technical training activities in the proposed projects to build capacity in the design, installation and efficient operation and maintenance of diesel power plants and to develop the market for Li Ion battery for storing renewable energy-based power. USP is the premier university in the PICs focusing on energy. USP will play a key role in developing and executing education activities related to energy planning, auditing, and monitoring of energy use/savings.
Suppliers of power generating equipment and spare parts	These include suppliers of equipment/machinery, spare parts and services for diesel power plants and for renewable energy-based power. These suppliers will play an important role in various market development activities for energy efficient power generating systems and equipment, including sourcing, sales, promotion, financing, vendor development, and sales.
Suppliers of energy efficient appliances	These include suppliers who are the importers, wholesalers and retailers of energy efficient appliances. These suppliers will play an important role in various market development activities for energy efficient products, appliances, including sourcing, sales, promotion, financing, vendor development, and sales.
Service providers	These include consultants, installers and maintenance professionals, who work either as part of the suppliers, or private firms or as individuals. It is important that service providers capacity in energy efficiency be improved through the various capacity building activities being proposed. They would also play a key part in promoting energy efficient equipment's, products and appliances
Owners and users of appliances	They are the ones who select the type of appliances and also use them. They need to have better awareness of the energy efficient products and appliances the different choices available, the significance of energy labels, service providers, how to monitor their energy bills… etc. Motivated Owners and users of appliances will be key in the uptake of efficiency products and appliances.

3.1.2 Key constraints and opportunities to strengthen Power and Appliances sub-sectors

There is no systematic or integrated form of energy planning process in Kiribati, the current focus of key stakeholders is on expanding supply capacity to meet rising demand. The DG sets in both the Bikenibeu and the Betio power stations suffer from lack of continual maintenance. As a result, the Bikenibeu power station operates at 65 % of its design capacity, and requires most of the DG sets to be online to meet the demand. Without taking into account any design or inefficient operation related issues, the delayed overhaul and low maintenance of these DG sets at the PUB power stations are likely to lower the energy efficiency of the DG sets over time. PUB also faces the challenge to meeting peak demand and there are currently no demand side management (DSM) and demand response (DR) programmes to help manage this.

Energy efficient appliances require a higher initial investment compared to the alternative, while the life time savings occur over a period of time. This additional upfront investment discourages investments in energy efficient appliances. Lask of consumer investments can be due to a lack of consumers awareness of the benefits of a higher star rated product, and going for the least investment cost options. It could also mean that they are not convinced that the energy savings from a higher star rated product will be paid back durign operation.[75] Once the exact reasons are known, these challenges can be countered by targeted measures. Standards and labelling (S&L) programmes have not yet been initiated for any products in Kiriabati, creating opportunities for products with lower energy performance to enter the market. S&L programmes will also help in the proposed utility led DSM programme.

The key constraints and strengthening opportunities identified below may provide the additional information for sound public / private sector decision-making, an encouraging enabling regulatory environment, and opportunities to finance the use of low-carbon technology (more information can be found in Annex F).

75 Jensen (2017) 'Kiribati 2016 Urban Household Electrical Appliances, Lights, and End-use Survey', UNDP

Table 13: Key Constraints and opportunities in Power and Appliances

Constraint / Barrier	Strengthening opportunities
Technology and Knowhow Transfer	• Enhancing capacity for integrated energy planning. • Enhancing ability for overhaul and retrofitting of DG sets. • Inclusion of energy efficiency / control technology with DG sets. • Inclusion of advanced metering technology on the supply and demand side. • Enhancing capacity of for demand side management (DSM) and demand response (DR). Capacity needs to be built for PUB for designing and operating DSM and DR programmes, Th capacity of suppliers, retailers and service providers of energy efficient products and appliances need to be enhanced on market development and financing such products and appliances
Access to Financing	• Financing mechanisms to support DSM.
Human capacity	• Enhance training offered by KIT for DG sets maintenance. • Participate in regional programmes for energy efficiency.
Information Availability and Reliability	• Regular household survey of energy use, at least every 5 years. • Continue to work with consumers to collect electricity use data. • Enhance the collection of disaggregated customs data. • Disseminate information on the use and financing saving of low carbon technology.
Limited Incentive/ Penalty structure	• Increase breadth and application of the standards and labelling (S&L) programme. Develop minimum energy performance standard (MEPS) and labels for widely used and more energy intensive products and appliances. • Utilise taxation mechanisms to reach cost parity for low carbon technology. • Use of bulk/cooperative procurement, especially public procurement, to lower unit costs of low carbon technology.

3.1.3 Mitigation opportunities and investment needs in Power and Appliances sub-sectors

There are five mitigation opportunities which focus on energy efficiency in the Power sector and Appliances. Together, these have the potential to reduce 58,700 tCO_2 emission by the end of 2030, with an annual mitigation potential of 13,400 tCO_2/yr. in 2030. This annual mitigation potential is approximately equal to 17% of the projected BAU emission in 2030. The estimated capital investment costs needed to reach the mitigation potential is US$ 43.8M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US$ 3.6M. The breakdown of support and investments needs is given in the table below, followed by a short description of each mitigation option. More information on mitigation option can be found in the concept notes in Annex A.

Table 14: Aggregated Information for energy efficiency in Power and Appliances

Opportunities	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 in 2030 (tCO_2/yr.)	Total Mitigation 2020-2030 (tCO_2)
E1 – Strengthening and expanding the standards and labelling programme for appliances (in combination with E4)**	0.3	0	30	2,900	9,700

E2 – Capacity building for integrated energy planning and energy statistics in Kiribati	0.4	0	50	2,000	7,000
E5 – Utility led programme to manage peak demand and savings in South Tarawa**	1.4	41.5	1,300	6,800	33,000
E8 – Promotion of Li Ion battery for renewable energy storage instead of lead acid	1.1	1.0	7,800	100	300
E9 – Programme on efficient operation and maintenance of diesel power plants	0.4	1.3	200	1,600	8,700
Total Mitigation Potential of all	3.6	43.8		13,400	58,700

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

** This includes the investment of consumer and company purchases of appliances and electrical equipment

- *E1 – Strengthening and Expanding the Standards and Labelling Programme for Appliances*: Capacity building and technical assistance to support the further development, broader implementation, and enforcement of the standards and labelling programme, through expansion into new appliance categories in Kiribati. This includes a market survey for the 3 products/appliances[76] being covered, developing the minimum energy performance standards (MEPS), the higher energy performance standard (HEPS) and the labels for the three products/appliances and an awareness raising campaign to support the S&L programme. This opportunity will be implemented in combination with E5.

- *E2 – Capacity Building for Integrated Energy Planning and Energy Statistics in Kiribati*: This mitigation opportunity calls for building capacity on energy statistics and integrated energy planning for key stakeholders in Kiribati such as MISE, PUB, KOIL and KSEC[77], which could potentially be integrated into a multi-country effort. The program would include training on integrated energy planning, the development of academic modules that can be integrated into existing courses at USP and the strengthening of institutional capacity in Kiribati on integrated energy planning. It is assumed that these measures will indirectly contribute to an annual reduction of up to 1% of the national primary energy consumption, and the new information systems developed would support other energy efficiency actions.

- *E5 – Utility Led Programme to Manage Peak Demand and Savings in South Tarawa*: This opportunity calls for the provision of technical assistance and training to the Public Utility Board (PUB) and MISE to control peak demand and save energy in Kiribati through three initiatives: developing and implementing a demand side management (DSM) programme; developing and implementing a demand response (DR) programme; and revision of the power tariff to incorporate demand charges with time of day (TOD) tariff and power factor incentives/penalties for larger users. In support of the DSM and DR programme, training programmes, and awareness raising programmes and a TV and social media campaign would be carried out and a guideline would be developed.

  The first initiative[78] under the DSM programme would promote the use of more efficient household appliances through bulk procurement of higher energy efficiency household appliances by major retailers for distribution to approximately 9,200 households on South Tarawa over a period of 6 years. The households would be encouraged to return their old appliances to participate in this programme, which will be disposed of through means of recycle in place at the time. A study would be undertaken for overall design of the DSM and DR programmes, including to determine a feasible subsidy rate (consumer discount and/or taxation changes) for the appliances. A mechanism for on-bill financing would be developed to promote affordability.

  The DR programme component would involve identifying key non-critical loads in the grid that can be either shifted to off-peak periods of operation or taken offline when there is demand driven stress on the grid. This programme

76 MISE is planning to initiate the S&L programme for air-conditioners, refrigerators and lighting products, though not much progress has been made. Depending on the progress being made, the project will support these three products/appliances or three other widely used products/appliances such as fans, TVs, water pumps, washing machines

77 The Kiribati Solar Energy Company (KSEC)

78 This activity will have a close link to the product standards and labelling (S&L) programme being promoted in E7 as products that are energy labelled through the S&L programme (if they are available during the period of the DSM activity) will be procured and distributed under the DSM activity. The proposed DSM activity can help counter a potential increase in prices of the energy labelled appliances through the S&L programme and can help increase awareness of the benefits of these appliances. By the time the S&L programme is fully operational and effective, the DSM activity can be gradually phased out, as the S& L will by themselves eliminate the low energy efficiency products from the market. However, the DSM programme can continue with other demand side energy efficiency initiatives

includes providing incentives for those participating in the programme and identifying the means for monitoring and controlling such DR actions.

Considering the period till 2030, the DSM programme and the introduction of TOD tariff is expected to lead to a reduction in peak demand of up to around 6.3 MW and energy savings of around 49,000 MWh.

- *E8 – Promotion of Lithium-Ion Battery for Renewable Energy Storage Instead of Lead acid*: This mitigation opportunity calls for the provision of technical assistance to PUB to support the development of regulations, fiscal incentives, and financing schemes that will promote the use of lithium-ion batteries (and other technology) for energy storage in households, commercial buildings, and PUB. This will include the development and implementation of a capacity building, awareness raising and advocacy programme on the benefits of lithium-ion batteries over lead-acid batteries, their proper use and approaches to offshore disposal. This initiative will also support the installation of around 1 MWh of Li Ion battery storage for off-grid (by private individuals and firms) and on-grid installations (by PUB).

- *E9 – Programme on Efficient Operation and Maintenance of Diesel Power Plants*: This mitigation opportunity calls for the provision of technical assistance to build the capacity of PUB and other stakeholders in Kiribati on the proper installation and efficient operation and maintenance of diesel generation (DG) sets. Apart from four training programmes, this will also include the development of a module in collaboration with KIT on the design, installation and O&M of DG sets to be integrated within existing courses in KIT and/or offered as a separate course. Detailed energy audits will be conducted of PUB owned diesel power plants and technical advisory and financial support will be provided to PUB to undertake the necessary retrofits and overhauls. Policy recommendations will also be provided to incentivise individual consumers to go for solar PV installations instead of DG sets. As a result of this initiative, a minimum 5% reduction per year is expected in the specific fuel consumption (kWh/litre) of the PUB managed diesel power 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 an 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 EGAT 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 agreementwith 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 incremen tal 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. 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 570 MW in capacity and 3.15 GWh. The programme came in under budget and the cost of saved peak demand was much lower than the cost of supplying additional power.

Kiribati has the opportunity to implement similar actions as defined in E1, E2, and E5 which expands upon the existing S & L programme for some appliances in Kiribati. 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 Buildings, Government, Industry Sub-Sectors

Most buildings in Kiribati are single level, and some double storeyed. The Building Code provides a standard design of the foundation of building which can be used by all buildings up to two storeys, whatever the location or soil conditions. Beyond two storeys, each building needs a site-specific design of the foundation that also needs approval of MISE. The design of government facilities is done by the in-house architect at MISE, and the Energy Planning Unit at MISE is responsible for the design of the air-conditioning and lighting systems of government buildings.[79]

Concrete blocks are the most commonly used material for construction, though are reported to be of poor quality. Other structural materials are timber (imported from Australia and New Zealand), and local materials with lower lifetime (pandanus logs, coconut logs and the coconut leaves). There is the possibility to increase the use of local materials, especially for interior, non-structural loads. Most buildings have metal roofs with water harvesting. Thatched roofs are used mainly in lower cost buildings. Few buildings have insulation and these are mostly government buildings and education centre buildings.[80]

The major of industries in Kiribati are sea food processing, ice plants, and copra processing factories. Not much information is available of their production process or of their energy performance. Kiribati Fish Ltd (KFL) is the only fishing company engaged in processing and exporting of fresh and frozen fish.[81] The key export markets for KFL fish products include Australia, Japan, the United States (US) and the European Union (EU).[82] Solar powered ice plants have been constructed in the outer islands to support the fishing industry.[83]

3.2.1 Key sector stakeholders and existing planning in Buildings, Government, Industry sub-sectors

The Building Code was developed and enacted in 2017, which is a simplified adaptation of the Australian and New Zealand Building Codes and focusses on structural and safety issues. The Code does not regulate houses and buildings made entirely with local building materials like thatched roofs with coconut leaves. Most constructions in the outer islands are of this type. After 2 years of piloting the Building Code, MISE has realised that integrating energy efficiency into the Building Code is critical.[84]

An energy audit programme for government buildings was initiated by MISE in 2012. There are around 15 ministries and each of them have a few buildings and all these buildings were audited during the first round in 2012. Based on the audits, fluorescent lamps and tubes were converted to LEDs in many of these buildings and in some of these buildings, ACs were replaced with fans. In 2019 MISE initiated a second energy audit of these buildings and plans to complete this in 2020. There is no audit programme yet for commercial buildings and hotels.[85]

MISE, MOFED and KIT are key public sector stakeholders in the construction sector. From the private sector, the Kiribati Chamber of Commerce and various suppliers and service providers would also have a significant role to play in improving energy efficiency in buildings. Owners and individual users of buildings also play a key role, in terms of making choices in procurement of material and equipment, and in terms of efficient operation and maintenance of the buildings.

The industrial sector is very small in Kiribati and no specific policy or plans on energy efficiency exist for it. Copra and fish processing are the only major industry and very little information is available on their operational details.

Key stakeholders and their roles are listed below, additional information on key stakeholders and existing planning and actions can be found in Annex C.

79 Information shared by MISE during this assignment
80 Information shared by MISE during this assignment
81 GOK, Kiribati 20 year vision 1916-36
82 GOK, Kiribati 20 year vision 1916-36
83 Information shared by MISE during this assignment
84 Information shared by MISE during this assignment
85 Information shared by MISE during this assignment

Table 15: Key Stakeholders in Buildings, Government, Industry

Stakeholder	Roles within the sector
Ministry of Infrastructure and Sustainable Energy (MISE)	The Quality Control and Inspection Unit of MISE inspects the design and construction of buildings and the implementation of the building code. A in-house Government Architect and a Senior Costing Engineer is housed in MISE. These three stakeholders will play a major role in the development and implementation of the proposed energy efficiency building code or a green building rating system. The Energy Planning Unit is also responsible for the design of the AC and lighting systems within government buildings. Moreover, the Energy Planning Unit (EPU) of MISE has the overall responsibility of power and energy sector planning. They are the key agency responsible for all energy efficiency activities and hence would play a major role in any energy efficiency project development and implementation, fund raising, and the development and implementation of policies and regulations related to energy efficiency
Kiribati Chamber of Commerce (KCC)	KCC is the industry association for business. KCC will be key in increasing participation of industry, hotels and commercial buildings in proposed energy efficiency initiatives, in increasing availability of sustainable construction materials, equipment, products and appliances.
Ministry of Finance and Economic Development (MOFED)	MOFED is responsible for budgeting, managing fiscal expenditure, and donor outlays for energy sector projects. The Central Procurement Unit of MOFED is in charge of public procurement and will be the key player to promote sustainable public procurement. MOFED would have a major role in supporting energy efficiency investments through the State Budget and through fiscal incentives.
Ministry of Industry, Commerce and Cooperatives (MICC)	MICC is in charge of industrial and trade issues. MICC will play a major role in developing and implementing policies and regulations to encourage and enable energy efficiency in industry and to help harmonise and benchmark them at the regional level to facilitate more exchange of low carbon technologies and expertise
University of South Pacific (USP)	USP is the leading university in PICs with campuses in several locations, including Kiribati. USP will have a major role in implementing training initiatives on energy efficiency, especially related to the proposed project to build capacity in the assessment, design and construction of low energy/ carbon buildings and in promoting sustainable public procurement.
Suppliers of construction materials	These suppliers are importers, wholesalers and retailers of building materials. These suppliers will play an important role in various market development activities for sustainable construction materials, including sourcing, sales, promotion, financing, vendor development and sales.
Suppliers of energy efficient industrial machinery, products, instruments and consumables	These suppliers are importers of the more energy efficient industrial machinery, products, consumables and monitoring equipment. These suppliers will play an important role in various market development activities of such products, including sourcing, sales, promotion, financing, vendor development and sales.
Service providers of construction services	These include the architects, civil engineers, masons, electricians, carpenters, plumbers, operation and maintenance technicians, facility managers, who as part of public or private organisations or as individuals, together design, construct, operate, and maintain buildings. Enhanced capacity of these stakeholders is very important for ensuring energy efficiency is improved in the construction sector.

Service providers for energy supply and use equipment	These include the installers, operation and maintenance professionals and facility managers, who as part of private firms or individuals, together design, construct, operate, and maintain the equipment. Enhanced capacity of these stakeholders is very important for ensuring energy efficiency is improved in the construction and industrial sector
Building energy performance assessment professionals	Building energy performance assessment professionals are currently not available in Kiribati. A new stream of certified experts needs to be developed in Kiribati who have the capacity to assess building energy performance and check if the building meets the requirements of the proposed energy efficiency Building Code (EEBC), as well as provide ratings as per the proposed green building rating scheme.
Industrial energy auditors	Industrial energy auditors are currently not available in Kiribati. These auditors will audit energy consumption trends and identify energy consumption potential in industry. Capacity needs to be developed for such professionals and their quality needs to be ensured through a certification process within or outside Kiribati
Owners and users of buildings (tenants, house owners, office employees)	They are the ones who select the type of building to be built, make investments in energy efficiency and also use the building. It is important that these stakeholders aware of the benefits of energy efficiency, the various options available for effecting energy efficiency, where they can get more information and expertise on the subject, where they can procure sustainable construction materials and financing options available
Seafood and copra processing companies and ice plants	These stakeholders are the constitute few small and medium sized companies within the small industrial sector in Kiribati. Advocacy, awareness raising, and capacity building are needed to ensure that the management and staff of these stakeholders participate in proposed energy efficiency initiatives, start monitoring and reporting of their energy performance, and invest in energy efficiency.

3.2.2 Key constraints and opportunities to strengthen Buildings, Government, Industry sub-sectors

Many regulatory tools for enabling energy efficiency are absent in Kiribati, such as an Energy Efficiency Building Code (EEBC) or a green building rating system. While the EEBC specifies minimum requirements and helps weed out poor performers from the market, the green building rating system incentivizes better performers to achieve higher building energy and environmental performance standards. There is also a lack of availability of environmentally friendly and low carbon building materials, and domestic designers and service providers have limited experience with these materials and technology. A significant level of capacity building will 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.

Information of the production process and technology of the various industries, and the performance is not easily available. Hence information gathering is an essential initial step needed to progress in energy efficiency inside industry.

It is noted that public procurement makes up a significant percentage of the national expenditure (GDP) in Kiribati and hence it can influence the market. By aggregating the requirements for energy efficient products and appliances from government facilities and if possible from larger private or non-governmental organisations, and thereby procuring larger volumes of these products, the Central Procurement Unit can get these products at a good bargain and thereby bring down the prices in the overall market.

Table 16: Key Constraints and opportunities in Buildings, Government, Industry

Constraint / Barrier	Strengthening opportunities
Technology and Knowhow Transfer	• Enhancing capacity of professionals and service providers like architects and civil engineers, for integrated sustainable/green building design. • Enhancing knowhow in energy saving measures & technology in buildings and industry.
Access to Financing	• Commercial financing mechanisms to support energy efficiency in building retrofits and new buildings. • Retail financing mechanisms to support energy efficiency in building retrofits and new buildings.
Human capacity	• Enhance training offered by KIT and USP for energy efficiency in building design and industry. • Enhance training offered by USP for energy auditing. • Participate in regional programmes for energy efficiency.
Information availability and reliability	• Continue to work with consumers (industry and building owner) to collect energy data. • Enhance the collection of disaggregated customs data of materials and equipment. • Disseminate information on the use and benefits of low carbon technology.
Limited Incentive/Penalty structure	• energy efficiency building code (EEBC) and green building rating system. • Utilise taxation mechanisms to reach cost parity for low carbon technology. • Utilise taxation mechanisms to encourage investment in energy efficiency retrofits and buildings. • Use of bulk procurement to lower unit costs of low carbon technology.

3.2.3 Mitigation opportunities and investment needs in Buildings, Government, Industry

There are four mitigation opportunities which focus on energy efficiency in Buildings, Government, Industry. Together, these have the potential to reduce 14,400 tCO_2 emission by the end of 2030, with an annual mitigation potential of 3,700 tCO_2/yr. This annual mitigation potential is approximately equal to 5% of the projected BAU emission in 2030. The estimated capital investment costs needed to reach the mitigation potential is US$ 13.5M between 2020 and 2030, along with an estimated cost for project/programme development, capacity building & technical assistance of US$ 3.2M. The breakdown of support and investments needs is given in the table below, followed by a short description of each mitigation option. More information on mitigation option can be found in the concept notes in Annex A.

Table 17: Aggregated Information for energy efficiency in Buildings, Government, Industry Mitigation Opportunities

Opportunities	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 in 2030 (tCO_2/yr.)	Total Mitigation 2020-2030 (tCO_2.)
E3 – Supporting the retrofitting of major hotels and commercial buildings	0.9	1.5	550	900	4,500
E4 – Promotion of sustainable public procurement**	0.5	0	110	1,200	4,200
E6 – Capacity building in energy efficiency in industry	0.5	0.5	250	1,100	4,000
E7 – Capacity building in the assessment, design and construction of low energy/carbon buildings	1.3	11.5	7,500	500	1,700
Total Mitigation Potential of all	3.2	13.5		3,700	14,400

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

** Does not include investment in goods and services

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.

Kiribati has the opportunity to implement a similar Energy Efficiency Building Code under opportunity E7, which requires developing and enacting the Energy Efficiency Building Code separate or in connection with the Structural Building Code. 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.

- *E3 – Supporting the Retrofitting of Major Hotels and Commercial Buildings*: This mitigation opportunity will be led by MISE and will provide technical assistance and financial support to hotels and commercial buildings for carrying out energy audits and cost-effective retrofits in up to 15 hotels and commercial buildings. Preliminary energy audits would be conducted in 20 hotels and commercial building, followed by detailed audits in 15 buildings. Technical and financial support will be provided to implement the recommendations of the audits in the 15 facilities. An ex-post audit would be conducted to assess the actual energy savings achieved and ensure the proper use of fiscal incentives. The retrofits are expected to reduce energy consumption by up to 40% in each of the participating facilities.

- *E4 – Promotion of Sustainable Public Procurement*: This mitigation opportunity calls for technical assistance and capacity building for the Central Procurement Unit (MOFED) for integrating sustainable procurement into existing public procurement rules and processes. This will also include the development of sustainable procurement guidelines for high volume and high carbon intensity products. The mitigation opportunity will support the implementation of cooperative procurement between government agencies in Kiribati and state-owned enterprises and/or larger private organisations. It may also include sub-regional or bilateral cooperative public procurement with entities located in other PICs. Training would be conducted on sustainable procurement and a module will be developed by USP on the topic to be integrated into regular academic courses and an online course on the topic would also be developed.

- *E6 – Capacity building on energy efficiency in Industry*: This mitigation opportunity calls for the provision of technical assistance and capacity building to support the upgrading of critical industrial equipment to promote energy efficiency and cost savings. A national survey and mapping of energy-intensive activities in the industry sector will be conducted in fish processing plants, copra processing plants, ice plants and others, followed by detailed energy audits to assess the potential technology options or operation and maintenance approaches available to improve energy efficiency. Finally, technical advisory and financial support will be provided for the implementation of the upgrades and financing options for up to five facilities. The potential

for cogeneration and sharing of such resources between industrial facilities and nearby power generation facilities will be explored. For the capacity building component, a certification system for energy auditors will be developed. Training would be provided for a selected number of beneficiaries, based on demand and available resources. A system for reporting and aggregating energy data from industry would also be developed. Assuming 25 % reduction in energy consumption, around 340 Terra Joules is expected to be saved till 2030 due to the project interventions.

- *E7 – Capacity Building in Assessment, Design and Construction of Low Energy/Carbon Buildings*: This mitigation opportunity will support the retrofit of up to 960 houses and 24 government buildings, as well as support and build the capacity of MISE and other relevant stakeholders to participate in and enable a transition toward green buildings in Kiribati. The initiative will support retrofits in the participating buildings, such as thermal insulation retrofits. Capacity of professionals would be developed through training and the development of a curriculum and certified course for the design and construction of low-carbon buildings, as well as in performing building energy audits. A certification system will be developed for low carbon building assessors, and rules and framework for the certification system. A low carbon building design and construction guideline would be developed for different building types in Kiribati, which will contribute to the development of the energy efficiency building code, the green building rating system, and the use by professionals for the design and construction of green buildings. Technical assistance will be provided to the GOK to develop the energy efficiency building code (EEBC) and a green building rating system. Energy efficiency retrofits and expansion of green building and construction approaches are both an employment creation opportunity and a cost-saving measures for households and building operators. The retrofits in the buildings are expected to save up to 2,500 MWh up through 2030, assuming 15% energy savings achieved in residential houses and 30% in government buildings.

Mitigation Example: Voluntary Agreement Scheme on Energy Efficiency in Denmark

Denmark faced an important barrier in implementing industrial energy efficiency as it 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) a refund of the all the CO2 tax for companies taking voluntary energy efficiency actions which were agreed with the authorities, and (3) offering subsidies for energy efficiency actions. For the tax refund and subsidies, companies were required to operate certified energy management system (ISO50001), companies must investigate where savings could be made, and all measures with 4 year or less payback period shall be implemented. Evaluations of the scheme between 1996 and 2013 estimate energy savings of 5 – 6% in participating companies.

Kiribati has the opportunity of implement a similar energy auditing and taxation incentive scheme for industry under E4.

Source: J.Vejen (2018) "Voluntary Agreement Scheme for Industries", Danish Energy Agency. in Denmark

4. Financing Pathway for the NDC Investment Plan

4.1 Prioritizing the Mitigation Opportunities

A comparative quantitative/qualitative evaluation 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 Kiribati (+)
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 (-)

The final Evaluation Criteria score is used to determined *Primary* or *Secondary* priority for finance and implementation of the opportunities for each of the transport and energy efficiency sectors. Primary opportunities are those leading to a sector threshold of total of GHG mitigation in 2030, of 18,200 tCO_2/yr for transport and 14,900 tCO_2/yr for energy efficiency.[86] 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 18: Primary mitigation opportunities

Primary Mitigation Opportunities in Transport	Score[87]	Annual Mitigation in 2030 (tCO2/yr)	Accumulative Mitigation in 2030 (tCO2/yr)
T1 – Outboard Motor Transition	20	3,700	3,700
T2 – Bicycle/E-Bike Financing Initiative	17	1,400	5,100
T3 – Aviation Operational Training Programme	16	400	5,500
T4 – National Maritime Action Plan	14	0	5,500
T5 – Low carbon Mini-Container Ship	14	1,400	6,900
T6 – Small low carbon cargo/passenger freighter	14	400	7,300
T7 – Biofuel blends in Land and Maritime Transport	14	3,100	10,400
T8 – Multi-modal Transit Initiative	11	7,000	17,400
T9 – Zero-impact Cruise Liner	11	800	18,200
Total Primary Mitigation Potential for Transport			18,200

86 Kiribati's (Intended) NDC has a 2030 goal to reduce approximately 25,500 tCO2 annually in 2030, the primary mitigation opportunities are chosen to approximately reach the value of 25,500 tCO2 annually. Noting that the net effect of mitigation from energy effected will be impacted by the additional RE installed in Kiribati.

87 The higher the score the higher the priority for the mitigation opportunity

Primary Mitigation Opportunities in Energy Efficiency	Priority Score	Annual Mitigation in 2030 (tCO2/yr)	Accumulative Mitigation in 2030 (tCO2/yr)
E1 – Strengthening and Expanding the Standards and Labelling Programme for Appliances	20	2,900	2,900
E2 – Capacity Building for Integrated Energy Planning and Energy Statistics in Kiribati	12	2,000	4,900
E3 – Supporting the Retrofitting of Major Hotels and Commercial Buildings	12	900	5,800
E4 – Promotion of Sustainable Procurement	12	1,200	7,000
E5 – Utility Led Programme to Manage Peak Demand and Savings in South Tarawa	11	6,800	13,800
E6 – Capacity Building in Energy Efficiency in Industry	11	1,100	14,900
Total Primary Mitigation Potential for Energy Efficiency			14,900

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

Table 19: Secondary mitigation opportunities

Secondary Mitigation Opportunities in Transport	Score4	Annual Mitigation in 2030 (tCO2/yr)	Accumulative Mitigation in 2030 (tCO2/yr)
T10 – Aircraft Re-Fleeting Programme	10	1,400	1,400
T11 – Electric Vehicle Network Development	8	6,500	7,900
T12 – Sustainable Aviation Fuel Integration Initiative	7	1,000	8,900
T13 – Whole-of-Lifecycle Vehicle Programme	6	100	9,000
T14 – Airport & Airfield infrastructure upgrade	2	100	9,100
T15 – Active Land Transport Infrastructure Upgrade	0	700	9,800
Total Secondary Mitigation Potential for Transport			9,800
Secondary Mitigation Opportunities in Energy Efficiency	**Score**	**Annual Mitigation in 2030 (tCO2/yr)**	**Accumulative Mitigation in 2030 (tCO2/yr)**
E7 – Capacity Building in the Assessment, Design and Construction of Low Energy/Carbon Buildings	9	500	500
E8 – Promotion of Li Ion battery for Renewable Energy storage instead of Lead Acid	8	100	600
E9 – Programme on Efficient Operation and Maintenance of Diesel Power Plants	5	1,600	2,200
Total Secondary Mitigation Potential for Energy Efficiency			2,200

4.2 Financing Pathway for Individual Mitigation Opportunities

Each of the mitigation opportunities for both the transport and energy efficiency sectors follows the general individual financing pathway as depicted in the Figure 6 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).

It is common that 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 or may fund Capacity Building activities for strengthening of institutions before implementation, or 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) which finance the physical activities of the mitigation opportunity, and can for example include 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 fund Technical Assistance activities for continuous training of persons skilled in maintaining the mitigation opportunity.

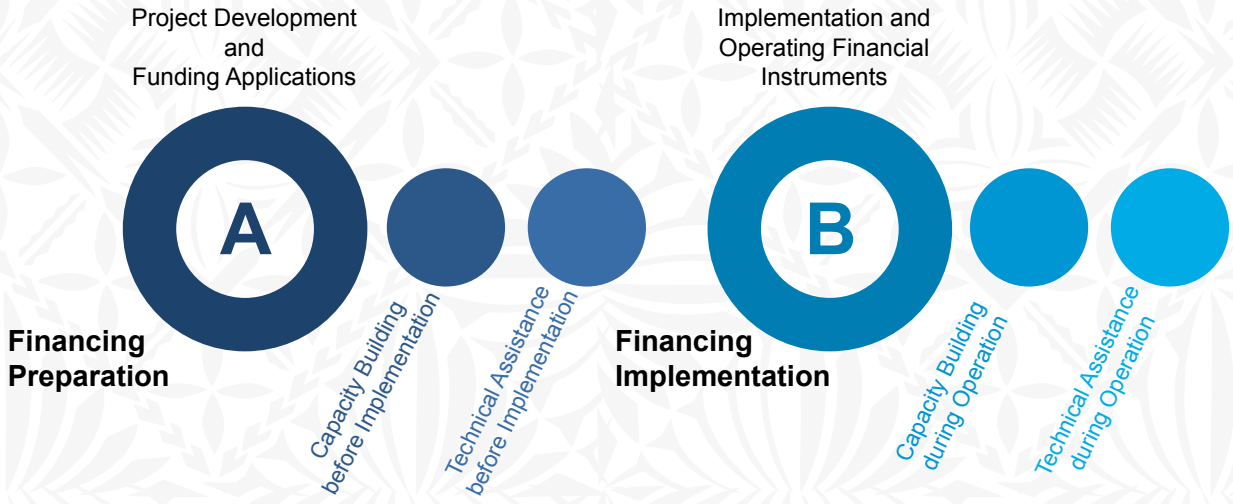

Figure 6: Individual Financing Pathway included in the estimated financing needs

Each of the mitigation opportunities for both the transport and energy efficiency sectors has different financing and financial instrument needs, and these are indicated in the individual Concept Notes found in the Project Pipeline associated with this NDC Investment Plan. Nearly all the mitigation opportunities have a need for continual externally sourced financing of Part B of the individual financing pathway over time.

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 opportunities, and Part B - Financing Implementation of a few primary mitigation opportunities which will require less preparation. The second (2023-2024) and third (2025-2030) involve a continuation of Part B – Financing Implementation of all the primary mitigation opportunities.

Transport Sector

The primary mitigation opportunities, as indicated in Section 4.1, for the transport sector during the period of 2020 through 2030 have a total indicative cost of US$ 163M, with a total indicative need for US$ 11.5M in capacity building & technical assistance, and an indicative need for US$ 151.5M in investment capital. These primary mitigation opportunities have the potential to reduce 115,400 tCO_2 in the 2020 through 2030 period, and to reach a mitigation potential of 18,200 tCO_2/yr in 2030. This is a potential mitigation of 23% of the estimated BAU baseline in 2030 as defined in the (Intended) NDC from 2016.[88] This leads to a combined potential mitigation cost of 1,400 US$/$tCO_2$. Figure 7 below shows the periodic breakdown of indicative capacity building & technical assistance needs, investment capital needs, and mitigation potential. More information on the temporal financing pathway for the primary and secondary mitigation opportunities for the Transport Sector can be found in Annex H.

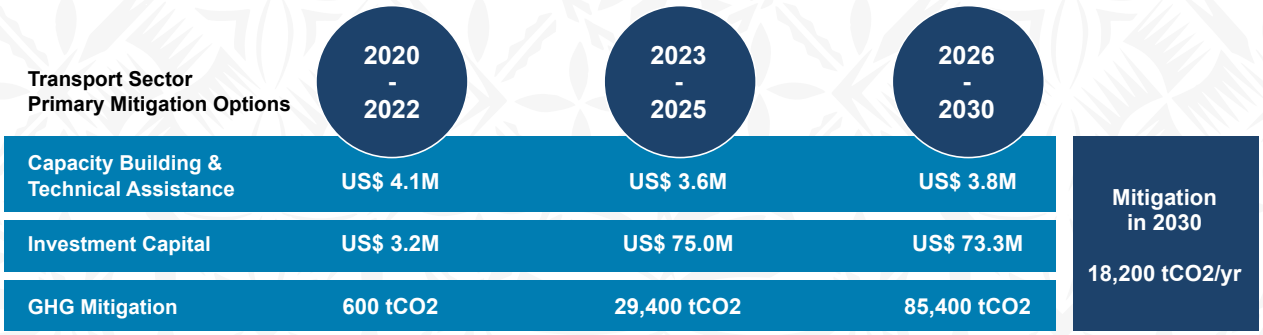

Figure 7: Consolidated temporal financing pathway – Transport Sector Primary Mitigation Opportunities

Energy Efficiency Sector

The primary mitigation opportunities, as indicated in Section 4.1, for the energy efficiency sector during the period of 2020 through 2030 have a total indicative cost of US$ 47.5M, with a total indicative need for US$ 4.0M in capacity building & technical assistance, and an indicative need for US$ 43.5M in investment capital. These primary mitigation opportunities have the potential to reduce 62,500 tCO_2 in the 2020 through 2030 period, and to reach a mitigation potential of 14,900 tCO_2/yr in 2030. This is a potential mitigation of 19% of the estimated BAU baseline in 2030 as defined in the (Intended) NDC from 2016.[89] This leads to a combined potential mitigation cost of 760 US$/$tCO_2$ 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. More information on the temporal financing pathway for the primary and secondary mitigation opportunities for the Transport Sector can be found in Annex H.

88 Note that this includes the uncertainly discussed in Sections 1.3.1 (and assumes existing levels of renewable energy power generation in the BAU baseline).
89 Note that this includes the uncertainly discussed in Sections Error! Reference source not found. (and assumes existing levels of renewable energy power generation in the BAU baseline).

Energy Efficiency Sector Primary Mitigation Options	2020 - 2022	2023 - 2025	2026 - 2030	Annual Mitigation in 2030
Capacity Building & Technical Assistance	US$ 0.8M	US$ 2.4M	US$ 0.8M	14,900 tCO2/yr
Investment Capital	US$ 0M	US$ 8.5M	US$ 35.0M	
GHG Mitigation	0 tCO2	5,800 tCO2	56,700 tCO2	

Figure 8: Consolidated temporal financing pathway – Energy Efficiency Sector Primary Mitigation Opportunities

4.4 Needs for Financial Instruments and Potential Funding Sources

The GOK budget in 2018 was approximately US$ 136M, 73% of which goes to department and other government expenditures, and 25% to the national development fund. 23% of the GOK's revenue comes from taxes, and 72% from non-tax revenues, and the remaining from budget support grants.[90] The GOK is also a recipient of a large amount of ODA in the form of development partner grants for investment and Capacity Building & Technical Assistance (CB & TA). According to the OECD the net ODA for Kiribati in 2018 was US$ 74M[91], which is 38% of the GDP of the country.[92] In addition, flows of personal remittance account for approximate US$ 20M in 2018.[93]

Kiribati's banking sector is limited to two primary banks, the first is the State Owned Enterprise (SOE) Development Bank of Kiribati (KDB) which provides limited senior debt for special purpose commercial and retail loans. The Australia and New Zealand Banking Group (ANZ) is the other commercial and retail lending entity in Kiribati providing senior debt. However, since many commercial business and households have limited collateral, the current magnitude of private sector debt is low.[94]

In relation to private and public finance, Kiribati has a limited number of financial instruments available to fund change within the transport and energy efficiency sectors, and these are currently implemented at a limited scale. The Figure below shows financial instruments which stakeholders in Kiribati have experience with (highlighted in dark blue boxes). The Figure also shows financial instruments where Kiribati has limited or no experience (highlighted in light blue boxes). Many of the financial instruments shown can be used in different combinations to finance the mitigation opportunities presented in this NDC Investment Plan. More information on the types and sources of financial instruments which can be used to finance the mitigation opportunities within this NDC Investment Plan can be found in Annex G.

90 National Economic Planning Office (2017) '2018 Budget', Republic of Kiribati. http://www.mfed.gov.ki/publications/government-kiribati-2018-budget-consolidated-budget-book
91 OECD (2020) 'Aid at a glance by recipients' https://www.oecd.org/dac/financing-sustainable-development/datavisualisations/
92 World Bank (2020) 'Data Kiribati'. https://data.worldbank.org/country/KI
93 World Bank (2020) 'Personal Remittance Received Kiribati'. https://data.worldbank.org/indicator/BX.TRF.PWKR.CD.DT?locations=KI
94 Information gained through interviews with DBK and ANZ during the assignment.

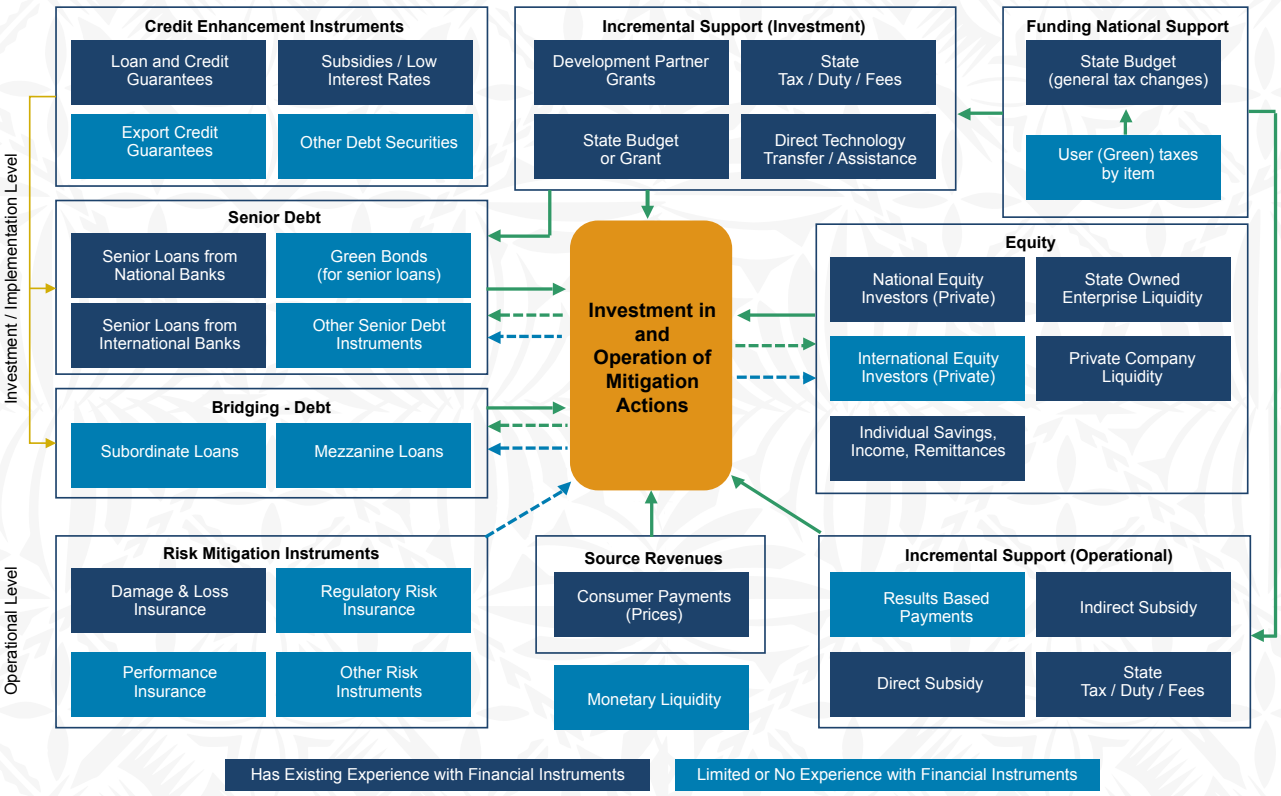

Figure 9: Financial instruments where the Transport & Energy Efficiency sector have some, limited or no experience in Kiribati

A general description of the financial instruments need for the mitigation opportunities is given in the table below (Table 20), and the potential financial instruments need for each mitigation action including potential financing sources can be found in Table 21. Each of the mitigation opportunities for both the transport and energy efficiency sectors have different financial instrument needs and potential financing structures, and these are briefly indicated in the individual Concept Notes of the included Project Pipeline of this NDC Investment Plan.

All of the mitigation opportunities for the transport and energy efficiency sectors require Grants for Capacity Building and Technical Assistance, and most can utilise Non-Government Grants for Finance to enable the mitigation opportunities. The State Budget & SOEs can provide a very limited amount of equity or in-kind finance for most of the mitigation opportunities, but there is a precedent in Kiribati that larger equity needs are financed through Non-Government Grants for Finance. Stakeholders in Kiribati have a broad level of experience with the aforementioned financial instruments.

The private sector in Kiribati is small, the GOK budget and ODA are equal to 69% and 38% of GDP respectively in 2018, and remittance is equal to only 10% of GDP in the same year. This indicates that GOK spending and ODA play a disproportionate role in the economy and may have a high impact on encouraging private sector investment in mitigation opportunities by influencing the costs of goods and services. Given the GOK's real limits of contributing to equity and debt, the Tariffs & Price Setting and Taxation are likely to be the most effective financial instruments within the control of the GOK which can encouraging private sector investment in mitigation opportunities. Especially for the mitigation opportunities where businesses and households traditionally finance the majority of investment needs, such as for appliances and vehicles. This also holds true where higher revenues are needed to service debt and Return on Equity (ROE), such as with shipping services. The GOK can also encourage private sector investment through bulk government procurement, which can lower costs through economies of scale and the make more efficiency goods available to the second-hand internal market.

After equity availability, the private and public sectors availably of secured debt and its capital are likely the biggest bottlenecks to finance mitigation opportunities in Kiribati. These elements and the ability to service debt are the reason why ODA is high in Kiribati. This is why external Guarantees for Credit and Export and Concessional Loans are clearly needed in Kiribati to finance mitigation opportunities. The availability of these will also allow for greater down-stream private sector lending for Commercial and Retail Senior Loans. In addition, Insurances products are needed to reduce the risk to lending, covering both the potential for property / asset losses, and performance losses.

Table 20: Financial instruments needed for NDC investment

Type of Financial Instrument	Description of the Financial Instrument
Private Equity from Households	Households and individuals in Kiribati have private equity usually in the form of individual savings, income, and/or remittance. *[Private equity is common across households in Kiribati but limited in scale]*
Private Equity from Businesses	Companies in Kiribati have private equity usually in the form of corporate savings and income. [common across businesses but limited in Kiribati]
Grants for Capacity Building and Technical Assistance	These grants are provided by various multi-lateral / bi-lateral institutions, and some development agencies (who also gain grants from multi-lateral / bi-lateral institutions). *[These grant are previously applied across the sectors in Kiribati]*
Non-Government Grants for Finance	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). For the absences of doubt these do not include government support grants. [These grants are previously applied across the sectors in Kiribati]
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). *[These guarantees are previously applied across the sectors in Kiribati]*
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. [The application of past guarantees for export to Kiribati are not known]
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. *[These loans are previously applied across the sectors in Kiribati]*
Commercial Senior Loans	Commercial Senior Loans are typically administered by national banks (ANZ and KDB) and are used by companies to finance no more the 80% of their activities, usually based on collateral of assets held by the company or a guarantee from another source. [These loans are previously applied across the sectors in Kiribati]
Retail Senior Loans	Retail Senior Loans are typically administered by national banks (ANZ and KDB) and are used by individuals to finance no more the 70% of their activities, usually based on collateral of assets held by the person, their income or a guarantee from another source. *[The loans are previously applied across the sectors but limited in Kiribati]*
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 transport sub-sectors, SOE equity is limited in Kiribati]
Tariffs & Price Setting: for energy and services	The GOK sets internal prices on fossil fuels, electricity, water, and maritime transport (passengers and cargo), some of which are influenced by indirectly subsidies to SOEs. Changes in the tariffs & pricing can influence the financial viability of investments and are also influenced by the politics for lowering the cost burden on households. *[*tariffs & pricing *are previously applied in Kiribati, but not always changed on a regular basis]*
Taxation: import duties & excise, corporate, personal	The GOK has a robust and simple 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. [Taxation is previously applied across the sectors in Kiribati, but have not been used specifically as negative and positive financial incentives on a broad scale]
Insurance: Loss/ Damage and Performance	Insurance for Loss/Damage allows for recovery of some of the value of and asset which undergoes a loss or is 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 investments have less than expected returns. *[loss & damage insurance has been previously applied in land transport, and along with performance insurance has very limited application in Kiribati]*

Table 21: Possible financial instruments and potential funding sources

Financial Instruments	Potential Sources*	Transport (T)**														
		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15
Private Equity from Households	Households	✓✓	✓✓									✓				
Private Equity from Businesses	Companies, Island Councils, SOEs	✓✓	✓					✓	✓✓		✓✓	✓✓		✓✓		
Grants for Capacity Building and Technical Assistance	GEF, AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, WB/ IFC, KOICA, CIDCA, EEAS, EIB, SIDA, UNDP, UNESCAP, UN Habitat, UNESCO, UNIDO, DE-GIZ, JICA, UK-FCDO	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Non-Government Grants for Finance	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, DBK	✓✓	✓						✓✓			✓✓		✓✓		
Retail Loans***	ANZ, DBK	✓✓	✓✓									✓				
State Budget & SOEs	MOFED & SOEs	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓✓	✓	✓	✓	✓
Taxation: import duties & excise, corporate, personal	MOFED	✓✓	✓✓	✓		✓	✓		✓✓	✓	✓	✓✓		✓✓		
Insurance: Performance and Loss/ Damage	ADB, WB, IFC, EIB, Commercial		✓			✓	✓		✓✓	✓	✓	✓		✓		✓

** 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*

Table 22: Possible financial instruments and potential funding sources

Financial Instruments	Potential Sources*	Energy Efficiency (EE)**								
		E1	E2	E3	E4	E5	E6	E7	E8	E9
Private Equity from Households	Households					✓		✓✓	✓✓	
Private Equity from Businesses	Companies, Island Councils, SOEs			✓✓		✓	✓✓		✓✓	
Grants for Capacity Building and Technical Assistance	GEF, AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, WB/IFC, KOICA, CIDCA, EEAS, EIB, SIDA, UNDP, UNESCAP, UN Habitat, UNESCO, UNIDO, DE-GIZ, JICA, UK-FCDO	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Non-Government Grants for Finance	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, DBK			✓✓		✓✓	✓✓		✓✓	
Retail Loans***	ANZ, DBK					✓✓			✓✓	
State Budget & SOEs	MOFED & SOEs	✓			✓	✓	✓✓		✓	✓
Taxation: import duties & excise, corporate, personal	MOFED			✓		✓✓	✓✓	✓	✓	
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*

Photo credit: GGGI

5. Conclusion

Kiribati has one of the smallest economies in the PICs, and it cannot support all the transitional changes needed to ensure low carbon transport and energy efficiency. The private sector (households and businesses) and public sector (Government of Kiribati entities) will finance vehicles, outboard motors, buildings, industrial equipment, and appliances without actions taken by the Government of Kiribati. There is no question that the vast majority within the private and public sectors of Kiribati 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 are to support the private and public sectors in choosing the least GHG emissions option. The primary mitigation opportunities provide this support to 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 in cost to the high GHG emissions option. This support is heavily grant dependent due to the realities of the economy in Kiribati, though there are some opportunities for encouraging the use of private sector debt and equity.

The main challenges and potential opportunities for increasing GHG mitigation in the transport and energy efficiency sectors in Kiribati 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 finance 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 Kiribati have limited experience with the implementation of a significate portion of the financial instruments needed to finance the primary mitigation opportunities. Existing limitations are mainly due the scale of finance need for the financial instruments and complexity of this (including blended finance). 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. All of these financial instruments will include grants, and a few include 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, are a set of five broad sectoral short-term activities which can encourage the broader implementation of the NDC Investment Plan within the transport and energy efficiency sectors, and these are indicated in Table 23.

Table 23: Five Recommended Broad Short-term Activities to Implement the NDC Investment Plan

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 funding criteria of each individual development partner. It is recommended to hold two development partner forums in Q1 and Q3 of 2021 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 Kiribati. Special focus can be placed on the inclusion in multi-country efforts / programmes, along with direct support to Kiribati.	OB MISE MOFED
2. Build capacity for blended financing of mitigation actions.	The financial sector in Kiribati has experience with grants, and some experience with lending, but very limited experience in blended finance (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 a few of primary mitigation opportunities. Especially those that require commercial and/or retail lending.	OB MOFED DBK ANZ
3. Secure the technical assistance for and implement the opportunities for (T4) National Maritime Action Plan and (E2) Capacity Building for Integrated Energy Planning and Energy Statistics in Kiribati.	The effectiveness of the primary mitigation opportunities in maritime transport and energy efficiency are directly or indirectly dependent on the outcomes of T4 and E2. The outcomes of T4 and E2 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.	MISE MICTTD MOFED
4. Analysis for jumpstarting the opportunities for (T1) Outboard Motor Transition, (T2) Bicycle/E-Bike Financing Initiative, (E3) Supporting the Retrofitting of Major Hotels and Commercial Buildings, (E6) Capacity Building in Energy Efficiency in Industry through tax policy changes within the next four years	The primary mitigation opportunities T1, T2, E3, and E6 are all dependent on tax policy changes. The economic impacts and recommended taxation changes can be investigated in the short term (Q2 and Q3 2021), and some may be potentially enacted for fiscal year 2022/2023, especially for T1 and T2. It is noted that T1, T2, E3, and E6 do require other financial instruments for full implementation, but some organic implementation is expected to happen with only the taxation changes.	MOFED
5. Further quantify the investment needs for implementation of (E1) Strengthening and Expanding the Standards and Labelling Programme for Appliances, (E2) Capacity Building for Integrated Energy Planning and Energy Statistics in Kiribati, (E4) Promotion of Sustainable Procurement, and (T8) Multi-modal Transit Initiative	The primary mitigation opportunities E1, E2, E4, and T8 have the potential for significant GHG mitigation. However, there is currently not enough adequate and reliable background information available to ascertain a high level of accuracy for 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 feasibility studies and straightening of information.	MISE MICTTD

* 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 A: Project Pipeline - Concept Notes of Mitigation Opportunities

T1 – Outboard Motor Transition

No.	T1
Action Name	Outboard Motor Transition
Sub-Sector	Maritime Transport
Description	Outboard motors are likely to be the single largest source of GHG emissions for Kiribati maritime sector, due to the large number of 2-stroke petrol outboard motors. 4-stroke motors are considerably more energy efficiency than 2-stroke outboards and fully electric outboard motors are in use commercially in other parts of the world. As small vessels could make up 40%[96] of the total emissions from maritime transport, a sizeable percentage of total emissions reduction for the sub-sector is available simply by transitioning from 2-stroke to 4-stroke outboards. This action aims to achieve a 40% reduction in emissions from outboards by 2030 from a combination of switching to 4-stroke ULP and electric outboards. 4-stroke outboards are approximately 50% more fuel efficient than 2-strokes[97]. Whilst there is no accurate data on the total number of outboards or type, based on estimates of ~2000[z] small boats using 2-stroke outboards, this would see at least 800 2-strokes being replaced with electric outboards by 2030. Transition to electric outboards requires consideration of charging technologies, and transition to 4-stroke or electric outboards involves several steps: • household census of outboard ownership and use (including fuel use if possible) – 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 2020 census which already collects data on boat ownership (by type e.g. wooded, aluminium, fibreglass, canoe) • Review fiscal policy – this would include removing duties on 4-stroke and electric outboards, lithium ion rechargeable batteries and chargers, parts, and raising import duties on 2-stroke outboards initially and in time raising import duties on 4-strokes. • Trial of e-outboards and recharging station at KNSL. Construction of a RE recharging station for batteries used in e-outboards and monitored trial on government and KNSL vessels of electric outboards. • Development of training course for marine mechanics on 4-strokes, electric motors and batteries/ accumulators • Establishment of a zero interest loan facility for purchase of electric outboards or recharging stations and related equipment and parts and low interest loan facility for purchase of 4-stroke outboards Publicity campaign to explain the planned transition to new generation outboard motors and the assistance available to support communities in that transition
Outcomes	• Reduced fuel use over time with uptake of more efficient outboard motors and sailing canoes and sail assist leading to reduced economic cost of imported ULP, particularly for households and fishers. • Opportunity for new businesses (4-stroke and electric outboard sales and servicing, and battery recharging)
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principal (2) OECD-DAC/CRS Purpose Code(s): 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

96 RMI estimated emissions from vessels <15m powered by outboards represent 40% of maritime transport emissions (Oxley, 2018 ibid) https://www.theprif.org/documents/republic-marshall-islands-rmi/transport-maritime/prif-rmi-shipping-baseline-data-report, 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 Government (2018) Low Emissions Development Strategy https://unfccc.int/sites/default/files/resource/Fiji_Low%20Emission%20Development%20%20Strategy%202018%20-%202050.pdf

97 See for example Johnson, D. (2018) 2 v.s 4 cycle Outboard Motors. In-Fisherman. https://www.in-fisherman.com/editorial/2-vs-4-cycle-outboard-motors/153421#:~:text=Fuel%20And%20Oil%20Economy,than%20typical%202%2Dstroke%20outboards.

98 Based on 2015 Census data

Implementing and Supporting Entities / Stakeholders	Implementing Entity / Stakeholders: Bureau of Statistics and Marine Division (household surveys of outboard ownership and use), MOFED (review of fiscal policy and investment), KIT, MTC (training for mechanics and marine engineers), KNSL (trialling of electric outboard recharging station and outboards), Marine Division (publicity campaign, awareness raising), DBK, ANZ (revolving concessional loan facility implementation), and PUB (installation of more renewable energy power generation to lower the grid emissions factor to ensure GHG mitigation, as well as work with the private sector and government to install and maintain EV charging infrastructure and higher capacity electricity distribution). Supporting Entity / Stakeholders: Island Councils, Church groups, MFMRD and other ministries, households, FAO (technical assistance and for training and awareness raising), Outboard motor manufacturers[8] (technical support), PBSP (technical cooperation and support network), USP MCST (technical support and access to academic networks), and SPC (technical support through PICREE/MTCC/PCCOS)

Policy / Plan Link	• Kiribati Development Plan 2016 - 2019 (issued 2016)
	  ○ Key Priority Area 6 (infrastructure to support transport decarbonisation
	• Ministry Strategic Plan 2020-2023 (issued 2019)
	  ○ 9.2: Strengthen air, sea and land transport and infrastructures to meet social demands and compliment economic enhancing activities.
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3 Improved connectivity and accessibility Goal: to improve air, land and sea transport infrastructure.
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ Section 12
	  ○ 15.3 Goal 2 Improve energy efficiency in electricity generation, buildings, water and sewerage and transport and cooking)
	• Kiribati Voluntary National Review and Kiribati Development Plan – Mid Term Review (issued 2018)
	  ○ KPA2 Outcome 1 Increased sustainable economic development and improved standards of living for all i-Kiribati.
	  ○ KPA6 Outcome 1 Improve access to quality climate change resilient infrastructure in urban and rural areas.
	• A range of other island specific plans that link to maritime transport

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: 2 years needed for action development and initial data collection. Time needed for securing finance: 1-3 years needed to secure financing for monitored trials of electric outboard operations and recharging; and for establishment of revolving concessional loan for commercial and household deployment. Time needed for capacity building: 1-3 years needed for capacity building/training development and roll out. When would the project investment start and end: Start 2021 end 2030 (note: mitigation would continue after 2030). Immediate steps (first 12 months) under this opportunity include: A. Secure technical assistance and capacity building support for items B - F B. Project development (concept note) C. National small vessel and outboard ownership/fuel use sample surveys D. KNSL trial of e-outboards and recharging station E. Policy and financing modality review F. Scholarships for training in 4-stroke and e-outboards

99 Of popular brands used in Kiribati e.g. Yamaha, Honda, and electric outboard suppliers e.g. Torqueedo, Elco

Mitigation Potential	Up to 3,600 tCO_2/yr and a total of 19,900 tCO_2 for 2020 – 2030 Key Assumptions: • No data is available to determine the fossil fuel used in outboard motors, nor the number of outboard motors owned and operated in Kiribati[100]. • It is assumed that Kiribati will have a similar profile to both RMI and Tuvalu in terms of small vessels (outboards) percentage of national fleets. Studies of neighbouring countries including Marshall Islands[101], Tuvalu and Fiji have been used to estimate emissions profile from outboard motors for Kiribati. • It is assumed that emissions from outboards could constitute ~ 40% of maritime transport emissions[102] • It is assumed that a phased transition from predominantly pre-mix 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. • It is assumed that by 2030 40% of 2-stroke outboards would have been replaced by electric, with only a small number switching in the first few years and growing numbers thereafter. Emissions reduction could also be achieved by replacing 2-strokes with 4-strokes but would require much higher proportion of replacement to achieve the emissions reduction projected of 40% by 2030. • It is also assumed that electric outboard batteries would only be recharged from renewable sources (predominantly solar PV). No costing is included for recharging batteries. • No emissions savings from reduced need to import fossil fuels has been included (such emissions should be accounted for under IMO)
Co-benefits / SDG Linkages	• 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 for electric outboard motors. • Reduced risk of environmental damage/pollution from outboard motors. • Traditional knowledge of small canoe building and sailing becomes more appropriate and valued. • Replicable and scalable. • Relevant SDGs include 1, 7, 8, 12, 13, 14, 17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation: US$ 20,798,000 Estimated development costs: US$ 5,000 Estimated Enabling, Capacity Building and Technical Assistance Needs: US$ 805,000
Potential Business Model and Financing Strategy	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 Australia, Fiji and elsewhere, 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 and electric outboards are considerably more expensive). Grant financing will enable KNSL to pilot recharging and use of electric outboards in monitored trials to demonstrate the operational savings potential as well as use of the technology. Targeted scholarships and training on servicing and use of 4-stroke and electric outboard motors through KIT and MTC will provide the human capacity. One business model to be explored for recharging is a “battery swap” as small businesses, 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 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 phased in over time) supplemented by a revolving low/zero interest loan facility.

100 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) 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 output from 8 outboard motors of 72.63 tonnes of CO_2 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 CO_2 emissions and their reduction potential” submitted to Universities of Applied Sciences Flensburg and Emden-Leer and Oxley (ibid) calculated that total consumption of outboard motors in RMI was about 1,277,000 litres of petrol equivalent to 3,038 tCO_2 in 2017.

102 MISE data from 2014 as baseline year was used to calculate percentage of national total as NDC total of 63,000 tCO_2e/yr is based on 2014 data.

Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	• Data availability – no information is available on the total number of outboard motors in use in Kiribati, the type of motors, or the fuel used. (Technical assistance to undertake survey of outboard motors in conjunction with Marine Division to register small vessels and outboard motor information) • Valley of Death (first mover) – monitored trial of use and recharging of electric outboard motors with KNSL and MFMRD (grant) • Human Capacity – lack of personnel within MICTTD and Marine Division, MTC and KIT 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 KIT and MTC; publicity and outreach campaign to raise awareness; scholarships for 4-stroke and e-outboard mechanics) • Financing – 4 stroke and electric outboard motors and batteries are Capex high and Opex low when compared to 2-stroke outboard motors. Recharging stations for electric outboards will be required (loan facility or "buy back" scheme)
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 batteries will assist in balancing out purchase cost of more efficient motors when compared to 2-strokes. Demonstrating the savings accruable from use of electric outboard motors over time through monitored trials by KNSL will add to the overall longer-term financial viability of the switch from 2-strokes as households see the costs saved by removing need for ULP. A revolving loan facility[103] will enable individuals and SMEs 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. ≈70% of the ULP used in Kiribati is in outboard motors (accounting for some AUD ≈7.6 million in 2017[104]) mostly paid by individuals (households). Phased transition to all electric outboards and banning of 2-strokes by 2030 would result in annual fuel cost savings in this ballpark, 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 action should be financially sustainable if fiscal policy, pilot demonstration by KNSL, 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: 0.02% of total cost equal to US$ 5,000 • Grants for Technical Assistance & Capacity Building: 3.73% of total cost equal to US$ 805,000 • Grant for KNSL monitored trials of e-outboard operation and recharging: 5.76% of total cost equal to US$ 80,000 • Private investment (supported by revolving loan facility) for outboard motor replacement: 95.88% of total cost equal to US$ 20.718M may require a credit or export guarantee • State budget: Fiscal duty amendments, and government purchases (raising import duties for 2-strokes and decreasing and removing duties for 4-stroke and electric outboards and parts)

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: PBSP[105], **ADB, WB**, PRIF, SPC, USP, UNESCAP, GGGI, NDC-Hub
	  ○ Project Implementation & Management: PBSP[34], **ADB, WB**, PRIF, SPC, UNDP, GGGI, NDC-Hub
	• Potential Financial Partners / Sources:*
	  ○ Grants for Technical Assistance & Capacity Building: Outboard motor manufacturers, JICA, KOICA, CIDCA, AU-DFAT, **NZ-MFAT, ADB**, FAO
	  ○ Loan for household and private sector loan facility through DBK/ANZ: **IFC, ADB**, EIB, EIBC

103 A concessionary loan facility for SMEs is a key component of the PBSP which all participating countries would be able to access Governments Fiji and RMI (2020) Concept Note: The Pacific Blue Shipping Partnership PBSP_Concept_Note_Feb_2020

104 KOIL fuel revenue data shows ULP sales in 2017 at AUD 10.48 million.

105 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 the PBSP provides for a coordinated programme of pilot projects in participating countries, it is logical that Kiribati should first consider formally joining the partnership to take advantage of the efforts being put in to programme development, and thinking around improving implementation and governance structures by neighbouring countries and the supporting regional experts.

Potential Supporting and Financing Partners / Sources	○ Guarantees: **ADB, WB, IFC**, EIB, GCF ○ Tax/Duty waivers: **GOK** ○ State budget: equity for GOK investments ○ Equity: **individual/private sector** (savings/income) *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$ 805,000 1) National small vessel and outboard motor ownership/fuel use census/ survey (US$ 25,000) 2) Review of fiscal policies and revenue/excise duties and taxes associated with outboard motors (including rechargeable batteries and charging stations) (US$ 10,000) 3) Amendment of fiscal policies and revenue/excise duties and taxes to incentivise purchase and use initially 4-stroke then electric outboard motors (including rechargeable batteries and charging stations) (US$ 15,000) 4) Review of option(s) for revolving loan facility (US$ 5,000) 5) Development of curriculum for MTC and KIT on outboard motor decarbonisation (US$ 30,000) 6) Recruitment of and salaries for suitably experienced staff in MTC and KIT (US$ 40,000) 7) Scholarships for 4-stroke and electric outboard mechanics (US$100,000) 8) Awareness raising/publicity campaign (US$30,000) 9) Project monitoring, reporting & verification (US$550,000)
Information and MRV Needs	• Household outboard motor ownership and fuel use survey (baseline and on-going monitoring of implementation and performance) • Traditional canoe ownership, building and sailing knowledge and practice • Fiscal import duties and excise 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	• Fiji Government (2018) Low Emissions Development Strategy; • PRIF (2018) Establishing Baseline Data to support Sustainable Maritime Transport Service Focussed on RMI; • Newell, A. and Bola, A. (2015) The Solodamu Surveys: determining fossil fuel use and sea transport need in a coastal village in Fiji. Front.Mar.Sci.2:59; • NIWA (2007) Potential impacts of emissions from outboard motors on the aquatic environment: a literature review ELF07201; • 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 • Diffey, S (1991) Experiences with the Yanmar diesel outboard engine: Outer Island Fisheries, Kiribati. SPC Fisheries Newsletter #59

Phased Approach for Development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1, 2, 3, 4, 5, 7, 8	6, 7, 9	6, 7, 9	
Estimated CB & TA Costs (US$)	250,000	210,000	350,000	810,000
Estimated Capital Investment (US$)	1,520,000	5,613,000	13,665,000	20,798,000
Estimated GHG Mitigation (tCO2)	408	3805	15708	19921
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				3652

T2 – Bicycle/E-Bike Financing Initiative

No.	T2
Action Name	Bicycle/E-Bike Financing Initiative
Sub-Sector	Land Transport
Context	Bicycles have remained more popular in Kiribati than the rest of the Pacific. MOFED's Customs office data reveals that in 2019, bicycles were imported at a rate of more than 2:1 to ICE motorbikes and motorcycles, with 5,000 bicycles logged in comparison to the 2,600 ICE motorbikes and motorcycles. This action focuses on keeping 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, replacing the role of additional ICE motorbikes and motorcycles by up to 60% between 2022-2030. This initiative should secure cost savings, emission reductions by encouraging the import and use of 22,600 standard and e-bikes between 2022 and 2030. This will also lead to health and well-being benefits for the population of Kiribati due to increase level of physical activity. This action should take place alongside the integration with emerging, cost-competitive e-bike technology, with infrastructure requirements outlined above in T1.
Key Implementation Milestones	**Policy / Technical Assistance** • Support to maintain 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 **Investment Needs** • Import and use of 22,600 standard and e-bikes between 2022 and 2030.
Outcomes	Primary Outcomes • Reduced emissions and air pollutants from land transport sources. • Improved public health and fitness, inclusive of reduced costs and burden on the Kiribati healthcare system. Secondary Outcomes • Significantly decreased costs associated with land transport fuel and ICE motorbikes and motorcycles imports.
Mitigation Potential	up to 1,360 tCO_2/yr in 2030 and a total of up to 7,940 tCO_2 for 2020 - 2030 • Starting in 2022, replacing 1,900 to 3,200 ICE motorbikes/motorcycles annually. In 2030 there is estimated to be up to an accumulated operational amount of standard and e-bicycles of 14,100 * 0.096 tCO_2 per ICE motorbikes/motorcycles per year.[106] Noting that new standard and e-bicycles are assumed to be imported at a ratio of 1:1.
Co-benefits / SDG Linkages	Curbing the proliferation of fossil fuels will reduce the potential threat of spills, and will aid in safeguarding the terrestrial and marine environment. Reducing dependence on imported fossil fuels will encourage retention of wealth in-country associated with economic activity which requires land transport logistics. Use of bicycles and e-bikes will have daily health and fitness benefits for all users, contributing to avoided medical costs and reduced mortality. It will also aid in reducing localized air pollutants and reduce risks associated with oil spills and contamination of both the coastal marine environment and freshwater lens, similar to benefits of broader EV adoption. Associated SDGs include; 3, 5, 7, 8, 10, 11, 12, 13, 14, 15, and 17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation: US$20,314,000.[107] Estimated development costs: US$110,000 to design, establish, and administer a revolving commercial and micro-finance mechanism prior to mainstreaming it within existing financial institutions (such as DBK and ANZ), and preparation of and instrument for taxation changes.[108] Estimated Enabling, Capacity Building and Technical Assistance Needs: US$790,000 to promote access to the financing mechanism across the outer islands and organize bulk purchasing to reduce shipment costs on a per unit basis, as well as training for bicycle/e-bike mechanics for each island to provide continued service.[109]
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) 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; 23642 - Electric mobility infrastructures; 24081 - Education/training in banking and financial services

106 Emissions reductions in 2030 assuming the following levels of new RE power generation going to EVs: 100% = 1,360 tCO2, 75% = 1,190 tCO2, 50% 1,010 tCO2.

107 Assumes the standard pre-tax cost of a standard bicycle of US$ 300 * 11,300 and e-bicycle of US$ 1500 * 11,300, and these include a bicycle operational lifetime of three years with proper maintenance.

108 Includes US$ 50,000 to prepare the taxation instrument, and US$ 60,000 for the revolving lending micro-finance instrument.

Implementing and Supporting Entities / Stakeholders	Potential National Implementing Entities / Stakeholders: MISE, MICTTD, Ministry of Health & Medical Services, PVU Potential Implementing Supporting Entities / Stakeholders: KIT, MCST-USP, Private Sector Companies, WHO, PCREEE-SPC, ONOC, Ministry of Women, Youth, and Social Affairs
Policy / Plan Link	• MOFED Value Added Tax (VAT) and Excise Exemptions and Zero-rated items bulletin (updated 2019) o bicycles and bicycle parts are exempt from taxation. • The Kiribati Customs Tariff schedule (updated 2019) o bicycles and parts free from duty. E-bikes, however, are classified separately and are assessed under section XVII alongside motorbikes. • The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015). • Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4) o Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available. • Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019) o Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency • Ministry Strategic Plan 2020-2023 (MICTTD & SOE) o Strategic Objective 1: Develop and strengthen sustainable Tourism development to boost economic development o Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities. • Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) - target for reduction of fossil fuel consumption by 2025 through Energy Efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa. • Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018). • Kiribati 20-Year Vision (issued 2016) o Pillar 3: Infrastructure for Development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Import of bicycles is ongoing in Kiribati, a simple feasibility study for technology, planning and support needs will be needed. This process may take 6-9 months. Time needed for securing finance: The time needed to secure multilateral assistance for a commercial and micro-lending facility and technical assistance may require 12 - 18 months, including preparatory arrangements. When will the project/investment start and end: 2022 to 2030, 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 bicycle/e-bike initiative in all municipalities/areas. E. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

109 Includes US$ 30,000 annually to promote access to financing and bulk procurement from 2022 to 2030, the one-time development of a standard and e-bicycle maintenance training programme/curriculum and equipment (US$ 60,000) and annual training of mechanics and tools/spares kits (US$ 40,000 per year) from 2022 to 2030.

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) leave a larger portion of the national population with the opportunity to acquire their own independent land transportation without significant additional subsidies required from outside partners. Bicycles are already more prevalent as a share of total land transport vehicles imported than in any other nation around the Pacific region. They are primarily utilized by the private sector, generally at the individual/household level. National-scale bulk purchasing from preferred suppliers of standard and e-bicycles and spare parts should be arranged in coordination with lending agencies (DBK and ANZ) who provide commercial lending packages at a significantly reduced interest rate to place higher quality bicycles and new e-bikes into circulation, including a financial support guarantee provided to the lending agencies. Lending mechanisms may require performance and loss & damage insurance as a part of the risk structuring. This lending is supported through a revolving fund replenished by private sector purchases to the retailer. On a household/individual level, fuel and vehicle costs should be promoted as avenues for greater cost savings. Though not all households will have access to retail lending at a small scale, especially to purchase e-bicycles, therefore 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 maintenance and parts & service environment will be necessary to ensure purchases stay in operable and in good repair through at least a 3-year lifespan (high quality standard and e-bicycles can last to 5+ years). • Disseminating information around the lending mechanisms to encourage participation will be a significant challenge for success. • As duty and excise designations for standard and e-bicycles are not properly grouped alongside VAT exemptions issued for bicycles and bicycle parts, political will and effort on the part of government to amend this tax policy and forego future revenue from motorbike taxation must be aligned. • Importers and retailers may need to collaborate (where otherwise functioning competitively) to reduce purchase costs for standard and e-bicycles through a government/DBK-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 opportunities 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. Sustainability should be achievable from a financing perspective with fewer required inputs from outside Kiribati. The TA for maintenance training will also help ensure longer life for standard and e-bicycles.
Potential Financing and Need for Financial Support and/or Financial Instruments	• Equity for Capital Investment: 25% of cost from Private Sector equal to US$5.1m over 2022-2030. • Debt for Capital Investment: 75% in lending support equal to US$ 15.2m over 2022-2030. • Credit guarantee for lending support: 75% equal to US$ 15.2m over 2022-2030 • Grants for TA/CB and project development: 100% of total equal to US$790,000 over 2021-2030. • Taxation changes to reduce the cost of standard and e-bicycles, and possible increase the cost of ICE motorbikes and motorcycles over 2022-2023.

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: DBK, UNESCAP, **GGGI**, **NDC-Hub**, **ADB**, World Bank/IFC, EEAS, **PCREEE-SPC**, UNCTAD
	  ○ Project Implementation & Management: DBK, **UNDP**, GGGI, NDC-Hub, **ADB, World Bank/IFC**, PCREEE-SPC, World Health Organization, UNICEF,
	• Potential Financial Partners / Sources:*
	  ○ Credit Guarantees: GCF, **ADB**, World Bank/IFC, EIB
	  ○ Debts & Loans: **DBK, ANZ, ADB, World Bank/IFC**, EIB
	  ○ Equity: PVU, **Private Companies, households**
	  ○ Non-Government Grants for investment: AU-DFAT, NZ-MFAT, GCF, GEF, **World Bank / IFC**, EIB, CIDCA, EEAS, KOICA, USAID
	  ○ Grants for Technical Assistance & Capacity Building: GEF, AU-DFAT, NZ-MFAT, CTCN, **ADB**, GCF, **World Bank/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNIDO, PCREEE-SPC, GIZ, GEF, World Health Organization, UNICEF,
	  ○ Government Budget & Taxes Incentives: **MOFED**
	  ○ Risk Instruments: ADB, World Bank/IFC, EIB
	*This is not a comprehensive list, other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	1. Support will be required both in the planning and technology selection phase (tendering, procurement, contracting, etc.) 2. Practical training will be required for the servicing and maintenance of bicycles and e-bikes, as well as outfitting trained technicians with relevant tools and start-up supply stock. 3. A marketing push to promote the financial mechanism to the public will be required across all islands. 4. Given the decentralized capacity development required, potential support cost for national-scale public awareness and training may be expected to exceed US$50,000
Information and MRV Needs	• Baseline assessment of ICE motorbikes and motorcycles use and fuel consumption, and use of standard bicycles, including men and women ownership. • Number of standard and e-bicycles imported. • Import value of standard and e-bicycles. • Number of ICE motorbikes and motorcycles imported. • Import value of ICE motorbikes and motorcycles. • Number of bicycles mechanics trained (men and women). • Number of men and women ownership for standard and e-bicycles. • Average number of km per day travelled by standard and e-bicycles. • Number and value of commercial loans issued. • Number and value of retail / micro-finance loans issued.
Supporting References	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. MOFED (2014), *Valued Added Tax (VAT) and Excise*. Tax Division, MOFED, GOK. http://president.gov.ki/wp-content/uploads/2014/08/Exemptions-and-Zero-rated.pdf Government of the Netherlands (2020), *Ways of Encouraging Bicycle Use*. (accessed August 2020). https://www.government.nl/topics/bicycles/bicycle-policy-in-the-netherlands Cycling Embassy of Denmark (2010), *Tax incentives for bike commuting*. (accessed August 2020). http://www.cycling-embassy.dk/2010/07/12/tax-incentives-for-bike-commuting/ Department for Transport (2019), *Cycle to Work Scheme Guidance for Employers*. Department for Transport: Great Minster House, London. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845725/cycle-to-work-guidance.pdf Konyk, J. (2018), *Green Policing: Recommended Actions for an Environmental Sustainability Plan for the Vancouver Police Department*. Vancouver Police Department: City of Vancouver, British Columbia. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/GCS/2018_GCS/Reports/2018-54%20Green%20Policing%20Recommended%20Actions%20for%20an%20Environmental%20Sustainability%20Plan%20at%20the%20VPD_Konyk.pdf CycleLoan (2008), *A Low Cost, Low Maintenance, Turnkey Bike Fleet Programme*. Ontario Trillium Foundation. https://www.cycleloan.ca/theprogram HM Revenue & Customs (2020), *Particular benefits: bicycles: simplified approach to valuing cycles sold to employees after end of loan period*. Government of the UK (accessed August 2020). https://www.gov.uk/hmrc-internal-manuals/employment-income-manual/eim21667a HM Revenue & Customs (2020), *Particular benefits: exemption for bicycles*. Government of the UK (accessed August 2020). https://www.gov.uk/hmrc-internal-manuals/employment-income-manual/eim21664 IBI Group Professional Services (Canada) Inc. (2017), *Toronto Ten Year Cycling Network Implementation Plan*. City of Toronto. https://www.toronto.ca/wp-content/uploads/2019/01/94e8-Cycling-Implementation-Plan-Table-of-Contents-Section-1-4.pdf

Supporting References	Newson, C. & Sloman, L. (2019), *The Case for a UK Incentive for E-bikes*. Bicycle Association. https://www.bicycleassociation.org.uk/wp-content/uploads/2019/07/The-Case-for-a-UK-Incentive-for-E-bikes-FINAL.pdf Pucher, J., Thorwaldson, L., Buehler, R. & Klein, N. (2010), *Cycling in New York: Innovative Policies at the Urban Frontier*. Research Initiatives program of the University Transportation Research Center, Region 2. https://www.researchgate.net/publication/242482597_Cycling_in_New_York_Innovative_Policies_at_the_Urban_Frontier Litman, T. (2020), *Evaluating Active Transport Benefits and Costs: Guide to Valuing Walking and Cycling Improvements and Encouragement Programs*. Victoria Transport Policy Institute. https://www.vtpi.org/nmt-tdm.pdf Saloojee, F., & Lloyd, J. (2015), *Lithium Battery Recycling Process: Desktop Study*. Dept. of Environmental Affairs: Development Bank of South Africa – DB-074-RP-001-A0. https://www.sagreenfund.org.za/wordpress/wp-content/uploads/2015/07/Lithium-Battery-Recycling-Literature-Review-CM-Solutions.pdf Haubold, H. (2016), *Electromobility for All: Financial incentives for e-cycling*. European Cyclists' Federation. https://ecf.com/sites/ecf.com/files/FINAL%20for%20web%20170216%20ECF%20Report_E%20FOR%20ALL-%20FINANCIAL%20INCENTIVES%20FOR%20E-CYCLING.pdf DuPuis, N., Griess, J., & Klein, C. (2019), *Micromobility in Cities: A History and Policy Overview*. The National League of Cities (NLC) Center for City Solutions. https://www.nlc.org/sites/default/files/2019-04/CSAR_MicromobilityReport_FINAL.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	3, 4	
Estimated CB & TA Costs (US$)	230,000	210,000	350,000	790,000
Estimated Capital Investment (US$)	1,719,000	5,877,000	12,718,000	20,314,000
Estimated GHG Mitigation (tCO2)	183	1,776	5,982	7,942
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				1,356

T3 – Aviation Operational Training Programme

No.	T3
Action Name	Aviation Operational Training Programme
Sub-Sector	Air Transport
Context	The process of re-training the Air Kiribati and Airports Kiribati staff 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. • Instituting protocols for ATM, single-engine taxiing/aircraft tugging, auxiliary power unit (APU) restrictions, and • On-the-ground activities account for up to 5% of fuel consumption, which can best be reduced through operational improvements. • The previous MSP also prioritized the need to develop a culture service that promotes good reputation for Bonriki, and establish a baseline for service expectations to use as a measurement of customer satisfaction.

<table>
<tr><td>Key Implementation Milestones</td><td>
<table>
<tr><th>Policy / Technical Assistance</th><th>Investment Needs</th></tr>
<tr><td>• All personnel have received Operational Training concerning efficiency improvements.
• 5% efficiency improvements and savings verified across industry operations.</td><td>All training completed for Air Kiribati and Airports Kiribati personnel on a national level, on an annual basis.</td></tr>
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</td></tr>
<tr><td>Outcomes</td><td>Primary Outcomes
• Reduced emissions associated with taxiing and on-ground operations of aircraft.
Secondary Outcomes
• Improved sub-sectoral performance by both ground and flight crew working with Airports Kiribati and Air Kiribati, respectively.</td></tr>
<tr><td>Mitigation Potential</td><td>< 328tCO_2/yr and a total of <2,980CO_2 for 2020 - 2030
Assumed emissions reduction potential of 63,000tCO2e per annum under the (Intended) NDC may be evaluated in the context of the SREP Investment Plan, which attributed only 4% of total national emissions to domestic aviation (2,520tCO2e). The totals above also assume 3.6% average Compound Annual Growth Rate (CAGR) estimated for the aviation market globally by IATA. 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.
Disaggregated fuel data for domestic/international aviation is still needed to update the estimates to appropriately evaluate the emission reduction potential of mitigation activities.</td></tr>
<tr><td>Co-benefits / SDG Linkages</td><td>Co-benefits include:
• Improved passenger comfort and level of service enjoyed (inclusive of reduced loading/unloading times, delays, and potentially reduced flight durations.)
• Avoided costs in aviation sector (both reduced recurring costs for government and increased profit margin for SOEs).
• Improved safety practices associated with increased awareness of management systems by operational staff.
• Improved equity of service delivery to all citizens/areas of Kiribati.
This sub-sectoral activity supports SDGs 1, 7, 8, 9, 10, 11, 12, 13, and 17.</td></tr>
<tr><td>Investment Needs (USD)</td><td>Estimated capital investment needed for the physical implementation: >US$0 – 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.
Estimated development costs: US$120,000 (including development and administration of training programme in coordination with national stakeholders in Kiribati and supporting institutions.)
Estimated Enabling, Capacity Building and Technical Assistance Needs: >US$1.2 million, as estimated by the MICTTD MSP 2016-19, the capacity building needs for efficiency improvements will exceed this total.</td></tr>
<tr><td>Rio Marker and CRS Purpose Code(s)</td><td>Rio Marker: Significant (1)
OECD-DAC/CRS Purpose Code(s): 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21050 - Air Transport; 21081 - Education and training in transport and storage;</td></tr>
<tr><td>Implementing and Supporting Entities / Stakeholders</td><td>Potential National Implementing Entities / Stakeholders:
MISE, MICTTD
Potential Implementing Supporting Entities / Stakeholders:
KOIL, Air Kiribati, Airports Kiribati, ICAO, PASO, National/International Consultants</td></tr>
</table>

Policy / Plan Link	• The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015).
	• Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for Development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Ministry Strategic Plan 2020-2023 (MICTTD & SOE)
	  ○ Strategic Objective 1: Develop and strengthen sustainable Tourism development to boost economic development
	  ○ Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities.
	  ○ Strategic Objective 4: To strengthen supporting services; human resource needs, printery, postal, accounts and registry, to support the efficient and effective functions of the Ministry and SOEs.

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: The process of identifying needs and gaps, identifying, selecting, and coordinating with training providers for delivery to all necessary personnel may take 12-18 months. Time needed for securing finance: 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: <12 months. When will the project/investment start and end: The training process should be rolled out to all personnel throughout Kiribati, occurring after a selection process, which could begin as early as 2021 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. Immediate steps (next 12 months) under this opportunity include: 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 Air Kiribati, and other SOE airline protocols. C. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.
Mitigation Potential	< 328tCO_2/yr and a total of <2,980CO_2 for 2020 - 2030 Assumed emissions reduction potential of 63,000tCO2e per annum under the (Intended) NDC may be evaluated in the context of the SREP Investment Plan, which attributed only 4% of total national emissions to domestic aviation (2,520tCO2e). The totals above also assume 3.6% average Compound Annual Growth Rate (CAGR) estimated for the aviation market globally by IATA. 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. Disaggregated fuel data for domestic/international aviation is still needed to update the estimates to appropriately evaluate the emission reduction potential of mitigation activities.
Co-benefits / SDG Linkages	Co-benefits include: • Improved passenger comfort and level of service enjoyed (inclusive of reduced loading/unloading times, delays, and potentially reduced flight durations.) • Avoided costs in aviation sector (both reduced recurring costs for government and increased profit margin for SOEs). • Improved safety practices associated with increased awareness of management systems by operational staff. • Improved equity of service delivery to all citizens/areas of Kiribati. • This sub-sectoral activity supports SDGs 1, 7, 8, 9, 10, 11, 12, 13, and 17.

Investment Needs (USD)	Estimated capital investment needed for the physical implementation: >US$0 – 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. Estimated development costs: US$120,000 (including development and administration of training programme in coordination with national stakeholders in Kiribati and supporting institutions.) Estimated Enabling, Capacity Building and Technical Assistance Needs: >US$1.2 million, as estimated by the MICTTD MSP 2016-19, the capacity building needs for efficiency improvements will exceed this total.
Potential Business Model and Financing Strategy	For a relatively small investment specifically targeted 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$114,000 at 2019 figures) per annum can be saved, paying off the investment within 12 years. While the private sector is not present, the employees of SOEs would benefit from associated training opportunities, and these best practices should be transferrable within the aviation sector. 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 partners invested in delivery of aircraft which utilize airport facilities in Kiribati (such as the Government of China).
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	The primary barriers to implementation are currently budgeting, logistical, and scheduling constraints. The opportunity cost associated with extensive training of all aviation personnel in Kiribati will also need to be quantified. Phased delivery of training will be required to avoid interruptions or reductions in aviation services provided, which will mean additional costs incurred for providing multiple training sessions on the same material.
Financial Sustainability	Building upon the existing identified needs and proposed training budget by MICTTD, financial sustainability of providing capacity building opportunities for Air Kiribati and Airports Kiribati personnel should provide, for an estimated investment of under US$1.32m, annual savings of up to US$114,000. 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.
Potential Financing and Need for Financial Support and/or Financial Instruments	It is expected operational training will be financed through technical assistance grants, ideally co-financed through established professional development and staff training budgets allocated within the Air Kiribati and Airports Kiribati budgets, supported by MOFED. • TA/CB Grant: >50% financed by donor partners, equal to >US$651,000 • State Budget: <50% financed by MOFED through Air Kiribati and Airports Kiribati, equal to <US$651,000

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, **World Bank/IFC**, CIDCA, PCREEE-SPC, FAO, WFP
	  ○ Project Implementation & Management: **ADB, World Bank/IFC**, GGGI, NDC-Hub, ADB, CIDCA, PCREEE-SPC
	• Potential Financial Partners / Sources:*
	  ○ Non-Government Grants for investment: GCF, GEF, World Bank/IFC, EIB, **CIDCA**, EEAS, KOICA, AU-DFAT, NZ-MFAT, USAID
	  ○ Grants for Technical Assistance & Capacity Building: GEF, AU-DFAT, NZ-MFAT, **CTCN**, **ADB**, GCF, World Bank/IFC, **CIDCA**, KOICA, USAID, UNDP, UNESCAP, **ICAO**, **PASO**
	  ○ Government Budget and SOEs: **GOK, Air Kiribati**
	  ○ Taxes Incentives: **GOK**
	*This is not a comprehensive list, other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	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. 2) Training requirements will extend beyond the operational needs of Air Kiribati and Airports Kiribati to include CAAK and MICTTD staff to provide expertise for policy and regulatory oversight.

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	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. Schlumberger, C.E. (2012), *Air Transport and Energy Efficiency*. World Bank Group. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/746271468184153529/air-transport-and-energy-efficiency Deloitte (2015), *Disrupt Aviation - Part 1: Unpredictable and Malicious Threats.* Deloitte. https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/consumer-business/avitran-disrupt-aviation-pov.pdf Ward, M., McDonald, N., Morrison, R., Gaynor, D., & Nugent, T. (2010), *A performance improvement case study in aircraft maintenance and its implications for hazard identification*. Ergonomics, 53:2, 247-267, DOI: 10.1080/00140130903194138. https://www.tandfonline.com/doi/pdf/10.1080/00140130903194138 Teter, J., Tattini, J., & Petropoulos, A. (2020), *Tracking Transport 2020*. International Energy Agency. (accessed August 2020). https://www.iea.org/reports/tracking-transport-2020/aviation#abstract IATA (2020), *Operational Efficiency & Cost Management*. International Air Transport Association. (accessed August 2020). https://www.iata.org/en/programs/ops-infra/efficiency/ PASO (2020). *Pacific Aviation Safety Office*. (accessed August 2020). http://paso.aero/

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$)	240,000	360,000	600,000	1,200,000
Estimated Capital Investment (US$)	0	0	0	0
Estimated GHG Mitigation (tCO2)	0	1,020	1,960	2,980
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				420

T4 – National Maritime Action Plan

No.	T4
Action Name	National Maritime Action Plan
Sub-Sector	Maritime Transport
Description	A coordinated national level action plan for decarbonising maritime transport, as envisaged in the discussions and for lodging in the IMO[19]. This involves several components addressing both international ships and domestic vessels:

Description	a) Identification of opportunities through Kiribati's international ship registry and KPA to incentivise decarbonisation of international shipping. Several registries already offer preferential fees for more energy efficient ships[20] and the Green Pacific Ports initiative could be expanded[21]. b) Identification of a coordinated programme of actions to transition domestic shipping to a zero-carbon future, in line with 40% reduction in GHG emissions by 2030 and 100% reduction by 2050 including a national fleet replacement strategy. The domestic actions need to be based on a national study of GHG emissions from shipping and full consideration of options, including establishment of a loan facility 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 facility could be through regional initiatives such as PBSP[22] which includes US$250m regional revolving loan and grant modalities, or established at national level. No allowance for quantum needed for loan modality for full transition of maritime transport sector is provided for.
Outcomes	• Co-ordinated plan for decarbonizing maritime transport drawing together actions that can be taken to reduce emissions by domestic vessels, visiting international ships and ships registered on open registry 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. • Improves overall data on Kiribati's domestic maritime GHG emissions. • Establishes a revolving loan facility to support individual and private sector actions
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; 21081 - Education and training in transport and storage;
Implementing and Supporting Entities / Stakeholders	Implementing Entity / Stakeholders: Marine Division (lead for national maritime policy, interface with IMO), MICTTD, KPA (port infrastructure and port fees for international and national vessels), Kiribati Ship Registry[23] (incentives for international ships to improve energy efficiency), DBK/ANZ (administration of revolving concessional loan facility) Supporting Entity / Stakeholders: Vessel Owners/Operators (including KNSL), MOFED, MISE, MFMRD, MDCC, 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)

Policy / Plan Link	• IMO Initial Strategy for GHG Emissions Reduction from Ships (issued 2018) (Resolution MEPC.304(72)
	  ○ 4.7.6: Encourage the development of national action plans…
	• Ministry Strategic Plan 2020-2023 (issued 2019)
	  ○ 9.2: Strengthen air, sea and land transport and infrastructures to meet social demands and compliment economic enhancing activities
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3 Improved connectivity and accessibility Goal: to improve air, land and sea transport infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ Section 12
	  ○ 15.3 Goal 2 Improve energy efficiency in electricity generation, buildings, water and sewerage and transport and cooking)
	• Kiribati Voluntary National Review and Kiribati Development Plan – Mid Term Review (issued 2018)
	  ○ KPA2 Outcome 1 Increased sustainable economic development and improved standards of living for all i-Kiribati;
	  ○ KPA6 Outcome 1 Improve access to quality climate change resilient infrastructure in urban and rural areas
	• A range of other island specific plans that link to maritime transport

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: 6 months needed for project development 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 facility Time needed for capacity building: 6 months for production of National Action Plan including consultation with Key Stakeholders. 6 months needed for domestic data collection and analysis When will the project investment start and end: Start 2021 end 2030 Immediate steps (first 12 months) under this opportunity include: A. Secure technical assistance and capacity building support for item B B. Project development (concept note/grant application)
Mitigation Potential	0 tCO_2/yr and a total of 0 tCO_2 for 2020 - 2030 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.
Co-benefits / SDG Linkages	○ Aligns with IMO international policy and regional initiatives such as PBSP (and therefore will provide leverage to Kiribati to access funds to implement NAP) ○ Aligns with Kiribati plans for increasing opportunity from sustainable tourism, and social and economic development as well as cultural seafaring heritage revival (e.g. sailing canoes) ○ Relevant SDGs include 1, 7, 8, 12, 13, 14, 17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation (sum to be determined) Estimated development costs US$ 2,500 Estimated Enabling, Capacity Building and Technical Assistance Needs US$ 312,500
Potential Business Model and Financing Strategy	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 staff to take responsibility for the ongoing 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[24], IMO, or bilateral partners[25]). In addition to KNSL there are only a handful of 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 a revolving zero/low-interest loan facility for private sector and Island Councils to access for decarbonisation of the domestic fleet.
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	- 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 MICTTD and Marine Division (staff are already fully committed) and with maritime emissions expertise (access to such expertise is available through USP MCST and MTCC); declining traditional knowledge on boat building and seafaring. - Financing/Insurance – NAP would look to include establishment of loan facility 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[26]. 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 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, focussing 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 Kiribati. Securing grants for purchase of new ships is notoriously difficult, with the major infrastructure banks active in the region (ADB, WB) only funding land-based infrastructure (e.g. ports and jetties) and not vessels. The past few years has seen a plethora of donor-driven projects in the electricity sector which are often un-coordinated, short-lived, and poorly monitored or reported (with project reports emphasizing perceived success and failing to mention what didn't work – often the most important thing governments need to know) as well as placing additional project management, input and oversight burden on already over-committed government officials.

Potential Financing and Need for Financial Support and/or Financial Instruments	• Grants for Technical Assistance & Capacity Building: 99.21% of total cost equal to US$ 312,500 • Grant for project design and development: 0.79% of total cost equal to US$2,500 • Revolving Concessional Loan Facility (sum to be determined)
Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):* o Project Planning, Development & Design: PBSP[27], **ADB, WB**, PRIF, SPC, USP o Project Implementation & Management: PBSP[22], **ADB, WB**, PRIF, SPC • Potential Financial Partners / Sources:* o Grants for Technical Assistance & Capacity Building: **ADB**, WB, PRIF, **EU/EC**, AU-DFAT, NZ-MFAT, SIDA, ADB, GCF, CIDCA, KOICA, JICA, IMO o Loan Facility: WB, **ADB,** IFC, EIBC o Government Budget & Tax Revenue: **State budget** *This is not a comprehensive list, other entities are possible as well.
Enabling, Capacity Building and Technical Assistance Needs	Enabling, Capacity Building and Technical Assistance: US$ 312,500 1) National vessel fuel use census/ survey (US$ 20,000) 2) Domestic fleet GHG emissions analysis (US$15,000) 3) Review of options for KPA and Kiribati Ship Registry to incentivise international shipping decarbonisation (US$ 5,000) 4) Review of options for loan modality for commercial roll-out (US$ 2,500) 5) Review of relevant policies and regulations (US$ 2,500) 6) Production and lodgement of NAP (US$ 10,000) 7) Amendment of policies and regulations ($7,500) 8) Provision of a staff positions within Marine Division (for 10 yrs) to lead development and implementation of NAP (US$ 150,000) 9) Scholarships focused on maritime transport decarbonisation (including maritime law, policy, naval architecture/surveying, seafaring) of relevance to NAP (US$ 100,000)
Information and MRV Needs	• Domestic fleet fuel use and emissions[28] • 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
Supporting References	• Vahs, M. et al (2019) Technical and Operational Options Catalog: Proposal for Technical and Operational Options to reduce Fuel Consumption and Emissions from "Inter-Atoll Transport" and "Inside-Lagoon Transport" Transitioning to Low Carbon Sea Transport in the Republic of the Marshall Islands. University of Applied Sciences Emden-Leer https://mcst-rmiusp.org/images/Projects/TLCSeaT_HEL_TechnicalAndOperationalOptionsCatalog.pdf • Oxley, M. (2018) Establishing Baseline Data to Support Sustainable Maritime Transport Services focused on the Republic of the Marshall Islands Final Report. Pacific Regional Infrastructure Facility https://www.theprif.org/documents/republic-marshall-islands-rmi/transport-maritime/prif-rmi-shipping-baseline-data-report • International Maritime Organisation (2020) Relevant National Action Plans and Strategies webpage (accessed August 2020) http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/RELEVANT-NATIONAL-ACTION-PLANS-AND-STRATEGIES.aspx

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, 9	7, 8, 9	8, 9	
Estimated CB & TA Costs (US$)	107,500	82,500	125,000	315,000
Estimated Capital Investment (US$)	0	0	0	0
Estimated GHG Mitigation (tCO2)	0	0	0	0
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				0

T5 – Low Carbon Mini-Container Ship

No.	T5
Action Name	Low carbon mini container ship
Sub-Sector	Maritime
Description	Maintaining connectivity between the 3 islands groups and with its neighbours is the lifeline of Kiribati. Providing essential sea connectivity is a core priority of GOK, with the vast majority of imports and exports being transported by sea[29]. In the past this need has been serviced by aged vessels in poor condition, the last of which sank at Suva wharf in 2017 and inter-regional shipping is now entirely dependent on international companies outside of the control of GOK. There is an urgent need for an 80 TEU capacity mini-container ship for this purpose to be operated by KNSL as a government service. Vessel design would incorporate limited domestic passenger capacity in a dedicated tween deck. Two development pathways are available: a new-build, high-efficiency, low-carbon vessel (preferred), or a conventional second-hand vessel retrofitted with a range of emissions abatement measures. There is an essential trade-off between Capex and Opex savings achieved, with a new build assumed to always achieve higher savings. Assuming a new build this could include advanced hull, propeller design; wind-hybrid main propulsion, solar/wind/biofuel auxiliaries, low energy hotel services and maximised operational efficiencies.
Outcomes	• More reliable interisland and regional freight transport • Reduced vulnerability to external "shocks" such as freight cost increases and reduced frequency of service
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principal (2) OECD-DAC/CRS Purpose Code(s): 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: KNSL (vessel owner and operator), and Marine Division (regulatory and project oversight) Supporting Entity / Stakeholders: Island Councils (community representation and service delivery insight), private sector e.g. Matson, Swire, KWA or similar (technical insight), KIT/MTC (seafarer training), PBSP (technical cooperation and support network), USP MCST (technical support and access to academic networks), and SPC (technical support through MTCC)

Policy / Plan Link	• Kiribati Development Plan 2016 - 2019 (issued 2016)
	  ○ Key Priority Area 6 (infrastructure to support transport decarbonisation)
	• Ministry Strategic Plan 2020-2023 (issued 2019)
	  ○ 9.2: Strengthen air, sea and land transport and infrastructures to meet social demands and compliment economic enhancing activities
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3 Improved connectivity and accessibility Goal: to improve air, land and sea transport infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ Section 12
	  ○ 15.3 Goal 2 Improve energy efficiency in electricity generation, buildings, water and sewerage and transport and cooking)
	• Kiribati Voluntary National Review and Kiribati Development Plan – Mid Term Review (issued 2018)
	  ○ KPA2 Outcome 1 Increased sustainable economic development and improved standards of living for all i-Kiribati;
	  ○ KPA6 Outcome 1 Improve access to quality climate change resilient infrastructure in urban and rural areas

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: 1 year needed for feasibility/business case, initial vessel design concept and costings; Time needed for securing finance – 1-3 years Time needed for capacity building: 2 years needed for vessel construction, trials, commissioning, business plan; 2 years needed for monitored operational trials When would the project investment start and end: Start 2022 end 2030 (note: mitigation would continue after 2030). Immediate steps (first 12 months) under this opportunity include: A. Secure technical assistance and capacity building support for items B to E B. Project development (concept note and design and business case) C. Feasibility studies and research D. Vessel design and tender E. Crew training
Mitigation Potential	• ~1,400[121] tCO_2/yr and a total of ~8,400 tCO_2 for 2020 – 2030 • Key Assumptions: • Assumes vessel operational in 2025 • 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 at least 50% efficiencies achievable[122] • Does not include savings if a successful pilot is replicated/scaled in Kiribati or elsewhere
Co-benefits / SDG Linkages	• Essential national connectivity, primary logistics mover for all aspects of cargo, trade and some passenger movements, enabler of all sustainable development initiatives throughout the island groups. • 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. • Enhanced disaster response capacity of heavy lift relief supply across Kiribati and neighbours. • Eco-flagship promoting Kiribati commitment to decarbonisation and ocean health. • Opportunity for cadet training increasing opportunity for Kiribati seafarers familiar with low carbon shipping operations access to international shipping employment. • Replicable and scalable. • Relevant SDGs include 1, 7, 8, 12, 13, 14, 17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation (vessel purchase/build and outfitting) US$ 5m Estimated development costs US$ 275,000 Estimated Enabling, Capacity Building and Technical Assistance Needs US$ 697,500

121 CO_2e 3.1 kgCO_2/kg diesel, Density diesel 0.85 kg/l

122 Blinkhorn (2016) Wind-assisted propulsion for sustainable shipping in the South Pacific. Thesis. University of Manchester https://mcst-rmiusp.org/index.php/resources/reference-library/send/30-renewable-energy-and-low-carbon-shipping/295-blinkhorne-p-2016-wind-assisted-propulsion-for-s-pacific 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 CO_2, 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 (Honolulu – Christmas – Penrhyn – Puka Puka – Fanning – Honolulu) and 2,316 litres on inter-island passages (Christmas-Washington-Christmas, Penrhyn-Puka Puka, Fanning-Washington-Christmas-Fanning) 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 DNV-GL (2019) Eco-Flettner rotor sail stands the test. Maritime Impact. (accessed August 2020) https://www.dnvgl.com/expert-story/maritime-impact/ECO-FLETTNER-rotor-sail-stands-the-test.html.

Potential Business Model and Financing Strategy	As with the other maritime transport actions which involve new vessels (rather than replacement of existing engines with already commercially available and proven technology) the options for financing and potential business models for Kiribati are extremely limited. This mitigation action requires a grant or PPP for the preparatory stages (feasibility studies, vessel design) and construction/purchase of a new vessel to be owned and operated by KNSL (alone or in partnership). Bilateral donors have in the past provided new vessels for Kiribati, and it is anticipated that this vessel would be funded in a similar fashion, with Japan, South Korea or China being the most likely partners for this mitigation action (all three being the world's leading ship builders). There are significant challenges with such donations and Kiribati and the rest of the Pacific are strewn with wrecked or un-operational boats from past donor projects. 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[17], enabling GOK 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. Operational costs (crew wages, vessel maintenance and fuel) would be from within national budget allocation for KNSL and revenue generated from freight charges (the latter being indirectly subsidised through GOK copra payments and import levies directed to underwrite costs of inter-island transport).
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	The action is relatively straightforward in terms of technology availability with a range of comparable vessel types and relevant technologies in design stages globally. Research into the specific routes envisaged are needed to model best fit options relative to wind, sunlight, technology capacity, etc. MCST's network of technical research centres is available to assist in this. It is assumed the vessel would be built in class, the design investment then being replicable in any other SIDs/LDC location. The greatest barrier is gaining economic consensus that a higher Capex model to develop the vessel is tradable for a much lower Opex. As a first mover, the increased cost of Capex should be source-able to global grant finance. Kiribati has no naval architecture or construction capacity so the build would have to be undertaken offshore. If undertaken as an incentivised design competition challenge there would be high interest from a number of maritime research academies. Kiribati has a human capacity of international mariners. New technologies would require a level of retraining and capacity development. However, KNSL are well experienced in operating vessels of this scale. This action will require institutional support to KNSL and Marine Division for business case, design, build and operational aspects. The vessel once operational provides training and capacity development opportunities for both KIT and MTC cadets.
Financial Sustainability	This action aims to improve Kiribati's national financial sustainability by providing a State-owned asset that can transport cargo (imports and exports) between the island groups and within the region (on international routes). Kiribati is currently dependent on external provision of such transport services making it particularly vulnerable to increased freight costs and lack of regular connectivity to markets. Purchase of a new vessel will reduce annual operating and maintenance costs which are covered by the national budget, with a more efficient vessel having lower fuel costs for example, i.e. higher Capex but lower Opex over the lifespan of the ship. Use of retrofitted wind-hybrid technology to reduce fuel use has proved successful in making the *SV Kwai* (owned and operated by Island Ventures Ltd) financially viable on international route from Hawaii to the Line Islands[32].

Potential Financing and Need for Financial Support and/or Financial Instruments	This action 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. Japan and Taiwan have traditionally donated commercial vessels to Kiribati and other Pacific states. The action could be a good fit between a trusted development partner such as Japan and their relevant industry research and development partners. Financial support needed includes: • Grant for project development, business case development and vessel design:4.6% of total cost equal to US$ 275,000 • Grants for Technical Assistance & Capacity Building: 11.68% of total cost equal to US$ 697,500 • Grant for vessel purchase: 83.72% of total cost equal to US$ 5,000,000 • National budget: operating costs minus crew costs (assumed to be covered by existing budget allocation to KNSL) • Taxation instruments maybe possible to support financial viability • Insurance to cover loss and damage

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: PBSP[33], **ADB, WB**, PRIF, UNESCAP
	  ○ Project Implementation & Management: PBSP[39], **ADB, WB**, PRIF, UNDP
	• Potential Financial Partners / Sources:*
	  ○ Grants for Technical Assistance & Capacity Building: **ADB**, WB, PRIF, GEF, GCF, AU-DFAT, NZ-MFAT, JICA, CIDCA, KOICA, UNDP
	  ○ Grants for investments: **ADB**, WB, **GCF**, EU, JICA, CIDCA, KOICA, Shipping companies (e.g. Hamburg Sud, Matson, Swire, Kwoya, KWA) as potential private sector partners
	  ○ Equity for vessel purchase: **GOK and SOEs**
	  ○ Guarantees for insurance/underwriting: **ADB, WB**
	  ○ Subsidies: GOK national budget allocation to indirectly subsidize cost of inter-island transport operational costs
	  ○ Taxation instruments: **GOK**
	  ○ Insurance: **ADB, WB**, IFC, EIB
	*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$ 697,500 1) Feasibility studies and baselines research (US$ 75,000) 2) Training for crew on sailing of vessel/use of fuel savings (US$ 42,500) 3) Salaries for additional crew (US$ 20,000/yr from 2024-2030 - total US$ 140,000) 4) Project monitoring, reporting & verification (US$ 440,000)
Information and MRV Needs	• Route planning and transport need assessment (weather data, trade movement, etc.) • Options for low carbon energy and energy efficiency (main engine and auxiliary power needs) • Project progress (deliverables, milestones) • Number of voyages by island (once vessel is operational), including voyage details (distance travelled, cargo/pax transported, voyage times and weather conditions, etc.)

Supporting References	• Cerulean Project – A Swire Shipping/USP Partnership webpage (accessed August 2020) https://www.mcst-rmiusp.org/index.php/projects/current-projects/cerulean-project; • Macalister RG (1985) Sail Retrofit on an inter-island vessel in Fiji. Journal of Wind Engineering and Industrial Aerodynamics Vol 19 Issues 1-3 July 1985 pages 157-186 https://www.sciencedirect.com/science/article/pii/0167610585900601 • Governments of Fiji and RMI (2020) Concept Note: Pacific Blue Shipping Partnership https://mcst-rmiusp.org/images/Projects/PBSP2019/PBSP_Concept_Note_Feb_2020.pdf • Blinkhorn (2016) Wind-assisted propulsion for sustainable shipping in the South Pacific. Thesis University of Manchester https://mcst-rmiusp.org/index.php/resources/reference-library/send/30-renewable-energy-and-low-carbon-shipping/295-blinkhorne-p-2016-wind-assisted-propulsion-for-s-pacific

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	
Estimated CB & TA Costs (US$)	0	590,000	380,000	970,000
Estimated Capital Investment (US$)	0	5,000,000	0	5,000,000
Estimated GHG Mitigation (tCO2)	0	1,395	6,975	8,370
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				1,395

T6 - Small Low Carbon Cargo/Passenger Freighter

No.	T6
Action Name	Small low carbon cargo/passenger freighter
Sub-Sector	Maritime
Description	In addition to the urgent need for a mini-container ship, KNSL has identified the need for smaller freighter of around 200 GRT, with some passenger capacity. This vessel, which would also be run by KNSL, would serve as a general service vessel primarily to smaller atoll nodes to maintain basic supply routes on outgoing and copra/primary produce inward. The vessel need mirrors the vessel type being developed under the Cerulean Project for international Pacific inter-island work. As a domestic variation, the overall vessel specifications would remain the same with additional allowance for some domestic passenger capacity. Shallow draft (<3m) would enable access to remote island anchorages. Assuming a new build this could include advanced hull, propeller design; wind-hybrid main propulsion, solar/wind/biofuel auxiliaries, low energy hotel services and maximised operational efficiencies as being considered for the Cerulean vessel. A low tech, low-cost approach to design is being taken.
Outcomes	• Reduced annual fuel bill for domestic shipping • Improved connectivity for outer island communities less reliant on outside service providers
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principal (2) OECD-DAC/CRS Purpose Code(s): 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: KNSL (vessel owner and operator), Marine Division (regulatory and project oversight) Supporting Entity / Stakeholders: Island Councils, Outer island communities, Private sector, KIT/MTC, PBSP (technical cooperation and support network), USP MCST (technical support and access to academic networks), SPC (technical support through MTCC)

Policy / Plan Link	• Kiribati Development Plan 2016 - 2019 (issued 2016)
	  ○ Key Priority Area 6 (infrastructure to support transport decarbonisation)
	• Ministry Strategic Plan 2020-2023 (issued 2019)
	  ○ 9.2: Strengthen air, sea and land transport and infrastructures to meet social demands and compliment economic enhancing activities
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3 Improved connectivity and accessibility Goal: to improve air, land and sea transport infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ Section 12
	  ○ 15.3 Goal 2 Improve energy efficiency in electricity generation, buildings, water and sewerage and transport and cooking)
	• Kiribati Voluntary National Review and Kiribati Development Plan – Mid Term Review (issued 2018)
	  ○ KPA2 Outcome 1 Increased sustainable economic development and improved standards of living for all i-Kiribati;
	  ○ KPA6 Outcome 1 Improve access to quality climate change resilient infrastructure in urban and rural areas

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: 1 year for feasibility/business case, vessel design confirmation/costings, tender Time needed for implementation: 3 years. 1 year for vessel construction, trials, commissioning, business plan; 2 years for monitored operational trials. Time needed for securing finance – 1-3 years Time needed for capacity building: 2 years needed for construction, trials, commissioning, business plan; 2 years needed for monitored operational trials When will the project investment start and end: Start 2022 end 2030 (note: mitigation would continue after 2030). Immediate steps (first 12 months) under this opportunity include: A. Secure technical assistance and capacity building support for items B to E B. Project development (concept note and design and business case) C. Feasibility studies and research D. Vessel design and tender E. Crew training
Mitigation Potential	~380 tCO_2/yr and a total of ~2,700 tCO_2 for 2020 – 2030 Key Assumptions: • Assumes vessel operational in 2024 • Assumes a conventional ship would burn ~1 tonne MDO p.d, operational 250 day/year[34]. There could be up to 50% variance on this figure • Assumes at least 50% efficiencies achievable[35] • Assumes that regular maintenance (including in water hull cleaning) is carried out[36] • Does not include savings if a successful pilot is replicated/scaled in Kiribati or elsewhere

Co-benefits / SDG Linkages	• Essential national connectivity for most remote/most vulnerable communities, primary logistics mover for all aspects of cargo, trade and some passenger movements at this scale, enabler of sustainable development initiatives and essential government service delivery throughout the island groups. • 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. • Enhanced disaster response capacity of heavy lift relief supply across Kiribati and neighbours. • Eco-flagship promoting Kiribati commitment to decarbonisation and ocean health • Opportunity for cadet training increasing opportunity for Kiribati seafarers familiar with low carbon shipping operations access to international shipping employment • Replicable and scalable • If a Pacific construction is possible, the action will contribute significantly to strengthening regional maritime construction capacity • Relevant SDGs include 1,7,8,12,13,14,17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation (vessel purchase/construction) US$2m Estimated development costs US$0.2m Estimated Enabling, Capacity Building and Technical Assistance Needs US$0.75m
Potential Business Model and Financing Strategy	This mitigation action requires a grant or PPP for the preparatory stages (feasibility studies, vessel design) and construction/purchase of a new vessel. Currently this scale of vessel is owned/operated by KNSL. KNSL would be the owner/operator of the new vessel, so providing demonstration to private sector operators of the potential for more affordable shipping by use of hybrid-propulsion and new vessels compared to fossil fuel powered older vessels. It is assumed that existing subsidies to reduce the costs of inter-island transport would continue. Bilateral donors have in the past provided new vessels for Kiribati, and this vessel could be funded in a similar fashion, with Japan, South Korea or China being the most likely partners for this mitigation action (all three being the world's leading ship builders). The PBSP[17] offers a better potential future financing source, enabling GOK to access a regional fund made from blended financing and mixture of grants and loans, designed specifically for this type of project. GOK participation in PBSP would enable access to financing but also to share results and lessons learned with neighbouring states in a coordinated and collaborative manner. Operational costs (crew wages, vessel maintenance and fuel) would be from within national budget allocation for KNSL (expected to be lower than the existing KNSL vessels due to reduced fuel use primarily) and revenue generated from passenger and freight charges (the latter being indirectly subsidised through GOK copra payments and import levies directed to underwrite costs of inter-island transport).
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	The action would replicate the technology being developed under related research in RMI where low tech but high efficiency, low carbon designs are being developed for at least two comparable classes of vessels. Research into the specific routes envisaged is needed to model best fit technology options relative to Kiribati specific wind and sunlight energy availability but the basic design functions will have been fulfilled under other research. A retrofitted vessel of this capacity, SV Kwai, already services some Kiribati routes so there is established knowledge of the vessel technology and its operation for some Kiribati routes. Full design analysis and costings will be available from the RMI research shortly, but it is assumed this is a low tech/low-cost design approach, preferably buildable in a Pacific yard Kiribati has a human capacity of skilled international mariners. Some new technologies would require a level of retraining and capacity development. However, KNSL are well experienced in operating vessels of this scale and current KNSL management has considerable past experience in sail-hybrid trials on vessels of this scale This action will require institutional support to KNSL and Marine Division for business case, design, build and operational aspects. The vessel once operational provides training and capacity development opportunities for both KIT and MTC cadets.

Financial Sustainability	Inter-island shipping in the Pacific, and Kiribati is no exception, has proved financially unsustainable for decades and provision of this essential service is heavily subsidised[37]. Given the lack of a market economy, the long distances and small populations/cargo volumes, it is unrealistic to expect that inter-island shipping can be financially sustainable without subsidy/support. The focus of this action is therefore on reducing annual operational costs by reducing fossil fuel use and in reducing GHG emissions. Annual diesel and oil spend by KNSL are US$0.5m for the two existing landing craft, and fuel savings through better boat design and use of renewables for propulsion and auxiliary power have potential to decrease operational cost by up to 60% when compared to the existing landing craft used for this purpose.
Potential Financing and Need for Financial Support and/or Financial Instruments	This action would need to be either a. fully externally publicly financed as a pilot and research demonstration through PBSP for example or b. as a PPP with an experienced operator. As the government has expressed their intention to own and operate, it is assumed this would be a grant funded project as part of a package funded under PBSP. Financial support needed includes: • Grant for project development 6.78% of total cost equal to US$ 200,000 • Grants for Technical Assistance & Capacity Building: 25.42% of total cost equal to US$ 750,000 • Grant for vessel purchase: 67.8% of total cost equal to US$ 2,000,000 • GOK Subsidy: Existing financial support from GOK (e.g. import levy and copra subsidy) that both provides outer island communities with higher income and decreased shipping costs would continue. • National budget: operating costs minus crew costs (assumed to be covered by existing budget allocation to KNSL). • Insurance to cover loss and damage

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: PBSP[38], **ADB, WB**, PRIF, UNESCAP
	  ○ Project Implementation & Management: PBSP[39], **ADB, WB**, PRIF, UNDP
	• Potential Financial Partners / Sources:*
	  ○ Grants for Technical Assistance & Capacity Building: **ADB**, WB, PRIF, GEF, GCF, AU-DFAT, NZ-MFAT, JICA, CIDCA, KOICA, UNDP
	  ○ Grants for investments: **ADB**, WB, **GCF**, EU, JICA, CIDCA, KOICA, Shipping companies (e.g. Hamburg Sud, Matson, Swire, Kwoya, KWA) as potential private sector partners
	  ○ Equity for vessel purchase: **GOK and SOEs**
	  ○ Guarantees for insurance/underwriting: **ADB, WB**
	  ○ Subsidies: GOK national budget allocation to indirectly subsidize cost of inter-island transport operational costs
	  ○ Taxation instruments: **GOK**
	  ○ Insurance: **ADB, WB**, IFC, EIB
	
	*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$ 750,000 1) Feasibility studies and background research (US$ 50,000) 2) Training for crew on sailing of vessel/use of fuel savings (US$ 45,000) 3) Salaries for additional crew (US$ 20,000/yr from 2023-2030 - total US$ 160,000) 4) Project monitoring, reporting & verification (US$ 495,000)

Information and MRV Needs	• Route planning and transport need assessment (weather data, trade movement, etc.) • Options for low carbon energy and energy efficiency (main engine and auxiliary power needs) • Project progress (deliverables, milestones) • Number of voyages by island (once vessel is operational), including voyage details (distance travelled, cargo/pax transported, voyage times and weather conditions, etc.)
Supporting References	• Cerulean Project (ibid) https://www.mcst-rmiusp.org/index.php/projects/current-projects/cerulean-project; • Macalister (ibid) https://www.sciencedirect.com/science/article/pii/0167610585900601 • https://mcst-rmiusp.org/images/Projects/PBSP2019/PBSP_Concept_Note_Feb_2020.pdf • Searcy T (2017) Bridging islands and calming seas: A material flow management approach to sustainable sea transportation for Fiji's lower southern Lau islands. Marine Policy 83 (2017) 221-229 • Searcy T (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 • Vahs et al (2019) ibid • Held (2018) ibid

Phased Approach for Development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1, 2, 4	2, 3, 4	2, 3, 4	
Estimated CB & TA Costs (US$)	325,000	237,500	387,500	950,000
Estimated Capital Investment (US$)	0	2,000,000	0	2,000,000
Estimated GHG Mitigation (tCO2)	0	775	1,938	2,713
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				388

T7 – Biofuel Blends in Land and Maritime Transport

No.	T7
Action Name	Biofuel Blends in Land and Maritime Transport
Sub-Sector	Land and Maritime Transport
Context	There are a range of alternative fuels that are already in use or are undergoing R&D globally, including biofuels, biofuel 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 is likely to be prohibitive in the PICs at this time. Technology piloting in the maritime sector is ongoing, but biofuels in land transport, especially biodiesel (<B10) and ethanol (<E10) blending, are already used and mandated extensively in Brazil, Europe, North America, Indonesia, and already blended and shipped from Singapore. This action focuses on importing the high-quality blended biofuels. Two actions can be taken: 1) a requirement that all imported biofuels include a blend such as B7 and E5 to start with which is medium amount as in the EU and compatible for EURO-3 vehicles are higher, this can raise up to 10% blending in 2030 when EURO-5 vehicles or higher are on the road. 2) allow for the availability of dual fuel types, e.g. bio-blends and regular fuels and later phase to only biofuels after 2030. Note that biodiesel blending will also affect the power generation sector, and this option influences emissions in that sectors as well, and all imported fuels will be blended. This option will require infrastructure investments. Action 1 only requires new terminal storage facilities. Action 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 vehicle (e.g. EURO-3). The price of blended fuels will likely be higher than standard fuels, and this will depend on the global oil prices. Tax policy can level out the price parity of the fuel types and potentially make biofuels cheaper to the consumer. There are also efforts in PIC to develop biodiesel industry via. Coconut production. These efforts have mainly focused on power generation, and not transport, and have face several bottle necks. Some of these are technical such as quality of fuel, but also economic where low diesel prices do not incentivise farmers to sell coconut oil / copra for biofuels when they get better prices from other markets. This regional & national production of biofuel is not considered in this action.

<table>
<tr><td>Key Implementation Milestones</td><td>
<table>
<tr><th>Policy / Technical Assistance</th><th>Investment Needs</th></tr>
<tr><td>• Completed Feasibility studies, EPC support, ESIAs, study on taxation policy options, and information dissemination efforts.
• Practical training for the new technology is completed.
• Scoping and sourcing blended fuels contracts are completed.</td><td>• Financing is secured for US$ 7,750,000 for development costs and implementation.</td></tr>
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</td></tr>
<tr><td>Outcomes</td><td>Primary Outcomes
- Reduced GHG emissions via blended biofuels
- Improved energy / fuels infrastructure
Secondary Outcomes
- Increased of trained persons for use of biofuels
- Increased capacity for financial and economic planning / policy in use of biofuels</td></tr>
<tr><td>Mitigation Potential</td><td>Up to 3,100 tCO_2/yr in 2030 and a total of up to 18,400tCO_2 for 2025 – 2030
Nominal BAU ER calculation is:[39]
Diesel fuel: 14,350,000 l per year (2019) * 2.66 kg CO_2 / l * 7% bio-blend / 1000 kg/t * 80%
= 2,137 tCO_2 per yr
Petrol fuel: 10,130,000 l per year (2019) * 2.29 kg CO_2 / l * 5% bio-blend / 1000 kg/t * 80%
= 927 tCO_2 per yr</td></tr>
<tr><td>Co-benefits / SDG Linkages</td><td>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 and/or reduced tax revenues.
Associated SDGs include: 7, 11, 13, and 17.</td></tr>
<tr><td>Investment Needs (USD)</td><td>Estimated capital investment needed for the physical implementation: Up to US$7m.
US$4m for Action 1 – which would require only 2 new terminal storage tanks in South Tarawa and likely 10 medium new standard storage tanks in the outer islands. Action 2 will have an estimate additional cost of US$3m new 30 new petrol tanks and pumps for both diesel and petrol, and two new tanker trucks.
Estimated development costs: US$750,000 – for funding of development, engineering design and ESIAs.
Estimated Enabling, Capacity Building and Technical Assistance Needs: US$450,000 – for fuel, market, taxation options, and feasibility studies. Including training for KOIL and petrol stations, and information dissemination programmes on the use of fuels blends.</td></tr>
<tr><td>Rio Marker and CRS Purpose Code(s)</td><td>Rio Marker: Principal (2)
OECD-DAC/CRS Purpose Code(s): 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</td></tr>
<tr><td>Implementing and Supporting Entities / Stakeholders</td><td>Potential National Implementing Entities / Stakeholders:
o KOIL: Responsible for handling and distribution of fuel in Kiribati.
o MICTTD: Serve as line ministry providing oversight for infrastructure upgrades.
o MISE: Serve as the line ministry for infrastructure/public works and sustainable energy systems, which may be incorporated into support storage and new vehicle options.
Potential Implementing Supporting Entities / Stakeholders:
SPC (PCREEE), MOFED, UNDP, UNIDO, USP (regional biofuel testing lab), KIT, National / International Consultants</td></tr>
</table>

Policy / Plan Link	• The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015).
	• Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for Development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Ministry Strategic Plan 2020-2023 (MICTTD & SOE)
	  ○ Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities.
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) - target for reduction of fossil fuel consumption by 2025 through Energy Efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa.
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Infrastructure needs and gaps need to be investigated and a feasibility study is needed for new terminal storage, and possible petrol station pumps and storage. All require an EIA and other permitting, and this is not expected to take more than 24 months. Time needed for securing finance: Given the need for up to US$ 7,000,000 in finance, it is expected to take up to 24 months to secure finance from blended finance. When will the project/investment start and end: It is expected that financial closure will happen in 2023, and implementation will have a 12 months (when investment will happen). Therefore, the start of operation of vehicles using biofuels will be in 2025 at the earliest. Immediate steps (next 12 months) under this opportunity include: 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 KOIL.
Potential Business Model and Financing Strategy	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 There are two financing models for development and implementation: Model 1 – Includes a 100% grant for project development costs and implementation. Under this model only the imported fuel price parity will affect the GOK revenues and/or consumer prices. Model 2 – Includes a concessional or other low interest loan taken out by Government or KOIL to provide debt, and a development loan guarantee for this amount will be needed. Equity will be gained from KOIL or GOK. This model will affect the GOK revenues and/or consumers prices.
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	- The availability of biofuel 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	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. If the infrastructure upgrades at the terminals and petrol stations are financed under a favourable model[40] 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.

Potential Financing and Need for Financial Support and/ or Financial Instruments	Grant for Estimated Enabling, Capacity Building and Technical Assistance Needs: US$450,000 There are two financing models for development and implementation: Model 1 – 100% grant for US$ 7,750,000 for development costs and implementation. Model 2 – A concessional or low interest loan taken out by Government or KOIL to provide debt of US$ 6,200,000 (80%), and a development loan guarantee for this amount will be needed. Equity will likely need to be gained from KOIL or GOK for US$ 1,550,000 (20%).
Potential Supporting and Financing Partners / Sources	Project / Financial Management Entity*: • Project Development: **ADB**, NDC Hub, **GGGI**, **UNDP**, SPC, **UNIDO** • Project Financial Management: **ADB**, UNDP, **UNIDO, WB/IFC**, EIB Potential Financing Partners / Sources*: • Credit Guarantee: **ADB, WB/IFC, GCF**, EIB • Equity: **GOK, KOIL** • Loan Facility: **ADB, GCF, WB/IFC**, EIB, • Non-Government Grants for Investment: **ADB**, **GCF**, GEF, AU-DFAT, NZ-MFAT, **IFC**, EIB, CIDCA, EEAS, KOICA *This is not a comprehensive list, other entities are possible as well.
Enabling, Capacity Building and Technical Assistance Needs	1. TA Support will be required both feasibility studies, EPC support, ESIAs, study on taxation policy options, and information dissemination efforts. 2. CB Practical training will be required for the new technology 3. TA for scoping and source blended fuels through contracts.
Information and MRV Needs	- Scoping and feasibility study will define the scale of installation need for implementation, and installation and operation is 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 MOFED.
Supporting References	– KOIL fuels imports data for 2014 to 2019 – "Learn the facts: Fuel consumption and CO2" https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/oee/pdf/transportation/fuel-efficient-technologies/autosmart_factsheet_6_e.pdf

Phased Approach for Development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1, 2	1, 2, 3		
Estimated CB & TA Costs (US$)	750,000	450,000	0	1,200,000
Estimated Capital Investment (US$)	0	7,000,000	0	49,500,000
Estimated GHG Mitigation (tCO2)	0	3,100	15,500	18,600
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				3,100

T8 – Multi-modal Transit Initiative

<table>
<tr><td>No.</td><td>T8</td></tr>
<tr><td>Action Name</td><td>Multi-modal Transit Initiative</td></tr>
<tr><td>Sub-Sector</td><td>Land Transport</td></tr>
<tr><td>Context</td><td>Transit in Kiribati is not organized under a formal, state-structured system or a robust, licensed commercial operator system found in other states. During the project inception workshop, congestion and increasing single-occupancy travel were cited as an issue by stakeholders, exacerbated by the limits of the road network to a single two-lane road throughout most of Tarawa. This mitigation option provides an improved and structured transit services to reduce distance (and associated emissions) of single occupant motorized transport between communities. This system will also increase mobility and equity for those in society without driver's licenses, improving options for youth, elderly, disabled persons, low-income travellers, and other vulnerable or disadvantaged demographics. National bus services with up to 132 buses in 2030 will be operated under a Public Private Partnership (PPP) model, and include the installation of bus stops and maintenance terminals.
The mitigation option assumes the implementation of T2 and T3, and that citizens will shift from remaining vehicles to public transport / buses. It is to be implemented in two phases, Phase 1 from 2021 to 2017 and Phase 2 from 2028 to 2030. The national bus services should be operational in 2023.</td></tr>
<tr><td>Key Implementation Milestones</td><td><table><tr><th>Policy / Technical Assistance</th><th>Investment Needs</th></tr><tr><td>Completing feasibility studies and financing support applications.
Driver and technician training programmes, setting up a PPP franchise scheme, setting up a PPP lending programme, and annual planning and regulation by government.</td><td>Financing buses, bus stops and maintenance terminals.</td></tr></table></td></tr>
<tr><td>Outcomes</td><td>Primary Outcomes
- Reduced GHG emissions through the use of Public Transit and non-motorised vehicles.
- A national public transport system providing land transport services to non-motorists and most vulnerable populations (including children, elderly, and disabled persons).
Secondary Outcomes
- Infrastructure established to support cycling at an intra-community level and public transport at an inter-community level.
- Establishment of regularly spaced bus stops, providing public service infrastructure (restrooms, lighting, shelter, etc.)</td></tr>
<tr><td>Mitigation Potential</td><td>Up to 6,977 tCO2/yr in 2030 and a total of 51,788 tCO_2 for 2020 – 2030.
Mitigation calculations are based on a modal shift model with a baseline of actively operated vehicles in 2019 and import of vehicles in 2019 increasing by 6.7% per year between 2020 to 2030. The mitigation calculations baseline assumes the results of scenarios for mitigation options of T2 (EVs) and T3 (standard and e-bicycles), plus assumes that the remaining petrol and diesel passenger vehicles are replaced by a modal shift to bus services (a fleet of up to 132 buses national wide active by 2030). The modal shift is based on the estimated demand for passenger-kms travel and is modelled using transport/vehicle type. The modal shift model does not take into account the baseline of standard bicycles outside of T3.</td></tr>
<tr><td>Co-benefits / SDG Linkages</td><td>The reduction of localized air pollutants and waste oil leakage from poorly maintained privately-owned vehicles may be reduced, helping protect environmental fidelity around the road networks.
Encouraging active transport in combination with public transit provides the joint benefits of encouraging improved health and fitness.
Public transit services improve equity (mobility, accessibility, affordability) for road users, particularly those disadvantaged financially or with limited physical mobility (inclusive of gender, disabled persons, youth, and the elderly).
Relevant SDGs include 1, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 17.</td></tr>
</table>

Investment Needs (USD)	Estimated capital investment needed for the physical implementation: up to US$ 89.4m for buses, bus stops and maintenance terminals.[41] Estimated development costs: US$ 750,000 for detailed feasibility studies and financing support applications.[42]. Estimated Enabling, Capacity Building and Technical Assistance Needs: US$ 3.1m for driver and technician training programmes, setting up a PPP franchise scheme, setting up a PPP lending programme, and annual planning and regulation by government.[43]
Rio Marker and CRS Purpose Code(s)	Note: 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; 23642 - Electric mobility infrastructures; 24030 - Formal sector financial intermediaries; 24081 - Education/training in banking and financial services; 43032 Urban development;
Implementing and Supporting Entities / Stakeholders	Potential National Implementing Entities / Stakeholders: MISE, MICTTD, MIA, MLPID Potential Implementing Supporting Entities / Stakeholders: KDB, KIT, PVU, UPS, SPC, Private Sector Companies, National/International Consultants, Island Councils
Policy / Plan Link	National Development Plan Mid-Term Review (issued 2014) Kiribati 20-Year Vision (issued 2016) o Pillar 3: Infrastructure for Development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20 The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015). Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4) o Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available. Ministry Strategic Plan 2020-2023 (MICTTD & SOE) o Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities. Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) - target for reduction of fossil fuel consumption by 2025 through Energy Efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa. Kiribati Integrated Energy Road Map – KIER (issued 2017) o The KIER addresses the inclusion of buses and minibuses as public transport options and the opportunity to electrify both, starting with an EV pilot project in South Tarawa.
General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Consultation and scoping for the design and structure of a public transit system, 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 24 months for review and approval. When will the project/investment start and end: The infrastructure scoping should begin in 2021, and the continuous acquisition of buses, training of drivers, installation of bus shelter/bicycle docking stations may be expected to start in 2023 to 2030. 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 utilization of buses and hub-and-spoke network. C. Updated bus/bicycle and bus/bicycle infrastructure (bus stop, terminal, bicycle racks, and depots) design standards for improved information display and commuter service delivery. D. Pilot items B and C in one or more feasibility study(s) for a planned network upgrade beginning in urban areas (the South Tarawa) with other areas to follow. E. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.

Potential Business Model and Financing Strategy	The national bus service will be operated under a PPP with bus routes franchise to private companies, and in effect regulated as municipal transport service, supported by Ministry of Internal Affairs/Ministry of Line and Phoenix Island Development, and MICTTD. The inclusion of buses and minibuses as public transport options will involve engagement of the private sector to promote transit and travel by bus instead of other GHG emitting transport forms (exclusion of EVs and bicycles which will operate in parallel). For an inclusive, national-level multi-modal public transport system to function, the government must introduce sufficient infrastructure to support PPPs with vehicle coverage to serve the nation. This will require a blended finance model, inclusive of infrastructure lending. Multilateral development banks should couple concessional loans and guarantees with financial grants, and multi-lateral and bilateral parties can provide technical assistance/capacity building grants to develop a qualified labour force to support decentralized bus operations. 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 PPP model will include the government setting passenger tariffs, enforcing payment, and remove licences of other transport operators (usually running mini-buses and vans). The government will then franchise the bus route in a competitive process. The private party of the PPP will have access to a lending facility for debt and grants to cover the equity portion of investments. the Private party will also have access to free driver and maintenance training (support by grants)
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	• The largest gap in place at the moment is the absence of a robust legislative/regulatory structure for the establishment and operation of a national public transport system. (The school bus system can be examined and lessons may be learned as to the operational and financial management of this service to expand to the entire population.) • The primary barrier to uptake of the multi-modal transport is fostering behaviour change and inducing a shift from private vehicle use. The private ICE vehicle import duty and registration rates may be increased to prohibitive levels to disincentivize the import and registration of new vehicles and stimulate rapid uptake of a newly established national transit system. The zero-rating of bicycles has shown continued interest in their utilization for short-distance travel, with continued growth of imports. If a flat annual fare is assessed for transit users, matched to be competitive against the cost of registering a vehicle, it can be included as an optional addendum to existing taxes to distribute the cost across the year and reduce the burden of upfront payment and eliminate the inconvenience of pay-as-you-ride fares. • One of the barriers to full decarbonisation under the transit model is the need for establishment of the electric vehicle infrastructure which is extraordinarily costly. The transit system can be established without requiring additional infrastructure and realize >87% emissions reductions in the land transport sub-sector if fully implemented.
Financial Sustainability	As mentioned above, the multi-modal transport system would not be sustainable if fully funded domestically. From established estimates in other markets, the operational costs over the lifespan of buses will make up the bulk of the overall cost, so sustainably operating (even discounting the capital costs) is not likely to be viable without continued subsidies and high ridership. This is where the primary barrier of fostering behaviour change away from private vehicle use will be instrumental in improving the margins on operations and reducing the required subsidies from government and donor agencies. Consequential reductions in fuel imports will improve viability on a national level, and help substantiate taking the approach of establishing a nationalized system managed through the island councils instead of turning over operations of a bus network to a private sector operator, which would not be able to operate profitably without substantial favourable subsidies.
Potential Financing and Need for Financial Support and/or Financial Instruments	Finance from both bilateral partners and multilateral development institutions will be necessary for the vehicle assets and supporting infrastructure required to establish a national transit network for the general public to reduce the need for private vehicle travel, as well as for capacity building and technical assistance. In the event the government wants to license private operators to provide transit services under a public-private partnership (PPP) model this may open financing from IFC and commercial lenders. Insurance will need to be provided by the GOK, potentially guaranteed by external financial institutions. Grants for Capital Investment (both supporting infrastructure and vehicles): 30% of total cost for buses equal to US$10.35m Phase 1 and US$ 11.97m Phase 2, 100% of total cost for bus-stops and maintenance terminals equal to US$15m Phase 1.[44]

Potential Financing and Need for Financial Support and/or Financial Instruments	Grants for Technical Assistance & Capacity Building: 100% Driver training programme equal to US$ 950,000 Phase 1 and US$ 180,000 Phase 2, 100% Bus maintenance training programme equal to US$ 525,000 Phase 1 and US$ 135,000 Phase 2, 100% Design, tendering and implementation of PPP equal to US$ 300,000 for Phase 1 and US$ 100,000 Phase 2, 100% Design and establish of PPP lending programme equal to US$ 60,000 Phase 1, 100% Design and establish of taxation instruments equal to US$ 50,000 Phase 1. State Budget: 100% of annual budget for government capacity building, planning and regulation of PPPs and information dissemination equal to US$ 100,000 annually, for US$ 500,000 in Phase 1 and US$ 300,000 in Phase 2. Credit guarantee and low-interest loan facility (same value for each): 70% of total cost for buses equal to US$24.15m Phase 1 and US$ 27.93m Phase 2. Performance and/or Loss and Damage insurance can be avoided depending on the conditions of the credit guarantee, but it is possible that state budget can be used to setup an insurance programme operated through DBK. Taxation incentive can be used to encourage efficiency vehicles. Note the depending on the tariff model and the lending mechanisms, Phase 2 grant and loan could be self-financing.

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: **GGGI**, NDC-Hub, **ADB**, **World Bank/IFC**, PRIF, CTCN, EEAS, **SPC**, UNIDO, **UNDP**, USP
	  ○ Project Implementation & Management: **ADB, World Bank/IFC**, SPC, UNIDO, UNDP
	• Potential Financial Partners / Sources:*
	  ○ Credit Guarantees: **GCF, ADB, World Bank/IFC**, EIB, **EXIMs**
	  ○ Debts & Loans: DBK, ANZ, **ADB, World Bank/IFC**, EIB, **GCF**
	  ○ Equity: PVU, Island Councils, **Commercial Companies**
	  ○ Non-Government Grants for investment: **GCF**, GEF, **World Bank/IFC, EIB, CIDCA**, EEAS, KOICA, AU-DFAT, NZ-MFAT, USAID
	  ○ Grants for Technical Assistance & Capacity Building: **GEF,** AU-DFAT, NZ-MFAT**, CTCN**, **ADB, GCF, World Bank/IFC**, **KOICA**, EEAS, IRENA, UNDP, GGGI, UNESCAP, **UNIDO**, PCREEE-SPC, GIZ
	  ○ Government Budget & Taxes Incentives: **GOK**
	  ○ Other Risk Instruments: **ADB, GCF, World Bank/IFC**, EIB
	*This is not a comprehensive list, other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	1. Technical assistance for comprehensive feasibility studies for bus services system and EPC tender and supervision of up to two maintenance / fuelling terminals. 2. Technical assistance for preparation of up to three financing support applications. 3. Capacity building for driver training curriculum development and training buses. 4. Capacity building for maintenance training curriculum development and training equipment 5. Technical assistance for design, tendering and implementation for public bus routes and PPP franchise programme 6. Technical assistance for design and establish revolving commercial PPP lending programme within existing financial institutions (such as DBK and ANZ). 7. Technical assistance for taxation changes. 8. Capacity building for PPP bus services regulation and oversight.

Information and MRV Needs	• Baseline assessment of all vehicles use and fuel consumption. • Number of buses. • Import value of buses. • Number of other vehicles imported. • Import value of other vehicles. • Number of drivers and mechanics trained (men and women). • Number of passengers per day and km each travelled (men and women) via sample surveys. • Average number of km per day travelled buses. • Volume of fuels consumption by buses. • Number and value of commercial loans issued. • Revenues from passengers' tariffs.
Supporting References	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. Litman, T. (2020), *Introduction to Multi-Modal Transportation Planning: Principles and Practices*. Victoria Transport Policy Institute. https://www.vtpi.org/multimodal_planning.pdf Wikimili (2020), *Delhi Integrated Multi-Modal Transit System*. (accessed August 2020). https://wikimili.com/en/Delhi_Integrated_Multi-Modal_Transit_System Global Designing Cities Initiative (2016), *Multimodal Streets Serve More People*. National Association of City Transportation Officials (NACTO). (accessed August 2020). https://globaldesigningcities.org/publication/global-street-design-guide/defining-streets/multimodal-streets-serve-people/ HUB (2020), *Bike to Transit*. (accessed August 2020). https://bikehub.ca/biketotransit Vasudevan, P., & Mulukutla, P. (2011), *Bus Karo 2.0: Case Studies from India*. World Resources Institute. https://wrirosscities.org/sites/default/files/BusKaro-Dec11.pdf Federal Highway Administration (2019), *Integrated Real-Time Multi-Modal Accessible Travel Information System (IRMATIS)*. US Department of Transportation. https://ops.fhwa.dot.gov/fastact/atcmtd/2017/applications/minnesotametro/project.htm Delhi Integrated Multi-Modal Transit System (DIMTS) Limited (2010), *Cycle Feeder & Rental Scheme (Integration of BRT with an emission free Non-Motorized Public Transport Feeder Network)*. Government of Delhi. https://www.dimts.in/download/Annexure-Detailed_Project_Document-Green_BIKE_Project.pdf King, D. (2014), *3 Big Challenges for Planning Multi-Modal Cities*. CityLab (accessed August 2020). https://www.citylab.com/design/2014/10/3-big-challenges-for-planning-multi-modal-cities/381254/ Savvides, A.L. (2012), *Multi-modal transit hubs: enhancing sustainability through joint highway development*. WIT Transactions on The Built Environment, Vol 128, WIT Press: ISSN 1743-3509. https://www.witpress.com/Secure/elibrary/papers/UT12/UT12060FU1.pdf Kumar, P., Jain, S.S., Kulkarni, S.Y., & Parida, M. (2020), *Multi Modal Transportation System*. New Building Materials & Construction World Magazine. (accessed August 2020). https://www.nbmcw.com/tech-articles/project-management-arbitration/18631-multi-modal-transportation-system.html Sheth, A., & Sarkar, D. (2019), *Life Cycle Cost Analysis for Electric vs. Diesel Bus Transit in an Indian Scenario*. International Journal of Technology 10(1):105. DOI: 10.14716/ijtech.v10i1.1958. https://www.researchgate.net/publication/330680375_Life_Cycle_Cost_Analysis_for_Electric_vs_Diesel_Bus_Transit_in_an_Indian_Scenario/figures Wang, E., & Samuels, J. (2018), *Fact Sheet: Battery Electric Buses: Benefits Outweigh Costs*. Environmental and Energy Study Institute. (accessed August 2020). https://www.eesi.org/papers/view/fact-sheet-electric-buses-benefits-outweigh-costs CarbonFootprint (2020), *Carbon Footprint Calculator*. (accessed August 2020). https://calculator.carbonfootprint.com/calculator.aspx?tab=5 Krizek, K., & Stonebraker, E. (2010), *Bicycling and Transit: A Marriage Unrealized*. Transportation Research Record: Journal of the Transportation Research Board, No. 2144, Transportation Research Board of the National Academies, Washington, D.C., 2010, pp. 161–167. DOI: 10.3141/2144-18 http://kevinjkrizek.org/wp-content/uploads/2012/04/Krizek_Stonebraker_2010.pdf

Supporting References	Federal Highway Administration (1997), *Integration of Bicycles and Transit*. US Department of Transportation. https://safety.fhwa.dot.gov/ped_bike/docs/bike_bus.pdf SMARTNET (2017), *Bus Shelter Layout Options with Cost Estimates*. Solutions Exchange for Urban Transformation of India. (accessed August 2020). https://smartnet.niua.org/sites/default/files/annexure.pdf MICTTD (2016), *Fees and Charges for Vehicle*. Government of Kiribati. (accessed August 2020). https://www.mictd.gov.ki/article/highway-authority/fees-and-charges-vehicle

Phase 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	3, 4, 8	3, 4, 8	
Estimated CB & TA Costs (US$)	2,210,000	615,000	1,025,000	3,850,000
Estimated Capital Investment (US$)	0	49,500,000	39,900,000	89,400,000
Estimated GHG Mitigation (tCO2)	0	17,526	34,262	51,788
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				6,977

T9 – Zero-impact Cruise Liner, Phoenix Islands

No.	T10
Action Name	Zero-impact Cruise Liner, Phoenix Islands
Sub-Sector	Maritime
Description	The Phoenix Islands Protected Area, is the largest designated Marine Protected Area in the world. There are only 20 residents. One of Earth's last remaining marine wilderness areas, it helps protect Kiribati's unique biodiversity and large tuna population and represents one of the world's few remaining places in pristine condition. A pilot 'zero-impact' small scale cruise liner (40-50 pax) operating from Tarawa would provide a unique marketing edge for developing a niche zero impact tourism industry in a country with limited options for sustainable employment or foreign exchange earnings. Developing zero impact tourism to the PIPA as a sustainable development measure is sought by the government. Potential is thought to be similar to Galapagos. The vessel can multi-task as a monitoring station for the PIPA. The vessel, most likely a catamaran, will need to be a true blue-water vessel capable of being self-sufficient over 2,500 NM routes and would need to have zero impact on the maritime/terrestrial environment and a zero-carbon operating footprint resulting in a high Capex/low Opex profile. Initial 'proof of concept' design would include wind/electric hybrid propulsion, RE (biofuel/solar/wind) auxiliary and hotel, advanced hull design and battery support.
Outcomes	• Maximised opportunity for tourism development as source of foreign exchange earnings • Diversified employment opportunity for Kiribati seafarers and hospitality workers
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principal (2) OECD-DAC/CRS Purpose Code(s): 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: KNSL (vessel owner and operator), private partner (cruise/tourism operations), Marine Division (regulatory and project oversight), KTO and PIO (Phoenix tourism development potential linkages), KIT/MTC (seafarer training) Supporting Entity / Stakeholders: Island Councils, PBSP (potential source of technical cooperation and support network), UNWTO[45], SPTO and ATTA[46] (sustainable tourism development research and analysis, support and data, capacity building), USP (technical support, tourism training and access to academic/research networks), SPC (technical support)

Policy / Plan Link	• Kiribati Development Plan 2016 - 2019 (issued 2016)
	  ○ Key Priority Area 6 (infrastructure to support transport decarbonisation)
	• Ministry Strategic Plan 2020-2023 (issued 2019)
	  ○ 8.1 High Value- Low Impact Tourism
	  ○ 9.1 Develop and strengthen sustainable tourism development to boost economic development
	  ○ 9.2: Strengthen air, sea and land transport and infrastructures to meet social demands and compliment economic enhancing activities
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3 Improved connectivity and accessibility Goal: to improve air, land and sea transport infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ Section 12
	  ○ 15.3 Goal 2 Improve energy efficiency in electricity generation, buildings, water and sewerage and transport and cooking)
	• Line and Phoenix Islands Integrated Development Strategy 2016 – 2036 (issued 2016)[47]
	• Kiribati Voluntary National Review and Kiribati Development Plan – Mid Term Review (issued 2018)
	  ○ KPA2 Outcome 1 Increased sustainable economic development and improved standards of living for all i-Kiribati;
	  ○ KPA6 Outcome 1 Improve access to quality climate change resilient infrastructure in urban and rural areas

General timeline for Development, Financing, Implementation, and Operation	Time needed for needed for development: 1 year for feasibility/business case, vessel design confirmation/costings, tender Time needed for implementation: 5 years. 2 years for vessel construction/purchase, trials, commissioning, business plan; 3 years for monitored operational trials/market establishment. Time needed for securing finance – 1-3 years Time needed for capacity building: 2 years needed for business plan, vessel construction/purchase, trials, commissioning; 3 years needed for monitored operational trials When would the project investment start and end: Start 2024 end 2030 (note: mitigation would continue after 2030). Immediate steps (first 12 months) under this opportunity include: A. Secure technical assistance and capacity building support for items B to E B. Project development (concept note and design and business case) C. Feasibility studies, research and marketing D. Vessel design E. Crew training

Mitigation Potential	~780 tCO_2/yr and a total of ~3,100 tCO_2 for 2020 - 2030 Key Assumptions: • Assumes vessel operational in 2027. • Assumes a conventional ship would burn ~2tonne MDO/day, operational 250 days/year. There could be up to 50% variance on this figure. • Assumes that purpose built vessel can achieve at least 50% energy efficiency savings compared to the current type of vessel used elsewhere. • Does not include savings if a successful pilot is replicated/scaled in Kiribati or elsewhere.
Co-benefits / SDG Linkages	• Sustainable economic development opportunity, including sustainable employment, foreign exchange earnings, etc. • Vessel can multi-task as a monitoring/research station for the PIPA • Eco-flagship promoting Kiribati commitment to decarbonisation and ocean health • Opportunity for cadet training increasing opportunity for Kiribati seafarers familiar with low carbon shipping operations access to international shipping employment • Replicable and scalable • Relevant SDGs include 1,7,8,12,13,14,17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation (vessel purchase/construction and outfitting): US$ 7m Estimated development costs: US$ 0.5m Estimated Enabling, Capacity Building and Technical Assistance Needs: US$ 0.945m
Potential Business Model and Financing Strategy	This mitigation action requires a grant for the preparatory stages (feasibility studies, vessel design) and construction/purchase/outfitting of a new vessel. If undertaken as an incentivised design competition challenge there, would be high interest from a number of maritime research academies, so providing GOK increased potential for additional voluntary and in-kind contributions. It is anticipated that the vessel would be operated by KNSL in a PPP and income from international tourists used to cover costs of crew salaries and vessel operations and maintenance, as well as contribute a source of income for i-Kiribati seafarers and relevant island communities.
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	This is a niche action, to develop a commercially operated demonstration vessel and presents unique challenges. It would require a significant capacity development element in both maritime and cruise liner hospitably marketing, management, training, and need to be carefully supported by the right combination of external partners in project design for both the vessel itself and the zero-impact cruise operation. There is currently almost zero tourism activity in Kiribati due to the limited number of direct flights and distance. However, tourism offers one of few available sustainability pathways for diversifying from fisheries licences. This initiative would be in line with the government's current $250m investment in direct air services to NZ, Fiji and Australia. While barriers of remoteness, size and total isolation are not insignificant, they are also marketing strengths for a narrow but growing eco-traveller market. Despite this advantage, the action would face the barriers of any first mover start up operating on one of the most remote routes in the world, where sources of finance for new vessels and insurance are few and far between. Kiribati has no naval architecture or construction capacity so the build would have to be undertaken offshore. This action will require institutional support for both the maritime and tourism aspects, including feasibility studies, data collection and analysis, etc. Kiribati has a surplus of internationally experienced seafarers but most without cruise experience and it is expected specific up-skilling and training would be required.
Financial Sustainability	This is a high-risk action, given its dependence on international visitors[48], and would require ongoing support. As with projects above, sources of such grant funding are extremely limited, and the PBSP has highest potential. This pilot is focused on taking advantage of an opportunity (to diversify income through tourism development) in the medium term (3-5 year). Income generated from tourism could be used to contribute to costs of operations (crew salaries, vessel maintenance, etc) but would take time to establish. Financial sustainability would also be highly dependent on GOK ability to attract international tourists to Kiribati, and ability to attract a suitable private niche cruise operator to run cruise liner tourism business.

Potential Financing and Need for Financial Support and/or Financial Instruments	This action would need to be either a. fully externally publicly financed through a grant as a pilot and research demonstration under a package of vessels through PBSP or b. as a PPP with an experienced operator. The potential for other sources of funding are extremely limited, especially given the high-risk nature of this pilot. GOK would need to ensure that ongoing national budget allocation covered tourism marketing and human resource capacity building needed post 2030. Financial support needed includes: • Grant for project development, business case and vessel design: 5.92% of total cost equal to US$ 500,000 • Grants for Technical Assistance & Capacity Building: 11.19% of total cost equal to US$ 945,000 • Grant for KNSL/GOK vessel purchase: 82.89% of total cost equal to US$ 7,000,000 • National budget: operating costs minus crew costs (assumed to be covered by income generated from cruises) • Insurance to cover loss and damage

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: PBSP[49], **ADB, WB**, PRIF, UNESCAP
	  ○ Project Implementation & Management: PBSP[39], **ADB, WB**, PRIF, UNDP
	• Potential Financial Partners / Sources:*
	  ○ Grants for Technical Assistance & Capacity Building: **ADB**, WB, PRIF, GEF, GCF, AU-DFAT, NZ-MFAT, JICA, CIDCA, KOICA, UNDP
	  ○ Grants for investments: **ADB**, WB, **GCF**, EU, JICA, CIDCA, KOICA, Shipping companies (e.g. Hamburg Sud, Matson, Swire, Kwoya, KWA) as potential private sector partners
	  ○ Equity for vessel purchase: **GOK and SOEs**
	  ○ Guarantees for insurance/underwriting: **ADB, WB**
	  ○ Subsidies: GOK national budget allocation to indirectly subsidize cost of inter-island transport operational costs
	  ○ Taxation instruments: **GOK**
	  ○ Insurance: **ADB, WB**, IFC, EIB
	*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$ 945,000 1) Feasibility studies, route and tour identification, background research (US$ 150,000) 2) Training for crew on sailing of vessel/hospitality (US$ 125,000) 3) Salaries for additional crew both onboard and shore-based (for bookings, marketing etc) (US$ 50,000/yr from 2026-2030 - total US$ 250,000) 4) Project monitoring, reporting & verification (US$ 60,000/yr from 2024-2030, total US$ 420,000)
Information and MRV Needs	• International visitor arrivals and tourist activity preferences • Tourism earnings • Number of visitors to Phoenix Islands • Existing vessel movement data between Tarawa and Phoenix Islands • Experiences from other locations (e.g. Galapagos) on potential revenues and impacts

Supporting References	• Galapagos Ecoventura Cruises (accessed August 2020) https://www.ecoventura.com/ • Galapagos Conservancy. Sustainable Tourism in Galapagos (accessed August 2020) https://www.galapagos.org/travel/travel/sustainable-tourism/ • Basantes, J. (2009) Planning for Sustainable Ecotourism in the Galapagos Islands: Exploring Galapagos Tourists' profiles and their integration into community-based Tourism. Thesis University of Florida. https://ufdc.ufl.edu/UFE0024536/00001 https://www.natgeoexpeditions.com.au/expeditions/ocean-cruise-expeditions/from-fiji-to-micronesia https://www.cruiseshipportal.com/categories/target-groups/ecotourism-expeditions/ • National Geographic Expeditions. French Polynesia: Beyond the Postcard (accessed August 2020) https://www.nationalgeographic.com/expeditions/destinations/australia-pacific/ocean/polynesian-culture-tour/ • World Tourism Organisation. Small Islands Developing States (SIDS) (accessed August 2020) https://www.unwto.org/sustainable-development/small-islands-developing-states • Adventure Travel Trade Association. Our Initiatives (accessed August 2020) https://www.adventuretravel.biz/our-initiatives/

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	
Estimated CB & TA Costs (US$)	0	875,000	575,000	1,450,000
Estimated Capital Investment (US$)	0	0	7,000,000	7,000,000
Estimated GHG Mitigation (tCO2)	0	0	3,100	3,100
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				775

T10 – Aircraft Re-Fleeting Programme

No.	T10
Action Name	Aircraft Re-Fleeting Programme
Sub-Sector	Air Transport
Context	The process of renewing the Air Kiribati fleet 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) • The three primary options under development for commercial deployment include 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 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.
Key Implementation Milestones	**Policy / Technical Assistance**:
	Investment Needs: • Meeting the aircraft re-fleeting requirements for replacement of the six aircraft currently registered with Air Kiribati.

Outcomes	Primary Outcomes • Efficiency gains and cost savings from emission reductions in domestic aviation activities. Secondary Outcomes • Integration of next-generation aircraft technology into the Air Kiribati fleet.
Mitigation Potential	378 – 2,520tCO_2/yr and a total of 4,993 – 33,289tCO_2 for 2020 - 2030 Assumed emissions reduction potential of 63,000tCO2e per annum under the (Intended) NDC may be evaluated in the context of the SREP Investment Plan, which attributed only 4% of total national emissions to domestic aviation (2,520tCO2e). The totals above also assume 3.6% average Compound Annual Growth Rate (CAGR) estimated for the aviation market globally by IATA, resulting in total 2020-2030 emissions of 34,488tCO_2 over the 2020-2030 period for the domestic aviation sector. Disaggregated fuel data for domestic/international aviation is still needed to update the estimates to appropriately evaluate the emission reduction potential of mitigation activities.
Co-benefits / SDG Linkages	Co-benefits include: • 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.) • Avoided costs in aviation sector (both reduced recurring costs for government and SoEs). • Improved equity of service delivery to all citizens/areas of Kiribati. This sub-sectoral activity supports SDGs 1, 7, 8, 9, 10, 11, 12, 13, and 17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation: US$201 million Estimated development costs: US$3.33 million Estimated Enabling, Capacity Building and Technical Assistance Needs: US$1.2 million (see T14: Operational Training Programme)
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; 21050 - Air Transport; 21081 - Education and training in transport and storage;
Implementing and Supporting Entities / Stakeholders	Potential National Implementing Entities / Stakeholders: MISE, MICTTD Potential Implementing Supporting Entities / Stakeholders: KOIL, Air Kiribati, Airports Kiribati, National/International Consultants, PASO

Policy / Plan Link	• The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015).
	• Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Ministry Strategic Plan 2020-2023 (MICTTD & SOE)
	  ○ Strategic Objective 1: Develop and strengthen sustainable Tourism development to boost economic development
	  ○ Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities.
	  ○ Strategic Objective 4: To strengthen supporting services; human resource needs, printery, postal, accounts and registry, to support the efficient and effective functions of the Ministry and SOEs.
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) - target for reduction of fossil fuel consumption by 2025 through Energy Efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa.
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Market assessment, due diligence, budgeting, tender, and selection process may take up to 18 months Time needed for securing finance: Depending on the funding pipeline, bilateral support will likely come within budget programming, but multilateral financing channels face additional delays. 12-36 months. When will the project/investment start and end: The re-fleeting process would be phased, occurring throughout the 2020-2030 period as the existing aircraft in the domestic Air Kiribati fleet reach their end of service. 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 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.
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. With only the State-owned air carrier operating in Kiribati, the involvement of the private sector is currently minimal, though additional charter flight businesses have existed in the past. 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 Air Kiribati accrued during operation of next-gen aircraft.
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	• 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 Kiribati will be able to take advantage of the next generation of decarbonised aviation. • Human capacity development for both ground and flight crews would need to be developed to ensure proper operation of the aircraft. • 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 recorded jet fuel consumption for 2019 was reported by KOIL at 2.5m litres, with a wholesale price well under US$1.00 per litre, eliminating the entirety of Kiribati's international and domestic aviation fuel use would not be sufficient to meet the payback period for even two of the six planes if replaced on the proposed re-fleeting schedule. 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	With an expectation of outer island airports being upgraded to accommodate aircraft at the scale of the DeHavilland Dash-8, the list price of the current production model (Dash-8 400) exceeds US$33.5 million, so 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 of six aircraft will exceed US$201 million for full re-fleeting. Supporting infrastructure will accrue additional costs beyond the capital expenditure made on the aircraft alone. It is expected aircraft re-fleeting will be financed through concessional lending, or through a structured operational/financial leasing arrangement, as per Air Kiribati and MOFED preferences. • Grants for Technical Assistance & Capacity Building: 100% of total cost equal to US$1.2 • Grants for capital expenditures: 90% of total cost equal to US$180.9 • State Budget: 10% of total cost equal to US$20.1m • Insurance: For loss and damage

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, World Bank/IFC, CIDCA, WFP
	  ○ Project Implementation & Management: ADB, World Bank/IFC, GGGI, NDC-Hub, ADB, CIDCA
	• Potential Financial Partners / Sources:*
	  ○ Credit or Export Guarantees: GCF, ADB, **World Bank/IFC**, EIB, **EXIMs**
	  ○ Concessional Loans: GCF, ADB, **World Bank/IFC**, EIB
	  ○ Equity: **Air Kiribati**
	  ○ Non-Government Grants for investment: GCF, GEF, **World Bank/IFC**, EIB, **CIDCA**, EEAS, KOICA, AU-DFAT, NZ-MFAT, USAID
	  ○ Grants for Technical Assistance & Capacity Building: GEF, AU-DFAT, NZ-MFAT, **CTCN, ADB**, GCF, **World Bank/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNES-CAP, UNIDO, PCREEE-SPC, UNCTAD, **PASO, ICAO, CIDCA**
	  ○ Government Budget & Taxes Incentives: **GOK**
	  ○ Risk Instruments: ADB, **World Bank/IFC**, EIB
	  ○ Insurance: **Commercial**
	*This is not a comprehensive list, other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	1. Operational Training on new aircraft technology, flight, and fuel systems: >US$1.2 million (see T14: Operational Training Programme – established training protocols expected to cost at least U$1.2 million, so supplemental training inclusive of novel systems will incur additional costs) 2. Training requirements will extend beyond the operational needs of Air Kiribati and Airports Kiribati to include CAAK and MICTTD staff to provide expertise for policy and regulatory oversight.
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. • 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 MSP objectives concerning the aviation sector.
Supporting References	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. ICAO (2010), *Aircraft Technology Improvements*. International Civil Aviation Organization.https://www.icao.int/environmental-protection/Documents/EnvironmentReport-2010/ICAO_EnvReport10-Ch2_en.pdf Kharina, A. & Rutherford, D. (2015), *Fuel Efficiency Treds for New Commercial Jet Aircraft: 1960 to 2014*. The International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/ICCT_Aircraft-FE-Trends_20150902.pdf Kharina, A. (2017), *Maximizing aircraft fuel efficiency: Designing from scratch*. The International Council on Clean Transportation. https://theicct.org/blogs/staff/designing-from-scratch-maximizing-aircraft-fuel-efficiency Thomson, R., Nazukin, M., Sachdeva, N., & Martinez, N. (2017), *Aircraft Electrical Propulsion – The Next Chapter of Aviation?* Roland Berger: Think:Act – Navigating Complexity. https://www.rolandberger.com/publications/publication_pdf/roland_berger_aircraft_electrical_propulsion.pdf Jansen, R., Bowman, C., Jankovsky, A., Dyson, R., & Felder, J. (2018), *Overview of NASA Electrified Aircraft Propulsion Research for Large Subsonic Transports*. National Aeronautics and Space Administration. https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20180000361.pdf

Supporting References	IATA (2017), *2036 Forecast Reveals Air Passengers Will Nearly Double to 7.8 Billion*. International Air Transport Association. https://www.iata.org/en/pressroom/pr/2017-10-24-01/ FlyRadius (2011), *Bombadier Q400 Price*. FlyRadius (accessed August 2020). https://www.flyradius.com/bombardier-q400/price PriJet (2019), *Bombardier Dash 8-Q400 Operating Costs*. PriJet. (accessed August 2020). https://prijet.com/operating_costs/Bombardier%20Dash%208-Q400

Phased Approach for Development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	2	1, 2	1, 2	
Estimated CB & TA Costs (US$)	3,330,000	450,000	750,000	4,530,000
Estimated Capital Investment (US$)	0	33,500,000	167,500,000	201,000,000
Estimated GHG Mitigation (tCO2)	0	725	4,830	5,555
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				1,449

T11 – Electric Vehicle Network Development

No.	T11
Action Name	Electric Vehicle Network Development
Sub-Sector	Land Transport
Context	Development of an EV network in Kiribati 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. Introducing EV technology[141] creates both a shift in energy storage and distribution requirements, as well as the current market access and profile of vehicles. Unlike the existing paradigm, in which individuals and households primarily purchase second-hand vehicles, the lack of maturity in the EV market means a robust second-hand vehicle market is not readily available to replace the second-hand ICE imports. • The infrastructure requirements include electric vehicle service equipment (EVSE), as well as designated carport space.[142] • The rationale for the transition to electric vehicles for motorized land transport relies upon recognizing the opportunity for decarbonisation of the sub-sector alongside increased installation of renewable energy infrastructure. Vehicle-based energy storage provides the opportunity for variable tariff rates contingent upon supply/demand electricity load curves. • It is estimated that there are 3,300 actively operated cars / SUVs / pickup trucks in Kiribati in 2020. In addition, there is an estimated average fuels increase in land transport of 6.7% annually between 2014 and 2019. Given this growth rate it is expected that up to 11,200 cars / SUVs / pickup trucks will be imported between 2022 and 2030, and there will be up to 7,000 actively operated cars / SUVs / pickup trucks on the roads in Kiribati in 2030. This mitigation option proposes that up to 2,800 new EVs will be on the road in 2030 which is equal to 38% of the total for such vehicles.[143] This mitigation options includes the EVs and one Level 2 charger per vehicle. • This mitigation option does not include additional (RE) power generation or power distribution system upgrades.

141 Electric vehicles are currently found predominantly in Brushless Direct Current (BLDC) configurations for 2- and 3-wheel vehicles, and Permanent Magnet Synchronous Motor (PMSM) configurations are most common for private and commercial automobile applications (cars and buses).

142 EVSE set-up requires a universal Society of Automobile Engineers (SAE) International J1772 connector for domestic (Level 1) or dedicated (Level 2) charging. Variations have been developed for direct current (DC) fast charging, but applications for vehicles on the consumer market are not as readily available currently.

143 Example 60% of Norway's new car market are EVs in 2020. Average EVs have an operational life of 10-years. spahttps://www.theguardian.com/environment/2020/apr/19/norway-and-the-a-ha-moment-that-made-electric-cars-the-answer

<table>
<tr><td>Key Implementation Milestones</td><td>
<table>
<tr><th>Policy / Technical Assistance</th><th>Investment Needs</th></tr>
<tr><td>• Deploying electric vehicle service equipment (EVSE)
• Establishing designated carport space.</td><td>• 2,800 new EVs will be on the road in 2030
• One Level 2 charger per vehicle</td></tr>
</table>
</td></tr>
<tr><td>Outcomes</td><td>Primary Outcomes
• Reduced GHG emissions through the use of EVs.
• Removal of localized emissions and air pollutants from land transport-based ICEs
Establishment of a distributed charging network
Secondary Outcomes
• Improved integration of transport and electricity generation/storage sub-sectors.</td></tr>
<tr><td>Mitigation Potential</td><td>6,500 tCO_2/yr in 2030 and a total of 29,800 tCO_2 for 2020 – 2030.
This mitigation option assumes that up to 25% of cars / SUVs / pickup trucks imports will be new EVs during the 2022 to 2030 period, this means that up to 2,800 new EVs will be on the road in 2030 which is equal to 38% of the total for such vehicles.[144] This assumes adding up to 238 to 398 EVs each years between 2022 and 2030 and that the baseline of cars / SUVs / pickup trucks have per unit emissions of 2.3 tCO_2/year yielding potential emissions reduction total up to 29,800 tCO2 in the 2020-2030.[145]</td></tr>
<tr><td>Co-benefits / SDG Linkages</td><td>The electrification of the 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 freshwater lens.
○ Associated SDGs include: 3, 6, 7, 8, 9, 11, 12, 13, 14, 15, and 17.
○ Curbing the proliferation of fossil fuels will reduce the potential threat of spills, and will aid in safeguarding the terrestrial and marine environment.
Reducing dependence on imported fossil fuels will encourage retention of wealth in-country associated with economic activity which requires land transport logistics. Additional employment will be required for the maintenance and upkeep of EVSE and vehicles.</td></tr>
<tr><td>Investment Needs (USD)</td><td>Estimated capital investment needed for the physical implementation: US$ 18,250,000 for Level 2 chargers accommodating all expected growth of the vehicle fleet over the 2022-2030 period.[146] The total investment cost of imported EVs is US$84,210,000 can be assumed.[147]
Estimated development costs: US$ 120,000 – for full feasibility study, concept development and preparation of applications for support.[148]
Estimated Enabling, Capacity Building and Technical Assistance Needs: US$3,090,000 – for market scoping and feasibility study(s), and annual planning and administrative facilitation of charging network development incl. training (2023-2030), direct training for technicians in installation and maintenance EVs & chargers in the private sector across the country, and developing a financial instrument to support public and private sector procurement.[149]</td></tr>
<tr><td>Rio Marker and CRS Purpose Code(s)</td><td>Rio Marker: Principle (2)
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; 23642 - Electric mobility infrastructures; 24030 - Formal sector financial intermediaries; 24081 - Education/training in banking and financial services</td></tr>
<tr><td>Implementing and Supporting Entities / Stakeholders</td><td>Potential National Implementing Entities / Stakeholders:
MISE, MICTTD, PUB, PVU
Potential Implementing Supporting Entities / Stakeholders:
KIT, KSEL, PPA, Private Sector Companies</td></tr>
</table>

144 Example 60% of Norway's new car market are EVs in 2020. Average EVs have an operational life of 10-years. spahttps://www.theguardian.com/environment/2020/apr/19/norway-and-the-a-ha-moment-that-made-electric-cars-the-answer

145 Emissions reductions in 2030 assuming the following levels of new RE power generation going to EVs: 100% = 6,500 tCO_2, 75% = 4,900 tCO_2, 50% 3,300 tCO_2

146 These figures represent high-end costs estimates for both EVSE units and installation. Installed costs of Level 1 or 2 chargers could include the significant corresponding renewable energy uptake necessary to decarbonise for the same cost as DCFC installations accommodating additional EVs. Only the average costs of Level 2 chargers per vehicle is included at US$ 6,500 per unit (pre-tax). The cost of additional power generation and distribution upgrades is not included.

147 with total projected cost of additional EV for the 2022-2030 period assuming an average pre-tax cost of US$ 30,000 per EV imported.

148 Development and financing support applications for US$ 120,000 (assumes three different applications).

149 Market scoping and feasibility study(s) for US$ 400,000, planning and administrative facilitation of charging network development for US$ 115,000 annually (2021-2030), preparation of technical training curriculum and training of technicians for EVs & chargers (+ test equipment) for US$ 100,000 annually (2021-2030), one-time purchase of three sets of special maintenance equipment and critical spares for US$ 600,000, develop and train for financial instrument(s) US$ 150,000.

Policy / Plan Link	• The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015).
	• Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Ministry Strategic Plan 2020-2023 (MICTTD & SOE)
	  ○ Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities.
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) - target for reduction of fossil fuel consumption by 2025 through Energy Efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa.
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Introducing EVs to the market will first require a feasibility study for both technology evaluation and location for installation of EV infrastructure before market uptake begins. Including project planning required for support applications, this process may take 6-12 months for market analysis and sites selection. Time needed for securing finance: The time needed to secure multilateral assistance may require 18 - 24 months, including preparatory arrangements. When would the project/investment start and end: 2022 to 2030 However, the timeline would also need to be closely linked to renewable energy (solar and storage) investments for grid power. 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.
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 KIER, KV20, and MISE strategic planning documents. The private sector is instrumental in making vehicle purchase choices, both at a business and personal/household level. However, EV transition requires significant investment, and public sector purchases will likely constitute the majority of financing contributed towards the vehicle purchase cost for early adoption. 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/institutional needs. 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 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. It is recommended RE financing packages for independent power producers be coupled with EV/charging infrastructure needs to enable renewably powered EV transport.
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	• Prior to entry of EVs to the market, the absence of charging and RE 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 (see T3. Bicycle/E-Bike Financing Initiative below) • 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 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. In addition, a subsidy may be required per purchase, depending on the structure of the new tax policy. This subsidy is 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 Kiribati, 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.
Potential Financing and Need for Financial Support and/or Financial Instruments	• Grants for Capital Investment: 90% of EV infrastructure cost equal to US$16.4m. • Equity for Capital Investment: 25% of vehicle cost from PVU/Private Sector equal at least to US$21.1m. • Debt for Capital Investment: 75% in lending support from DBK/ANZ (guaranteed by ADB, World Bank, EIB, or MOFED) equal up to US$63.2m • Grants for TA/CB and project development: 100% of total equal to US$3.09m • State Budget: 10% from the Government of Kiribati (MOFED/PUB) for infrastructure, equal to US$1.8m • Other financial instruments may be needed to ensure price parity of EVs of other vehicles (e.g. changed in duty, VAT, and excise changes).

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: **DBK**, UNESCAP, **GGGI**, NDC-Hub, **ADB, World Bank/IFC**, PRIF, IEA, IRENA, **CTCN**, EEAS, **PCREEE-SPC**, **UNIDO**, USP, UNCTAD
	  ○ Project Implementation & Management: DBK, UNDP, GGGI, NDC-Hub, **ADB, World Bank/IFC, CIDCA**, EEAS, **PCREEE-SPC**, USP
	• Potential Financial Partners / Sources:*
	  ○ Credit Guarantees: **GCF, ADB, World Bank/IFC**, EIB, **EXIMs**
	  ○ Debts & Loans: DBK, **ANZ, ADB, World Bank/IFC**, EIB, **GCF**
	  ○ Equity: PUB, **PVU-GOK**, **Private Companies/Vehicle Owners**
	  ○ Non-Government Grants for investment: **GCF, ADB, GEF, World Bank/IFC**, EIB, **CIDCA**, EEAS, KOICA, AU-DFAT, NZ-MFAT, USAID
	  ○ Grants for Technical Assistance & Capacity Building: **GEF, AU-DFAT, NZ-MFAT, CTCN, ADB, GCF, World Bank/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNIDO, PCREEE-SPC, GIZ, **CIDCA**
	  ○ Government Budget & Taxes Incentives: **GOK**
	  ○ Risk Instruments: ADB, **World Bank/IFC**, EIB
	*This is not a comprehensive list, as other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	1. Full project concept development and preparation of applications for accessing future support needs, 2. Market scoping and feasibility study(s), 3. Annual planning and administrative facilitation of charging network development incl. public sector training (2023-2030), 4. Curriculum development and training for technicians in installation and maintenance EVs & chargers in the private sector across the country, and; 5. Developing and implementing financial instruments to support public and private sector procurement of EVs.
Information and MRV Needs	• Number of EVs and charging stations imported and registered. • Number of ICE cars / SUVs / pickup trucks imported and registered. • Number of public sector staff trained for EV planning (certifications records) • Number of technicians trained for maintenance of EVs and installation & maintenance of EV chargers. • Number of government EVs procured. • Detailed baseline determination of emission of CO2 per vehicle per year. • Grid emissions factors for areas with EVs. • Power consumption of EV charging stations. • Tax records for procurement of EVs and charging stations. • Number and value of commercial and retail loans issued.

Supporting References	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. Nesbitt, S. (2014), *Electric Vehicle Fleet Feasibility Study*. Pitt & Sherry: Moreland City Council.https://www.moreland.vic.gov.au/globalassets/areas/esd/esd-electric-vehicle-ev-feasibility-study-august-2014 O'Connor, P., Mandel, B., Welch, D. Bolduc, A., & Stith, P. (2019), *Evaluating Electric Vehicle Infrastructure in New Hampshire*. U.S. Department of Energy's State Energy Program: New Hampshire Department of Business and Economic Affairs, Division of Economic Development. https://www.nh.gov/osi/resource-library/documents/nh-ev-infrastructure-analysis.pdf EVSE (2019), *How much does it cost to set up an EV Charging Station?*. (accessed August 2020). https://evse.com.au/blog/evchargercost/
Supporting References	Maninnerby, H., Bergerland, S., Lazarou, S., & Theocharis, A. (2019), *Electric Vehicle Penetration in Distribution Network: A Swedish Case Study*. Applied System Innovation: MDPI. https://res.mdpi.com/d_attachment/asi/asi-02-00019/article_deploy/asi-02-00019.pdf Energeia (2018), *Australian Electric Vehicle Market Study*. Australian Renewable Energy Agency (ARENA): Clean Energy Finance Corp. (CEFC). https://www.arena.gov.au/assets/2018/06/australian-ev-market-study-report.pdf Weiss, M., Peter Dekker, P., Moro, A., Scholz, H., & Patel, M.K. (2015), *On the electrification of road transportation – A review of the environmental, economic, and social performance of electric two-wheelers*. Transportation Research Part D: Transport and Environment, Volume 41, December 2015, Pages 348-366. https://www.sciencedirect.com/science/article/pii/S1361920915001315/pdfft?md5=1e81620071461ac2a53bef3e77626cdb&pid=1-s2.0-S1361920915001315-main.pdf MARCON (2016), *Business Case for Investing in Electric Vehicle Direct Current Fast Charge Station Infrastructure*. PN 1567: Canadian Council of Ministers of the Environment. https://www.ccme.ca/files/Resources/air/mobile_sources/Final%20DCFC%20Report.pdf PCREE (2019), *PCREEE and UNIDO join efforts to develop a regional e-mobility policy and program for the for Pacific Island Countries and Territories (PICTs)*. (accessed August 2020). https://www.pcreee.org/article/pcreee-and-unido-join-efforts-develop-regional-e-mobility-policy-and-program-pacific-island Karthink, S.H. (2019), *Types of Motors used in Electric Vehicles*. Circuit Digest. (accessed August 2020). https://circuitdigest.com/article/different-types-of-motors-used-in-electric-vehicles-ev http://driveelectricnoco.org/wp-content/uploads/2013/02/DENC-Full-Case-Study.pdf Lay Eng Teoh, L.E., Khoo, H.L., Goh, S.Y., & Chong, L.M. (2017), *Scenario-based electric bus operation: A case study of Putrajaya, Malaysia*. International Journal of Transportation Science and Technology, Volume 7, Issue 1, March 2018, Pages 10-25. https://www.sciencedirect.com/science/article/pii/S2046043017300540/pdfft?md5=53748fe78c6b213f2dbacfdfd93c5781&pid=1-s2.0-S2046043017300540-main.pdf Küfeoğlu, S. & Pollitt, M. (2018), *The impact of PVs and EVs on Domestic Electricity Network Charges: a case study from Great Britain*. University of Cambridge: Energy Policy Research Group. https://www.eprg.group.cam.ac.uk/wp-content/uploads/2018/05/1814-Text.pdf Partners in Project Green (2016), *Charge Up Ontario: A Guide for Businesses to Invest in Electric Vehicle Charging Stations*. Ontario Trillium Foundation. https://www.partnersinprojectgreen.com/wp-content/uploads/2017/01/PPG_Charge-Up-Ontario_EVSE-Report-UPDATED-MARCH_1_2017.pdf Ramaswamy, P.C., Chardonnet, C., Rapoport, S., Czajkowski, C., Bulto, G.O., Sanchez, R.R., & Arriola, I.G. (2016) *Impact of Electric Vehicles on Distribution Network Operation: Real World Case Studies*. CIRED Workshop: Helsink 14-15 June 2016, Paper 0415. http://www.cired.net/publications/workshop2016/pdfs/CIRED2016_0415_final.pdf GreenLearning Canada (2010), *Sustainable Transportation Case Studies*. GreenLearning Canada. http://tigurl.org/images/tiged/docs/activities/951.pdf International Energy Agency (2017), *Global EV Outlook 2017: Two Million and Counting*. OCED/IEA. http://www.cleanenergyministerial.org/sites/default/files/2018-07/GlobalEVOutlook2017.pdf Xue, X.D., Cheng, K.W.E., & Cheung, N.C. (2008), *Selection of Electric Motor Drives for Electric Vehicles*. Conference: Power Engineering Conference, 2008. AUPEC '08. Australasian Universities. https://www.researchgate.net/publication/224400819_Selection_of_eLECTRIC_mOTOR_dRIVES_for_electric_vehicles Gorzelany, J. (2019), *Comparing All 2019 Electric Vehicles*. MyEV (accessed August 2020). https://www.myev.com/research/buyers-sellers-advice/comparing-all-2019-electric-vehicles Huang, Q., Li, J., & Chen, Y. (2010), *Control of Electric Vehicle*. University of Electronic Science and Technology of China: P.R.China. https://cdn.intechopen.com/pdfs/12061/InTech-Control_of_electric_vehicle.pdf Lutsey, N., & Nicholas, M. (2019), *Update on Electric Vehicle Costs in the United States through 2030*. The International Council on Clean Transportation: Working Paper 2019-06. https://theicct.org/sites/default/files/publications/EV_cost_2020_2030_20190401.pdf Republic of Kiribati (2013), *Value Added Tax Act 2013*. http://www.MOFED.gov.ki/sites/default/files/Value%20Added%20Tax%20Act%20No.14%20of%202013.pdf

Phased Approach for Development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1, 2, 3, 4, 5	3, 4, 5	3, 4, 5	
Estimated CB & TA Costs (US$)	770,000	1,245,000	1,075,000	3,090,000
Estimated Capital Investment (US$)	7,140,000	24,360,000	52,710,000	84,210,000
Estimated GHG Mitigation (tCO2)	552	5,343	23,877	29,772
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				6,510

T12 – Sustainable Aviation Fuel Integration Initiative

No.	T12
Action Name	Sustainable Aviation Fuel Integration Initiative
Sub-Sector	Air Transport
Context	Integration of biofuels into the Air Kiribati 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 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. 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.
Key Implementation Milestones	**Policy / Technical Assistance** • Achieving annual market updates on cost-effectiveness and availability of SAF sources. **Investment Needs** • Achieving either full fuel subsidy support or cost-effective subsidies to meet the cost-competitive fossil fuel options available.
Outcomes	Primary Outcomes • GHG emission reductions associated with domestic air travel. • A reliable, regular supply chain for SAF alternatives has been established through KOIL to fuel the Air Kiribati fleet. • Integration of biofuels into national-scale fuel mix. Secondary Outcomes • Fuel infrastructure and storage upgrades for KOIL facilities.
Mitigation Potential	>756tCO_2/yr and a total of >6,867tCO_2 for 2020 - 2030 Assumed emissions reduction potential of 63,000tCO2e per annum under the (Intended) NDC may be evaluated in the context of the SREP Investment Plan, which attributed only 4% of total national emissions to domestic aviation (2,520tCO2e). The totals above also assume 3.6% average Compound Annual Growth Rate (CAGR) estimated for the aviation market globally by IATA, which would result in 33,289tCO_2 to potentially mitigate over the 2020-2030 period. Given the approved blends range from a maximum of 10-50% SAF with conventional A1 rated kerosene, the contributions of SAFs reflect this proportion above. Disaggregated fuel data for domestic/international aviation is still needed to update the estimates to appropriately evaluate the emission reduction potential of mitigation activities.
Co-benefits / SDG Linkages	Co-benefits include: • Updated regulatory environment to account for changing fuel standards in aviation sector. This sub-sectoral activity supports SDGs 1, 7, 8, 9, 10, 11, 12, 13, 14, and 17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation: 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$5.8m if non-compatible SAFs are used which require additional storage – inclusive of two large-scale terminal storage tanks located on Tarawa and 19 storage tanks distributed across each of the outer island airfields. Estimated development costs US$750,000 (engineering, due diligence, tendering, and procurement process) Estimated Enabling, Capacity Building and Technical Assistance Needs: <US$450,000 (decentralized training and awareness required around SAFs and quality assurance/compliance for KOIL, Air Kiribati, and Airports Kiribati staff.)
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) OECD-DAC/CRS Purpose Code(s): 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; 21061- Storage; 23641 - Retail distribution of liquid or solid fossil fuels
Implementing and Supporting Entities / Stakeholders	Potential National Implementing Entities / Stakeholders: MISE, MICTTD Potential Implementing Supporting Entities / Stakeholders: KOIL, Air Kiribati, Airports Kiribati, National/International Consultants, PASO

Policy / Plan Link	• The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015).
	• Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for Development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Ministry Strategic Plan 2020-2023 (MICTTD & SOE)
	  ○ Strategic Objective 1: Develop and strengthen sustainable Tourism development to boost economic development
	  ○ Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities.
	  ○ Strategic Objective 4: To strengthen supporting services; human resource needs, printery, postal, accounts and registry, to support the efficient and effective functions of the Ministry and SOEs.
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) - target for reduction of fossil fuel consumption by 2025 through Energy Efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa.
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Market assessment, due diligence, budgeting, tender, and supplier selection process may take 6-12 months Time needed for securing finance: Depending on the funding pipeline, both national-level and bilateral support will likely come within budget programming: 12-18 months. When will the project/investment start and end: The integration of SAFs may begin as soon as the financial structure of paying increased costs for jet fuel has been arranged, and the supply chain has been established through KOIL to Air Kiribati and the Airports Kiribati facilities: <18 months. Immediate steps (next 12 months) under this opportunity include: 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	This investment option represents an additional annual recurring cost that will yield emissions reductions without any shift in infrastructure, added capital costs, or change to operations. With only the State-owned air carrier operating in Kiribati, the involvement of the private sector is currently minimal, though additional charter flight businesses have existed in the past. Given the price premium on SAFs in the current market, relative to the current estimated costs of approximately US$2m on aviation fuel imported by KOIL in 2019, shifting the entirety of the supply to available biofuels will range from US$5-18m.
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. • Kiribati 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.) • 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.
Financial Sustainability	Without an external partner willing to subsidize more than 100% of the cost of Kiribati's aviation fuel, or technological breakthroughs occur alongside a significant increase in SAF supply, financing the adoption of SAF for Kiribati'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.
Potential Financing and Need for Financial Support and/or Financial Instruments	It is expected, with SAFs ranging from 2.5 – 9 times the cost of fossil fuels, the cost of sourcing SAFs may end up increasing the base cost of the operating aircraft by US$5 – 18 million per annum. • Grants for TA/CB and Capital investment: 90% equal to US$7 million. • State Budget or SOEs: 10% from the Government of Kiribati for capital investment, equal to US$580,000.

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: **PASO**, UNDP, GGGI, NDC-Hub, ADB, **ICAO, UNIDO, CTCN**, EEAS, IRENA, World Bank/IFC, CIDCA, PCREEE-SPC, FAO, WFP
	  ○ Project Implementation & Management: CIDCA, **World Bank/IFC**, GGGI, NDC-Hub, ADB, CIDCA, **PCREEE-SPC**, FAO
	• Potential Financial Partners / Sources:*
	  ○ Equity: **Air Kiribati, KOIL**, Private Sector
	  ○ Non-Government Grants for investment: GCF, GEF, **World Bank/IFC**, EIB, CIDCA, EEAS, KOICA, AU-DFAT, NZ-MFAT, USAID
	  ○ Grants for Technical Assistance & Capacity Building: GEF, AU-DFAT, NZ-MFAT, **CTCN, ADB**, GCF, **World Bank/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, UNCTAD, **ICAO, PASO**
	  ○ Government Budget & Taxes Incentives: **GOK**
	*This is not a comprehensive list, other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	1) Those associated with fuel handling and refuelling at Air Kiribati and Airports Kiribati may need additional awareness material and operational training (see T14: Operational Training Programme), but the functionality of biofuels is nearly identical to existing aviation fuel. 2) TA Support will be required both feasibility studies, EPC support, ESIAs, study on taxation policy options, and information dissemination efforts. 3) CB Practical training will be required for the new technology 4) TA for scoping and source blended fuels through contracts. 5) Training requirements will extend beyond the operational needs of Air Kiribati and Airports Kiribati to include CAAK and MICTTD staff to provide expertise for policy and regulatory oversight.
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
Supporting References	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. Mazza, P. (2017), *Raising the Bar: NRDC's 2017 Aviation Biofuels Scorecard*. National Resource Defence Council. https://www.nrdc.org/sites/default/files/aviation-biofuels-sustainability-scorecard-2017.pdf FAO (2011), *Jatropha Cultivation*. Food and Agriculture Organization of the United Nations. http://www.fao.org/3/i1219e/i1219e02.pdf AutoBlog (2015), *Aviation Biofuels*. AutoBlog. (accessed August 2020). https://www.autoblog.com/photos/aviation-biofuels/ IATA (2020), Developing Sustainable Aviation Fuel (SAF). International Air Transport Association. https://www.iata.org/en/programs/environment/sustainable-aviation-fuels/ IATA (2015), *Sustainable Aviation Fuel Roadmap*. International Air Transport Association. https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/safr-1-2015.pdf ATAG (2017), *Beginner's Guide to Sustainable Aviation Fuel*. Air Transport Action Group. https://aviationbenefits.org/media/166152/beginners-guide-to-saf_web.pdf ICAO (2017), *Sustainable Aviation Fuels Guide*. International Civil Aviation Organization. https://www.icao.int/environmental-protection/knowledge-sharing/Docs/Sustainable%20Aviation%20Fuels%20Guide_vf.pdf

Phased Approach for Development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1, 2, 3, 4, 5			
Estimated CB & TA Costs (US$)	1,200,000	0	0	1,200,000
Estimated Capital Investment (US$)	0	3,425,000	2,375,000	5,800,000
Estimated GHG Mitigation (tCO2)	0	2,351	4,517	6,867
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				968

T13 – Whole-of-Lifecycle Vehicle Programme

<table>
<tr><td>No.</td><td>T13</td></tr>
<tr><td>Action Name</td><td>Whole-of-Lifecycle Vehicle Programme</td></tr>
<tr><td>Sub-Sector</td><td>Land Transport</td></tr>
<tr><td>Context</td><td>Derelict vehicles are a common sight around Tarawa. The current dominance in the Kiribati market of second-hand vehicles largely represents the importing of end-of-life vehicle issues from the exporting countries. Given the 5-year lifespan estimated for vehicles in the KIER, it is expected the 9,175 vehicles from 2004-2013 are largely deregistered and no longer functioning. Given the vehicles brought in prior to this period, the assumption over 10,000 derelict vehicles are present across the nation remains a conservative estimate, as no mechanism for disassembling, consolidating, and exporting scrapped vehicles currently exists. Building upon the existing requirements for the deposit of an old battery to purchase/obtain a new battery should serve as an appropriate model to build upon, extending beyond lead acid battery collection to include lithium ion, nickel cadmium, and other types of batteries to prevent exacerbating environmental contamination. 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.
The scrapping process will necessary involve breaking down vehicles either on-site or at a designated scrapyard serving as a repository for whole vehicle chasses. Vehicle lifecycle management generally involves cutting chasses into transportable sections or compacting vehicles for loading onto vessels for export. Logistics and supply chain management of the removal of derelict vehicles is crucial to ensure the emissions associated with removal are offset with the environmental benefits of waste management (which may include remediation and greening of newly cleared land footprint.)
The distinction between scrapping older vehicles and derelict vehicles must be reinforced, with prioritization upon maintenance and upkeep of older operational vehicles to extend beyond the expected 5-year lifespan outlined in the KIER. For older vehicles, establishment of a machining capacity for engine remanufacturing is an option with additional emission reduction potential (at the expense of adding significant capital costs and capacity building requirements domestically.)</td></tr>
<tr><td>Key Implementation Milestones</td><td><table><tr><th>Policy / Technical Assistance</th><th>Investment Needs</th></tr><tr><td>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.</td><td>Supporting establishment of facilities to process at least 10,000 legacy vehicles and up to 2,000 per annum.</td></tr></table></td></tr>
<tr><td>Outcomes</td><td>Primary Outcomes:
Removal/recovery of waste materials for salvage and/or export.
Opportunity for sequestration of carbon through restored vegetation.
Secondary Outcomes:
New industry developed.
Remediation and beautification of currently occupied and degraded land area.</td></tr>
<tr><td>Rio Marker and CRS Purpose Code(s)</td><td>Rio Marker: Significant (1)
OECD-DAC/CRS Purpose Code(s): 21011 - Transport policy, planning and administration; 21013 - Transport regulation; 21081 - Education and training in transport and storage; 43032 – Urban Development; 33120 – Trade facilitation;</td></tr>
<tr><td>Implementing and Supporting Entities / Stakeholders</td><td>Potential National Implementing Entities / Stakeholders:
MISE, MICTTD, PVU
Potential Implementing Supporting Entities / Stakeholders:
KIT, KSEL, MELAD, Private Sector Companies, National/International Consultants, SPREP, UNEP, MCIC</td></tr>
</table>

Policy / Plan Link	• The National Development Plan Mid-Term Review (issued 2014)
	  ○ The significant waste issue associated with end-of-life vehicles and absence of proper disposal mechanisms. The Kiribati Institute of Technology (KIT) was running a level III certification course in light vehicle mechanical technology, but it ceased in 2016 after 12 students enrolled in 2015, which highlights the need for capacity development for preventative maintenance and proper disposal of vehicles.
	• The Kiribati Integrated Environment Policy (issued 2013)
	  ○ Goals and objectives include waste management & pollution control.
	• The current MSP (2020-2023) identifies as one of its three core issues (addressed as Strategic Objective 2), "The need to improve, air, sea and land transportation and infrastructures." This involves the following strategies;
	• Commonwealth Clean Oceans Alliance (CCOA) (initiated 2018)
	• SPREP/EU PacWaste+ Programme (initiated 2018)

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: 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 3-6 months, and market assessment of the appropriate price thresholds for incentivizing appropriate disposal may take another 1-3 months (4-9 months total). Time needed for securing finance: Financial instruments will need to be put in place to establish the end-of-life vehicle management system, which may be structure to sustainably fund itself following start-up costs based upon the cost recovery from the steel recycling market. This will likely take 6-12 months to arrange between donors/financiers, private sector, and Government. When will the project/investment start and end: It can reasonably be expected to begin in 2022, and run indefinitely 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. 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 Tarawa, Kiritimati, etc. D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations including land considerations.
Mitigation Potential	Up to 70 tCO_2/yr in 2030 and a total of 465 tCO_2 for 2020 – 2030. • Given the sequestration potential, land reclamation may account for 8,593m^2 from motorbikes, 19,804m2 from automobiles for a total of 33.2tCO_2 from legacy vehicles[59], and at least 2.9tCO_2 per annum in additional sequestration from 2022 onward in avoided land degradation.[60]
Co-benefits / SDG Linkages	The Whole-of-Lifecycle Vehicle Programme involves recovering devalued land and rehabilitating both greenspace and otherwise usable land, providing a range of co-benefits beyond the relatively limited potential for mitigation and additional sequestration. Chief among these are resource recovery potential (for steel recycling and other material processing) and beautification/remediation of land to improve aesthetic value for locals and especially tourists. Relevant SDGs include 3, 6, 8, 9, 10, 11, 12, 13, 15, 17.
Investment Needs (USD)	Estimated capital investment needed for the physical implementation: Site-specific costs for establishment of a vehicle scrapyard and processing facility will need to be determined, inclusive of cutting equipment to dismantle vehicles on outer islands for easier transport back to Tarawa (minimum US$1,500,000) Estimated development costs: Full feasibility study for development of the Whole-of-Lifecycle Vehicle Programme. Establishing the financial mechanism to remove derelict vehicles will involve structuring of a penalty system to discourage abandoning vehicles and improper disposal. ($300,000) Estimated Enabling, Capacity Building and Technical Assistance Needs: Course development and 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. US$60,000 per year during 2022 to 2030. (total US$ 540,000)

Potential Business Model and Financing Strategy	• Due to land use constraints and 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 Kiribati. 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 government of Kiribati to manage the Whole-of-Lifecycle Vehicle programme, depending on Ministerial capacity and preferences – the government could delegate within the Ministerial structure, seating the programme and all facilities under the purview of either ministerial staff in a newly formed division or State-owned Enterprise. 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 (MISE or MITTCD, most likely) instead of establishing an SOE. The market is relatively small, and it is unlikely a competitive structure between multiple businesses will prove viable. Those who deliver a derelict car with certificate of registration and title will receive a certificate of destruction.
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 (up to 28,400m^2 to accommodate the >9,175 vehicles estimated to be due for removal), 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 cargo onto vessels around various atolls. • 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 Kiribati, 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 five-year lifespan of existing second-hand vehicles in the market coupled with the expected increases in the land transport vehicle fleet, a need for a 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 partners (such as ADB, World Bank, DFAT-AU/MFAT-NZ, and SPREP) to upskill a local labour force to undertaken scrapping and salvage activities for the foreseeable future. • The main barrier to financial sustainability would be in the transport (both by land and maritime means) of derelict vehicles, which under the BAU scenario, will 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	• Finance from both bilateral partners and multilateral development banks will be necessary for the capital investment in the vehicle processing facility, as well as initial support to 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, ANZ, DBK, and IFC may have funding sources available to participate in investment and operations of the programme. • Equity for Capital Investment: 50% of infrastructure cost from Private Sector equal to US$0.75m. 50% from MOFED/PVU equal to US$0.75m. • Grants for investment: 100% of total equal to US$300,000 • Grants for TA/CB and project development: 100% from multilateral/bilateral financing facilities equal to US$540,000

Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):*
	  ○ Project Planning, Development & Design: **DBK**, UNESCAP, GGGI, NDC-Hub, **ADB, World Bank/IFC, UNIDO**, EEAS, SPREP, UNEP, MCST-USP
	  ○ Project Implementation & Management: SPREP, UNEP, GGGI, NDC-Hub, ADB, IUCN, DBK, World Bank/IFC
	• Potential Financial Partners / Sources:*
	  ○ Credit Guarantees: GCF, **ADB, World Bank/IFC**, EIB
	  ○ Debts & Loans: **DBK, ANZ, ADB, World Bank/IFC**, EIB, CIDCA
	  ○ Equity: **PVU-GOK, Private Companies**
	  ○ Non-Government Grants for investment: AU-DFAT, NZ-MFAT, **GCF**, GEF, **ADB, World Bank/IFC**, EIB, CIDCA, EEAS, KOICA
	  ○ Grants for Technical Assistance & Capacity Building: GEF, **GCF**, **ADB, World Bank/IFC**, KOICA, EEAS, IRENA, UNDP, GGGI, UNESCAP, **UNIDO**, SPREP, GIZ, UNDP, UNEP, **AU-DFAT, NZ-MFAT**
	  ○ Government Budget & Taxes Incentives: **GOK**
	  ○ Risk Instruments: ADB, World Bank/IFC, EIB
	*This is not a comprehensive list, other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	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. 2. A marketing push to promote the financial mechanism to the public will be required across all islands to encourage recovery of derelict vehicles.
Information and MRV Needs	• Data will be required in an initial baseline assessment to identify how many derelict and/or deregistered vehicles need to be removed from Kiribati 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	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. SPREP (2015), *Improved Waste Management in Kiribati: A Case Study*. SPREP. https://www.sprep.org/solid_waste/documents/Kiribati-Case-Study.pdf Jeong, K.M., Hong, S.J., Lee, J.Y., & Hur, T. (2007), *Life Cycle Assessment on End-of-Life Vehicle Treatment System in Korea*. J. Ind. Eng. Chem., Vol. 13, No. 4, (2007) 624-630. https://www.cheric.org/PDF/JIEC/IE13/IE13-4-0624.pdf Environment Agency (2019), *Guidance: When a motor vehicle is waste*. Government of the UK. https://www.gov.uk/guidance/when-a-motor-vehicle-is-waste DS Covers (2016), *Motorcycle Measure Instruction*. DS Covers (accessed August 2020). https://www.dscovers.com/motorcycle-measure-instruction/ Office of Energy Efficiency & Renewable Energy (2011), *Fact #693: September 19, 2011 Average Vehicle Footprint for Cars and Light Trucks*. US Dept. of Energy. https://www.energy.gov/eere/vehicles/fact-693-september-19-2011-average-vehicle-footprint-cars-and-light-trucks Citizens Information (2020), *How to dispose of an end-of-life vehicle*. Department of Communications, Climate Action and Environment (accessed August 2020). https://www.citizensinformation.ie/en/travel_and_recreation/motoring_1/buying_or_selling_a_vehicle/how_to_dispose_of_an_end_of_life_vehicle.html

Supporting References	Oeko-Institut e.V. (2017), *Assessment of the implementation of Directive 2000/53/EC on end-of life vehicles (the ELV Directive) with emphasis on the end-of life vehicles with unknown whereabouts*. Oeko-Institut e.V. – Institute for Applied Ecology, Germany. https://elv.whereabouts.oeko.info/fileadmin/images/Project_Docs/Study_description_ELV.pdf HIS Global Insight (2010), *Assessment of the Effectiveness of Scrapping Schemes for Vehicles Country Profile Annex*. European Commission: DG Enterprise and Industry Automotive Industry. https://circabc.europa.eu/sd/a/b34363fe-8903-4d9c-a2f1-aa38733f0500/report_scrapping_schemes_annex_en.pdf OECD (2020), Car scrapping schemes. OECD (accessed August 2020). https://www.oecd.org/greengrowth/greening-transport/car-scrapping.htm Schweinfurth, A. (2009), *Car-scrapping schemes: An effective economic rescue policy?*. The Global Subsidies Initiative Policy Brief: IISD. https://iisd.org/gsi/sites/default/files/pb2_carscrap.pdf Lin, H., Nakajima, K., Yamsue, E., & Ishihara, K.N. (2018), *Recycling of End-of-Life Vehicles in Small Islands: The Case of Kinmen, Taiwan*. Sustainability: MDPI. https://res.mdpi.com/d_attachment/sustainability/sustainability-10-04377/article_deploy/sustainability-10-04377.pdf Van Wee, B., Moll, H., & Dirks, J. (2000), *Environmental Impact of Scrapping Old Cars*. Transportation Research Part D 5 (2000) 137-143. https://pdfs.semanticscholar.org/ff70/6aacb56e262a72b92e9f7ef55073a7c1f1eb.pdf South Coast Air Quality Management District (2019), *Rule 1610. Old-Vehicle Scrapping*. South Coast AQMD. https://www.aqmd.gov/docs/default-source/rule-book/reg-xvi/rule-1610-old-vehicle-scrapping.pdf?sfvrsn=11 Miller, S.F. (1971), *Junkyard Valuation: Salvage Industry Appraisal Principles Applicable to Highway Beautification*. Highway Research Board: Division of Engineering, National Research Council, National Academy of Sciences-National Academy of Engineering. http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_112.pdf Yue, K. (2012), *Comparative analysis of scrap car recycling management policies*. Procedia Environmental Sciences 16 (2012) 44 – 50. https://core.ac.uk/download/pdf/82227253.pdf Department of Environmental Quality (2020), *Auto Dismantler Handbook: Best management practices and environmental compliance*. State of Oregon Department of Environmental Quality. https://www.oregon.gov/deq/FilterDocs/hw-autodismantlerhandbook.pdf Transport Division (2019), *Draft Guidelines for Setting Up, Authorization, and Operation of Authorized Vehicle Scrapping Facility (AVSF) in the Country*. Government of India: Ministry of Road Transport & Highways. https://morth.nic.in/sites/default/files/circulars_document/Draft%20Guidelines%20for%20Vehicle%20Scrapping%20(1).pdf Grabowski, L., Gliniak, M., Polek D., & Gruca, M. (2017), *Cost-assessment Analysis of Local Vehicle Scrapping Facility*. IOP Conference Series Earth and Environmental Science 95(2):022007. DOI: 10.1088/1755-1315/95/2/022007. https://www.researchgate.net/publication/321990088_Cost-assessment_Analysis_of_Local_Vehicle_Scrapping_Facility

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$)	360,000	180,000	300,000	840,000
Estimated Capital Investment (US$)	1,500,000	0	0	1,500,000
Estimated GHG Mitigation (tCO2)	36	131	297	465
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				70

T14 – Airport & Airfield Infrastructure Upgrade

<table>
<tr><td>No.</td><td>T14</td></tr>
<tr><td>Action Name</td><td>Airport & Airfield Infrastructure Upgrade</td></tr>
<tr><td>Sub-Sector</td><td>Air Transport</td></tr>
<tr><td>Context</td><td>Under the current and previous MSP, MICTTD has identified a number of recommended improvements to infrastructure supporting the aviation sub-sector. These include objectives to address the following issues;
Improve passenger and baggage security screening operations
Improve infrastructure required to facilitate efficient and effective air service as well as supporting safer and secure operations domestically and internationally
Integrate safety strategies into all facilities and processes
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-life-cycle 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.</td></tr>
<tr><td>Key Implementation Milestones</td><td><table><tr><th>Policy / Technical Assistance</th><th>Investment Needs</th></tr><tr><td>Operational and facility upgrades have been delivered for the 19 sites under Airports Kiribati oversight.</td><td>Facility upgrade requirements have been met for the 19 sites handling aircraft arrivals.</td></tr></table></td></tr>
<tr><td>Outcomes</td><td>Primary Outcomes
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.
Secondary Outcomes
Improved inter-island connectivity and opportunity for expanded domestic economic activity.</td></tr>
<tr><td>Mitigation Potential</td><td><$75.6tCO_2$/yr and a total of <$999tCO_2$ for 2020 - 2030
Assumed emissions reduction potential of 63,000tCO2e per annum under the (Intended) NDC may be evaluated in the context of the SREP Investment Plan, which attributed only 4% of total national emissions to domestic aviation (2,520tCO2e). The totals above also assume 3.6% average Compound Annual Growth Rate (CAGR) estimated for the aviation market globally by IATA. Given the International Energy Agency estimates 3.2% of emissions per passenger/km are attributed to aviation infrastructure, the direct reduction potential is minimal, at less than $999tCO_2$ over the ten-year period.
Disaggregated fuel data for domestic/international aviation is still needed to update the estimates to appropriately evaluate the emission reduction potential of mitigation activities.</td></tr>
<tr><td>Co-benefits / SDG Linkages</td><td>Co-benefits include:
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.
Avoided costs in aviation sector (both reduced recurring costs for government and increased profit margin for SOEs).
Improved safety, security, and support facilities to accommodate both staff and airline customer needs.
Improved equity of service delivery to all citizens/areas of Kiribati.
This sub-sectoral activity supports SDGs 7, 8, 9, 10, 11, 12, 13, and 17.</td></tr>
</table>

Investment Needs (USD)	Estimated capital investment needed for the physical implementation: As per the costs identified in the previous MSP pertaining to aviation infrastructure, >US$32 million. Estimated development costs US$3.2 million, as feasibility of activities would need to be conducted, including ESIA activities and review by both the government of Kiribati and donors/partners financing the infrastructure developments. Estimated Enabling, Capacity Building and Technical Assistance Needs: >US$0 – 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.
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; 21050 - Air Transport; 21081 - Education and training in transport and storage;
Implementing and Supporting Entities / Stakeholders	Potential National Implementing Entities / Stakeholders: MISE, MICTTD, MIA, MLPID Potential Implementing Supporting Entities / Stakeholders: ○ KOIL, Air Kiribati, Airports Kiribati, Island Councils, National/International Consultants, PASO
Policy / Plan Link	• The Climate Change Mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015). • Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4) ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available. • Kiribati 20-Year Vision (issued 2016) ○ Pillar 3: Infrastructure for Development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20 • Ministry Strategic Plan 2020-2023 (MICTTD & SOE) ○ Strategic Objective 1: Develop and strengthen sustainable Tourism development to boost economic development ○ Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities. ○ Strategic Objective 4: To strengthen supporting services; human resource needs, printery, postal, accounts and registry, to support the efficient and effective functions of the Ministry and SOEs.
General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Infrastructure needs and gaps have already been identified, but all necessary tendering and construction can, based upon the lack of completion under the previous MSP period of 2016-2019 may exceed 36 months. Time needed for securing finance: Given the blended finance requirements for a variety of infrastructure upgrades and equipment scaled from US$10,000 up to US$20 million, 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, and could take more than 36 months. When will the project/investment start and end: 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, and a subsequent 2024-2027 MSP should involve identification of forthcoming aviation infrastructure requirements which will support development toward decarbonizing the sub-sector in the 2027-2030 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.
Potential Business Model and Financing Strategy	• Concessional loans backed by guarantees would provide the upfront capital necessary to upgrade airfields on outer islands and facilitate improved trade domestically. • With only the State-owned air carrier operating in Kiribati, the involvement of the private sector is currently minimal, though additional charter flight businesses have existed in the past, and would be able to use larger aircraft wherever infrastructure has been upgraded to Dash-8 scale (and beyond.) 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. Similarly structuring a project to address resurfacing/extension needed in outer islands may be scaled to meet the >US$32m expected of this project.

Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	The financing gap is the largest barrier to implementation of the previously completed operational plan in the MSP 2016-2019. Matching donor priorities to existing needs still has yet to take place in order to ensure all projects are budgeted and attributed to specific financing partners. 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. The domestic aviation sector is tied tightly to the tourism development agenda, so targeting visitor arrivals and revenue earning mechanisms may prove an attractive way to package spending on the prioritized assets.
Financial Sustainability	There are two opportunities for expanded revenue as a result of upgrading airport infrastructure; a) increased domestic trade between outer islands, Tarawa, and Kiritimati, and b) increased access by tourists/foreign investors. The expectation in KV20 of growth in the tourism industry must be tempered against the recent COVID-19 pandemic, and growth in the tourism sector from the 3.6% contribution to GDP noted in 2016 (approximately US$6.4m) will need to exceed US$9.6m per year for expanded aviation infrastructure to be paid back within ten years. This represents a 51.5% growth in revenue from the sector, which may be offset by other foreign investment and domestic trade.
Potential Financing and Need for Financial Support and/or Financial Instruments	Financial grants may contribute particularly towards the investment need to upgrade the 19 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. • Grants for TA/CB and Capital investment: 90% from multilateral financing partners equal to US$31.68m. • State Budget: 10% from the Government of Kiribati equal to US$3.52m.

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, **World Bank/IFC**, CIDCA, PCREEE-SPC, FAO, WFP
	  ○ Project Implementation & Management: **ADB, World Bank/IFC**, GGGI, NDC-Hub, ADB, CIDCA, PCREEE-SPC, FAO
	• Potential Financial Partners / Sources:*
	  ○ Non-Government Grants for investment: GCF, GEF, **ADB, World Bank/IFC**, EIB, CIDCA, EEAS, KOICA, **AU-DFAT, NZ-MFAT**, USAID
	  ○ Grants for Technical Assistance & Capacity Building: GEF, **AU-DFAT, NZ-MFAT**, CTCN, **ADB**, GCF, **World Bank/IFC**, CIDCA, KOICA, USAID, UNDP, GGGI, UNESCAP, UNCTAD, PCREEE-SPC, ICAO, **PASO**
	  ○ Government Budget & SOEs: **GOK**
	*This is not a comprehensive list, other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	1) Introducing new technology, and correlation between these activities and emissions reductions will be instrumental to avoiding costs and improving efficiency of the aviation subsector. 2) Understanding the infrastructure/asset management requirements of Air Kiribati and Airports Kiribati will necessarily include CAAK, as well as MISE and MICTTD staff.
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 personnel under MISE, then external assessment will be needed. If completed by non-government contractors, government approval of works completed will be required. • All domestic airstrips must be able to employ Dash-8 aircraft to increase passenger capacity per flight and reduce emissions per passenger/km, which will be dependent upon length, grade, and material used in the construction of the runway. • Asset valuation and degradation assessments should be included in annual reporting by Airports Kiribati to government. • Passenger occupancy and wait times should be collected to quantify opportunity cost avoided through efficiency improvements.
Supporting References	Include reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. Carlucci, F., Cira, A., & Coccorese, P. (2018), *Measuring and Explaining Airport Efficiency and Sustainability: Evidence from Italy*. Sustainability: MDPI. https://res.mdpi.com/d_attachment/sustainability/sustainability-10-00400/article_deploy/sustainability-10-00400.pdf Schlumberger, C.E. (2012), *Air Transport and Energy Efficiency*. World Bank Group. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/746271468184153529/air-transport-and-energy-efficiency

Supporting References	ESTAP (2011), *Aviation Infrastructure*. International Energy Agency: Energy Technology Network. (accessed August 2020). https://iea-etsap.org/E-TechDS/PDF/T16_Aviation_Infrastructure_v4%20Final.pdf Egeland, J., & Smale, P. (2017), *Capacity Building through Efficient Use of Existing Airport Infrastructure*. International Transport Forum, Discussion Paper 2017 – 27. https://www.itf-oecd.org/sites/default/files/docs/capacity-building-efficient-use-existing-airport-infrastructure.pdf Department for Transport (2018), *Aviation 2050 - The future of UK aviation: A consultation*. UK Department for Transport: Great Minster House, London. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769696/aviation-2050-print.pdf Soetantri, N., & Ogita, S. (2020), *Pacific Aviation Investment – Tuvalu*. World Bank Group. https://projects.worldbank.org/en/projects-operations/project-detail/P128940

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$)	1,920,000	480,000	800,000	3,200,000
Estimated Capital Investment (US$)	0	12,000,000	20,000,000	32,000,000
Estimated GHG Mitigation (tCO2)	0	279	536	815
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				115

T15 – Active Transport Road Infrastructure Upgrade (non-motorised)

No.	T15
Action Name	Active Transport Road Infrastructure Upgrade (non-motorised)
Sub-Sector	Land Transport

Context	To encourage decarbonisation in the market, reinforcing non-motorized transport (cycling, walking, etc.) through inclusion of separated, protected active transport lanes. As a larger part of roadways should incentivize non-motorized road users to take advantage of the additional allocated space. There are currently 615km of roads in Kiribati requiring rehabilitation/upgrade beyond the recently rehabilitated South Tarawa road. This mitigation option will upgrade 370km of these roads by the end of 2030.
	The separation of active transport lanes from motorways should ideally be achieved through inclusion of green space between lanes (1-2m width should be allocated in the road design.)
	Infrastructure design standards around how carriageway and bridges are partitioned, and the allocation of space between partitioning for motorized and non-motorized transport will dictate how the roads are used.
	- Technological options for achieving this partitioning of active transport infrastructure include;
	  o Curbing, bioswales, and green walls, potentially inclusive of a variety of appropriate flora species.
	  o Bio-generated lighting systems may subsequently be integrated into the greenspace to provide street lighting as the technology is commercially deployed.
	- The need for traffic control and safety benefits associated with protected non-motorized paths may be coupled with emission sequestration and particulate matter filtration potential.

<table>
<tr><td>Key Implementation Milestones</td><td>
<table>
<tr><th>Policy / Technical Assistance</th><th>Investment Needs</th></tr>
<tr><td>• Infrastructure design standards around how roads and footpaths/bicycle lanes and the space between them will dictate how the roads are used.
• MISE, KHA and the Island Councils will use improved infrastructure planning, design standards, regulation, and enforcement approaches during the construction of carriageways, roads and bridges to increase access for non-motorised transport.</td><td>• This will include the construction of 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/bioswales which can lead to improved drainage and carbon sequestration.
• The initial implementation phase would take place in areas requiring road rehabilitation or sealed pavement upgrades. The action would lead to a total of up to 615km of new or rehabilitated roadways, with 370km by 2030.</td></tr>
</table>
</td></tr>
<tr><td>Outcomes</td><td>Primary Outcomes
• GHG mitigation (carbon sequestration through increased green space.)
• Improved access and safety for non-motorized transport users.
Secondary Outcomes
• Improved operational efficiency for road users and reduced operational costs associated with maintenance and repair.
• Strengthened barriers between motor vehicles and non-motorized transport users.</td></tr>
<tr><td>Mitigation Potential</td><td>650 tCO_2/yr in 2030 and a total of <2,600 tCO_2 for 2020 – 2030.
• The emission reductions considered under this action are those directly attributable to sequestration, and any mode shift from motorized to non-motorized transport would be in addition to the base sequestration values, but are not included in the presented calculations. The sequestration rates are based upon area-based carbon contained in vegetation biomass estimated by the FAO (>11.7 tCO_2 per hectare/yr or 1.17kg CO_2 per m^2/yr).[61]
The calculation is based upon the assumption that every kilometre of newly constructed roadway of the 370km requiring rehabilitation include this partitioning with greenspace of 1-2m allocated in the road design, with an average of 1.5m.</td></tr>
<tr><td>Co-benefits / SDG Linkages</td><td>• Partitioning active transport through green space provides the joint benefits of 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 615km of road network requiring improvement.
Relevant SDGs include 3, 5, 6, 8, 9, 10, 11, 13, 15, 17.</td></tr>
<tr><td>Investment Needs (USD)</td><td>Estimated capital investment needed for the physical implementation: US$ 572m total cost from 2020-2030 (2024-2030 implementation), based upon the per km costs of US$ 1.55m for 370 km of roads.[62]
Estimated development costs: US$ 7.4m relative phased planning and management costs based upon the scaling of the action should come in lower than 1.3% of capital investment.[63]
Estimated Enabling, Capacity Building and Technical Assistance Needs: US$ 12.6m for phased project oversight support which is determined as 2.2% of capital investment.[64]</td></tr>
<tr><td>Rio Marker and CRS Purpose Code(s)</td><td>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</td></tr>
<tr><td>Implementing and Supporting Entities / Stakeholders</td><td>Potential National Implementing Entities / Stakeholders:
MICTTD, MISE
Potential Implementing Supporting Entities / Stakeholders:
MOFED, MELAD, PPA, Private Sector Companies</td></tr>
<tr><td>Policy / Plan Link</td><td>• Ministry Strategic Plan 2020-2023 (MICTTD & SOE)
○ Strategic Objective 2: Strengthen air, sea and land transportation and infrastructures to meet social demands and compliment economic enhancing activities.
• The Kiribati 20-Year Vision – KV20 (issued 2016)
○ Pillar 1: Wealth and Health outlines plans to use the Revenue Equalisation Reserve Fund RERF as collateral for a $70 million loan to develop infrastructure (road, runways, ports) to develop 19 tar sealed roads by 2036 in the outer islands.
Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20</td></tr>
</table>

General timeline for Development, Financing, Implementation, and Operation	Time needed for development: Implementation of the recently completed road rehabilitation project took place over nine years, with preparation primarily occurring in the first 1.5 years, so >18 months will be expected for preparation. Time needed for securing finance: Project financing would likely need to be allocated in phases, and the need for multilateral assistance typically requires 24-36 months for preparatory arrangements. When would the project/investment start and end: Under the KV20, the timeframe for completing tar-sealing of all 19 outer island roads, which will need to be packaged with active transport infrastructure upgrades, is the 16-year period from 2020-2036. This action will start in 2024 and end in 2030, and upgrade 370km of these roads. Immediate steps (first 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 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 areas beyond south Tarawa. E. Enter into discussions (and agreements) with supporting agencies for primary investment financing and state budget allocations.
Potential Business Model and Financing Strategy	• The rationale behind financing the Active Transport Road Infrastructure Upgrade is based in proportional scaling up of the previous, successfully completed Tarawa Road Upgrade 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 such as the previously supplied funds from DFAT Australia. The coordination between MICTTD, MISE, and MELAD budgets should contribute towards implementation and funding of this action.
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 the 16-year implementation period. • Formalizing carriageway designs to maximize green space in partitioning lanes is one of the most important aspects to address before this action begins. • Road User levies could 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 Kiribati, which will require adherence to a range of donor requirements.
Financial Sustainability	• There is no way 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. It is also recommended, based upon the timeframe for the Tarawa Road Rehabilitation Project, that this exercise be steadily deployed over a timeframe of 7 years (+3 years of preparation). • Investment at this scale would be more than tenfold the investment made during the Tarawa Road Rehabilitation project. Spreading the project implementation period over 16 years will bring the annualized cost below the total cost of the Tarawa investment.
Potential Financing and Need for Financial Support and/or Financial Instruments	• Grants for Capital investment: 90% from international source – US$ 515m. • Grants for TA/CB: 100% from international source – US$ 20m • State Budget for Capital Investment: 10% from the Government of Kiribati – US$ 57m.
Potential Supporting and Financing Partners / Sources	• Management Partner (assisting with access to finance):* o Project Planning, Development & Design: **ADB, World Bank**, PRIF, NDC-Hub, GGGI, CTCN, UNIDO, UNDP, UNESCAP, IUCN, o Project Implementation & Management: **ADB, World Bank**, PRIF, NDC-Hub, GGGI, CIDCA • Potential Financial Partners / Sources:* o Credit Guarantees: **ADB, World Bank**, EIB o Debts & Loans: **ADB, World Bank**, EIB, GCF o Equity: **GOK** o Non-Government Grants for investment: **ADB, World Bank,** GEF, GCF, AU-DFAT, NZ-MFAT, CIDCA, KOICA, USAID o Grants for Technical Assistance & Capacity Building: GEF, AU-DFAT, NZ-MFAT, UNDP, **ADB**, GCF, CIDCA, EEAS, GIZ, UNESCAP o Government Budget & Taxes Incentives: **GOK** o Risk Instruments: ADB, World Bank/IFC, EIB *This is not a comprehensive list, as other entities are possible as well.

Enabling, Capacity Building and Technical Assistance Needs	6. Technical assistance for planning, feasibility study(s) and funding application(s) (in phases) 7. Technical assistance for the basic design and EPC tendering, engineering and contract supervision (in phases) 8. Capacity building for training in the management and construction of Active Transport Infrastructure for both engineers/supervisors and skilled/un-skilled labour (continual). This could be included in multi-country efforts.
Information and MRV Needs	• To track progress during implementation, 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. • Quality of sealed road coverage is linked to the existing KPIs for land transport development, roads with Active Transport Infrastructure integrated needs to be tracked (km).
Supporting References	Includes reference of supporting documentation such as feasibility studies, analysis, social-economic benefit studies…etc. Yocum, D. (2005), *Design Manual: Biological Filtration Canal (Bioswale)*. Bren School of Environmental Science and Management, University of California, Santa Barbara. http://fiesta.bren.ucsb.edu/~chiapas2/Water%20Management_files/Bioswales-1.pdf Environmental Protection Agency (1999), *Preliminary Data Summary of Urban Storm Water: Best Management Practices*. US EPA, Office of Water. https://www3.epa.gov/npdes/pubs/usw_d.pdf Environmental Protection Agency (2012), Costs of Low Impact Development: LID Saves Money and Protects Your Community's Resources. US EPA, Office of Wetlands, Oceans, and Watersheds.https://www.epa.gov/sites/production/files/2015-09/documents/bbfs3cost.pdf Scharenbroch, B.C., Morgenroth, J. & Maule, B. (2016), *Tree Species Suitability to Bioswales and Impact on the Urban Water Budget*. Journal of Environmental Quality: The Urban Forest and Ecosystem Services. http://treesandstormwater.org/wp-content/uploads/2017/09/Trees-Bioswales-and-Reduced-Stormwater-Flow.pdf World Health Organization (2014), *7 million premature deaths annually linked to air pollution*. WHO Media Centre. https://www.who.int/mediacentre/news/releases/2014/air-pollution/en/ Green City Solutions (2020), *City Tree 2020* (accessed August 2020). https://greencitysolutions.de/en/solutions/#researchdevelopment Via Verde, (2020), *What is it?* (accessed August 2020). http://viaverde.com.mx/v2/?lang=en# Ambius (2020), *Green Walls* (accessed August 2020). https://www.ambius.com/green-walls/benefits/ Atkinson, C.J. & Winner, W.E. (1987), *Annual Absorption of Gaseous Air Pollutants by Mosses and Vascular Plants in Diverse Habitats*. Effects of Atmospheric Pollutants on Forests, Wetlands and Agricultural Ecosystems, pp 427-438. NATO ASI Series, Vol. 016. https://link.springer.com/chapter/10.1007%2F978-3-642-70874-9_31 Environment and Conservation Division (2015), *Kiribati National Biodiversity Strategies and Action Plan 2016-2020*. MELAD. https://www.cbd.int/doc/world/ki/ki-nbsap-v2-en.pdf Government of Kiribati (2015), *Kiribati 20-Year Vision 2016-2036 (KV20)*. http://www.MOFED.gov.ki/sites/default/files/KV20%20VISION.pdf FAO (2001), *Climate Change and Forests*. Food and Agricultural Organization of the United Nations. (accessed August 2020). http://www.fao.org/docrep/003/y0900e/y0900e06.htm WebQC (2020), *Chemical Equation Balancer*. (accessed August 2020). https://www.webqc.org/balance.php?reaction=C%2BO2%3DCO2 The World Bank (2018), *Kiribati Road Rehabilitation Project*. (accessed August 2020). https://projects.worldbank.org/en/projects-operations/project-detail/P122151

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$)	2,500,000	7,000,000	10,500,000	20,000,000
Estimated Capital Investment (US$)	0	164,000,000	408,000,000	572,000,000
Estimated GHG Mitigation (tCO2)	0	279	2,325	2,604
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				651

E1 – Strengthening and Expanding the Standards and Labelling Programme for Appliances

No.	E1
Action Name	Strengthening and Expanding the Standards and Labelling Programme for Appliances
Sub-Sector	Efficient Appliances
Context	A significant portion of the electricity consumption in Kiribati is in appliances. Most appliances imported are not energy labelled. While around 20 % of the freezers and refrigerators that are being imported are energy labelled based on Australian and New Zealand labelling schemes, the remaining are mostly non- labelled products or even if labelled, they are cheaper products that are not comparable to the Australian or New Zealand labelling system. Even within the good quality energy labelled products being imported, most of them are of 2.5 star rating or lower, which are much less energy efficient than a product with a higher star rating. Hence, to reduce energy consumption in appliances, it is important that Kiribati set up its own system of product Standards and Labels and ensure imported appliances meet those standards. 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.
Key Implementation Milestones	**Policy / Technical Assistance** • The proposed action would strengthen the existing standards and labelling programme and also help expand it to three other products. This would include support for conducting a market survey for three products/appliances, development of the standards and labelling system for the three products/ appliances (including minimum and higher energy performance standards and the energy labels, testing system, protocols and facilities), and the awareness raising and communication campaign in support of the standards and labelling programme
Outcomes	<u>Primary Outcomes</u> • GHG mitigation and lower carbon intensity of the economy • Reduction in energy intensity of the residential and commercial sub-sectors • Increased availability in Kiribati of higher rated labelled products and appliances • Lower cost of administering the existing standards and labelling programme per unit of labelled product <u>Secondary Outcomes</u> • 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 oi prices • This would improve energy access
Mitigation Potential	2,894 tCO2/yr and a total of 9,716 tCO2 for 2020 – 2030 (actual emission reduction during 2025-2030) • To avoid duplication and double counting, this only considers the use of appliances in commercial and government sub-sectors. Energy efficiency in appliances used in residential sub-sector is captured in other action proposal (DSM). • The energy consumption by various appliances is estimated based on import data available from customs department and from the results of Kiribati 2016 Urban Household Electrical Appliances, Lights, and End-use Survey. • 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

Co-benefits / SDG Linkages	• Resulting reduction in air pollution would lead to improved health outcomes • This would result in improved reliability and stability of power grid which would enable more economic activity, as well as non-productive uses of energy • Resulting improvement in energy access would 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 Contributes to SDGs 7, 12, 13.
Investment Needs (US$)	Estimated capital investment needed for the physical implementation: Investments not considered for this action, as it is expected that the incremental cost incurred by commercial end users and the government for energy efficient appliances would be borne by themselves. The investment needs for appliances used in residential sub-sector is captured in the DSM programme under E4 Estimated development costs: US$ 58,000 Enabling, Capacity Building and Technical Assistance: US$ 219,000
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) 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: MISE • Potential Implementing Supporting Entity / Stakeholders: KIT, PCREEE-SPC, KCC, KCAE, CPU-MOFED, National / International Consultants, Private Sector companies

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015);
	• Kiribati Climate Change Policy (issued 2018)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018)

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 year will be needed for the project / programme design Time needed for securing finance: 1 to 1.5 years to secure financing and international implementing / development partner assessments When would the project/investment start and end: 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 D below. B. Initiate discussions with MISE 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 MISE 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.
Potential Business Model and Financing Strategy	No investments are there for this action. 90 % of the costs for the Technical Assistance and Capacity Building activities is expected from international donors and 10 % 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 would offset all costs needed to run this action.
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 action a better system for data collection would be implemented Kiribati does not have any testing facility for products. This would require testing to be conducted outside and would raise the cost of the programme. In the NDC investment plan for Fiji , testing facility for few products and appliances is being proposed to be established in Fiji, to be shared with all PICS, which could partially help reduce the cost
Financial Sustainability	Along with the proposed demand side management programme and the sustainable procurement programme, the Standards and Labelling programme will gradually help develop the market for higher rated labelled products and appliances, and help phase out less energy efficient products (non-labelled, less recognised labels and lower rated labelled products). This will reduce the perceived and actual risk for financing Energy Efficient products and appliances and thus will help to reduce the cost for financing such products. This could help Financial Institutions and manufacturers/suppliers develop new, attractive financial products for this market segment However, this could also 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
Potential Financing and Need for Financial Support and/or Financial Instruments	Investments not considered for this action, 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.
Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • 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 Potential Financial Partners / Sources* • Non-Government Grants for investment: **GEF, GCF,** AU-DFAT, NZ-MFAT, **World Bank/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, World Bank/IFC** • Government Budget & Taxes Incentives: **GOK** *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$ 219,000 1) Market survey of 3 appliances. (US$ 62,000) 2) Support development of the Standards and Labelling system for 3 appliances, including Minimum and Higher Energy Performance Standards (MEPS, HEPS), and the energy labels, testing system, protocols and facilities. (US$ 110,000) 3) Awareness raising and communication campaign in support of the standards and labelling programme. (US$ 18,100)
Information and MRV Needs	1) Residential and commercial energy use per GDP 2) Number of appliances for which Standards and Labelling system developed 3) Import volume, costs and ratings of each labelled products and appliances 4) Cost of administering the existing Standards and Labelling programme per unit of labelled product 5) Evaluation and progress reports of the Standards and Labelling programme

Supporting References

- **Kiribati 2016 Urban Household Electrical Appliances, Lights, and End-use Survey, UNDP, 2016.**
- **Data provided by MISE and PUB on power generation, and power tariff**
- **Import data from customs department**
- **Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).**
- **Energy Calculator, E3 Program, GEMS Regulator, Department of Industry, Science, Energy and Resources , Government of Australia**

  https://www.energyrating.gov.au/calculator
- **2006 IPCC Guidelines for National greenhouse gas Inventories**

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$)	94,366	170,483	11,749	276,598
Estimated Capital Investment (US$)	0	0	0	0
Estimated GHG Mitigation (tCO2)	0	425	9,291	176,769
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				2,894

E2 - Capacity Building for Integrated Energy Planning and Energy Statistics

No.	E2
Action Name	Capacity Building for Integrated Energy Planning and Energy Statistics
Sub-Sector	Power
Context	In Kiribati, energy planning is currently not done systematically or in an integrated or comprehensive manner. Planning is done separately for power and petroleum, the two major energy sub-sectors, along with little or no integration with demand side energy sub-sectoral planning (transport, industry, urban etc). National energy planning should be able to meet a large number of varied and often conflicting objectives[65], 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 Kiribati 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 Kiribati: • 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. There are a set of priorities that needs to be considered and integrated at all three levels of planning, and energy efficiency and fuel substitution[66] 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.

Context	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. Currently there is no capacity in Kiribati for performing integrated energy planning or for collecting the full set of energy data needed for such efforts, hence there is an urgent need to build capacity for this type of action, which will also contribute to energy efficiency.
Key Implementation Milestones	**Policy / Technical Assistance** The proposed capacity development initiative would include preparing and conducting of training programmes, including development of a module on the topic in existing courses held by universities (e.g. USP), development and launch of an online training course, development of an Integrated Energy Plan and Energy Balance framework for Kiribati, and setting up of the institutional infrastructure for integrated energy planning and energy statistics in Kiribati.
Outcomes	<u>Primary Outcomes</u> • 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 Kiribati 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 Kiribati 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) <u>Secondary Outcomes</u> Reduced air pollution due to reduced supply and use of petroleum products
Mitigation Potential	1,985 tCO2/yr in 2030, Total of 6,998 tCO2 for 2020 – 2030 (actual emission reductions during 2025 to 2030, and the mitigation benefit would continue past 2030) Key Assumptions: • The annual fuel savings and GHG emissions were estimated assuming a reduction of 1% (year on year) due to the activity, based on the national primary energy consumption per year. • National annual Primary Energy consumption was estimated and projected based on fuel distribution data of 2019 from KOIL and estimates for renewable energy in the SREP report[67]. • From the estimated value of national annual Primary Energy consumption, transport related emissions was deducted assuming 95 % of petrol, 75 % of diesel, 15 % of kerosene and none of the LPG consumed is used for transportation. These percentages were assumed to be the same as the estimates obtained for Fiji, by the consultants • An emission factor (tCO2/TJ) for the overall economy for a particular year, was estimated based on the annual Primary Energy data from which transport related emissions were removed. This emission factor was used to estimate the GHG emission reduction for each year through the action.

Co-benefits / SDG Linkages	• 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 • Potential contributions to SDGs 3, 7, 11, 12, 13
Investment Needs (US$)	Estimated capital investment needed for the physical implementation: Nil Estimated development costs: US$ 46,000 Enabling, Capacity Building and Technical Assistance: US$ 332,000
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principal (2) OECD-DAC/CRS Purpose Code(s): 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	Potential National Implementing Entities / Stakeholders: MISE Potential Implementing Supporting Entities / Stakeholders: PUB, KOIL, KSEL, PPA, SPC (PCREEE), MOFED, USP, Private Sector companies, National / International Consultants

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015).
	• Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) - target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa.
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 year needed for the project / programme design. Time needed for securing finance: 1 to 1.5 years to secure financing and international implementing / development partner assessments. When would the project/investment start and end: The Technical Assistance and Capacity Building would be during 2022 to 2025 (4 years). There are no investments involved. Note that the mitigation benefit would continue past 2030. **Immediate steps (next 12 months) under this opportunity include**: A. Secure support for the technical assistance and capacity building package B. Discuss with MISE, PUB, KOIL 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.
Potential Business Model and Financing Strategy	The proposed action has no investments involved. The activities would 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 would 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: 90 % of total cost • State Budget support for Technical Assistance & Capacity Building: 10 % of total cost
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	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 would 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 would 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. 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 institutionalised at the national and regional level. As part of the action, a national level entity would be identified and the capacity would be institutionalized there. Further, the capacity would also be institutionalized at the regional level (e.g., in a university), as well as through the formation of a network of practitioners. To reduce the risks, the trainees would also be selected from several relevant entities to ensure that the capacity is not concentrated in a single entity.
Financial Sustainability	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 GOK's contribution the Technical Assistance and Capacity Building would 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.
Potential Financing and Need for Financial Support and/or Financial Instruments	• Grants for Technical Assistance & Capacity Building: 90 % of total cost equal to US$ 299,000. • State Budget: 10 % of total cost equal to US$ 33,000.
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, **UNESCAP** • Project Implementation & Management: **PCREEE-SPC, UNDP**, GIZ, **GGGI, NDC-Hub**, ADB, IUCN, CIDCA Potential Financial Partners / Sources:* • Grants for Technical Assistance & Capacity Building: **GEF, GCF**, DFAT, GIZ, CTCN, ADB, KOICA, IEA, **UNDP, UNIDO, UNESCAP**, EEAS, **World Bank/IFC** *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$ 332,000 1) 4 comprehensive training programmes implemented on "Energy Statistics and Integrated energy planning". (US$ 193,000) 2) development of a module on integrated energy planning to be incorporated in existing courses in USP. (US$ 28,000) 3) development of an online course on integrated energy planning tailored for the situation in PICs, to be hosted by USP. (US$ 33,000, including US$ 5,000 for software) 4) development of the Integrated Energy Plan and Energy Balance for Kiribati (US$ 35,000, 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 Kiribati 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 Kiribati involving all energy sub-sectors in the supply and demand side, and frequency of updates. • development of the Energy Balance for Kiribati and frequency of updates. • Number of persons trained from relevant institutions and their evaluation of the training. • Expenditures
Supporting References	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018). • Fuel distribution data from KOIL for 2014-2019. • 2006 IPCC Guidelines for National greenhouse gas Inventories.

Phased Approach for Development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1	1, 2, 3, 4		
Estimated CB & TA Costs (US$)	105,700	275,040	0	380,740
Estimated Capital Investment (US$)	0	0	0	0
Estimated GHG Mitigation (tCO2)	0	338	6,660	6,998
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				1,985

E3 – Supporting the Retrofitting of Major Hotels and Commercial Buildings

No.	*E3*
Action Name	Supporting the retrofitting of major hotels and commercial buildings
Sub-Sector	Buildings
Context	At present the energy performance of hotels and other commercial buildings in Kiribati is very poor as the buildings are not well designed and have not utilised energy efficient or low carbon materials, technologies and equipment. This is partly due to the lack of business and capital for investment and the lack of materials and technologies, but more due to lack of awareness and capacity to identify and implement relatively low-cost energy efficiency measures. While separate measures are being proposed to move the buildings and construction sector in Kiribati towards low carbon design and operations (such as energy efficiency building code , green building rating system, certification programme for building energy assessors, training programmes etc), the transition for commercial buildings need to be accelerated due to their critical role as a tourism infrastructure. Hotels and commercial buildings are crucial infrastructure that would need to expand and upgrade fast if Kiribati has to realise its tourism potential. Retrofit projects could help demonstrate the viability of energy efficiency and low carbon measures and thus speed up the transition of hotels and commercial buildings towards low carbon design and operations.

Key Implementation Milestones	**Policy / Technical Assistance** • The proposed action would support energy audits and provide financial support and technical advisory support for implementing the recommendations in hotels and commercial buildings that commit to the program.	**Investment Needs** • Investment would need to be made by hotels and commercial buildings that commit to the action objectives. Around 15 hotels and commercial buildings are expected to commit to the action.
Outcomes	Primary Outcomes • GHG mitigation and lower carbon intensity of the economy • hotels and commercial buildings in Kiribati achieve lower specific energy consumption (kWh/m^2/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 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	901 tCO2/yr in 2030 and a total of 4,471 tCO2 for 2020 – 2030 (actual emission reduction occurring during 2025 to 2030) • It is assumed that there are a total of 45 small to medium sized commercial building, including hotels[68] (Out of these, assumed that around one third (15), would commit themselves to this programme • 40% energy savings is targeted under this action with an investment of USD100,000 per commercial building. The demonstrations would also inspire replications which would result in energy savings in several other existing hotels and commercial buildings in Kiribati, as well as for new hotels and buildings that might come up in future. However, this indirect savings and emission reductions has not been considered in the estimates	
Co-benefits / SDG Linkages	• 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 would 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 • Contributes to SDGs 7, 12, 13	
Investment Needs (US$)	Estimated capital investment needed for the physical implementation[69]: US$ 1.5m Estimated development costs: US$ 46,200 Enabling, Capacity Building and Technical Assistance: US$ 891,000	
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) 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: MISE • Potential Implementing Supporting Entity / Stakeholders: KCC, CPU-MOFED, PCREEE-SPC, National / International Consultants, Private Companies/SOE's	

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015);
	• Kiribati Climate Change Policy (issued 2018)
	  ○ Objective 1: Promote and enhance the transition towards renewable energy sources.
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through renewable energy ranging between 23 to 40 % in Kiritimati, Outer Islands and Tarawa.
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018)

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 to 1.5 year would be needed for the project / programme design. Time needed for securing finance: 1 to 1.5 years to secure financing and international implementing / development partner assessments. When would the project/investment start and end: The Technical Assistance and the financing would happen 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 MISE, KCC 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.
Potential Business Model and Financing Strategy	The hotels and commercial buildings in Kiribati are mostly small and energy consumption is very low. However, the hotels are much more energy intensive (energy per square metre) than normal households, as most of the rooms are air-conditioned, the building design has not considered energy efficiency and the occupancy rates are also high (around 75 %). The energy saving potential is thus higher than normal households. In addition, the average commercial electricity tariff is 38 % higher than the average domestic tariff. Hence, the investments made can pay back on its own due to the higher energy saving potential and higher power tariff. However, the retrofits require upfront investment to be made which will be a burden and discourage building owners to commit to the programme. To overcome this, a subsidy (30 % of investment) and an interest free (or low interest) loan (50 % of investment) could be provided to the building owner

Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	Getting initial commitment from building owners to do retrofits will be a major challenge. To ensure this happens, the funding and financing will have to be made attractive, and in addition they have to be convinced about the financial benefits that will accrue over the longer term. Building owners could be provided an interest free (or low interest) loan for the retrofits and the initial and final energy audits could be provided free of charge. Many of these commercial buildings will not have a full time and properly qualified facility manager and in addition service providers in Kiribati also do not have capacity in low carbon buildings. Hence smooth implementation of the action and communication would require more effort. This would require the use of a local expert who will be able to closely and appropriately interact with the building management and service providers
Financial Sustainability	The private sector in general is reported to be relatively small in Kiribati due to various reasons, and this situation might not change during the period of the project intervention. The tourism sector also is also yet to realise its potential. They may have limited ability to finance the larger initial investments needed, though the cost savings will be paid back. The market for energy efficiency in hotels and commercial buildings in Kiribati is also small to attract larger or overseas private sector investments in it. 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. 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	US$ 450,000 as grant for 15 hotels and commercial buildings that commit to the programme, which is equal to 30 % of the initial investment needs. US$ 750,000 as low interest loan for owners of 15 hotels and commercial buildings that commit to the programme, which is equal to 50 % of the initial investment needs. The remaining US$ 300,000 is in the form of equity from the owners of the 15 hotels and commercial buildings, which is equal to 20 % of the initial investment needs.
Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • Project Planning, development & Design: **PECREE-SPC, UNDP**, GIZ, **GGGI, NDC-Hub, ADB**, IUCN, CTCN, PRIF, **World Bank/IFC,** IRENA • Project Implementation & Management: **PECREE-SPC, UNDP**, GIZ, GGGI, NDC-Hub, **ADB**, IUCN, CIDCA, **World Bank/IFC** Potential Financial Partners / Sources* • Credit Guarantee: **GCF, ADB**, Supplier EXIM Banks, EIB, **World Bank/IFC** • Loans: DBK, ANZ, **ADB**, EIB, **IFC** • Equity: **Private Sector companies** • Non-Government Grants for investment: **GEF, GCF, ADB,** AU-DFAT, NZ-MFAT, **World Bank/IFC**, EIB, CIDCA, KOICA, EEAS • Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT**, NZ-MFAT, GIZ, CTCN, **ADB**, KOICA, **UNDP, UNIDO**, EEAS, **World Bank/IFC, UNESCO**, UN Habitat • Government Budget & Taxes Incentives: GOK *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$ 891,000 (includes 15 % overhead for Implementing Partner) 1) Preliminary energy audits of 20 of the largest hotels and commercial facilities who make an initial commitment to the programme. (US$ 233,000) 2) Detailed energy audits of 15 hotels and commercial facilities which have the highest potential for energy savings and have given a firm commitment to the programme (US$ 363,000) 3) Implementation of the recommendations of the detailed energy audit in the 15 hotels and commercial facilities (US$ 152,000) 4) Energy audit of the 15 hotels and commercial facilities for assessing if the retrofits have been effective and the energy savings and GHG emission reductions achieved (US$ 27,000)

Information and MRV Needs	• Specific energy consumption of hotels and commercial buildings in Kiribati (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	• Data provided by MISE and PUB on power generation and power tariff • Data provided by Tourism Authority of Kiribati on hotel numbers, rooms and occupancy • Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018). • 2006 IPCC Guidelines for National greenhouse gas Inventories • WACC Expert, Finance 3.1 http://www.waccexpert.com/

Phased Approach for development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1	1, 2, 3	3, 4	
Estimated CB & TA Costs (US$)	185,838	650,014	100,938	936,790
Estimated Capital Investment (US$)	-	1,500,000	0	1,500,000
Estimated GHG Mitigation (tCO2)	-	376	4,094	4,471
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				901

E4 – Promotion of Sustainable Procurement

No.	E4
Action Name	Promotion of Sustainable Procurement
Sub-Sector	Efficient Appliances
Context	Public procurement volume is a significant percentage of the national expenditure in Kiribati (around 55 % of GDP in 2016[70]) and hence it can influence the market towards energy efficient and low carbon products. In addition, by aggregating the requirements for low carbon products and services from Government facilities and if possible from larger private or non-governmental organisations within the country as well as aggregation between the PICs, and thereby procuring larger volumes of these labelled products, the Central Procurement Unit can get these products at a good bargain and thereby bring down the prices in the overall market for low carbon products and services. In parallel the consumers have to be informed and convinced of the fact that the cost of ownership of a low carbon product could be comparatively lower over its life cycle.

	Policy / Technical Assistance
Key Implementation Milestones	• The action would support the Central Procurement Unit for integrating sustainable procurement into existing public procurement rules and guidelines and preparing new sustainable procurement guidelines for high volume and high carbon intensity products going through Public Procurement. • It would also support cooperative procurement within the public procurement system and explore the possibility of doing the same with state owned enterprises, larger private organisation or with other public procurement in other PICS.
Outcomes	Primary Outcomes • 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 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 oi prices • This could lead to improvements in energy access
Mitigation Potential	1,215 tCO2/yr in 2030 and a total of 4,284 tCO2 for 2020 - 2030 (actual emission reductions during 2025-2030) • 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 existing annual public procurement volume with respect to GDP. Based on 2016 data for public procurement volume and GDP, it is estimated that public procurement accounts for around 60 % of GDP in Kiribati. • An assumption was made that sustainable procurement contributes to energy savings of 1 % per year of the national annual Primary Energy consumption (excluding transport). • National annual Primary Energy consumption was estimated and projected based on fuel distribution data of 2019 from KOIL and estimates for renewable energy in the SREP report[71]. From the estimated value of national annual Primary Energy consumption, transport related emissions was deducted assuming 95 % of petrol, 75 % of diesel, 15 % of kerosene and none of the LPG consumed, is used for transportation. These percentages were assumed to be the same as the estimates obtained for Fiji, by the consultants. • An emission factor (Tonnes CO2/TJ) for the overall economy for a particular year, was estimated based on the annual primary energy data (excluding transport related). This emission factor was used to estimate the GHG emission reduction for each year through the project intervention. • As the energy savings and GHG emission reductions from the procurement of construction, appliances and equipment would already be accounted for in other proposed projects for Standards and Labelling and on low energy/carbon buildings, to avoid duplication and double counting a conservative value of 1% emission reduction is assumed, of the 60 % of primary energy that is assumed to be influenced by public procurement
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. • 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. • Contributes to SDGs 7, 12, 13.
Investment Needs (US$)	Estimated capital investment needed for the physical implementation: - Investments not considered for this action, as the incremental investment needed for procuring more energy efficient products is expected to be borne by the Government of Kiribati. Estimated development costs: US$ 46,000 Enabling, Capacity Building and Technical Assistance: US$ 438,000

Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) OECD-DAC/CRS Purpose Code(s): 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	National Implementing Entity / Stakeholders: MISE, CPU-MOFED Potential Implementing Supporting Entity / Stakeholders: PCREEE-SPC, KCC, USP, National / International Consultants, Private Sector companies

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015);
	• Kiribati Climate Change Policy (issued 2018)
	  ○ Objective 1: Promote and enhance the transition towards renewable energy sources.
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through renewable energy ranging between 23 to 40 % in Kiritimati, Outer Islands and Tarawa.
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 year would be needed for the project / programme design Time needed for securing finance: 1 year to secure financing and international implementing / development partner assessments When would the project/investment start and end: 2022 to 2025 (4 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 MISE, CPU, KCC 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, for providing advisory support to procurers to implement sustainable procurement and cooperative procurement in routine public procurement actions and for conducting training programmes

Potential Business Model and Financing Strategy	No investment is included in this action. 90 % of the costs for the Technical Assistance and Capacity Building activities is expected from international donors and 10 % 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 action.
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 action, 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. 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.
Potential Financing and Need for Financial Support and/or Financial Instruments	Investments not considered for this action, as the incremental investment needed for procuring more energy efficient products is expected to be borne by the Government of Kiribati.
Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • 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 Financial Partners / Sources* • Grants for Technical Assistance & Capacity Building: **GEF, AU-DFAT, NZ-MFAT**, CTCN, **ADB,** GCF, **WB/IFC**, KOICA, CIDCA, EEAS, EIB, SIDA, UNDP, UNESCAP, UN Habitat, UNESCO, UNIDO, **UNEP**, DE-GIZ, JICA • Government Budget & Taxes Incentives: **GOK** *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$ 438,000 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$ 15,000) 2) Support the Central Procurement Unit 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$ 18,000) 3) Develop sustainable procurement guidelines for each key product category. (US$ 35,000) 4) As a capacity building activity, provide advisory support to procurers to implement sustainable procurement in procurement actions.(US$ 40,000) 5) Support cooperative procurement of low carbon products. (US$ 14,000) 6) Conduct 4 trainings on sustainable procurement. 20 to 30 participants each (US$ 208,000) 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	• Annual volume of energy efficient and low carbon products and services procured through Public Procurement • Annual public procurement volume • Annual volume of energy efficient and low carbon products and services that are covered through cooperative procurement agreements

Supporting References	• Kiribati Public Procurement Reform Program, Cabinet Concept Paper, MOFED, 2017 Kiribati 2016 Urban Household Electrical Appliances, Lights, and End-use Survey, UNDP, 2016. • Fuel distribution data provided by KOIL • Scaling up renewable energy programme (SREP) in low-income countries: Investment Plan for the Republic of Kiribati (issued 2018). • 2006 IPCC Guidelines for National greenhouse gas Inventories

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	1, 2, 3, 4, 5, 6, 7, 8		
Estimated CB & TA Costs (US$)	142,203	341,659	0	483,863
Estimated Capital Investment (US$)	0	0	0	0
Estimated GHG Mitigation (tCO2)	0	207	4,077	4,284
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				1,215

E5 – Utility Led Programme to Manage Peak Demand and Savings in South Tarawa

No.	E5
Action Name	Utility Led Programme to Manage Peak Demand and Savings in South Tarawa
Sub-Sector	Power
Context	Meeting peak demand is a challenge for PUB, and PUB is planning to procure new DG sets. The lack of reserve capacity is also a challenge for carrying out maintenance activities for the DG sets. The proposed action would help to control peak demand through various methods, including through the tariff, through demand side management (DSM) and demand response (DR) programmes.

	Policy / Technical Assistance	Investment Needs
Key Implementation Milestones	• The action would build the capacity of PUB and other stakeholders to conduct DSM as a long-term programme. To start with, the first phase of the DSM programme would focus on residential energy users alone and would be done in cooperation with other partners such as the product manufacturers, the Central Procurement Unit (Ministry of Finance and Economic development), retailers, financial institutions etc. This phase would focus on those appliances for which Standards and Labelling programmes are just being initiated and would be planned for in the future. It would include bulk procurement of energy labelled appliances with a higher energy performance rating, and mass distribution to consumers at discounted prices, and potentially along with on-bill financing[163] . This would help counter a potential increase in prices of these appliances through the Standards and Labelling programme and increase awareness of these appliances. By the time the Standards and Labelling programme is fully operational and effective, the first phase of the DSM programme can be gradually phased out, as the Standards and Labelling programme will by itself eliminate the low energy efficiency products from the market. As part of the DSM programme, an organisation needs to be identified to be responsible for the safe, offshore disposal of the old appliances that are required to be returned by residential consumers and technical assistance and capacity building support needs to be provided. • The DR programme[164] that would be supported will identify certain class of consumers and equipment's 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. The action would support PUB to build capacity on DR and PUB could launch it later on its own. • In terms of tariff revisions[165], introduction of demand charges (including a penalty if the demand crosses the contract maximum demand), time of day tariff[166] and power factor incentives/penalties are being proposed for specific classes of consumers. These will encourage end users to critically consider demand reduction measures.	• To introduce TOD tariff, PUB 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 needs to be made to facilitate the safe offshore disposal of old appliances that are returned by consumers as part of the DSM programme.

163 In this case, on-bill financing would involve repayment of loans by residential users for purchasing labelled appliances/products, by adjusting the loans against the electricity bill

164 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.

165 Though existing power factor of the grid is relatively high and the solar inverters and modern lighting products being introduced into the system in future will have inbuilt power factor compensation features, it would be advisable to introduce power factor incentives/penalties as many equipment's/products/appliances that lower power factor could also be introduced into the economy

166 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.

Outcomes	Primary Outcomes • GHG mitigation and lower carbon intensity of the economy • Significant reduction in peak demand in the grid in South Tarawa • Energy and cost savings for residential consumers • Lowering of energy intensity of the economy • PUB 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 oi prices • This will improve energy access
Mitigation Potential	6768 tCO2/yr in 2030 and a total of 33,028 tCO2 for 2020 – 2030 (actual emission reductions during 2025-2030) Only two aspects of this programme has been considered for estimating GHG emission reductions, Investments and funding requirements • Introduction of time of day (TOD) tariff • demand side management (DSM) programme Only the grid in South Tarawa has been considered for the estimates. 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** • Peak load and base load are considered at 5000kW and 3200kW respectively based on the daily load profile curve of PUB operated grid in South Tarawa. The difference between the peak load and base load is 1,800kW, which is the demand that needs to be optimized and reduced. • Based on past data, assumed that the commercial, government and industrial consumers contribute 59% of demand which corresponds to 1062 kW peak load contribution. • 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 and peak period is considered as 50% each of total. • 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 6-hour peak period, energy consumption during the peak period and tariff premium of 10% over off-peak tariff during the peak TOD zone. • There is no direct energy savings and corresponding GHG emission reductions due to the TOD tariff. There will be indirect energy savings and GHG emission reductions, due to steadier load on the diesel power plants and less start and stop cycles, however, these have not been estimated. **DSM programme** • The utility led DSM for residential sub-sector will reduce peak load demand from residential sub-sector and reduce energy consumption. • Based on data from the household energy survey data, the most significant appliances used in households have been considered: lights, fans, refrigerators, freezers and washing machines. • The scheme consists of PUB procuring energy efficient appliances in bulk (at a discount) and distributing it to consumers at a discount. Only consumers who return their old appliance to PUB, would be able to participate in this scheme. Due to the weak financial position of PUB, unlike typical DSM programmes, all expenses incurred would be reimbursed to PUB. • By this measure, there will be a peak demand savings, as well as energy savings. • It is assumed that 60% of peak power demand by residential sub- sector will be reduced.

Mitigation Potential	• The energy consumption by various appliances is estimated based on import volume from customs department, the results of Kiribati 2016 Urban Household Electrical Appliances, Lights, and End-use Survey and the proportion of the power demand of the residential sub-sector in the total power consumption. The historical stock of each appliance/product was taken as the total import volumes from 2016 to 2019. The annual import volume was assumed to be the average import volume from 2016 to 2019 and increasing annually in proportion to the existing population growth rate. The proportion of these appliance/products that might be used solely in the residential sub-sector was assumed to be in the same proportion as the residential sub-sectors contribution to the total power demand. • 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 find the total electricity consumption on which this energy saving % can be applied, the following method has been followed: Based on data available, the % of total electricity consumption that can be attributed to residential sub-sector has been taken as 41 % and 55 % of this has been considered for lights, fans, refrigerators and freezers. For washing machines, the entire stock has been attributed to the residential sector alone. • To estimate total investment, the investment per consumer/household is estimated as 5000 US$[167]. The number of residential consumers (no of private households) in South Tarawa during 2024 to 2034 was estimated using the household data from 2015 Population and Housing Census. World Bank estimates that 34.6 % of the population in Kiribati are poor[168], and it is assumed that the poor may not participate in the DSM programme. Hence, it is assumed that only 65 % of the private households would participate in the DSM programme. • The end user committing to the DSM programme would get a 35 % subsidy on the initial investment and 55 % would be provided as an interest free (or low interest) loan. The DSM programme assumes that the old inefficient or less efficient appliance/product would be replaced with an efficient appliance/product, whatever be the remaining life. Hence, the subsidy and the loan is provided for the whole investment need and not the incremental cost.
Co-benefits / SDG Linkages	• Resulting reduction in air pollution will lead to improved health outcomes • This will result in improved reliability and stability of power grid which will enable more economic activity, as well as non-productive uses of energy • Resulting improvement in energy access will especially benefit women and people living in remote areas • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure • Contributes to SDGs 7, 12, 13
Investment Needs (US$)	Estimated capital investment needed for the physical implementation[169]: US$ 41.5 million Estimated development costs: US$ 104,000 Enabling, Capacity Building and Technical Assistance: US$ 1.3 million
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) 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: MISE, PUB • Potential Implementing Supporting Entity / Stakeholders: KIT, PPA, PCREEE-SPC, KCC, KCAE, CPU-MOFED, National / International Consultants, Private Sector companies

167 Based on IMF data (IMF Data Mapper,, https://www.imf.org/external/datamapper/PCPIPCH@WEO/KIR) the average inflation for the last 10 year (2010 to 2019) for Kiribati was -0.32 and the average for the last 5 years was +0.32. It is being assumed that the historical average inflation might continue within this range and future prices may not be affected much by inflation.

168 Poverty and Equity Brief, East Asia and Pacific, World Bank, 2018

169 It is assumed that PUB or the Government of Kiribati will host and manage the DSM facility as in-kind contribution, and hence no cost has been added for its operating cost

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015);
	• Kiribati Climate Change Policy (issued 2018)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 to 1.5 years would be needed for the project / programme design Time needed for securing finance: 1 to 1.5 years to secure financing and international implementing / development partner assessments When would the project/investment start and end: The Technical Assistance and Capacity Building programme would be during 2022 to 2026 (5 years). The financing would run from 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 F below. B. Initiate discussions with PUB, MISE 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

Potential Business Model and Financing Strategy	3 separate interventions are involved under this action. These interventions would impact the end users and PUB. • Tariff revisions (Introduction of time of day (TOD) tariff and demand charges) • demand side management (DSM) programme • demand response (DR) programme. The introduction of TOU 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 PUB, as it will reduce or delay the investments that PUB needs to make in future for increasing power generation capacity to meet peak demand. It will also bring in additional revenue for PUB through the use of critical loads during peak period. Introduction of demand charges will provide additional revenue for PUB. It will encourage consumers to spread out their consumption, and will also have a similar impact as the TOU tariff. 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, a 35 % subsidy and 55 % of the initial investment is to be provided to households as an interest free (or low interest) loan. More than end users, PUB will be the main beneficiary of the DSM programme by cost savings through reduced or delayed investments that PUB needs to make in future for increasing power generation capacity. Hence DSM programmes are normally funded by the utility (PUB). However, considering the poor financial position of PUB, it is recommended that the DSM programme be funded by external donors. Under this opportunity it is suggested that all lending go through bulk importer / retailers, who have a consumer payment agreement with PUB. The low interest loans will need to be backed by a credit guarantee from an IFI. To lower the costs it is recommended that one or more bulk importers / retailers be used, and these retailers may need a low interest loan to cover the cost of import of goods, and this in turn may require a credit guarantee from an IFI. The demand response programme will require lower investments from PUB 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.
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	PUB, as the main electric utility, has to lead the DSM and DR programmes. Typically, PUB should provide financial incentives to end users to buy specific energy efficient appliances or equipment's promoted through the DSM programme. However, the financial condition of PUB might limit their ability to make the initial investments needed to initiate the DSM activity . To overcome this, the DSM programme would be designed similar to a typical DSM programme and led by PUB, but will be mostly funded by external donors. The DR programme will need better monitoring and communication infrastructure. The existing system will need to be upgraded for this. Both the DSM and DR programmes is a new activity for PUB and is complex to implement and monitor. This might appear like an added burden for already strained resources of PUB. The action will have to ensure adequate support by external consultants to ensure that PUB is not burdened by this activity
Financial Sustainability	The specific activities under this action deliver cost savings for the end user and PUB, which would cover the investments to be made. 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 will 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.

Potential Financing and Need for Financial Support and/or Financial Instruments	US$ 285,000 full grant funding to PUB to procure meters and software needed to convert to time of day tariff, as well as the annual maintenance fee for the software US$ 21.6 million as low interest loans for bulk importers and retailers participating in the programme and signing a contract with PUB and the financing facility set up by the action. The retailers need to pass on a discounted price to the consumers, and also agree to facilitate the take back of the old appliances. US$ 10.3 million as indirect subsidy equal to 25 % reduction in import duty of the energy efficient appliances being distributed through the DSM programme Financing to house owners from South Tarawa who join the DSM programme and return their old appliances.: • US$ 16 million as 35 % subsidy on the cost of appliances and products • US$ 25.2 million as interest free (or low interest) loan equal to 55 % of the cost of appliances and products. The loan repayments could be adjusted against the electricity bill (on-bill financing) and a contract needs to be signed between PUB and the financing facility set up by the action. Credit guarantees will likely be required to finance the lending above. An unquantified amount will be needed to fund the safe offshore disposal of old appliances that are returned by consumers as part of the DSM programme. An organisation needs to be identified to be responsible for the waste management
Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • **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 Financial Partners / Sources* • Credit Guarantee: **GCF, ADB, Supplier EXIM Banks**, EIB, **World Bank/IFC** • Loans: DBK, ANZ, **ADB**, EIB, **World Bank/IFC,** • Equity: PUB, **bulk importers, households (downstream of the finance)** • Non-Government Grants for investment: **GEF, GCF, World Bank/IFC**, EIB, CIDCA, KOICA, EEAS, AU-DFAT, NZ-MFAT • Grants for Technical Assistance & Capacity Building: **GEF, AU-DFAT**, NZ-MFAT, **CTCN, ADB, GCF**, **WB/IFC**, **KOICA, CIDCA**, EEAS, EIB, SIDA, **UNDP**, UNESCAP, UN Habitat, **UNESCO**, UNIDO, DE-GIZ, JICA • Government Budget & Taxes Incentives: **GOK** *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$ 1.3 million (includes 15 % overhead for Implementing Partner) 1) Design, development of the DSM and DR programme, and support for revision of tariff. (US$ 52,000) 2) Support for implementation of the DR programme and the first activity under the DSM programme. (US$ 38,000) 3) 2 Training programmes on DSM and DR programme development and implementation“, 2 days each. 20 to 30 participants. (US$ 67,000) 4) 6 half day awareness raising programme on DSM and DR programme development and implementation, half day each. 80 to 100 participants each. (US$ 254,000) 5) A TV and social media campaign to raise awareness. (US$ 46,000) 6) development of a guideline on DSM and DR programme development and implementation. (US$ 18,000) 7) Midterm and final evaluation of the DSM and DR programme. (US$ 29,000) 8) Set up and operate a financing facility (US$ 609,000)
Information and MRV Needs	• Energy saved during the project period and estimates till 2030 • Avoided demand during the project period and estimates till 2030Type and number of energy efficient appliances distributed • Number of trainees attending the training programmes and their evaluations • Number of people reached out through the awareness raising programmes and TV and social media campaigns

Supporting References	• Data provided by MISE and PUB on daily load curve, power generation, and power tariff • Import data from customs department • Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018). • Kiribati 2016 Urban Household Electrical Appliances, Lights, and End-use Survey, UNDP, 2016. • Poverty and Equity Brief, East Asia and Pacific, World Bank, 2018 • IMF Data Mapper , https://www.imf.org/external/datamapper/PCPIPCH@WEO/KIR • Energy Calculator, E3 Program, GEMS Regulator, Department of Industry, Science, Energy and Resources , Government of Australia https://www.energyrating.gov.au/calculator • 2006 IPCC Guidelines for National greenhouse gas Inventories

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, 7, 8	
Estimated CB & TA Costs (US$)	129,400	593,600	595,250	1,318,250
Estimated Capital Investment (US$)	0	6,507,669	35,023,179	41,530,848
Estimated GHG Mitigation (tCO2)	0	8,943	167,825	176,769
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				48,965

E6 – Capacity Building in Energy Efficiency in Industry

No.	E6	
Action Name	Capacity Building in Energy Efficiency in Industry	
Sub-Sector	Industry	
Context	There are very few industries in Kiribati[170] and there is very little information on them. The industries are small in size and the major ones are related to seafood processing/exports and copra processing. An effort is needed to gather information on the technology and the processes followed in these industries and their energy and environmental performance, based on which measures can be taken to address weaknesses and to encourage areas of strength.	
Key Implementation Milestones	**Policy / Technical Assistance** • The proposed action would support energy audits and the implementation of the recommendations in industries that commit to the action objectives. • The action would also help set up a certification system for energy auditors and energy managers and a system for collecting and reporting energy performance of industries.	**Investment Needs** • Investments needs to be made by the existing industries to retrofit their existing machinery to improve their energy efficiency. It is assumed that five industries would commit to this action.

170 assumed to be 5

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 MISE, 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 oi prices • This could lead to improvements in energy access
Mitigation Potential	1,143 tCO2/yr in 2030 and a total of 4,032 tCO2 for 2020 – 2030. • Presently 2 % of the total annual Primary Energy for the country is used in industry • It is assumed that through this action, around 25% of this energy use in industry can be reduced through energy efficiency and cogeneration projects. • It is assumed that there are 5 industries in Kiribati and that all of them would sign up to this action. • The retrofit cost is assumed to be $100,000 per industry • National annual primary energy consumption was estimated and projected based on fuel distribution data of 2019 from KOIL and estimates for renewable energy in the SREP report[171]. The energy saving (25%) was estimated on the annual energy consumption for industry (2% of annual Primary Energy consumption for the country) • An emission factor (Tonnes CO2/TJ) for the overall economy for a particular year, was estimated based on the annual Primary Energy data. This emission factor was used to estimate the GHG emission reduction for each year through the action intervention
Co-benefits / SDG Linkages	• Resulting reduction in air pollution will lead to improved health outcomes. • This will result in improved reliability and stability of power grid which will enable more economic activity, as well as non-productive uses of energy • Resulting improvement in energy access will especially benefit women and people living in remote areas • Improved operations and profitability of industries could lead to more job creation and more decent jobs • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure • Contributes to SDGs 7,9, 12, 13
Investment Needs (US$)	Estimated capital investment needed for the physical implementation[172]: US$ 500,000 for 5 industrial facilities Estimated development costs: US$ 58,000 Enabling, Capacity Building and Technical Assistance: US$ 450,000
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) 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; 32161 - Agro-industries
Implementing and Supporting Entities / Stakeholders	National Implementing Entity / Stakeholders: MISE Potential Implementing Supporting Entity / Stakeholders: USP, KCC, PCREEE-SPC, National / International Consultants, Private Companies/SOE's

171 Scaling up renewable energy programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).
172 It is assumed that the Government of Kiribati will host and manage the financing facility as in-kind contribution, and hence no cost has been added for the financing facility

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015);
	• Kiribati Climate Change Policy (issued 2018)
	  ○ Objective 1: Promote and enhance the transition towards renewable energy sources.
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through renewable energy ranging between 23 to 40 % in Kiritimati, Outer Islands and Tarawa.
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018)

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 to 1.5 years would be needed for the project / programme design Time needed for securing finance: 1 to 1.5 years to secure financing and international implementing / development partner assessments When would the project/investment start and end: The Technical Assistance and Capacity Building, as well as the financing would occur during2022 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 D below. B. Initiate discussions with MISE, KCC 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. D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.
Potential Business Model and Financing Strategy	Industries in Kiribati are reported to be relatively small and there are only a few of them, though they do contribute to around 15 to 20 % of the overall power consumption and their consumption of thermal energy is not known. Though the energy related data is not available, considering the status of energy efficiency in Kiribati, it is assumed that there will be significant energy saving opportunities. Any investments are also likely to pay back as the electricity tariff for industry is the highest, 75 % higher than that for domestic users. However, the retrofits require upfront investment to be made which will be a burden and discourage industries to commit to the programme. To overcome this, interest free (or low interest) loan of 60 % of the total investment needed can be provided to the industry committing to the programme. 90 % of the loan could come from international donors and inline with the NDC commitment, Government of Kiribati could contribute 10 %.
Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	No information is available on energy use and performance inside industry and this is the major challenge. As part of the action, a survey would be conducted, and recommendations provided for an effective data collection system

Financial Sustainability	The industrial sector and the private sector in general are reported to be limited in Kiribati due to various reasons, and this situation might not change during the period of the action intervention. They may have limited ability to finance the larger initial investments needed, though the cost savings will pay back investments. The market for energy efficiency in industry in Kiribati is also small to attract larger or overseas private sector investments in it. 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	US$ 300,000 as low interest loans for retrofits and investments in 5 industrial facilities, which is 60 % of the investment needed. Industries would provide the 40% in equity. GOK would provide corporate tax incentives / credits for industry to recover part of the investments of at least 10%.
Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • 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 Financial Partners / Sources* • Credit Guarantee: **GCF, ADB, Supplier EXIM Banks**, EIB, **World Bank/IFC** • Debts and Loans: DBK, ANZ, **ADB**, EIB, **World Bank/IFC** • Equity: **private sector companies, SOE** • Non-Government Grants for investment: **GCF, GEF**, AU-DFAT, NZ-MFAT, WB/IFC, EIB, CIDCA, EEAS, KOICA • Grants for Technical Assistance & Capacity Building: **GEF**, AU-DFAT, NZ-MFAT, **CTCN**, **ADB, GCF, WB/IFC**, KOICA, CIDCA, EEAS, EIB, SIDA, **UNDP**, UNESCAP, UN Habitat, UNESCO, **UNIDO**, DE-GIZ, JICA • Government Budget & Taxes Incentives: MOFED *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$ 450,000 (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$ 42,000) 2. Conduct detailed energy audit of these energy intensive equipment in 5 facilities in Kiribati, prioritised based on the national survey, as well as study the potential for cogeneration. (US$ 80,000) 3. Provide advisory support to support the implementation of viable recommendations for the equipment that were studied (US$ 46,000) 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$ 21,000) 5. Conduct 4 training programmes on energy efficiency in industry. 4 days each. 20 to 30 participants (US$ 158,000) 6. Support development of a system for reporting and aggregating energy data from medium sized and large Industry (US$ 46,000)
Information and MRV Needs	• Energy consumed by industrial sector in each year • Energy consumed each year by the larger industrial units, per unit of output • Number of certified energy auditors • Number of certified energy managers • Number of industries that have conducted energy audits once every 2 years • Number of trainees attending the training programmes and their evaluation of the training
Supporting References	• Data provided by MISE and PUB on power tariffs • Fuel distribution data provided by KOIL • Scaling up renewable energy programme (SREP) in low income countries: Investment plan for the Republic of Kiribati (issued 2018). • 2006 IPCC Guidelines for National greenhouse gas Inventories

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	3, 5	
Estimated CB & TA Costs (US$)	90,322	350,931	66,530	507,783
Estimated Capital Investment (US$)	0	500,000	0	500,000
Estimated GHG Mitigation (tCO2)	0	195	3,837	4,032
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				1,143

E7 – Capacity Building in the Assessment, Design and Construction of Low Energy/ Carbon Buildings

No.	*E7*	
Action Name	Capacity Building in the Assessment, Design and Construction of Low Energy/Carbon Buildings	
Sub-Sector	Buildings	
Context	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 bioclimatic design of buildings, energy efficiency of electro-mechanical systems and thermal energy, and essential understanding of building physics. At present this is absent in Kiribati. The policy and regulatory tools to support energy efficiency in buildings have also not been developed.	
Key Implementation Milestones	**Policy / Technical Assistance**	**Investment Needs**
	The proposed action would • build capacity of professionals for the design and construction of energy efficient buildings, through training programme and academic courses. • develop a certification programme for building energy assessors. • develop guidelines on energy efficiency in buildings for different building typologies. • and support the development of key policy tools such as a mandatory energy efficiency building code (EEBC) and a voluntary green building rating system.	• End users committing themselves to construct or retrofit their buildings to meet the standards set by the energy efficiency building code or the green building rating system, would have to make investments and the action would support them financially. Approximately 1000 households and 25 government buildings are anticipated to conduct such retrofits.

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	518 tCO2/yr in 2030 and a total of 1,700 tCO2 for 2020 – 2030 • This program impacts all buildings, but to avoid double counting of benefits, 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 • 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 2015 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. In 2015, only 25 % of the total houses were of permanent type and it was assumed that annually there would be an increase of 2 % in the number of permanent houses. Assumed that 2 % per year of these existing permanent houses would upgrade themselves during 2025 to 2030 to meet the requirements of the EEBC (mandatory) and/or the Green Building rating system (voluntary). • It is assumed that there are a total of 80 medium to large government buildings. Out of these, it is assumed that around 5 % would upgrade themselves per year (4 per year, total 24) during the period 2025 to 2030. • The total investment per house to make them meet the requirements of the EEBC or the rating system was assumed to be 5,000 US$ of which 2,500 US$ is assumed to be the incremental cost. The investment for conversion of Government buildings is assumed to be US$ 50,000 per building, of which US$ 25,000 is assumed to be the incremental cost. • Also, it is assumed that each of the private houses that would upgrade themselves, would achieve 15 % reduction in specific energy consumption (kWh/m2/year) 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 (t CO2eq). • Since buildings in Kiribati 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. This might result in a slight overestimation of cost of energy saved, as Government buildings have the same power tariff as industrial consumers which is the highest tariff for all types of consumers.
Co-benefits / SDG Linkages	• 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 • Contributes to SDGs 7, 12, 13

Investment Needs (US$)	Estimated capital investment needed for the physical implementation: 11.5 million US$ Estimated development costs: US$ 92,000 Enabling, Capacity Building and Technical Assistance: US$ 1.2 million
Rio Marker and CRS Purpose Code(s)	Rio Marker: Principle (2) 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: MISE • Potential Implementing Supporting Entity / Stakeholders: USP, PCREEE-SPC, National / International Consultants
Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015); • Kiribati Climate Change Policy (issued 2018) o Objective 1: Promote and enhance the transition towards renewable energy sources. o Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available. o Objective 3: Increase energy conservation and energy efficiency on both the supply and demand. • Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019) o Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency • Kiribati 20-Year Vision (issued 2016) o Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20 • Kiribati development Plan 2016-19 (issued 2016) o Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas • Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018) o Key Priority Area 6: Infrastructure • Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017) o KIER target for reduction of fossil fuel consumption by 2025 through renewable energy ranging between 23 to 40 % in Kiritimati, Outer Islands and Tarawa. o KIER target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa • Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 to 1.5 years would be needed for the project / programme design Time needed for securing finance: 1 to 1.5 years to secure financing and international implementing / development partner assessments When would the project/investment start and end: The Technical Assistance and Capacity Building programme would be during 2022 to 2026 (5 years). The financing would run from 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 MISE 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.
Potential Business Model and Financing Strategy	Household sizes (in terms of area) are mostly small in Kiribati. Their energy intensity is also low[173], as individual ownership of air-conditioners is very low. The energy saving potential is thus low compared to hotels and commercial buildings or government buildings. In addition, the average domestic electricity tariff is 38 % lower than the average commercial tariff and 75 % lower than the tariff for Government buildings. Also, retrofitting a building into an energy efficient one 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 would 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 PUB 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 would receive financial incentives through this programme and comply with the EEBC and/or meet the green building rating scheme requirements, would 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 would commit to retrofit their buildings. The role of the private sector is also limited in Kiribati due to various reasons, and this situation might not change during the period of the action intervention. Hence, the incremental cost for the retrofits for households could be provided as interest free (or low interest) loan, which is assumed to be US$ 5000 per building. Government buildings are more energy intensive than households as a portion of these buildings use air-conditioners. Government buildings pay an average power tariff at the same rate as industrial users which is 75 % more than the average domestic tariff and 30 % more than the average commercial power tariff. However, compared to hotels and commercial buildings, the time of usage might be lower. Hence the investments made in Government buildings are likely to pay back faster compared to that of individual households. 100 % of the total cost of the retrofit for Government buildings could be provided as subsidy, which is assumed to be 50,000 US$ per building. In line with Kiribati's NDC commitments, it is assumed that the Government would fund only 10% of the incremental cost for this financial support and the remaining is expected to be subsidized through international donors

173 For the purpose of this project, the energy consumption of buildings only considers those aspects of energy consumption in buildings that can be managed through building design, such as energy used for space conditioning (by reducing cooling load and improving natural ventilation) and artificial lighting (through improved daylighting). Thus the consumption of energy through other appliances are not considered, and they are addressed through projects E4, E7 and E8

Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	For the training to be effective, ideally engineering and architecture graduates need to be trained. However, there are not many engineers, and especially architects in Kiribati. Hence, the design of the training needs to take this into account and adapt it to suit less qualified trainees. 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 which is suitable for Kirbati, 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	In the short term, the cost benefits of retrofitting a house is not very attractive. However, it is important that households are retrofitted for energy efficiency for few reasons: • The percentage of permanent houses is very low (around 25 % in 2015). More houses would be converted to permanent houses 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 PUB 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 would receive financial incentives through this programme and comply with the EEBC and/or meet the green building rating scheme requirements, would 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. For the current conditions in Kiribati, where energy efficiency has no foothold in the market and the private sector is very weak, the focus could be on risk reduction measures (through the Technical Assistance and Capacity Building measures), subsidies and interest free (or low interest) loans. In the longer run, through the capacity built through the proposed action and other interventions, the Government of Kiribati, with the support of a revitalised private sector, is expected to fund any future investments needed to continue improving the energy and carbon performance of the construction sector. In the future, more traditional financing products and mechanisms could be offered, along with risk transfer mechanisms. The Technical Assistance and Capacity Building being provided would help ensure better design, procurement, installation, operation and maintenance of the diesel power plants, thereby improving the energy efficiency and life of the assets and reducing the operating costs. It would also help increase the volume and attractiveness of financing products available for energy efficiency in diesel power plants, by reducing the real and perceived risks associated with financing such measures
Potential Financing[174] and Need for Financial Support and/or Financial Instruments	• US$ 5.2 million as grant for 1034 households, which represents the incremental cost for retrofitting the houses, equal to approx. 50% of the investment. • US$ 5.1 million as equity from 1034 households, equal to approx. 50% of the investment. • US$ 1.2 million as full subsidy for the total investment for 24 government buildings. • Taxation incentives to lower the cost of energy efficient materials.
Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • Project Planning, Development & Design: **SPC, UNDP**, GIZ, **GGGI, NDC-Hub, ADB**, IUCN, CTCN, PRIF, **World Bank/IFC** • Project Implementation & Management: **SPC, UNDP**, GIZ, GGGI, NDC-Hub, **ADB**, IUCN, CIDCA, **World Bank/IFC** Potential Financial Partners / Sources* • Equity: **Households / Persons** • Non-Government Grants for investment: **GEF, GCF, ADB,** AU-DFAT, NZ-MFAT, **World Bank/IFC**, EIB, CIDCA, KOICA, EEAS • Grants for Technical Assistance & Capacity Building: **GEF, GCF, AU-DFAT**, NZ-MFAT, GIZ, CTCN, **ADB**, KOICA, **UNDP, UNIDO**, EEAS, **World Bank/IFC, UNESCO**, UN Habitat • Government Budget & Taxes Incentives: GOK *This is not a comprehensive list, other entities are possible as well.

174 It is assumed that the Government of Kiribati will host and manage the financing facility as in-kind contribution, and hence no cost has been added for the financing facility

Enabling, Capacity Building and Technical Assistance Needs	Enabling, Capacity Building and Technical Assistance: US$ 464,000 (includes 15 % overhead for Implementing Partner) 1) 4 Training programmes on "Low Carbon Buildings: Design, construction, operation and assessment", 4 days each. 20 to 30 participants (US$ 208,000) 2) development of a module on "Low Carbon Buildings: Design, construction, operation and assessment" to be integrated into existing courses in USP and to be provided as a stand-alone short-term course. (US$ 23,000) 3) Develop a guideline on low Carbon building design and construction for different building typologies. (US$ 47,000) 4) development of the energy efficiency building code by integrating the essential minimum requirements for energy efficiency in buildings into the existing building code. (US$ 47,000) 5) Support development of a voluntary green building rating system, including identification of a host institution to administer it . (US$ 47,000) 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$ 33,000)
Information and MRV Needs	• % of new constructions per year that comply with the energy efficiency building code • Number of existing and new buildings per year that have applied for a Green building rating • Number of existing and new buildings per year that have obtained a higher Green building rating • Specific energy consumption of different types of buildings (kWh/m2/year) • Total number of certified building energy assessors in the country • Number of trainees attending the training programmes and their evaluation of the training
Supporting References	• Data provided by MISE and PUB on power generation and power tariff • Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018). • 2006 IPCC Guidelines for National greenhouse gas Inventories

Phased Approach for development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	4, 5	1, 2, 3, 4, 5, 6, 7	1, 4, 7	
Estimated CB & TA Costs (US$)	133,720	541,427	580,653	1,255,800
Estimated Capital Investment (US$)	0	3,340,000	8,200,000	11,540,000
Estimated GHG Mitigation (tCO2)	0	75	1625	1700
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				518

E8 – Promotion of Li Ion Battery for Renewable Energy Storage Instead of Lead Acid

No.	E8
Action Name	Promotion of Li Ion Battery for Renewable Energy Storage Instead of Lead Acid
Sub-Sector	Power
Context	The existing variable renewable energy (VRE) based power in Kiribati is around 2 MWp, with around 1.57MWp concentrated in South Tarawa. There remains a significant untapped potential to scale up the use of renewable energy for power generation—about 554 MWp of solar and 1.1 MWp of wind potential. A key barrier for further expansion of VRE based power is reported to be storage capacity. Currently energy for off-grid VRE based individual power projects is stored using lead acid batteries. The use of lead acid batteries for individual power projects is expected to rise in the future, in line with the increased deployment of VRE based power being targeted by the Government in its long-term plans and targets. In the future, batteries can also be installed on a larger scale by the utility to smoothen the variability and vulnerability to the grid created by the increased usage of VRE based power and this could further increase the use of lead acid batteries. However, in terms of energy consumption and investment requirements, Li Ion battery has several advantages over lead acid battery. It is more efficient which reduces energy lost in storage and conversion. It has longer life which reduces the replacements required and the investment needs over a period. It also has a higher depth of discharge 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 than lead acid batteries, but the cost is predicted to lower steeply in the near future. However, a natural transition to 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.
Key Implementation Milestones • **With the aim to develop the market for Li Ion battery in both on-grid and off-grid applications, the proposed action would support policy and market assessments, necessary revisions to the policy and regulatory framework, training and awareness raising programmes, and implementation of demonstration projects.**	**Policy / Technical Assistance** • Investment is needed 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 PUB. • Investment is also needed for 2 demonstration projects. **Investment Needs** • Investment is needed 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 PUB. • Investment is also needed for 2 demonstration projects.
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 Kiribati • 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 PUB 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 oi prices

Mitigation Potential	50 tonnes CO2eq/year in 2030 and a total of 269 tCO2 for 2020 – 2030 (actual emission reductions during 2025-2030) • The solar off grid capacity was around 500 kWp in 2019, and its 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 battery and Li Ion battery, based on which mitigation potential and investment requirements were estimated. • The BAU assumes that all storage from 2020 to 2030 would be through lead acid battery. The Alternate Scenario assumes that all storage from 2025 onwards will be through Li Ion. • Battery storage capacity was assumed as 20% of daily solar off-grid generation. The capacity requirements are projected on YoY growth factor of 5%. • Energy storage requirement and the incremental investment needs for Li Ion is estimated separately for the solar off grid capacity for households, commercial buildings and government buildings. • 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 85% and 95% 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. • Weighted average cost of electricity supply was estimated as 0.438 US$/kWh, and the tariff for domestic and commercial consumers was 0.274 and 0.377 US$/kWh. • The overall grid emission factor is estimated as 0,680 TCO_2 / MWh. • Cost of lead acid battery was assumed as 480 US$/kWh, and Li-Ion battery as 960 US$/kWh.
Co-benefits / SDG Linkages	• Resulting reduction in air pollution will lead to improved health outcomes • This will result in improved reliability of power grid which will enable more economic activity, as well as non-productive uses of energy • This will improve energy access, especially benefiting 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 • Contributes to SDGs 7, 12, 13
Investment Needs (US$)	Estimated capital investment needed for the physical implementation: US$ 1 million Estimated development costs: US$ 81,000 Enabling, Capacity Building and Technical Assistance: US$ 985,000
Rio Marker and CRS Purpose Code(s)	Rio Marker: Significant (1) OECD-DAC/CRS Purpose Code(s): 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	• National Implementing Entity / Stakeholders: MISE, PUB • Potential Implementing Supporting Entity / Stakeholders: KIT, PPA, PCREEE-SPC, MOFED, USP, National / International Consultants, Private Sector companies

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015);
	• Kiribati Climate Change Policy (issued 2018)
	  ○ Objective 1: Promote and enhance the transition towards renewable energy sources.
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand.
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency
	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through renewable energy ranging between 23 to 40 % in Kiritimati, Outer Islands and Tarawa.

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 year would be needed for the project / programme design Time needed for securing finance: 1 to 1.5 years to secure financing and international implementing / development partner assessments When would the project/investment start and end: The Technical Assistance and Capacity Building would happen during 2022 to 2025 (4 years). The financing would be done during 2025 to 2030. **Immediate steps (next 12 months) under this opportunity include:** 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 PUB and MISE 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.
Potential Business Model and Financing Strategy	Three major user groups were identified for the Li Ion battery: Households, commercial buildings/hotels and the Utility (PUB). All three 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 will be needed for developing a proper system for safe disposal of Li Ion battery 90 % of the loan and the subsidy could be funded by international donors. The Government of Kiribati could fund the remaining 10 % in line with NDC commitments. This 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.

Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	Li Ion is a new technology for Kiribati 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. The higher initial investment needed for Li Ion will be a barrier and innovative financing schemes need to be developed to overcome this. 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. To ensure that the end of life disposal of Li Ion is done properly, the Special Fund (Waste Materials Recovery) Act 2004 could be extended to cover Li Ion battery also and a waste management levy could be applied to imports of Li Ion
Financial Sustainability	PUB is reported to be in a financially weak position and at present may have limited ability to finance the larger initial investments needed for Li Ion battery systems (though it could be recovered through cost savings over the life time and through the avoided costs in generation infrastructure) or to handle more complex project implementation mechanisms. The role of the private sector is also limited in Kiribati due to various reasons, and this situation might not change during the period of the action intervention. Hence, at this initial stage of market development for Li Ion battery, no more complex financing mechanisms are being proposed. The financial sustainability of the action will be strengthened through the Technical Assistance and Capacity Building being provided, ensuring better design, procurement, installation, operation and maintenance of Li Ion battery systems, thereby increasing the energy efficiency and life of the assets, and reducing the operating costs. In the longer run, through the capacity built through the proposed action and other interventions, PUB and private companies are expected to improve their financial and operational capacity with respect to Variable renewable energy storage and fund any future investments needed to replace existing storage capacity or install additional storage capacity. It will also help increase the volume and attractiveness of financing products available for Energy Efficient products such as Li Ion battery, by reducing the real and perceived risks associated with financing such measures.
Potential Financing and Need for Financial Support and/or Financial Instruments	To cover the cost for replacing lead acid battery with Li Ion battery: • A grant of US$ 147,000 (equal to 35 % of initial investment) and interest free (or low interest) loan of US$ 231,000 (equal to 55 % of initial investment) would be provided for households installing Li Ion battery. • A grant equal of US$ 50,000 (equal to 20 % of initial investment) and interest free (or low interest) loan of US$ 172,000 (equal to 70 % of initial investment) would be provided for private companies installing Li Ion battery. • For the Utility (PUB), 100 % of the incremental cost needed for Li Ion Battery installations would be subsidized which is equal to US$ 286,000 (the difference in total initial investment needed for Li Ion battery compared to that for lead acid battery). **Other** • An unquantified amount is needed for safe disposal of Li Ion batteries till 2030 and for developing a waste management system. This can be fully or partly funded through the existing waste management levy • A credit guaranty would likely be required to finance the lending above

Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • 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 Financial Partners / Sources* • Credit Guarantee: **GCF, ADB, Supplier EXIM Banks**, EIB, **World Bank/IFC** • Debts and Loans**:** DBK, ANZ, **ADB**, EIB, **World Bank/IFC** • Equity: PUB, households, communities • Non-Government Grants for investment: **GEF, GCF**, **ADB**, AU-DFAT, NZ-MFAT, **World Bank/IFC**, EIB, CIDCA, **KOICA**, EEAS • Grants for Technical Assistance & Capacity Building: **GEF, GCF, DFAT**, GIZ, CTCN, ADB, **KOICA**, IEA, **UNDP, UNIDO**, EEAS, **World Bank/IFC**, • Government Budget & Taxes Incentives: GOK *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$ 985,000(includes 15 % overhead for Implementing Partner) 1) 4 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. 20 participants.(US$ 143,000) 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 KIT. (US$ 14,000) 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 KIT. (US$ 24,000) 4) Conduct of a market study on how to develop the market for Li Ion battery in Kiribati. (US$ 30,000) 5) development and implementation of 2 demonstration projects in Kiribati. (US$ 37,000) 6) Set up and operate a financing facility (US$ 609,000)
Information and MRV Needs	• % of Li Ion storage capacity out of total storage capacity for VRE based power in Kiribati • Number of trainees from relevant organizations and their evaluation reports • Commissioning reports of the demonstration projects
Supporting References	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017); • Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018). • Data provided by MISE and PUB on solar PV installed capacity and power tariff. • Pacific Energy Update 2019. ADB • 2006 IPCC Guidelines for National greenhouse gas Inventories • IMF Data Mapper , https://www.imf.org/external/datamapper/PCPIPCH@WEO/KIR

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, 6	6	
Estimated CB & TA Costs (US$)	145,577	413,630	506,383	1,065,590
Estimated Capital Investment (US$)	0	804,057	222,146	1,026,204
Estimated GHG Mitigation (tCO2)	0	39	229	269
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				50

E9 – Programme on Efficient Operation and Maintenance of Diesel Power Plants

<table>
<tr><td>No.</td><td colspan="2">E9</td></tr>
<tr><td>Action Name</td><td colspan="2">Programme on Efficient Operation and Maintenance of Diesel Power Plants</td></tr>
<tr><td>Sub-Sector</td><td colspan="2">Power</td></tr>
<tr><td>Context</td><td colspan="2">Diesel power plants are the major source of power in Kiribati, with 6.85 MW of installed capacity, of which 5.45MW are medium speed engines (e.g. DG sets) and 1.4 MW are High Speed engines. Its high dependence on imported diesel for power exposes Kiribati to fluctuating fuel prices and contributes to one of the highest costs of generation in the Pacific of US$ 0.36/kWh against the average of US$ 0.32/kWh.
The performance of the DG sets have also been reported to be poor over time. The existing specific fuel consumption figure is 3.58 kWh/litre, which is quite low compared to an average of 4 kWh/litre (2018 data) among the utilities in the PICS. Often key maintenance activities have been delayed due to the higher cost of maintenance which depends on overseas expertise, as well as due to the lack of spare generation capacity.
A capacity building programme would help to ensure long term improvement in terms of system design, installation, operation and maintenance practices and systems. It is suggested to include a comprehensive performance assessment as a starting activity, and PUB would need support at different levels to implement all the measures identified.</td></tr>
<tr><td>Key Implementation Milestones</td><td>Policy / Technical Assistance
Energy audits of PUB owned diesel power plants.
Technical advisory support for implementing recommendations of the energy audit.
Conduct a study for development of policy incentives for DG set owners to reduce use of diesel and to shift to cleaner alternatives.
Training programmes on the enhanced installation and efficient operation and maintenance of DG sets, and developing vocational training courses to support long term sustainability of know-how present in Kiribati.</td><td>Investment Needs
This would include the investment by PUB for retrofitting their existing diesel power plants to bring them to a higher level of energy efficiency.
It also includes the incremental cost to ensure that new diesel power plants being installed by PUB before 2030 are energy efficient.</td></tr>
<tr><td>Outcomes</td><td colspan="2"><u>Primary Outcomes</u>
GHG mitigation and lower carbon intensity of the economy
Improved energy efficiency for the PUB owned diesel power plants, in terms of Specific Fuel Consumption.
Lower energy intensity of the economy
Improved maintenance and capacity availability of PUB owned diesel power plants.
Capacity built and awareness raised of PUB and other key institutions and stakeholders on the efficient operation and maintenance of diesel power plants
Improved profitability for PUB
Improvement in reliability and stability of power grid
Delayed or avoided investments in power and oil infrastructure
<u>Secondary Outcomes</u>
Reduced air pollution due to reduced supply and use of petroleum products
Reduced import bill for the country, thereby improving macro-economic conditions
Improved energy security, less disruptions to oil imports and less impacts due to increases in international oi prices
This will improve energy access
Improved adherence to grid code and power quality (voltage, harmonics, power factor)</td></tr>
</table>

Mitigation Potential	1,627 tCO2/yr in 2030 and total 8,669 tCO2 during 2020 – 2030 (actual emission reductions during 2025 to 2030) • Used the annual values of Electrical Generation (MWh) and Fuel Consumption (kL) for previous years and their GHG emissions (Tonnes of CO_2eq) and the existing specific fuel consumption(kWh/L) was estimated as 3.58 kWh/Litre. • Electricity demand growth rate is considered as 5% per year. • Additional capacity of DG set needs to be installed periodically due to increase in demand. This additional capacity to be installed periodically is estimated assuming that the DG sets would operate at a maximum plant load factor of 80%. • Annual fuel savings and GHG emission reductions were estimated for future years assuming an annual reduction of 5% in the specific fuel consumption due to the action activities (current and target specific fuel consumption 3.58 and 3.76 kWh/Litre respectively). Assumed an investment of 1 million US$ during this period to retrofit the existing diesel power plants to bring about this performance improvement, which is approximately 10 % of the initial investment requirement for a new power plant with equivalent capacity. In addition, the incremental cost (280,000 US$) would be provided for new capacity that will be added before 2030, to ensure that energy efficiency features are considered.
Co-benefits / SDG Linkages	• Reduced air pollution will lead to improved health outcomes • Improved reliability and stability of power grid could enable more economic activity, as well as non-productive uses of energy • This will improve energy access, which will especially benefit women and people living in remote areas • Due to reduced need of petroleum imports, more spare capacity in marine transport and port infrastructure and avoided or delayed investment in marine transport and port infrastructure • Contributes to SDG 3,7, 11
Investment Needs (US$)	Estimated capital investment needed for the physical implementation: US$ 1.3 million Estimated development costs: US$ 46,000 Enabling, Capacity Building and Technical Assistance: US$ 346,000
Rio Marker and CRS Purpose Code(s)	Rio Marker: Significant (1) OECD-DAC/CRS Purpose Code(s): 23110 - Energy policy and administrative management; 23181 - Energy education/training; 23183 - Energy conservation and demand-side efficiency; 23330 - Oil-fired electric power plants
Implementing and Supporting Entities / Stakeholders	National Implementing Entity / Stakeholders: MISE, PUB Potential Implementing Supporting Entity / Stakeholders: • KIT, PPA, PCREEE-SPC, MOFED, USP, National / International Consultants, Private Sector companies

Link to Existing Policy / Plan	• The climate change mitigation targets under Kiribati's Nationally Determined Contribution (issued 2015);
	• Kiribati Climate Change Policy (issued 2018). Strategic Priority on Energy Security (section 6.4)
	  ○ Objective 2: Strengthen the technical and institutional capacities of the energy sector using the most innovative technologies available.
	  ○ Objective 3: Increase energy conservation and energy efficiency on both the supply and demand
	• Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 (issued 2019)
	  ○ Strategy 9: Promoting the use of sustainable renewable sources of energy and energy efficiency

Link to Existing Policy / Plan	• Kiribati 20-Year Vision (issued 2016)
	  ○ Pillar 3: Infrastructure for development, Improving Access to Utility and Social Infrastructure, Energy as a foundation of the KV20
	• Kiribati development Plan 2016-19 (issued 2016)
	  ○ Goal 6: To improve access to quality climate change resilient infrastructure in urban and rural areas
	• Kiribati Voluntary National Review and Kiribati development Plan - Mid-Term Review (issued 2018)
	  ○ Key Priority Area 6: Infrastructure
	• Kiribati Integrated Energy Roadmap 2017-2025 (issued 2017)
	  ○ KIER target for reduction of fossil fuel consumption by 2025 through energy efficiency ranging between 20 to 22 % in Kiritimati, Outer Islands and Tarawa
	• Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati (issued 2018).

General timeline for development, Financing, Implementation, and Operation	Time needed for development: 1 year would be needed for the project / programme design Time needed for securing finance: 1.5 to 2 years to secure financing and international implementing / development partner assessments. When would the project/investment start and end: The Technical Assistance and Capacity Building would happen during 2022 to 2025 (4 years). The financing would be done during 2024 to 2029 **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 PUB and MISE on the scope for the energy and performance audits of PUB facilities, and the specific diesel power plants to be covered. Discuss also specific capacity building needs to be addressed. C. Develop the terms of reference for hiring experts for conducting training programmes and for conducting energy and performance audits of PUB facilities. D. Enter into discussions with supporting agencies for primary investment financing and state budget allocations.
Potential Business Model and Financing Strategy	There are two major groups of DG set users: PUB, who owns larger DG sets, and private owners of DG sets (commercial buildings, Industry, households) with smaller DG sets. The focus of the action is to support improvements to the diesel power plants owned by PUB. No support is proposed for private owners for replacing or improving their DG sets, as a better option would be to replace it with solar PV. Accelerating the market development for solar PV will indirectly help the replacement of smaller and inefficient DG sets. Raising import duty on small and inefficient DG sets could also discourage their use and also could help the Government fund the NDC project pipelines. The financial position of PUB is reported to be very weak. Hence only grants have been considered for all retrofits being proposed for PUB diesel power plants. US$ 1 million is considered as full funding for PUB for all retrofits needed during the project period to make the PUB owned diesel power plants more energy efficient. However, PUB also would need to add some capacity periodically to ensure that the system is not overloaded (assuming a maximum plant load factor of 80 %, around 1000 kW new capacity is to be added before 2030). The investment for this 1000 kW is expected to be 1.7 million US[175]. The action would fund the incremental cost (US$ 280,000) for this new capacity addition.

175 Assumed US$ 1680/kW overnight cost for a diesel power plant with all energy efficiency features and 1400/kW for a normal diesel power plant

Gaps & Barriers to Implementation, Including Proposed enabling mechanisms	Obtaining data of the performance of DG sets is a challenge at present, which is an important starting point to design any performance improvement programme. The action would be designed so that the activities will be led by PUB so that they take ownership of the initiative and consider the activities as a support for improving their operations rather than a set of externally imposed activities. In most DG sets, common reason for underperformance of the system are the poor performance of the cooling system, the lack of heat recovery systems or their poor performance, problems created due to improper installation such as backpressure imposed on the DG set or suction of hot/less dense air, improper air fuel ratio, improper storage of the diesel etc. Based on the performance report of the DG sets owned by PUB, some of these are likely to be present and no detailed investigation have been conducted yet. Underloaded DG sets can be inefficient, while overloading can lead to reduced life or maintenance problems. There are also retrofits possible that can increase the capacity or efficiency of these DG sets. These needs to be investigated through a detailed energy audit, which would be carried out through the action. Another key reason for underperformance of DG sets or any machinery is the maintenance practices. PUB assets have traditionally been sub-contracted for maintenance, however financial issues have delayed the major maintenance of DG sets affecting the performance and remaining life. The issue has become highly critical with even the cooling systems of some of the DG sets not functioning and temporary arrangements being made to operate it. Long delays have also been reported in the supply of spares. Another reason for the lack of maintenance has been the lack of reserve capacity that is needed to stop the machines for maintenance. It is crucial to develop in house capacity to do proper maintenance and to sub-contract major repairs only. Especially preventive and computerised maintenance practices will ensure that breakdown and unplanned maintenance is reduced and an inventory of critical spares are maintained. Condition based maintenance techniques also allows scientifically testing and predicting the time that the machine can run till a stoppage is needed for maintenance and meanwhile to do essential maintenance without stopping it, and thereby extending the time between machine stoppage. As government staff are few and burdened with their tasks, there is the risk of diluted commitment from them or less relevant personnel being nominated for the training. To overcome this, the training will be directly linked to the actual development and implementation of improvements at PUB facilities and in other facilities, which would make the training directly relevant for the trainees and ensure their commitment. There is the risk that the trainees shift jobs or move out of the country and then the capacity that was built is lost to the country. Hence, the training needs to be institutionalized at the national level. As part of the action, the capacity would be institutionalized at KIT and a module will be developed on the topic to be offered as part of relevant courses or as a separate course. However, there is also the risk that many potential trainees may not be able to access the proposed course at KIT if the fee is high. Hence the action will ensure that the course is designed and provided based on fee paying capacity. There is also the risk that KIT might face low demand for the course or they may not be able to get the trainers with adequate qualifications. If this is an issue, the action could try to facilitate collaboration between KIT and an overseas institution, so that the course can be opened to students from both institutions and the faculty resources can be shared
Financial Sustainability	Without considering the subsidies proposed, PUB will still have net savings of around 3 million US$ till 2030 which would help it to easily recover any investments to be made. However, PUB is reported to be in a financially weak position and at present may have limited ability to finance the larger initial investments needed (or to handle more complex project implementation mechanisms). The market for larger DG sets in Kiribati is also very small to attract private sector investments in it. The role of the private sector is also limited in Kiribati due to various reasons, and this situation might not change during the period of the action intervention. Hence, at this initial stage of market development for Energy Efficient diesel power plants, no financing or market-based mechanisms are being proposed. The investments till 2030 are proposed to be subsidised, mainly through grants from external donors, and a smaller portion by PUB/Government of Kiribati. Instead, the focus could be on risk reduction measures (through the Technical Assistance and Capacity Building measures) and subsidies. In the longer run, through the capacity built through the proposed action and other interventions, PUB is expected to improve its financial and operational capacity and fund any future investments needed to continue improving its energy and carbon performance. In the future, more traditional financing products and mechanisms could be offered, along with risk transfer mechanisms. The Technical Assistance and Capacity Building being provided will help ensure better design, procurement, installation, operation and maintenance of the diesel power plants, 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 diesel power plants, by reducing the real and perceived risks associated with financing such measures
Potential Financing and Need for Financial Support and/or Financial Instruments	US$ 1 million to retrofit the existing diesel power plants of PUB, provided as a grant. In addition, approximately US$ 280,000 to ensure that new diesel power plants being added to the system before 2030 are energy efficient

Potential Supporting and Financing Partners / Sources	Project Implementing Entity / Stakeholders (including. access to financial sources)* • 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, KOICA Potential Financial Partners / Sources* • Non-Government Grants for investment: GCF, **GEF**, AU-DFAT, NZ-MFAT, **WB/IFC**, EIB, CIDCA, EEAS, KOICA • Grants for Technical Assistance & Capacity Building: **GEF**, AU-DFAT, NZ-MFAT, **CTCN, ADB, GCF, WB/IFC,** KOICA, CIDCA, EEAS, EIB, SIDA, **UNDP, UNESCAP**, UN Habitat, UNESCO, **UNIDO**, DE-GIZ, JICA • Government Budget & Taxes Incentives: GOK *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$ 346,000 (includes 15 % overhead for Implementing Partner) 1) 4 Training programmes on "Installation and Efficient Operation and Maintenance of DG sets", 4 days each. 20 participants. (US$ 160,000) 2) Development of a module on "Design, Installation and Efficient Operation and Maintenance of DG sets" in KIT, to be integrated with existing courses and/or offered as a separate course. (US$ 19,000) 3) Conduct of detailed energy and performance audits at all the facilities of PUB (US$ 58,000). 4) Supporting PUB in the implementation of recommendations from the energy audit. (US$ 56,000) 5) A study on development of policy incentives for DG set owners to reduce use of diesel and to shift to cleaner alternatives ((S$ 9,000)
Information and MRV Needs	• PUB's annual performance figures of each of the DG sets owned by PUB before and after the project (kWh generated/litre of diesel consumed, mean time between failure (MTBF), unscheduled maintenance related downtime, scheduled maintenance related downtime, maintenance cost/kWh generated) • Annual diesel consumption by PUB • Number of trainees from PUB, service providers, facility managers of larger buildings and industry
Supporting References	• Data provided by MISE and PUB on installed and derated capacity, generation and fuel consumption of the PUB diesel power plants • Fuel distribution data from KOIL for 2014-2019 • Sustainable Energy Handbook, 2016. Module 6.1 - Simplified Financial Model. EU, 2016. https://europa.eu/capacity4dev/public-energy/wiki/sustainable-energy-handbook • Generation Cost Benchmarking, Consultation Paper. Energy Regulatory Commission. Philippines, 2015 • Pacific Power Utilities Benchmarking Report. PPA, 2018 • Overhaul Maintenance Report, 2018. Power Engineering Department, PUB • 2006 IPCC Guidelines for National greenhouse gas Inventories

Phased Approach for development, Implementation, and Investment

	2020-2022	2023-2025	2026-2030	Total
Proposed CB & TA Needs (no.)	1, 3	1, 2, 3, 4, 5		
Estimated CB & TA Costs (US$)	126,084	265,951	-	392,035
Estimated Capital Investment (US$)	-	1,000,000	280,000	1,280,000
Estimated GHG Mitigation (tCO2)	-	1,275	7,395	8,669
Estimated Annual GHG Mitigation in 2030 (tCO2/yr)				-

Annex B: Alignment with Policies, Strategies, and Plans

There are several strategies and plans defined by the Government of Kiribati which are relevant to this assignment, where the most relevant key national level strategies and plans consist of the following:

- Kiribati's Nationally Determined Contribution *[issued 2015]*;
- Kiribati Climate Change Policy *[issued 2018]*;
- Kiribati Joint Implementation Plan: for climate change and disaster risk management 2019-2028 *[issued 2019]*;
- Kiribati 20-Year Vision *[issued 2016]*;
- Kiribati Development Plan 2016-19 *[issued 2016]*;
- Kiribati Voluntary National Review and Kiribati Development Plan - Mid-Term Review *[issued 2018]*;
- Ministry Strategic Plan 2020 – 2030 – Ministry of Information, Communication, Transport & Tourism Development (MICTTD) & State-Owned Enterprises (SOEs), Kiribati *[issued 2020]*.
- Kiribati Integrated Energy Roadmap 2017-2025 *[issued 2017]*;
- Scaling up Renewable Energy Programme (SREP) in Low Income Countries: Investment Plan for the Republic of Kiribati [issued 2018];
- Kiribati Integrated Environmental Policy *[issued 2013]*;
- Ministry Strategic Plan 2020 – 2030 – Ministry of Information, Communication, Transport & Tourism Development (MICTTD) & State-Owned Enterprises (SOEs), Kiribati *[issued 2020]*.

Kiribati's Nationally Determined Contribution (NDC) is the committed contribution of the Republic of Kiribati under the Paris Agreement of the United Nations Framework Conventions on Climate Change (UNFCCC). In principle, the mitigation component of the NDC focuses on the broader energy sector (specifically power and transport) and maritime & coastal sector. The GHG mitigation targets are defined for 2025 and 2030 based on a Business As Usual (BAU) scenario starting in 2014. The NDC has an unconditional commitment to reduce GHG emissions by 13.7% (2025) and 12.8% (2030), and a conditional commitment to reduce GHG emissions further by 48.8% (2025) and 49% (2030). Combining these commitments offers roughly a 60% reduction of GHG emissions by 2030 based on the BAU. For the energy sector there are outlined specific targets for a reduction of GHG emissions with both RE and EE. Specific to this assignment the EE targets are to reduce energy use by 20-22% by 2025, and GHG mitigation expected in transport is not well defined.

Kiribati Climate Change Policy is a high-level policy which strategically guides and supports decision-making processes and sets the direction for enhanced coordination and scaled-up implementation of climate change adaptation, mitigation and disaster risk reduction, and it is linked to the KDP and KV20. The elements and objectives of this policy which relate to this assignment are the institutional set-up and governance, and priorities related to energy security, capacity building and education, and climate finance. Energy security under the policy directly addresses energy conservation and efficiency, but there is no direct reference to low carbon transport in the policy.

Kiribati Joint Implementation Plan (KJIP): for climate change and disaster risk management 2019-2028 is based on a set of 12 major strategies which are defined as "Key National Adaptation Priorities", and is very much adaptation / resilience oriented, however four of these strategies have significant direct relevance to GHG mitigation and finance:

Strategy 2: Improving knowledge and information generation, management and sharing;

Strategy 7: Delivering appropriate education, training and awareness programmes;

Strategy 9: Promoting the use of sustainable, renewable sources of energy and energy efficiency;

Strategy 10: Strengthening capacity to access finance, monitor expenditures and maintain strong partnerships;

Other strategies have minor and indirect relevance to GHG mitigation and finance, such as *Strategy 6*: Promoting sound and reliable infrastructure development and land management. The KJIP has well defines KPIs and allocation of responsible and supporting agencies, and development partners who may support the individual strategies.

Kiribati 20-Year Vision (also known as KV20) is Kiribati's long-term macro development blueprint for the period of 2016 to 2036 and is based on the four pillars of Wealth, Peace & Security, Infrastructure for Development, and Governance. Climate change is a cross cutting element within the four pillars, but it is not specifically included in individual strategies / actions, however several of the individual strategies and their defined KPIs have the potential to indirectly track implementation of elements which involve sectoral level GHG mitigation actions and related investment.

Kiribati Development Plan 2016-19 (also known as KPD) is divided into six Key Priority Areas, where the Key Priority Area 6: Infrastructure has the most direct relevance to this assignment. This Key Priority Area addresses the improvement of infrastructure which can support GHG mitigation in transport (e.g. roads, airfields, and ports), and energy efficiency (e.g. labelling and services). Whereupon, other Key Priority Areas address cross cutting issues which indirectly impact or relate to the relevance to this assignment. It is acknowledged that the next development plan stating in 2020 can provide more detail on GHG mitigation actions, and the results of this assignment can provide input to the next development plan.

Kiribati Voluntary National Review and Kiribati Development Plan - Mid-Term Review is a comprehensive review of the KDP and provides good general insights to the status of implementation of activities which relate to this assignment (including results), as well as comprehensive linkage of Key Priority Area / activities to the SDGs.

Ministry of Information, Communication, Transport and Tourism Development: Strategic Plan 2020 – 2023 is the strategy and operational plan for the MICTTD. This strategic plan focuses on four of the Key Priority Areas (1, 2, 5, and 6) of the KV20, and details four strategic objectives to achieve along with their KPIs and proposed budget. It is aligned with the KPD and covers a variety of matters including transport, and identifies various challenges and priority actions including consolidation of Maritime Acts[95], as well as practical projects such as improvements to aviation and maritime infrastructure (including establishing Kiritimati as an international port), purchase of a dredger, and stakeholder workshops to improve understanding of maritime regulations and safety at sea. This Strategic Plan is focused on improving connectivity of outer islands and does not consider GHG emissions reduction. Included in the objectives are three which have a direct or indirect impact on mitigation, its enabling environment, and related finance, and these objectives are listed below.:

Strategic Objective 1: Develop and strengthen sustainable Tourism development to boost economic development.

Strategic Objective 2: Strengthen air, sea, and land transportation and infrastructures to meet social demands and compliment economic enhancing activities.

Strategic Objective 3: To strengthen supporting services; human resource needs, printery, postal, accounts and registry, to support the efficient and effective functions of the Ministry and SOEs.

Kiribati Integrated Energy Roadmap 2017-2025 provides a comprehensive plan for transitioning Kiribati from a highly fossil fuel (imports) energy dependent country to a low-carbon / domestic-resource energy country. The Energy Roadmap predominantly focuses on renewable energy in on- and off-grid electricity generation and desalination with targets between 55% to 80% inclusion. However, the Energy Roadmap does suggest low-carbon pathways for both land and maritime transport, and comprehensive context for cross sectoral energy efficiency (including fuel switch). The Energy Roadmap provides a key list of goals and high-level results framework (with identified activities / mitigation actions) for both energy efficiency and low-carbon pathways for both land and maritime transport. The "high-level" information provided within the Energy Roadmap will provide a key input to this assignment, though this assignment will focus on a longer time-horizon (e.g. at least to 2030).

Scaling up Renewable Energy in Low Income Countries: Investment Plan for the Republic of Kiribati is only focused on renewable energy in on- and off-grid electricity generation and desalination, not transport and energy efficiency. However, the Scaling Up Report does offer country specific insights to potential environmental and social co-benefits as well as SREP financing criteria and structuring, which may be useful in this assignment.

95 This new Act will consolidate the existing Shipping Act 1990, the Merchant Shipping Act 1983 and the Harbours Ordinance (Cap 40-1977 Ed).

Kiribati Integrated Environmental Policy (KIEP) is aimed at strengthening the coordination, collaboration and coherent implementation of the existing thematic environmental area plans and activities. This includes offering clarity of the roles and responsibilities of the different networks of relevant key sectors and stakeholders who are involved with climate change in Kiribati, including mechanisms that will increase effective stakeholder consultation, interaction and cooperation. It does not replace the existing thematic area plans and action strategies of ministries, but rather provides an integrated framework for their effective implementation of KDPs in terms of environmental protection and climate change. A key element within the KIEP is climate change, where the following three overall crosscutting areas are strategically addressed.

- To improve knowledge, information and national adaptive capacity for responding and adapting to climate change;
- To build on existing adaptation measures and continue with implementation of concrete interventions aimed at protecting the environment and its goods and services;
- To implement mitigation measures and strengthen synergies between climate change mitigation and environment sustainability.

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 and future NDC related actions/projects85
Ministry of Infrastructure and Sustainable Energy (MISE)	Oversees the electricity infrastructure throughout Kiribati and roadway infrastructure on Tarawa atoll, particularly through the Energy Planning Unit.	• (C) Kiribati Outer Island Transport Infrastructure Investment Project - The project implementation timeline is six years with a total investment of US$42 million, of which World Bank IDA financing of US$ 30 million and ADB financing of US$ 12 million. • (C) PV Solar Off Grid Power System Rural Communities Church Headquarters Project - The aim of this project is to provide a 24/7 hr secure, reliable and affordable electricity services to the church communities headquarter in the rural community in the outer islands. • (F) Any and all land transport infrastructure will require involvement of MISE to complete. EV network development is recommended for the future in the KIER.
Ministry of Information Communication, Transport and Tourism Development (MICTTD)	Oversees the transport sector (inclusive of land, marine, and aviation), serving as the line ministry for KHA and Plant & Vehicle Unit.	• (C) Delivery of the MSP in alignment with the KV20, inclusive of sustainable development/Clean-Green-Blue Economy objectives for the Tourism industry. • (C) The Ministry has achieved an update of the Public Highways Protection Act highlighted under the MSP to improve management of land transport infrastructure. • (F) Policies requiring a bounded transition period and strategy to decarbonise the land transport sub-sector may be developed under MICTTD as the governing authority.
Kiribati Highway Authority (KHA)	Tarawa licensing and registration is handled by the Highway Authority.	• (C) Licensing and registration, including records of make, model, and engine size, are collected under the Highway Authority, which was only established last year. • (F) Evaluation of efficiency/emissions standards may be incorporated into future vehicle inspection and registration requirements but are not currently attributed to KHA. • (F) Transfer of licensing from Island Councils to KHA is expected, with consolidation of more responsibilities under KHA as a regulator of the land transport sub-sector.

Kiribati Insurance Corporation (KIC)	The sole national provider of insurance for motor vehicles (and other coverage.)	• (C) A fleet discount of 20% is offered on motor policies consisting of more than one vehicle. The effect of this is a further discounted premium to normally charged premium annual per any one vehicle alone. This encourages bringing in multiple vehicles at once and will likely detract from efforts to reduce emissions. • (C) A No Claim bonus is offered in the second year of insurance with no claims through a 20% discount is offered on the annual premium, with a further 40% discount offered after a third year without claims. This is the maximum bonus discount offered. This incentivizes keeping vehicles on the road, out of accidents, and in good repair. • (F) Graded premiums based upon vehicles' contributions to national emissions could be designed and introduced, particularly in consideration of increased impacts of climate change and associated risks.
Kiribati Oil Company Limited (KOIL)	National fuel importer, storage facility, and distributor to all transport users.	• (C) Plans to install a 2 million litre Petrol tank and 1 million litre diesel tank are in place, and need for expanded LPG infrastructure was noted, so fuel storage capacity is currently trending upward (along with consumption) instead of reducing emissions. • (F) Increase in fuel quality from EURO2 to EURO6 standard is desired, but not yet scheduled to take place.
Kiribati Police Service (KPS)	Police conduct physical inspections upon first registration, and upon expiration of license, as well as provide enforcement around all moving violations and accident response through the Traffic Unit.	• (C) The Police currently enforce the Traffic Act, and oversee behaviour of land transport users, but do not have a specific focus on reducing emissions from the sub-sector beyond ensuring fitness of vehicles operating on Kiribati roads. • (F) The Police will be an integral part of enforcing regulatory changes to the type of vehicles allowed to operate in Kiribati, as well as behaviour/conduct of road users that may be detrimental to NDC goals.
Island Councils	Island Councils are responsible for both vehicles and roadways in areas outside Tarawa.	• (C) Under the KIER and SREP, RE capacity and independence from diesel generations on outer atolls should be coordinated with the Island Councils. No specific initiatives led by the Island Councils have been identified to encourage emission reductions in regard to transport and energy efficiency. • (F) Island Councils will be instrumental in the implementation of emission reduction policies on-the-ground outside South Tarawa.
Plant & Vehicle Unit (PVU)	Handles import, operations, and maintenance of new government vehicles.	• (C) Currently orders new models of vehicles, which ostensibly operate more efficiently than second-hand models being imported by the private sector. • (F) Green procurement guidelines for hybrid/EV purchases are to be considered.
Private Sector	Largely represented by the Kiribati Chamber of Commerce & Industry, there are a number of businesses engaged in transport of goods between islands, as well as haulage of goods and carrier transport of passengers by land. ANZ also operates as the sole commercial bank which finances land transport-related investments.	• (C) Market behaviour in the private sector operates in response to the existing legal and financial regulatory structure, and land transport activities reflect the business-as-usual scenario now underway. • (F) Opportunity for the private sector in Kiribati to decarbonise activities will be contingent upon an enabling environment being provided by the various stakeholders listed above.

Maritime Transport – Key Stakeholders and Current and future NDC related actions/projects

Stakeholder	Roles within the sector	Current and future NDC related actions/projects86
Ministry of Information Communication, Transport and Tourism Development (MICTTD)	Government Ministry responsible for transport planning, regulation and enforcement, under which sit KNSL and MTC. Also, MDCC oversight and coordination role.	• (C) Main point of contact for maritime project development, oversight and delivery. • (C) Participation in IMO meetings related to GHG emissions reduction from ships (includes preparation and lodgement with IMO of National Action Plans to reduce GHG emissions from ships) • (C) IMO MTCC Pacific project (focussed on domestic ship fuel use data collection and stakeholder workshops on improving energy efficiency) • (F) Participation in the Pacific Blue Shipping Partnership (PBSP) • (F) Outboard motor electrification transition • (F) National Action Plan • (F) New build mini cargo/pax/cruise liner vessels
Kiribati National Shipping Line (KNSL)	SOE responsible for operation of government vessels (currently landing craft) and port buildings	• (C/F) IMO MTCC Pacific project (focussed on energy efficiency of ports and purchase of new landing craft) • (F) New RE building HQ • (F) Operational improvements on existing vessels • (F) Retrofits on existing vessels • (F) New RE vessels trials • (F) E-outboards (recharging station and outboard) trial
Kiribati Port Authority (KPA)	SOE responsible for management and operations of Ports of Betio (Tarawa) and Ronton (Kiritimati)	• (C/F) Pacific Green Ports initiative – SPC MTCC • (F) National Action Plan
Betio Shipyard Ltd	Ship repair/retrofits	• (F) Potential for involvement in smaller scale retrofits to existing vessels and small vessel new builds
Ministry of Fisheries & Marine Resource Development (MFMRD)	Ship owner/operator	• (F) Potential for involvement in e-outboard trials and trials of operational & technological options on existing vessels
Island Councils	Ship owner/operator	• (F) Potential for involvement in e-outboard trials and trials of operational & technological options on existing vessels • (F) Potential for incorporating GHG emissions reduction in already planned projects (e.g. wharf construction, new vessel purchase for Line & Phoenix Islands)
Kiribati Marine Training Centre (MTC) Kiribati Institute of Technology (KIT)	Seafarer training Mechanic training	• (F) Training in electric outboards, low carbon technologies and alternative fuels for ships • (F) Potential source of cadets for pilot vessel crews
Ministry of Finance and Economic Development (MOFED)	Taxation, Investment and financing, development project management/ oversight	• (F) Outboard motor project – fiscal incentives (removal or raising of import duties, tax free holidays, etc.) • (F) Fiscal support for any technology and parts imported relating to decarbonisation of maritime transport e.g. (duty concessions) • (F) Facilitation of loan facility for commercial deployment of maritime technologies to reduce emissions from vessels

Ministry of Infrastructure and Sustainable Energy (MISE)	Energy and GHG emissions calculations and data analysis and NDC reporting	• (C) Data collection on fuel use and GHG emissions calculations, decarbonisation planning/strategy development • (F) Involvement as supporting ministry to MICTTD on pilot projects
Private sector – commercial ship owners and operators	Own and operate vessels	• (F) Commercial deployment of successful operational and technological pilot trials
Private sector – shore based	Provide support services such as marine parts, boat repairs, etc.	• (F) Commercial deployment of successful RE pilot trials (e.g. sale, servicing and recharging of lithium-ion rechargeable batteries, sale and servicing of e-outboard motors)
Household/Individuals	Own vast majority of small boats, also customers of commercial and government vessels	• (F) uptake of more energy efficient outboard motors on small boats over time for household/artisanal use.

Aviation Transport – Key Stakeholders and Current and future NDC related actions/projects

Stakeholder	Roles within the sector	Current and future NDC related actions/projects87
Ministry of Information Communication, Transport and Tourism Development (MICTTD)	Oversees the transport sector (inclusive of land, marine, and aviation), serving as the line ministry for the Civil Aviation Authority.	• (C) There is a current focus on strengthening the Airport's roles and support to MICTTD's strategic plan, improve economic benefits from Air Service Agreements and Upper Airspace, and to improve accessibility to aviation information and publication. These are focused on service delivery over NDC-related emission reductions.
MLPID	Oversees the administration and socio-economic development of the Line and Phoenix island groups.	• (C) The Guiding Development Principles are focused primarily on adaptation research, but the limitations imposed by available resources and environmental stability may require decarbonisation to contribute to risk reduction and improve resilience.
Civil Aviation Authority of Kiribati (CAAK)	Regulator for the SOEs, Air Kiribati and Airports Kiribati, CAAK deals with both international and domestic aviation sectoral concerns, including ICAO compliance and national-level GHG inventory reporting.	• (C) Build capacity of CAAK staff and aviation participants/ stakeholders to meet ICAO requirements • (C) Provision of safe and reliable Air service, as per the MSP. • (F) Integrate ICAO CORSIA requirements for M&E and carbon accounting into the domestic aviation carbon accounting process.
Air Kiribati	Air Kiribati operates the aircraft fleet	• (C) Improve AKL's financial viability, as per the MSP. • (C) Improve efficiency of Air services, as per the MSP. • (F) Replacing the domestic aviation fleet will require additional consideration following the response to the international aviation purchases of the Embraer aircraft.
Kiribati Oil Company Limited (KOIL)	National fuel importer, storage facility, and distributor to all transport users.	• (C) Fuel depot improvements should reduce potential fuel leakage, as well as increase operational efficiency at the KOIL tank farm. Diversification of assets and revenue streams has yet to be acted upon by KOIL management.
Airports Kiribati	Airports Kiribati operate the various airport facilities around the country.	• (C) Capacity and upskilling of Airport's workforce, as per the MSP. • (C) The need for sustainable and improved AKL's Infrastructure development, as per the MSP. • (F) Upgrading outer island airports for Dash 8 access is included in the MSP, alongside technical advisory support and training for engineering/operations of the Air Kiribati fleet.

Island Councils	Island Councils are responsible administrative management of issues concerning outer island constituencies served by the aviation sector.	• (C) The SREP indicates 40% reductions in fuel consumption are targeted for outer islands through renewable energy generation uptake. • (F) Capacity for servicing a future generation of electric aircraft should be considered in regard to energy demand for outer island airport facilities.

Power and Appliance – Key Stakeholders and Current and future NDC related actions/projects

Stakeholder	Roles within the sector	Current and future NDC related actions/projects88
Public Utilities Boards (PUBS)	Manages the power system in South Tarawa, including power generation, transmission and distribution. PUBS also takes care of the water pumping and sewerage system in South Tarawa.	• (F) PUBS is looking at improving maintenance practices and the energy efficiency of its Diesel Power Plants
Ministry of Infrastructure and Sustainable Energy (MISE)	Responsible for managing the power system in Kiritimati and the Outer Islands, The Energy Planning Unit (EPU) of MISE has the overall responsibility of power and energy sector planning.	• (C/F) MISE is leading the development of the proposed Standards and Labelling programme
Kiribati Oil Company Limited (KOIL)	Majority state-owned enterprise that serves as the main fuel importer and distributor in Kiribati. It operates the main fuel terminal on South Tarawa and a smaller bulk fuel terminal on Kiritimati. The Power sector is the main client of KOIL	
Ministry of Finance and Economic Development (MOFED)	Responsible for budgeting, managing fiscal expenditure, and donor outlays for energy sector projects. The Central Procurement Unit of MOFED is in charge of Public Procurement which is a significant part of the Annual State Budget	• (C) Climate Finance Division (CFD), under MOFED focuses on facilitating access to multilateral climate funds and is the focal point for Government to the Climate Investment. • (F) Due to the influence of their procurement actions on the economy, they can influence the market towards low carbon products and services, and through activities like Cooperative Procurement could help bring down price levels of low carbon products and thereby also support actions being planned such as the Standards and Labelling programme Fund, Green Climate Fund and Adaptation Fund.
University of South Pacific (USP)	USP is the leading university in PICs with campuses in several locations, including Kiribati.	• (C) Currently provide higher level engineering education (BSc, MSc, continual education) in the PICs. • (F) They will have a major role in implementing the proposed project to build capacity in integrated energy planning (E1)
Kiribati Institute of Technology (KIT)	KIT is the premier institute in Kiribati focussing on vocational education.	• (C) Currently provide higher level technical vocational education in Kiribati. • (F) They will have a major role in capacity building activities in the proposed projects to build capacity in the design, installation and efficient operation and maintenance of diesel power plants (E2) and to develop the market for Li Ion battery for storing renewable energy based power (E3)
Private suppliers of power generating equipment and spare parts	They supply equipment / machinery, spare parts and services for Diesel Power Plants and for Renewable Energy based power. They are also helping build capacity of PUBS through the involvement of PUBS personnel in the installation and major overhaul activities of the power supply equipment.	

Suppliers of energy efficient appliances	They are the importers, wholesalers and retailers of energy efficient appliances	• (F) There is a lack of appliances in the market, with a higher star rating and most of the appliances sold and used are of 2.5 star or below. This could partly be due to their higher cost. However, as the government tackles these barriers through some of the measures proposed in the investment plan, the suppliers should be capable of ensuring adequate supply of these products and at reasonable cost. They should also be motivated to participate in the various initiatives under a standards and labelling scheme
Service providers	These include the installers and maintenance professionals, who work either as part of the suppliers, or private firms or as individuals	• (F) In some cases, energy efficient appliances might need special training, especially for maintenance, e.g. air-conditioners or refrigerators using variable speed drives. While the predominant tendency is to discard appliances if they are difficult to repair, since energy efficient appliances will be relatively more expensive, a better strategy is to repair and extend their life to the extent possible. Hence, existing maintenance professionals might need additional training to be capable of maintaining such equipment
Owners and users of appliances	They are the ones who select the type of appliances and also use them	• (C/F) The owners are the ones who have to decide that they will like to have a low energy and low carbon appliance. Even if an energy efficient appliance is selected, in case they are not well used or maintained properly, they could consume more. Hence, these stakeholders will also play a significant role in curtailing energy demand from appliances

Building, Government, and Industry – Key Stakeholders and Current and future NDC related actions/projects

Stakeholder	Roles within the sector	Current and future NDC related actions/projects89
Ministry of Infrastructure and Sustainable Energy (MISE)	The Quality Control and Inspection Unit of MISE inspects the design and construction of buildings and have around 10 staff. An in-house Government Architect and a Senior Costing Engineer is housed in MISE. The Energy Planning Unit is responsible for the design of the AC and lighting systems within Government buildings	• (C/F) The Quality Control and Inspection Unit is planning to apply to the government for support for Technical Assistance to enhance the Building Code to integrate energy efficiency and other environmental considerations, as well as to identify any other actions to be taken to enhance the Building Code. The Government Architect strongly supports bioclimatic design of buildings and will have a key role to play in the sector. The Senior Costing Engineer, could play a significant role in promoting Life Cycle Costing benefiting Energy Efficiency in Government construction projects and procurement. MISE had conducted one round of energy audits of Government buildings and had implemented some of the recommendations. It is currently doing another round of audits.
Kiribati Chamber of Commerce	The industry association for business	• (F) They could influence building owners and tenants towards Energy Efficiency, play a key role in improving supply of low carbon equipment, building materials and services, and could support Government in developing relevant policies for it.
Ministry of Finance and Economic Development (MOFED)	The Central Procurement Unit of MOFED is in charge of Public Procurement which is a significant part of the Annual State Budget	• (F) Due to the influence of their procurement actions on the economy, they can influence the market towards low carbon products and services, and through activities like Cooperative Procurement could help bring down price levels of low carbon products and thereby also support actions being planned such as the Standards and Labelling programme
University of South Pacific (USP)	USP is the leading university in PICs with campuses in several locations, including Kiribati.	• (C/F) They could help in capacity building activities, including developing relevant long- and short-term courses and training and could support or host certification programme for professionals such as energy auditors and building energy assessors. especially related to the proposed project to build capacity in the assessment, design and construction of low energy/carbon buildings (E5) and in promoting sustainable public procurement (E8)

Suppliers of construction materials	They are importers, wholesalers and retailers of building material like Concrete Bricks, cement, sand, aggregates, timber, glazing, insulation, coatings, etc.	• (F) The quality of building materials is critical for the energy and carbon performance of the building. They also affect the life of the buildings, and thereby the lifetime GHG emission reduction potential. Hence, these suppliers will have a crucial role to play in this sector by ensuring good quality materials are readily available and at reasonable prices
Suppliers of energy efficient industrial machinery, products, instruments and consumables	They are importers of the more energy efficient industrial machinery relevant for copra and fish processing plants, such as high efficiency refrigeration compressors, cooling towers, freezing machines, cold storages, ice plants, boilers, blanching machines, oil extraction machines etc. They also include retailers of industrial products and consumables that influence energy efficiency such as water treatment chemicals, cold and hot insulation, variable speed drives, high efficiency motors and pumps etc. as well as portable and panel mounted energy monitoring instruments.	• (F) The ready availability of more energy efficient industrial equipment, products and consumables and monitoring instruments, at reasonable prices is crucial for industries to adopt energy efficiency. Hence, these stakeholders are crucial
Service providers of construction services	These include the Architects, Civil Engineers, Masons, Electricians, Facility Managers, who as part of private firms or individuals, together design, construct, operate, and maintain the building.	• (C/F) The capacity of these stakeholders to design, construct, operate and maintain the building, in a way that energy consumption is minimised, will be crucial. The capacity, especially for designing such buildings, is lacking, and capacity building will be needed
Service providers for energy	These include the installers, operation and maintenance professionals and facility managers, who as part of private firms or individuals, together design, construct, operate, and maintain the equipment.	• (C/F) The capacity of these stakeholders to design, construct, operate and maintain industrial machinery, in a way that energy consumption is minimised, will be crucial. The capacity, especially for designing such buildings, is lacking, and capacity building will be needed.
Building energy performance assessment professionals	They will have to check if the building meets the requirements of the proposed Energy Efficiency Building Code (EEBC), as well as provide ratings as per the proposed Green Building Rating scheme.	• (F) Currently the Quality Control and Inspection Unit of MISE is carrying out this function of building quality checks. However, they, as well as additional professionals, will need to be trained on building energy efficiency to ensure they are able to ensure compliance of buildings with the requirements of the EEBC, as well as for providing ratings under the green building rating scheme.
Industrial energy auditors	They will audit energy consumption trends and identify energy consumption potential in industry.	• (F) Currently the Energy Planning Unit of MISE does carry out energy audits in government buildings. However, industrial energy auditing will require additional training and in case the industrial sector expands in Kiribati in future, more professional will be required.
Owners and users of buildings (tenants, house owners, office employees)	They are the ones who select the type of building to be built and also use the building.	• (C/F) The building owners are the ones who have to decide that they will like to have a low energy and low carbon building. The operation phase of the building consumes the largest proportion of the energy consumption in the life cycle of a building. Even if a building is designed in the most energy efficient manner, if the users do not use it properly, much energy can be wasted. Hence, the way these stakeholders use the building will also play a significant role in curtailing energy demand from buildings
Seafood and copra processing companies and ice plants	Few small and medium sized companies who constitute the small industrial sector in Kiribati.	• (F) implement energy savings actions.
Ministry of Industry, Commerce and Cooperatives (MICC)	In charge of Industrial and trade issues.	• (F) facilitate energy efficiency programmes.

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**			
Health & Safety	Land	Maritime	Aviation	Power & Utilities	Buildings & Cities	Appliances & Government	Industry & Facilities
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)	✓				✓		

183 http://www.un.org/sustainabledevelopment/sustainable-development-goals/

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[183]		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15
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[91]	E1	E2	E3	E4	E5	E6	E7	E8	E9
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

Annex E: Evaluation Criteria and Matrix for Mitigation Opportunities

A comparative quantitative/qualitative evaluation for the prioritization of the realistic mitigation opportunities for each sub-sector has been performed. This prioritization identifies the best opportunities for mitigation actions to be included in the roadmap. 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 Government, insofar as to the opportunities: 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 that interventions. *[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. *[Scoring: selection one from +5 pts for <5k tCO2e/yr, +4 pts for 5k – 4k tCO2e/yr., +3 pts for 4k – 3k tCO2e/yr., +2 pts for 3k – 2k tCO2e/yr., +1 pts for 2k – 1k tCO2e/yr., +0 pts for < 1k tCO2e/yr.]*

C. Level of private sector financial participation, as a means to reduce or eliminate the impact on GOF finances and 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. *[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. Minimum expected level of incremental financial needs (as increase above BAU case). *[Scoring: selection one from +5 pts for below 30%, +4 pts for 30%, +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. *[Scoring: selection one from -0 pts for widely available in Kiribati, -1 pts for marginally available in Kiribati, -2 pts available in the AP region but not Kiribati, -3 pts only available in developing countries, -4 pts under scaling-up internationally, -5 pts under development internationally]*

G. Potential for negative environmental impact. *[Scores: 0 pts measurable but very controllable/minimal 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]*

Comparative quantitative/qualitative evaluation for Transport

Rank	Action / Item	Starting	Investment	GHG Mitigation	Private Participation	Social-Economic Impacts	Incremental Finance Needs	Technology Inclusion	Environmental Impacts	Total
11	T1 – Active Land Transport Infrastructure Upgrade	2022	0	1	0	3	0	-3	-1	0
7	T2 – Electric Vehicle Network Development	2021	1	5	3	1	3	-3	-2	8
2	T3 – Bicycle/E-Bike Financing Initiative	2021	3	1	4	6	4	-1	0	17
9	T4 – Whole-of-Lifecycle Vehicle Programme	2020	5	0	4	0	0	-3	0	6
5	T5 – Multi-modal Transit Initiative	2020	0	5	4	2	3	-2	-1	11
4	T6 – National Maritime Action Plan	2021	5	0	0	6	5	-2	0	14
1	T7 – Transitioning to Electric Outboard Motors	2022	5	5	3	6	3	-1	-1	20
4	T8 – Mini container low carbon vessel	2024	3	1	4	6	2	-2	0	14
4	T9 – Small low carbon cargo/passenger freighter	2024	4	0	4	6	2	-2	0	14
5	T10 – Zero-impact cruise liner, Phoenix Islands	2025	3	1	4	3	2	-2	0	11
6	T11 – Aircraft Re-Fleeting Programme	2022	0	2	4	3	3	-2	0	10

8	T12 – Sustainable Aviation Fuel Integration Initiative	2021	4	1	4	3	1	-5	-1	7
3	T13 – Operational Training Programme	2020	5	0	5	3	5	-2	0	16
10	T14 – Airport & Airfield infrastructure upgrade	2025	2	0	1	3	1	-2	-3	2
4	T15 – Alternative fuels in land and maritime transport	2024	3	4	4	3	3	-2	-1	14

Comparative quantitative/qualitative evaluation for Energy Efficiency

Rank	Action / Item	Starting	Investment	GHG Mitigation	Private Participation	Social-Economic Impacts	Incremental Finance Needs	Technology Inclusion	Environmental Impacts	Total
2	E1 – Capacity building for integrated energy planning and energy statistics in Kiribati	2027	5	3	0	5	0	-1	0	12
6	E2 – Programme on efficient operation and maintenance of Diesel Power Plants	2026	4	1	0	2	0	-2	0	5
5	E3 – Promotion of Li Ion battery for Renewable Energy storage instead of Lead Acid	2026	5	0	0	2	5	-2	-2	8
3	E4 – Utility led programme to manage peak demand and savings in South Tarawa	2027	0	5	2	2	4	-2	0	11
4	E5 – Capacity building in the assessment, design and construction of low energy/carbon buildings	2027	3	0	3	3	3	-2	-1	9
2	E6 – Supporting the retrofitting of major hotels and commercial buildings	2027	3	1	3	3	4	-1	-1	12
1	E7 – Strengthening and expanding the standards and labelling programme for appliances	2027	5	1	5	6	5	-1	-1	20
2	E8 – Promotion of Sustainable Procurement	2027	5	3	0	3	3	-1	-1	12
3	E9 – Capacity building in energy efficiency in Industry	2027	5	0	4	1	4	-2	-1	11

Annex F: Constraints and Opportunities for Enabling Environment

Constraints and Strengthening opportunities in Land Transport

Constraint / Barrier	Strengthening opportunities	National and Project Implementing Entities
Limited Market Options	• Establish lending mechanism 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 both PVU and KCCI for bulk ordering arrangements to bring down per unit costs when importing new technology.	MOFED MICTTD (KHA) PVU Diplomatic/Trade partners (e.g. Australia, New Zealand, US, China, Japan) Private Sector (KCCI)
Incomplete Incentive/Penalty structure	• 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. • Include more stringent vehicle emission standards in roadworthiness inspections.	MOFED (Customs & Taxation) MICTTD (KHA) Kiribati Police Service
Lack of human capacity	• Continue expanding purview of Kiribati Highway Authority and incorporate land transport management oversight and enforcement into staff job descriptions. • Institute public awareness campaign on both the environmental and health impacts of motor vehicle use to encourage modal shifts. • Include efficiency measures in examination material required for licensing drivers.	MISE MICTTD (KHA) PVU Kiribati Police Service CROPs (USP, SPC, SPREP) Donor/Development partners
Data collection	• Expand vehicle registration and inspection form to include age of vehicle and emissions testing for roadworthiness. • Survey the total number of derelict/de-registered vehicles nationally which require removal/disposal. • Centralize Island Council vehicle data for outer islands with KHA. • Improve coordination/integration between Customs and Taxation office to better integrate understanding of trade flows with revenue generation measures. • Undertake traffic survey and analysis on South Tarawa and Kiritimati to determine vehicle occupancy, peak travel times, and other aspects of road users' behaviour.	Statistics Department MICTTD (KHA) MELAD Kiribati Police Service UN (e.g. UNDP, UNESCAP) CROPs (e.g. SPC, SPREP, USP)
Land Management	• Incorporate both green space/vegetation and land transport infrastructure (EV charging stations/parking, cycling racks, bus stands, etc.) into budget and policy planning. • Utilize multi-storey designs to the foundational limits physically allowed. • Incentivize the removal of derelict vehicles to reclaim the currently unused/degraded land footprint.	MOFED MISE MICTTD MELAD

Constraints and Strengthening opportunities in Maritime Transport

Constraint / Barrier	Strengthening opportunities	National and Project Implementing Entities
Access to Financing	• Prepare National Action Plan and lodge with IMO • Actively participate in existing initiatives e.g. MTCC, MCST, PBSP and advocate at regional and international level e.g. in IMO, UNFCCC, CROPs meetings, etc. • Use existing SOE vessels and infrastructure to trial and demonstrate low carbon options for maritime transport (i.e. act as the first mover) • Build in RE criteria into new asset purchase or maritime transport infrastructure proposals • Establish/administer soft loans, and other financing mechanisms to support domestic commercial and household deployment (e.g. removal of duties on imported RE vessels, machinery and parts, tax holidays)	MOFED MICTTD (KNSL, KPA) Donor/Development partners (e.g. PRIF, ADB) PBSP UN (e.g. IMO, UNCTAD, UNESCAP)
Insurance/Underwriting	• Raise issue of insurance and underwriting in discussions and negotiations with development partners/donors, including international development banks • Participate in initiatives[92] which look to also address insurance/ underwriting challenges for maritime transport e.g. PBSP	MOFED MICTTD (KNSL, KPA) KIC PBSP Donor/Development partners (e.g. PRIF, ADB, WB, IFC) UN (e.g. IMO, UNCTAD, UNESCAP)
Human capacity	• Work with all relevant Government sections to co-ordinate and have oversight of an integrated programme of transport decarbonisation for Kiribati • Continue prioritising GOK scholarships in maritime transport, and expand to also cover other skill sets such as zero/low carbon shipping • Review and expand existing training opportunities offered by MTC and KIT to also include electric motors, wind hybrids, and other forms of low/zero carbon maritime propulsion and boat design/ operation and maintenance • Continue to participate in international and regional forums such as IMO to build capacity of existing staff in international negotiations and advocacy	Marine Division MDCC MISE PBSP KNSL, KPA MTC KIT CROPS (USP, SPC, SPREP) Donor/Development partners
Data availability and reliability	• Undertake household survey of small boat and outboard motor ownership and use. Could be based on representative sample. Include vessel and outboard ownership questions on national census. • Continue to work with vessel owners and operators to collect fuel use data, including analysis and reporting back to vessels owners/ operators • Build capacity of relevant government departments and SOEs to collect, analyse and report on maritime transport data including sharing of that data with regional and international repositories to assist in global consideration of the situation in Kiribati (especially in regards the role and costs associated with shipping to and within Kiribati)	Statistics Department MISE MICTDD PBSP Vessel owners/operators UN (e.g. IMO, UNCTAD, UNESCAP) CROPs (e.g. SPC, USP)

Constraints and Strengthening opportunities in Aviation Transport

Constraint / Barrier	Strengthening opportunities	National and Project Implementing Entities
Technology Transfer	• Developments in both aviation fuels and aircraft themselves are being commercialized rapidly in developed markets where aerospace manufacturing takes place. The opportunity for Kiribati to secure downstream benefits of these breakthroughs will be present over the coming years as electrified flight becomes cost-competitive and biofuel sources diversify. • The opportunity for bilateral arrangements with developed countries to facilitate trade and technology transfer as an element of ODA exists, and may be pursued in regard to both hard purchases (such as replacement aircraft) and soft support (such as pilot and engineer training on new technology.)	MOFED MICTTD (Air Kiribati, Airports Kiribati) Pacific Aviation Safety Office (PASO) Diplomatic/Trade partners (e.g. Australia, New Zealand, US, China, Japan) Private Sector (Foreign Investment)
Financing	• Given the recent acquisition of two aircraft intended for international aviation, connectivity to outer islands is being prioritized to distribute benefits of expected increases in tourism activity. Tourism revenue and viability of the aviation sub-sector are recognized as inextricably linked. • Under the CORSIA model, the opportunity to provide carbon offsets for the global aviation industry has been discussed as a potential source of funding to support the domestic aviation sector in Kiribati.	MOFED MICTTD (Air Kiribati, Airports Kiribati) Donor/Development partners (e.g. World Bank, ADB) UN (e.g. ICAO, World Food Programme, UNCTAD, UNDP)
Human capacity	• Technical advisory support and training of both Air Kiribati and Airports Kiribati personnel has already been recommended under the MSP, and this will need to include an understanding of the various technological developments that will likely be integrated into aviation sub-sectoral operations over the coming decade. • Operational requirements and safety protocols for new aircraft will provide justification for training of all flight and ground crew.	MITCTTD (CAAK) Air Kiribati Airports Kiribati PASO Donor/Development partners (World Bank, ADB) UN (e.g. ICAO, World Food Programme, UNCTAD, UNDP)
Insufficient Infrastructure	• Expanding outer island airport facilities to be able to accommodate aircraft of at least the size of a de Havilland Dash-8 (the smallest model of which, the Q200, holds 37-39 passengers) • Providing renewable energy to outer island airports to support offsetting of aircraft fuel requirements • Improving the construction quality of the airstrips to prevent closure and delays.	MOFED MISE MITCTTD (CAAK) MLPID Air Kiribati Airports Kiribati

Annex G: Financial Instruments and Sources of Finance

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 solar streetlight network).	ADB, WB, PRIF, bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.)
TA/CB 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, 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.	DBK, ANZ, IFC
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.	GOK (KIC), private sector
Guarantees	Debt guarantees for commercial loans can larger purchases of for example buses, especially for operators who may lack necessary assets as collateral. Where the Debt guarantees may need to be tied to a revolving loan fund. Payment guarantees can be utilised to lower the borrower risk and default on payments, especially for commercial bank lending to private operators. It can also address risks for periods of non-revenue during times of disasters.	ADB, IFC, GCF, EIB, EXIM banks
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.	DBK, ANZ, 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.	GOK, UNDP, USP,
State Budget PUB Budget	State budgetary considerations will come into play in regard to 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[93]. PUB budget and financials will also be impacted due to charging infrastructure for EVs and electricity payments.	GOK PUB
Taxes: Import/Excise, corporate, personal, etc.	In order to motivate a transition towards decarbonisation in the market, the government will have the opportunity to adjust tax / duties / excise 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. But may also lead to lower government revenues (as indicated above)	GOK

Personal Savings, Income, and Remittances	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 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

Financial Instruments and Sources of Finance in Maritime Transport

Type of Financial Instrument	Description of the Financial Instrument	Potential Sources of Finance
Finance Grants	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	ADB, PRIF, WB, GEF, GCF, UNDP, GGGI, Bilateral partners (e.g. China, Japan, EU, Sweden[94]), MTCC and other IMO initiatives
TA/CB Grants	Grants for building capacity of Kiribati stakeholders to access financing, administer and monitor trials, and to coordinate an integrated programme of transport decarbonisation Scholarships (bonded) for seafarers, maritime transport planning, maritime tourism, RE/low carbon shipping, surveying, naval architecture, marine engineering, etc.	ADB, PRIF, WB, GEF, GCF, UNDP, GGGI, Bilateral partners (e.g. China, Japan, EU, Sweden) MTC, KIT, USP, international academy
Loans: concessional, commercial and retail (personal), revolving, special commercial loans	Low/zero interest loans for commercial and household deployment of demonstrated solutions to reduce or remove fossil fuel use in domestic shipping.	ADB, IFC, Investment banks, PRIF, DBK, ANZ
Guarantees	Debt guarantees for commercial and household loans can facilitate the purchase of vessels and outboard motors, for business and individual who lack assets for collateral. Payment guarantees can be utilised to lower the borrower risk and default on payments, especially for commercial banks. As well as address risks periods of non-revenue during times of disasters.	ADB, IFC, GCF, EIB, EXIM banks
Tax, duty and excise incentives/penalties	Reduction or removal of tax and import duties from imports of low/zero carbon vessels, machinery and equipment (e.g. electric outboard motors and recharging equipment), spare parts etc. 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)	MOFED
State Budget PUB	Expenditures for KNSL and KPA may be supplemented through the State budget, and operational budgets for may be assumed to come from the State budget entirely, which will be essential for providing regulatory oversight of the maritime sub-sector and MRV on associated emissions. PUB budget and financials will also be impacted due to charging infrastructure for electric outboards and electricity payments.	MOFED
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

Financial Instruments and Sources of Finance in Aviation Transport

Type of Financial Instrument	Description of the Financial Instrument	Potential Sources of Finance
Finance Grants	Financial grants may contribute particularly towards the investment needed to upgrade the 19 domestic airports, as the international airport rehabilitation was undertaken with grant support.	ADB, WB, bilateral partners (e.g. China, Japan, EU, UK, Australia, NZ, US, etc.)
TA/CB Grants	The technical training already identified in the MSP will most appropriately be facilitated with technical assistance and capacity building grants.	ADB, WB, EU, GGGI, GIZ, 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 through ownership or lease.	ADB, WB, EIB, GCF.
Guarantees	Debt guarantees for commercial loans can facilitate the purchase of aircraft, especially for Air Kiribati who may lack necessary assets as collateral. Payment guarantees can be utilised to lower the borrower risk and default on payments, especially for commercial bank lending and leasing of aircraft. It can also address risks for periods of non-revenue during times of disasters.	ADB, IFC, GCF, EIB, EXIM banks
State Budget	Expenditures for Air Kiribati and Airport Kiribati may be supplemented through the State budget, and the CAAK 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 monitoring of associated emissions / fuel use.	GOK

Financial Instruments and Sources of Finance in Power and Appliances

Type of Financial Instrument	Description of the Financial Instrument	Potential Sources of Finance
Finance Grants	Financial grants may contribute particularly towards funding for the cost of physical investments being proposed to be made by PUBS to retrofit existing Diesel Power Plants, for replacing Lead Acid battery storage for off grid power facilities owned by them to Li Ion and for new installations, to purchase new meters and software and for annual maintenance required for changing to a Time of Day metering for larger commercial and industrial consumers and for bulk procurement of energy efficient appliances for distribution through DSM programme. This also includes the financial burden for PUBS to cover a proposed minimum of 30 % subsidy for individuals who procure energy efficient appliances under the proposed DSM programme. For private companies and individuals currently using Lead Acid Batteries, a minimum subsidy of 30 % for replacing it with Li Ion is being proposed. For private companies and individuals currently using DG sets for backup power, financing DG set replacements is not being proposed, as a more ideal alternative is for them to replace it with rooftop solar PV which is also more in line with national plans and targets. A minimum of 30 % subsidy on the initial investment by individual users to buy energy labelled appliances under the project titled “Strengthening and expanding the standards and labelling programme for appliances in Fiji and Kiribati”. Grant funding of investments by the Government to procure energy efficient constructions, appliances and equipment’s for meeting Sustainable Procurement standards under the project titled “Promotion of Sustainable Procurement in Fiji and Kiribati”	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	Grant funding for the capacity building and technical assistance needs for Integrated Energy Planning, efficient operation and maintenance of the Diesel Power Plants, and managing peak demand.	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	Low interest loans for funding for the cost of physical investments being proposed to be made by PUBS to retrofit existing Diesel Power Plants, for replacing Lead Acid battery storage for off grid power facilities owned by them to Li Ion and for new installations, to purchase new meters and software and for annual maintenance required for changing to a Time of Day metering for larger commercial and industrial consumers and for bulk procurement of energy efficient appliances for distribution through DSM programme.	ADB, WB, IFC, EIB, DBK GEF, GCF
Commercial & Retail (Personal) Loans, Revolving Loans	Special commercial loans will be of relevance for implementing efficient power generation solutions in the outer islands. Any commercial and retail loan facilities set up to support energy efficient appliances for the private sector. This can build upon the existing DBK and ANZ lending programmes.	DBK, ADB, WB/IFC, ANZ
State Budget (SB) PUB Budget	Allocations for the cost of physical investments being proposed to be made by PUB to retrofit existing Diesel Power Plants, for replacing Lead Acid battery storage for off grid power facilities owned by them to Li Ion and for new installations, to purchase new meters and software and for annual maintenance required for changing to a Time-of-Day metering for larger commercial and industrial consumers and for bulk procurement of energy efficient appliances for distribution through DSM programme. Allocations for the cost of physical investments (energy efficient appliances) being proposed for Government buildings.	MOFED PUB
Taxation	There is a possibility to use excise and duties as a means to influence the comparative cost purchase between low- and high-efficiency power equipment, such as between lead acid and Li Ion batteries, non and efficient appliances. In addition, provisions for tax deductions from capital investments in efficient technology or tax credits can be instituted.	MOFED
Private equity, Personal Savings, Income, and Remittances	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.	Private sector

Financial Instruments and Sources of Finance in Buildings, Government, and Industry

Type of Financial Instrument	Description of the Financial Instrument	Potential Sources of Finance
Finance Grants	Full funding is being proposed for all investments being made by the Government to retrofit existing buildings and the incremental cost for new Energy Efficient buildings, to meet the requirements of the proposed EEBC (mandatory) and the Green Building rating schemes (voluntary) A minimum of 30 % subsidy on the initial investments by Private companies and Individual users to retrofit existing buildings and houses, and the cost of new constructions for meeting the requirements of the proposed EEBC and Green Building Rating system A minimum of 30 % subsidy on the initial investments for physical investments by Private companies to retrofit existing larger hotels and commercial buildings based on recommendations from energy audits and studies carried out under the proposed project. Experience indicates that a minimum of 30 % subsidy on the initial investment (CAPEX) by private companies to procure energy efficient equipment, including cogeneration infrastructure, will encourage a change.	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	Grant funding for the capacity building and technical assistance needs for developing policy tools, stakeholder capacities, support in procurement and availability, and design criteria…etc. Grant funding for the capacity building and technical assistance needs for industrial energy audits and planning.	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	Low interest loans for funding for the cost of physical investments in government building retrofits.	ADB, WB, IFC, EIB, DBK GEF, GCF
Commercial & Retail (Personal) Loans, Revolving Loans	Any commercial and retail loan facilities set up to support low carbon new and retrofit buildings in the private sector. Any commercial and retail loan facilities set up to support energy efficient appliances for the private sector. This can build upon the existing DBK and ANZ lending programmes.	DBK, ANZ, IFC
State Budget (SB)	Allocations for the cost of physical investments (new and retro fit) being proposed for Government buildings.	MOFED
Taxes: Excise, corporate, personal, etc.	In order to motivate a transition towards decarbonisation in the building sector, the Government will have the opportunity to adjust tax rates at each stage of collection to incentivize certain construction and retrofitting to make low carbon practices more attractive. This can be lower stamp duties on new buildings, removing excise and duties, provisions for tax deductions from capital investments in efficient technology or tax credits can be instituted. 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 appliances. As well the opportunity to of provisions for tax deductions from capital investments in efficient technology or tax credits can be instituted.	MOFED
Personal Savings, Income, and Remittances	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, and appliances.	Private sector
Private equity,	The liquidity in the market will provide a basis for spending by the businesses. Business people allocate their cash towards their investment dependent heavily on the options provided to them in other financial instruments and their understanding of energy savings.	Private sector, SOE

Annex H: Consolidated Financial Needs and Mitigation

Transport Sector Primary Mitigation Options	Mitigation in 2030	Total	2020 - 2022 CB & TA	2020 - 2022 Invest	2023 - 2025 CB & TA	2023 - 2025 Invest	2026 - 2030 CB & TA	2026 - 2030 Invest
T2 - Bicycle/E-Bike Financing initiative	1,400	21,104	230	1,719	210	5,877	350	12,718
T8 - Multi-modal Transit Initiative	7,000	93,250	2,210	-	615	49,500	1,025	39,900
T4 - National Maritime Action Plan	-	315	108	-	83	-	125	-
T1 - Outboard Motor Transition	3,700	21,608	250	1,520	210	5,613	350	13,665
T5 - Low Carbon Mini-Container Ship	1,400	5,970	-	-	590	5,000	380	-
T6 - Small Low Carbon Cargo/Passenger Freighter	400	2,950	325	-	238	2,000	388	-
T9 - Zero-impact Cruise Liner	800	8,450	-	-	875	-	575	7,000
T3 - Aviation Operational Training Programme	400	1,200	240	-	360	-	600	-
T7 - Biofuel blends in Land and Maritime Transport	3,100	8,200	750	-	450	7,000	-	-
Primary Options Total Costs (1000s US$)		***163,047***	***4,113***	***3,239***	***3,630***	***74,990***	***3,793***	***73,283***
Primary Options Total Mitigation (tCO2)	***18,200***	***115,400***	***600***		***29,400***		***85,400***	
Transport Sector Secondary Mitigation Options								
T15 - Active Land Transport Infrastructure Upgrade	700	592,000	2,500	-	7,000	164,000	10,500	408,000
T11 - Electric Vehicle Network Development	6,500	105,545	770	8,687	1,245	29,638	1,075	64,130
T13 - Whole-of-Lifecycle Vehicle Programme	100	2,340	360	1,500	180	-	300	-
T10 - Aircraft Re-Fleeting Programme	,1,400	-	3,330	-	450	33,500	750	167,500
T12 - Sustainable Aviation Fuel Integration Initiative	1,000	7,000	1,200	-	-	3,425	-	2,375
T14 - Airport & Airfield Infrastructure Upgrade	100	35,200	1,920	-	480	12,000	800	20,000
Secondary Options Total Costs (1000s US$)		***947,615***	***10,080***	***10,187***	***9,355***	***242,563***	***13,425***	***662,005***
Secondary Options Total Mitigation (tCO2)	***9,800***	***46,100***	***600***		***9,100***		***36,400***	

Energy Efficiency Sector Primary Mitigation Options	Mitigation in 2030	Total	2020 - 2022 CB & TA	2020 - 2022 Invest	2023 - 2025 CB & TA	2023 - 2025 Invest	2026 - 2030 CB & TA	2026 - 2030 Invest
E1 - Strengthening and Expanding the Standards and Labelling Programme for Appliances	2,900	277	95	-	170	-	12	-
E2 - Capacity Building for Integrated Energy Planning and Energy Statistics in Kiribati	2,000	381	106	-	275	-	101	-
E3 - Supporting the Retrofitting of Major Hotels and Commercial Buildings	900	2,437	186	-	650	1,500	-	-
E4 - Promotion of Sustainable Procurement	1,200	484	142	-	342	-	576	-
E5 - Utility Led Programme to manage Peak Demand and Savings in South Tarawa	6,800	42,915	151	-	657	6,508	67	35,023
E6 - Capacity Building in Energy Efficiency in Industry	1,100	1,009	91	-	351	500	756	-
Primary Options Total Costs (1000s US$)	***-***	***47,503***	***771***	***-***	***2,445***	***8,508***	***56,700***	***35,023***
Primary Options Total Mitigation (tCO2)	***14,900***	***62,500***	***-***	***-***	***5,800***	***-***	***-***	***-***
Energy Efficiency Sector Secondary Mitigation Options								
E7 - Capacity Building in the Assessment, Design and Construction of Low Energy/Carbon Buildings	500	12,796	134	-	541	3,340	581	8,200
E8 - Promotion of Lilon battery for Renewable Energy storage instead of Lead Acid	100	2,089	145	-	413	804	505	222
E9 - Programme on Efficient Operation and Maintenance of Diesel Power Plants	1,600	1,673	126	-	267	1,000	-	280
Secondary Options Total Costs (1000s US$)	***-***	***16,558***	***405***	***-***	***1,221***	***5,144***	***1,086***	***8,702***
Secondary Options Total Mitigation (tCO2)	***2,200***	***10,600***	***-***	***-***	***1,400***	***-***	***9,200***	***-***

Investment Planning in Kiribati for the Transport and Energy Efficiency Sectors

IMPLEMENTING PARTNERS

REGIONAL PACIFIC NDC HUB

GGGI

WITH FINANCIAL SUPPORT FROM

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NEW ZEALAND FOREIGN AFFAIRS & TRADE Aid Programme

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