KINGDOM OF TONGA

TNA MITIGATION FOR CLIMATE CHANGE TECHNOLOGIES

Technology Action Plan (TAP)

Report

(January, 2025)

TECHNOLOGY ACTION PLAN REPORT FOR CLIMATE CHANGE TECHNOLOGIES

Author: Dr Tevita Tukunga
Former Director of Energy
Current Director of the Board of Utilities

This publication is an output of the Technology Needs Assessment project, funded by the Global Environment Facility (GEF) and implemented by the United Nations Environment Programme (UN Environment) and the UNEP Copenhagen Climate Centre (UNEP-CCC, formerly UNEP DTU Partnership) in collaboration with University of the South Pacific (USP). The views expressed in this publication are those of the authors and do not necessarily reflect the views of UNEP-CCC, UN Environment or USP. We regret any errors or omissions that may have been unwittingly made.

Table of Contents

1 List of Tables

2 List of Abbreviation

AC – Alternating Current
ADB – Asian Development Bank
BAEF- Barrier and Analysis and Enabling Framework
BAU - Business-As-Usual
BESS – Battery Energy Storage System
CNBC – Consumer News and Business Channel
CTCN – Climate Technology Centre and Network
DC – Direct Current
EE – Energy Efficiency
Eff - Efficiency
EU – European Union
ESCAP – Economic and Social Commission for Asia and the Pacific
EV – Electric Vehicle
GCF - Green Climate Fund
GEF- Global Environment Facility
GHGs – Green House Gases
GGGI – Global Green Growth Institute
GOT – Government of Tonga
ICE – Internal Combustion Engine
IEA – International Energy Agency
IMF – International Monetary Fund
INDC – Intended Nationally Determined Contribution IPCC –Inter-governmental Panels on Climate Change
IPP- Independent Power Producers
IRENA – International Renewable Energy Agency
LED – Light Emitting Diode
MCA – Multi-Criteria Analysis
MEIDECC - Ministry of Meteorology, Energy, Information, Disaster, Environment, Climate Change and Communication
Climate Change Policy
NEXSTEP - National Expert SDG Tool for Energy Planning
NDC - Nationally Determined Contribution
NDC IP - Nationally Determined Contribution Implementation Plan
NREL - National Renewable Energy Laboratory
O&M – Operation and Maintenance
OIREP – Outer Islands Renewable Energy Project
PCREEE – Pacific Centre for Renewable Energy and Energy Efficiency
PICs – Pacific Island Countries
PPA – Power Purchase Agreement
PV – Photovoltaic
RE - Renewable Energy
SHS – Solar Home System
SIDS – Smal Islands Developing States
TAPs -Technology Action Plans
TEC - Tonga Electricity Commission

TERM - Tonga Energy Road Map
TERM – IU Tonga Energy Road Map Implementation Unit
TEEMP – Tonga Energy Efficiency Master Plan
TNA – Technology Needs Assessment
TNC = Third National Communication
TOP – Tongan Paanga, $
TPL – Tonga Power Limited
TREP – Tonga Renewable Energy Project
UNDP – United Nation Development Programme
UNEP - United Nations Environment Programme
UNEP/CCC-United Nations Environment Programme (UNEP) and Copenhagen Climate Centre)
UNFCCC - United Nation Framework Convention Climate Change
V2G – Vehicle to Grid
V2H – Vehicle to Home

3 FOREWORD

The Kingdom of Tonga has successfully conducted a Technology Needs Assessment (TNA) aimed at addressing the negative impacts of climate change on the mitigation sector. This initiative was launched following a stakeholder meeting held in 2023. The completed TNA report, along with the BAEF report, has led to the identification and prioritization of technologies related to energy and transportation, as well as the recognition of barriers and the enabling framework that Tonga must adopt to tackle climate change challenges. Tonga's commitment to the TNA process is evident in its ability to incorporate an action plan and the necessary activities for implementing specific measures to combat the adverse effects of climate change within the nation. The country has experienced significant challenges, including severe cyclones, flooding, and extreme temperatures, compounded by erratic rainfall patterns during the wet season and rising average temperatures, all of which have adversely impacted the livelihoods and well-being of its population. The frequency of such climatic events is expected to rise, posing a threat to the developmental progress made over recent decades due to the consequences of climate change. Consequently, Tonga, in partnership with other small island nations, recognizes the importance of fostering global initiatives to mitigate climate change through Technology Needs Assessments (TNA).

The TNA process aimed at climate change mitigation in Tonga has resulted in three interrelated reports that collectively summarize its findings:

1. Technology Needs Assessment Report - This report delineates the methodology utilized in the Technology Needs Assessment (TNA) process, providing a comprehensive overview of how different sectors and technologies were identified and prioritized. The Energy and Transportation sectors were identified as the key focal points for climate change mitigation, resulting in their selection for detailed analysis. Within each sector, three specific technologies were selected for the energy sector: on-grid photovoltaic systems, on-grid wind energy, and energy-efficient appliances. Additionally, three technologies were chosen for the transportation sector: battery electric vehicles, hybrid vehicles, and on-grid electric vehicles, to facilitate a thorough examination of the associated barriers.

2. Barrier Analysis and Enabling Framework Report - This document emphasizes the obstacles to technology diffusion recognized by stakeholders, as well as the fundamental reasons behind these challenges. Additionally, it delineates the essential measures and enabling framework needed to facilitate technology diffusion across the relevant sectors and for each chosen technology.

3. Technology Action Plans - This report has been finalized and is presented below as a significant component of this document. It outlines the essential steps and actions necessary for the effective dissemination of each prioritized mitigation technology within the energy and transportation sectors. The primary actions to facilitate technology

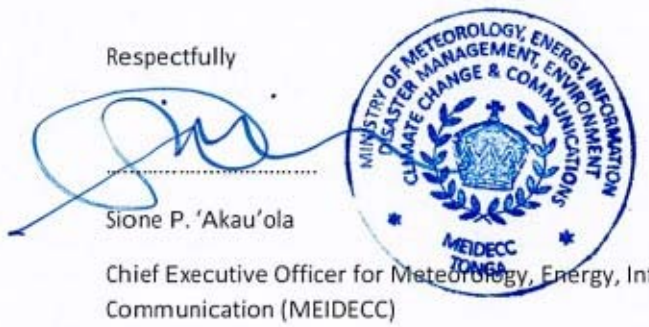
diffusion encompass: a) recruitment of a team as institutional arrangement for implementation of Technology Action Plan b) conducting research to evaluate the economic feasibility of the technologies, c) implementing initiatives to raise public awareness, d) identifying financing opportunities for technology and creating financial incentives and opportunities , and collaborating with development organizations to obtain financing , e) procurement of pilot projects and identifying and evaluating supportive policies and legislation, and f) Maintenance, testing, management of the project improving institutional frameworks and fostering collaboration

4. We can now compile a project concept and proposal based on the three reports mentioned above, as the concluding phase of the TNA assessment in Tonga to be addressed as final deliverable of the TNA report.

I would like to express my sincere appreciation to all stakeholders who have been involved in this process over the past two to three years. I extend special thanks to our partners, including the United Nations Environment Programme (UNEP) and the UNEP Copenhagen Climate Centre (UNEPCCC), along with the Regional Energy Research Centre at the University of the South Pacific and GEF, for their invaluable financial support of the TNA process in Tonga.

I would like to take this opportunity to acknowledge the significant contributions made by our Consultants, including Dr. Tevita Tukunga from the Board of Utilities of Tonga, Dr. Subash, and Dr. Sandra from UNEPCCC, and Dr. Hilda from USP. Their efforts have been vital in guiding the process and consolidating the insights gathered from stakeholder consultations into the aforementioned reports. It is essential that we collaborate effectively to ensure that the outcomes of this comprehensive process lead to impactful and actionable initiatives on the ground. The Department of Energy and the Department of Climate Change within the Ministry of MEIDECC in the Kingdom of Tonga have prioritized climate change on their agenda. Project coordinator Mr. Filimone Fifita, the Director of the Department of Energy, Ms. Emeline Veikoso Laumanu , and I are committed to diligently progressing the identified projects. We will require the ongoing support of all stakeholders involved.

Respectfully



Sione P. 'Akau'ola

Chief Executive Officer for Meteorology, Energy, Information, Disaster, Environment, Climate and Communication (MEIDECC)

4 Executive Summary

The primary objective of the TNA project is to support countries that are Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in identifying their technology priorities for reducing greenhouse gas emissions and adapting to the impacts of climate change. The TNA encompasses both mitigation and adaptation components, which are carried out in three phases, resulting in three distinct reports: the Technology Needs Assessment Report (TNA) focusing on technology prioritization; the Barriers Analysis and Enabling Framework Report (BA&EF); and the Technology Action Plan (TAP) report.

Under the financial assistance of the Global Environment Facility, which was carried out by UNEPCCC, the Department of Energy of the Ministry of Meteorology, Energy, Information, Disaster, Environment, Climate Change and Communication (MEIDECC) of the Kingdom of Tonga coordinated the many multi-stakeholders' the Technology Action Plan (TAP) assessment of the six prioritized climate technologies.

This final report, referred to as the TAP, expands on the insights gathered from previous reports and integrates feedback from stakeholders concerning key decisions. The main aim of the TAP is to outline a strategic action plan for the prioritized technologies identified in the first stage (TNA report), which were later assessed for implementation challenges in the second stage (BAEF report). In this latter phase (TAP report), strategies to tackle the identified barriers for each technology were also deliberated. As a result, the BAEF analysis was instrumental in informing the TAP for each technology. In this regard, the strategies devised to overcome obstacles were transformed into critical actions designed to support the effective deployment of the technology.

A consensus was reached to evaluate six specific technologies: on-grid solar (PV) systems, on-grid wind power system, energy efficient home appliances, EV battery vehicle, hybrid vehicle and electric vehicles (EVs) grid connected vehicle. Given the similarities in barriers and strategies for three stated technologies in the energy sector, these three technologies were combined into a single Technology Action Plan (TAP) focused on energy sector. Given the similarities in barriers and strategies for three stated technologies in the transport sector, these three technologies were combined into a single TAP focused on transport sector. The overarching objectives for each TAP are driven by the necessity for inclusive economic growth and development, while also prioritizing environmental sustainability. Essentially, the TAP aims to foster the sustainable development of the Kingdom of Tonga. As highlighted in the Technology Needs Assessment (TNA) and the Barriers Analysis and Enabling Framework (BA&EF) Reports, the primary goals of the TNA-Mitigation are to support:

1. Sustainable economic development
2. Poverty alleviation through enhanced employment opportunities or income
3. Climate change mitigation and environmental protection.

4.1 Objective of the Technologies Action Plan (TAP) for Mitigation

The TAP plays a significant role in advancing two essential sustainable development goals: SDG 7, which promotes sustainable energy access for all, and SDG 13, which addresses the challenges of climate change. The initiatives outlined in this report demonstrate how the TAP can effectively support these goals. From a sustainable development standpoint, the TAP not only fosters socio-economic growth in Tonga but also emphasizes social inclusion and aims to minimize the island's carbon footprint. Furthermore, the climate change policy for Tonga outlines the vision and objectives necessary for addressing climate change on the island. In conjunction with this, the Nationally Determined Contribution (NDC) sets specific targets for reducing greenhouse gas (GHG) emissions, with an overarching goal of achieving a 30% reduction by 2025 compared to 2010 levels, and an indicative target of 40% reduction by 2030 (GOT,2020a).

4.2 Key Sectors and Technologies for TAP

4.2.1 National Target for Energy Sector

In 2024, the Prime Minister of Tonga, Hon Hu'akavameiliku, emphasized the significance of the government's objective to achieve 70% renewable energy by 2025 through the new RAPID PROJECT (TPL, 2024). However, it may be wise to adopt the findings of the TNA, thus consider the technology action plans both energy and transportation sectors in the race to achieve 70% renewable energy or 100% renewable in the Kingdom.

4.2.2 Prioritised Technologies for TAP

The two sectors identified for the Technology Needs Assessment (TNA) process in the Kingdom of Tonga are: (1) energy and (2) transportation, encompassing a total of six technologies. This Technology Action Plan (TAP) report outlines these six prioritized technologies for each sector, as detailed below:

1. Technologies for the energy sector include:
i. On-grid photovoltaic (PV) systems
ii. On-grid wind energy
iii. Energy-efficient home appliances

2. Technologies for the transportation sector comprise:
i. Battery electric vehicles (EVs)
ii. Hybrid vehicles
iii. On-grid electric vehicles (EVs)

4.2.3 Development of TAP.

The Technical Assistance Plan (TAP) was formulated through a participatory methodology based on the preceding steps of the Training Needs Assessment (TNA), including TNA report and BAEF report for Mitigation. A diverse array of stakeholders,

encompassing individuals from both the public and private sectors, along with members of the TNA Steering Committee, were engaged to ascertain that the selected measures are fitting for the context of Tonga.

This process employed several guiding criteria, including:

1) Effectiveness: To what extent do these actions facilitate the achievement of the implementation target?
2) Efficiency: Does the action promote implementation at the minimal possible cost regarding human and financial resources?
3) Interactions: Is the action in harmony with existing policies?
4) Suitability: Are the actions appropriately aligned with the country's context?
5) Cost and benefits: Do the expected benefits surpass the anticipated social, environmental, and economic costs?

The identified measures were subsequently transformed into specific actions, with each action delineated into activities that include established deadlines and associated costs.

The following technology descriptions are provided as Policy and Advocacy Brief for each technology to guide the action plan and activities for the technology.

4.3 Policy Brief for Prioritized Mitigation Technologies

4.3.1 Energy Sector

4.3.1.1 On-Grid Solar (PV) Systems

4.3.1.1.1 Technical Description OF On-Grid PV

The on-grid photovoltaic (PV) system is engineered to generate approximately 20 MW of solar energy alongside 50 MWh of battery storage capacity. This initiative is aligned with the national goal of achieving 70% renewable energy by 2025, with an ambitious long-term objective of reaching a complete 100% renewable energy share by 2035 (TPL, 2024). This 20MW solar farm/50MWh BESS on-grid photovoltaic system is making a significant contribution towards achieving the target of a 50% share of renewable energy by 2020, a 70% share by 2025, and a 100% share by 2035. The TAP connection to the on-grid network will be established through three distinct methods: first, by connecting the network to a solar farm located on the main islands; second, by linking the electricity network to rooftop installations on the main islands; and third, by connecting micro-grid networks in remote islands to smaller photovoltaic farms

The total hardware cost/budget for this TAP is approximately 50m USD for on-grid PV and 30m USD for PV on-grid Rooftop and 20m USD for remote islands individual on-grid networks. The actual costs and benefits will be contingent upon the least cost procurement process and methodology employed.

4.3.1.1.2 Climate Rationale of On-Grid PV

Tonga INDC report in 2015 reported a total of 69.1 Gigagrams of carbon emissions from electricity and 15.0 Gigagrams of GHG emissions from other energy sources compared to 120.2 Gigagrams of GHG from Transportation sector (GOT, 2020a). The Tonga Third National Communication in 2019 reported 40.2 Gigagrams of GHG from electricity and 7.8 Gigagrams of GHG from other energy compare to 72.3 Gigagrams of GHG emissions from the Transportation sector (GOT, 2020a).

The Tonga Energy Efficiency Master Plan Report in 2021 indicates that a 50% reduction in emissions by 2030 is achievable, using 2020 as the baseline year. This translates to a decrease from the business-as-usual (BAU) emissions of 210,000 metric tonnes of CO2 equivalent (UNCTCN, 2020).

4.3.1.1.3 Ambition of the Technology

The TAP aims to enhance socio-economic development by providing approximately 20MW/50MWh of on-grid electricity to the main electricity grids as well as adding new micro-grids to households and communities in remote islands addressing energy poverty, thereby further soliciting the complete share of renewable energy to help mitigate the adverse impacts of climate change. The project is also intended to enhance the existing 100% renewable power generation, which is currently operational in eight remote islands of Tonga, by extending its reach to additional outer islands and integrating their electricity networks into the renewable energy framework. Consequently, Tonga is on track to become the first small island nation in the South Pacific to achieve a 100% renewable energy share for its electricity micro-grids across all remote islands. Furthermore, to facilitate this transition towards a 100% renewable energy share in the capital and larger outer islands, a solar rooftop initiative has been proposed and included in the project to inform the decisions of the Kingdom's Electricity Boards.

4.3.1.1.4 Scale for Implementation and Timeline

This TAP on installing on-grid solar system-based in Tonga is scheduled from 2025 to 2027, beginning with recruiting consultants/local experts and establishing to the institutional set up to manage and assess the implementation of on-grid solar projects, energy storage, and infrastructure requirements. In 2025-2026, the focus will shift to engaging stakeholders from public and private sectors, including local communities, to ensure the technology meets Tonga’s on-grid PV needs based on local contexts. Draft findings will be shared for feedback, promoting inclusivity and local buy-in. By 2026-2027, the project assessment and evaluation will be finalized, with results informing potential legislation to support renewable energy infrastructure, aligning with Tonga’s low-carbon development objectives. By 2026-2030, the project will focused on installation of on-grid PV technologies according to three stages, including on-grid PV solar farm for capital island and other 3 main islands, on-grid solar forms for remaining 12 remote islands of Tonga, and finally the on-grid PV for solar roof-top.

4.3.1.1.5 Expected Impacts of the Technology

This strategy is anticipated to provide a more substantial impact on the national energy objectives than a solitary 20MW / 50MWh BESS and solar farm to the national electricity grid.

Renewable energy sources are expected to account for 40% of the reductions, or 43,500 metric tonnes of CO2e, while energy efficiency improvements in the electric sector will contribute 29.6%, amounting to 32,500 metric tonnes of CO2e (GOT, 2021c). Efforts in the ground transportation sector are projected to contribute to 30.4% of the total emissions reductions, equating to 33,400 metric tonnes of CO2e.

4.3.1.1.6 Ambition for Technology Readiness Level

The Technology Action Plan (TAP) outlines that this level of readiness encompasses essential activities such as the recruitment of specialists, acquisition of funding, and the execution of technical studies to assess the reliability and feasibility of on-grid photovoltaic systems, the established independent power producer (IPP) tariffs, and the opportunities for reducing emissions. Although on-grid solar-powered IPPs are already well-integrated, this project's technical assessment and evaluation seek to tailor these systems to align with Tonga's existing electricity infrastructure, regulatory framework, and local energy requirements. The current state of readiness is considered moderate, with the TAP specifying vital measures to improve readiness through focused capacity-building initiatives and collaboration with key stakeholders, thereby facilitating successful implementation.

4.3.1.1.7 Policy Actions for Technology Implementation

This Technology Action Plan (TAP) is well-suited to enhance the effectiveness and efficiency of on-grid PV initiatives, given the presence of established policies and ongoing projects related to solar farm connections to the grid, as well as policies and agreements for rooftop connections to the national grid and existing policy frameworks for micro-grid connections to solar farms on remote islands. The TAP is appropriate for the country's context, considering the current projects in place. Additionally, it offers cost benefits due to its potential to significantly reduce carbon emissions. Table 1 presents a comprehensive overview of the essential policies currently in place that pertain to on-grid solar power technology.

Table 1: Existing Policies related to the dissemination of on-grid PV

Name of Policy	Year of Enacted	Contents
1. National Climate Change Policy	2020	The purpose of the Tonga Climate Change Policy is to provide a clear vision, goal, and objectives to direct responses to climate change and disaster risk reduction over the next five years.
2. National Energy Act	2021	A legislation to create the Ministry in charge of Energy, the Energy Commission, and the Regulatory Authorities, aimed at establishing a coherent institutional, regulatory, and policy

		framework for the energy sector
3. Tonga Energy Road Map	2010	TONGA ENERGY ROAD MAP (TERM) 2010-2020 A Ten Year Road Map to Reduce Tonga's Vulnerability to Oil Price Shocks and to Achieve an Increase in Quality Access to Modern Energy Services in an Environmentally Sustainable Manner
4. Tonga Energy Road Map Plus	2021	The Tonga Energy Road Map 2021-2035 (TERMPLUS) is Tonga's national energy policy and 15-year roadmap, to achieve ambitious renewable energy targets of 70% and 100% renewable electricity by 2025 and 2035, respectively, through actionable energy strategies.
5. Tonga INDC	2015	Tonga's Intended Nationally Determined Contributions (INDC) – 2015 is designed for both reduced emission and increased investing in climate resilience, Tonga makes an explicit call for a more cost-effective national response and avoids the much bigger costs caused by climate inaction.
6. Tonga NDC reports	2020	This NDC review process was designed to provide a formal framework within which governments would increase the ambition of their actions against climate change and reduce its GHG emission over time, with the intention that each successive NDC would represent a progression beyond a country's current NDC and ultimately allow to meet the aims of the Paris Agreement goal.
7. Tonga SDG 7 Report	2021	The key objective of this SDG 7 roadmap is to assist the Government of Tonga develop enabling policy measures to achieve the targets of SDG 7. This roadmap contains a matrix of technological options and enabling policy measures for the Government to consider. It presents several scenarios that have been developed using national data, considering existing energy policies and strategies, and reflecting on other development plans.
8. Tonga Grid Code	2020	The primary objective of this grid connection code is to specify minimum technical and design grid connection requirements for Renewable Power Plants connected to or seeking connection to the Tonga Power Limited's network
9. Tonga Energy Efficiency Master Plan Report	2021	This document builds on Tonga's ratification of the Paris Agreement in 2016 and contains priority ambitious and urgent actions that would contribute to pursuing targets in Tonga's Nationally Determined Contribution. The TEEMP represents the Tonga Government's commitment to join the global community in addressing the challenges of climate

		change and improving national energy security. It is a whole of government's approach to maximizing benefits from the low hanging fruits in energy efficiency
10. Tonga Green Climate Fund Country Programme(CP)	2018	The Tonga CP for the Green Climate Fund (GCF) is one of the outputs of Tonga's Green Climate Fund (GEF) Readiness and Preparatory Support programme. Tonga's – GCF CP consolidates nationally driven priorities for GCF support. The CP is to also guide international and regional GCF accredited entities and nationally accredited on the resilient development priorities that they should be focusing on and developed for GCF funding

4.3.1.1.8 Proposed Policies to Enhance Technology Implementation

The lack of a regulatory support framework within the existing concession contract for on-grid PV systems due to insufficient legislation and policies on ON-GRID PV systems currently hinders the inter-ministerial collaboration that is vital for effective implementation. Although the Ministry of MEIDECC has been provided with the approved Energy Act of 2021, it has yet to be utilized. It is essential to establish dedicated legislation or policies for solar power that emphasize the use and production of renewable energy sources in preference to traditional energy forms. This approach would facilitate a national shift towards sustainable energy and could enable the seamless integration of maximum solar power generated from solar farm projects into the existing grid. Furthermore, it seeks to enhance the institutional framework for electricity, ensuring that it can draw in the essential investments needed to achieve renewable energy objectives.

4.3.1.1.9 Cost for proposed Policies

The estimated cost for these activities is approximately USD 104,355,000 with the Department of Energy, MEIDECC serving as the primary implementing entity.

4.3.1.2 : On-grid Wind Power Systems.

4.3.1.2.1 Technical Description

The on-grid wind power project is ongoing of which JICA installed 1 MW of wind power project in 2019 and through China Aid, 2.3 MW of wind power is currently installing by a Chinese company in the eastern part of Tongatapu at a total cost of 20-23m USD. This TAP aims to build a total of 2.3MW on-grid wind power projects in the main island of Tongatapu, and other outer islands of Tonga after the installation of the China funded on-grid wind projects in 2025.

4.3.1.2.2 Climate Rationale of the Technology.

The currently installing wind project financed by China and other future follow up wind project will contribute to the achieving 70% or 100% share of RE in the country.

4.3.1.2.3 Scale for Implementation and Timeline

4.3.1.2.4 Expected Impacts of the Technology

TAP aims to establish on-grid wind power projects, targeting a reduction of GHG emissions by roughly 21,750 Metric Tonnes of CO2 equivalent. Furthermore, these wind power projects are expected to help power utility lower their diesel power energy-related operational expenses by approximately 20%.

4.3.1.2.5 Ambition for Technology Readiness Level

That represents a reduction from the BAU emissions of 210,000 metric tonnes of CO2e (UNCTCN, 2020c). Renewable electricity is responsible for 40% (43,500 metric tonnes CO2 emissions (UNCTCN, 2020c).

4.3.1.2.6 Policy Actions for Technology Implementation

This Technology Action Plan (TAP) is well-suited to enhance the effectiveness and efficiency of on-grid wind power initiatives, given the presence of established policies like the grid code and IPP/PPA contracts and ongoing projects related to wind farm connections to the grid, as well as existing policy frameworks for micro-grid connections for 100% renewable energy electricity network connections in the remote islands of Tonga. It is appropriate to make suitable regulatory policy for wind power generation

4.3.1.2.7 Proposed Policies to Enhance Technology Implementation

The TAP is appropriate for the country's context, considering the current projects in place. Additionally, it offers cost benefits due to its potential to significantly reduce carbon emissions. However, it is important to review the existing policy to be able to allow maximum volume of power generation from wind power into the grid, at all time. . It is essential to establish dedicated legislation or policies for on-grid wind power that emphasize the use and production of wind energy sources in preference to traditional energy forms. This approach would facilitate a national shift towards sustainable energy and could enable the seamless integration of maximum wind power generated from any wind farm projects into the existing grid.

4.3.1.2.8 Cost Related to the Implementation of Policies

The estimated funding required for this TAP is around US$ 20-23 Millions for new 2.3MW on-grid wind power. According to the Tonga Energy Efficiency Master Plan, it is estimated that a reduction of 50% of total emission a year by 2030 is possible using 2020 as the reference year.

4.3.1.3 : Energy Efficient Home Appliances – LED Lighting, Refrigerators, Freezers, and High-Efficiency Air Conditioning Units

4.3.1.3.1 Technical Description

The aim of the initiative involving the installation of LED lights and high-efficient freezers, refrigerators, and air conditioners to reduce electricity consumption by 20%.

4.3.1.3.2 Climate Rationale of the Technology

This program seeks to potentially lower CO2 equivalent emissions by approximately 20% from the use of high-efficiency freezers, refrigerators, and air conditioners, in addition to

an expected 15% reduction from lighting. Furthermore, it is projected that energy-related operational costs for both the power utility and energy consumers could decrease by 30%.

4.3.1.3.3 Scale for Implementation of the Timeline

The estimated funding required for this initiative is around US$ 27- 30 million.

According to Tonga"s Progress on the SDGs Report, Tonga has just passed the energy intensity rate of 4MJ/USD of GDP in 2018 (GOT, 2020b), so we can target the national energy intensity to 3MJ/USD of GDP by 2030, and through this Technology Action Plan.

4.3.1.3.4 Expected Impacts of the Technology

Tonga Energy Road Map Plus Report set up our national energy targets for 2021-2035 is to improve demand side energy efficiency by reducing the total energy consumption from 65GWh in 2021 to 40GWh by 2035 (GOT, 2021b).

4.3.1.3.5 Ambition for Technology Readiness Level

Appropriate energy efficient action are essential to reduce from 4MJ/USD in 2018 to 3MJ/USD by 2030.

4.3.1.3.6 Policy Actions for Technology Implementation

The TERMPlus report also set up target to maintain electricity network losses under 8% by 2035 (GOT, 2021B). According to the Tonga Energy Efficiency Master Plan, it is estimated that a GHGs reduction of 50% a year by 2030 is possible using 2020 as the reference year. That represents a reduction from the BAU emissions of 210,000 metric tonnes of CO2e. Action taken in the EE in the electric sector is responsible for 29.6% of the reduction (32,500 metric tonnes CO2e) (GOT, 2021c).

4.3.1.3.7 Proposed Policies to Enhance Technology Implementation

A new energy efficiency policy for minimum energy performances energy appliances efficiency standard is needed as well as new energy efficiency act. It is essential to establish dedicated legislation or policies for energy efficient appliances that emphasize the use and production of renewable energy sources in preference to traditional energy forms. This approach would facilitate a national shift towards sustainable energy and could enable the seamless integration of maximum energy efficient projects into the existing grid.

4.3.1.3.8 Cost Related to the Implementation of Policies

The estimated funding required for this initiative is around US$ 27- 30 million.

4.3.2 Transportation Sector

4.3.2.1 EVs battery Powered

4.3.2.1.1 Technical Description

The plan culminates in a project proposal centered on electric vehicles, named the Tonga Integrated PV Systems and EV Plug-in Demonstration Project (TIPVEV Project)

4.3.2.1.2 Climate Rationale of the Technology

According to the Tonga Energy Efficiency Master Plan, it is estimated that a reduction of 50% a year by 2030 is possible using 2020 as the reference year. That represents a reduction from the BAU emissions of 210,000 metric tonnes of CO2e. Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e), renewable electricity is responsible for 40% (43,500 metric tonnes CO2e), and EE in the electric sector is responsible for 29.6% of the reduction (32,500 metric tonnes CO2e) (GOT, 2021c). Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e) (UNCTCN,2020).

4.3.2.1.3 Scale for Implementation of the Timeline

Tonga Energy Road Map Plus (TERMPlus) set out target to limit growth in oil consumption for road transport to an average of 1.4% per year and overall to limit growth to 25% increase by 2035(GOT, 2021b). TERMPlus report set up target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030 (GOT, 2021b).

4.3.2.1.4 Expected Impacts of the Technology

The Electric Vehicle Technology Action Plan (EV TAP) has the capacity to reduce carbon dioxide emissions by approximately 10 kilotons each year.

4.3.2.1.5 Ambition for Technology Readiness Level

Additionally, research will be undertaken to evaluate the economic feasibility of battery powered electric vehicles, along with recommendations for specific policy incentives and regulatory system to facilitate their growth.

4.3.2.1.6 Policy Actions for Technology Implementation

This initiative will build on the findings from the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) research conducted in 2020 and aims to achieve a 10% decrease in greenhouse gas emissions across the Pacific Island Countries. Tonga is still access to insufficient policy tools that are directly related to the safety and operation of the battery charged electric vehicles.

4.3.2.1.7 Proposed Policies to Enhance Technology Implementation

It is important to identify policies and regulatory tools that are necessary for installing solar recharging station in order to operation the battery charged EVs in Tonga. It is essential to establish dedicated legislation or policies for battery charged electric vehicles (EVs) that emphasize the use and production of renewable energy sources in preference to traditional energy forms in the charging EVs. This strategy would promote a nationwide transition to sustainable energy and could allow for the utilization of the maximum potential of renewable energy sources that are generated but currently excluded from the electricity grids.

4.3.2.1.8 Cost Related to the Implementation of Policies

The projected costs for executing this action plan are estimated to be between US$4 million and US$5 million.

4.3.2.2 Hybrid Vehicle

4.3.2.2.1 Technical Description

The TAP culminates in a project proposal centered on Hybrid Electric Vehicles, titled: Tonga Hybrid Electric Vehicle Project.

4.3.2.2.2 Climate Rationale of the Technology

The Hybrid Electric Vehicle Technology Action Plan (TAP) has the capacity to significantly reduce emissions, potentially saving approximately 10 kilotons of carbon dioxide each year. This TAP will leverage the findings from the CNBC's research conducted in 2023 and aims to achieve a 7% decrease in greenhouse gas emissions in Tonga.

4.3.2.2.3 Scale for Implementation of the Timeline

Research will be undertaken to evaluate the economic feasibility of Hybrid Electric Vehicles, along with recommendations for incentives to facilitate their growth.

4.3.2.2.4 Expected Impacts of the Technology

Tonga Energy Road Map Plus (TERMPlus) set out target to limit growth in oil consumption for road transport to an average of 1.4% per year and overall to limit growth to 25% increase by 2035(GOT, 2021b). TERMPlus report set up national target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030 (GOT, 2021b).

4.3.2.2.5 Ambition for Technology Readiness Level

According to the Tonga Energy Efficiency Master Plan, it is estimated that a reduction of 50% a year by 2030 is possible using 2020 as the reference year. That represents a reduction from the BAU emissions of 210,000 metric tonnes of CO2e. Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e),

4.3.2.2.6 Policy Actions for Technology Implementation

renewable electricity is responsible for 40% (43,500 metric tonnes CO2e), and EE in the electric sector is responsible for 29.6% of the reduction (32,500 metric tonnes CO2e) (GOT, 2021c).

4.3.2.2.7 Proposed Policies to Enhance Technology Implementation

It is important to identify policies and regulatory tools that are necessary for operation of the hybrid vehicles in in Tonga. It is essential to establish dedicated legislation or policies for hybrid vehicles that emphasize the use and production of renewable energy sources in preference to traditional energy. This strategy would promote a nationwide transition to sustainable energy.

4.3.2.2.8 Cost Related to the Implementation of Policies

The projected costs for executing this TAP are estimated to be between US$10 million and US$20 million.

4.3.2.3 : Grd-Connected EVs

4.3.2.3.1 Technical Description

EV Technology is the recognized authority in the UK on the impact of EV on the electricity network. We're a pioneer of smart solutions designed to mitigate the demands the increasing adoption of EV places on the grid.

4.3.2.3.2 Climate Rationale of the Technology

TERMPlus report set up target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030.

4.3.2.3.3 Scale for Implementation of the Timeline

Tonga Energy Road Map Plus (TERMPlus) set out target to limit growth in oil consumption for road transport to an average of 1.4% per year and overall to limit growth to 25% increase by 2035(GOT, 2021b).

4.3.2.3.4 Expected Impacts of the Technology

Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e)

4.3.2.3.5 Ambition for Technology Readiness Level

4.3.2.3.6 Policy Actions for Technology Implementation

According to the Tonga Energy Efficiency Master Plan, it is estimated that a reduction of 50% a year by 2030 is possible using 2020 as the reference year. That represents a reduction from the BAU emissions of 210,000 metric tonnes of CO2e. Renewable electricity is responsible for 40% (43,500 metric tonnes CO2e), and EE in the electric sector is responsible for 29.6% of the reduction (32,500 metric tonnes CO2e) (GOT, 2021c).

4.3.2.3.7 Proposed Policies to Enhance Technology Implementation

Tonga currently lacks adequate local infrastructure for grid-connected electric vehicles. Therefore, it is in the best interest of this project to concentrate on the assessment, evaluation, and design of appropriate policies, legislation, and regulatory frameworks that will facilitate the future integration of grid-connected electric vehicles in Tonga

4.3.2.3.8 Cost Related to the Implementation of Policies

The projected costs for executing this TAP are estimated to be between US$10 million and US$20 million. Electricity Networks need novel approaches to manage the increase in demand and complex, un-predictable network flow patterns resulting from the uptake of d electric vehicles (EV).

4.3.3 On-Grid Network Upgrade

In support of on-grid PV development, AusAID has pledged a grant of 15 million AUD, equivalent to 22,800,000 TOP (TPL, 2024), which is already an available co-financing financial resources to the TAP, and such available co-financing funding will finance the following initiatives:

Phase 1: Upgrade Project for Conventional Power Generation

Phase 2: High Voltage 33kV Wiring for Grid Strengthening

Phase 3: Network Enhancement for Area-4 in Nukualofa

4.4 Formulation of Technology Action Plan

For each technology, six distinct actions have been identified for incorporation into the Technology Action Plan (TAP). In the energy and transportation sectors, the chosen actions include: a) Improving the economic and financial viability of the selected technology, with a particular focus on policy, legal, and regulatory enforcement; b) Enhancing the financial accessibility and profitability of the selected technology; c) Identifying and promoting policy incentives for technology imports; d) Increasing public awareness among technology users, as well as in the e) design, procurement, and f) management, maintenance, and testing of pilot projects..

The action plan also outlines a timeline, a preliminary budget, and identifies key stakeholders essential for the planning and execution phases. Most activities are scheduled for implementation over a 10-year period, with primary responsibilities resting on government ministries, non-governmental organizations, and the private sector. The key ministries involved include the MEIDECC's Office – Division of Energy, Climate Change, Environment, the Ministry of Infrastructure, the Tonga Power Limited Board, and the Ministry of Natural Resources and Management. Potential funding sources have been identified, including the Government of Tonga and various development partners such as JICA, China, AusAID, MFAT, EU, ADB, and the World Bank.

Capacity building requirements have been delineated for each technology and subsequently associated with specific activities of selected initiatives. Additionally, the TAP has sought to outline potential implementation risks related to these actions while emphasizing essential contingency measures. The identified risks encompass financial constraints, scheduling challenges, insufficient political commitment, and poverty. Furthermore, the TAP has articulated immediate prerequisites for advancement and critical actions necessary for success, which will facilitate the allocation of resources towards the realization of the three technologies.

In this framework, project concepts have been formulated for each of the three technologies. The aim of the concept for the Energy Sector is to enhance the profitability of energy sector initiatives. In contrast, the goal of the concept for the Transport sector is to mitigate existing disincentives and showcase the advantages of electric vehicles (EVs). The Hybrid Vehicle and EV on-grid project concept is designed to promote sustainable

energy development and improve the livelihoods of the populace. These project concepts have been refined into six distinct project ideas—one for each of the three technologies across the two sectors.

The dissemination of the three technologies will be achieved through public awareness initiatives, financial support, technical design, assessment and analysis; enhanced enforcement of laws and regulations, the harmonization of conflicting and overlapping legal frameworks, and the removal of disincentives.

4.5 Energy Sector

In the energy sector, the actions comprise a) the institutional strengthening and enhancing the policy, legal, and regulatory framework, b) assessment, identifying financial policy incentives and implementation of economic feasibility of adopting the technology c) create public awareness and communication strategies for promotion of technological investment; d) Enhance accessibility for investment opportunities e) design, procure and installation, monitoring and maintenance of the technology; f) assessment and improvements of national infrastructure . Each action is accompanied by a detailed set of activities aimed at achieving the technology objectives.

Table 2: Summary of Designed Technology Action Plan for On-Grid PV

Sector	Energy
Sub-sector	Electricity
Technology	On-Grid PV for Electricity Generation
Technological Output	The On-grid photovoltaic system for TAP is engineered to generate around 20 MW of solar energy and provide 50 MWh of battery storage capacity. This initiative supports the objective of achieving 70% renewable energy by 2025, with a long-term goal of transitioning to a full 100% renewable energy share by 2045 (TPL, 2024).
	Furthermore, to facilitate this transition to 100% share of RE, a solar rooftop study has been conducted to inform the decisions of the Kingdom's Electricity Boards. We are targeting 10MW of solar farm and 25MWh of BESS.
	The TAP seeks to promote socio-economic growth by supplying around 10 MW of on-grid electricity to households and communities on isolated islands experiencing energy poverty, thus encouraging the full utilization of renewable energy resources..
	The total cost for TAP is approximately 50m USD for on-grid PV and 30m USD for PV on-grid Rooftop and 20m USD for remote islands individual on-grid networks
Mitigation Output	The Tonga Energy Efficiency Master Plan indicates that a 50% reduction in emissions by 2030 is achievable, using 2020 as the baseline year (UNCTCN, 2020; GOT, 2020c). This translates to a decrease from the business-as-usual (BAU) emissions of 210,000 metric tonnes of CO2 equivalent per year (UNCTCN,2020). Renewable energy sources are expected to account for 40% of the reductions, or 43,500 metric tonnes of CO2e.
	Tonga INDC report in 2015 reported a total of 69.1 Gigagrams of carbon emissions from electricity and 15.0 Gigagrams of GHG emissions from other energy sources compared to 120.2 Gigagrams of GHG from Transportation sector (GOT, 2020a). The Tonga Third National Communication in 2019 reported 40.2 Gigagrams of GHG from electricity and 7.8 Gigagrams of GHG from other energy compare to 72.3 Gigagrams of GHG emissions from the Transporation sector (GOT, 2020a).

Actions	Activities	Funding	Timeframe	Budget
Establish a unit under MEIDEC to oversee the implementation of the TAP		GoT, Development partners	1-2 years	36,000
Action 1 : Process Recruitment of positions and improve legal and regulatory policy and legislations for on-grid PV investments	Activity 1.1: identify and Confirm positions to be recruited and conduct official process for recruitment.	GoT, Development partners	1-2 years	36,000
	Activity 1.2: Process approval and expenditures for all associated investment and budget for the recruitment	GoT, Development partners	1-2 years	36,000
	Activity 1.3: Identify policy, legislative and regulatory shortfalls and discuss both the shortfalls and improvement steps to implement with key stakeholders and prepare policy statements for Cabinet endorsement and approvals	GoT, Development partners	1-2 years	36,000
Action 2: Conduct the economic feasibility of on-grid PV applications.	Activity 2.1: Conduct economic feasibility assessment of the on-grid PV , including market assessment and analysis and conduct consultations and prepare meetings to endorse the economic feasibility model before submission to Cabinet for approval and implementation	GoT, Development partners	1-2 years	150,000
	Activity 2.2: Conduct full assessment of Government Tax and Subsidy Policies, putting emphasis on identifying viable options for government import policy, tariff policy and investment policy for on-grid PV technology.	GoT, Development partners	1-2 years	150,000
	Activity 2.3: Conduct grid-connectivity assessment and analysis of key technical and economic barriers for the existing on-grid PPA projects/investment.	GoT, Development partners	1-2 years	150,000
	Activity 2.4: Identify and conduct computer modelling and testing the most sustainable installed capacities of the specific applications for on-grid solar farm, rooftop PV and outer islands on-grid solar farm.	GoT, Development partners	1-2 years	100,000

	Activity 2.5: Conduct stakeholders consultations and prepare policy statements and recommendations for Cabinet Approval on stakeholders agreements	GoT, Development partners	1-2 years	100,000
Action 3: Create awareness of both developer, and users of the technology	Activity 3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, and Users) to better inform their decision makings on on-grid investment project	GoT, Development partners	1-2 years	30,000
	Activity 3.2: Develop a communication strategy Profile for the target stakeholders particularly PPA owners and possible private sector investors and well known businesses in both overseas and in Tonga.	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Sign Memory of Understanding with key media agencies and companies on public campaign strategies on on-grid PV investments and benefits for public domains	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Implement awareness campaign on regional and national on-grid PV PPA investors.	GoT, Development partners	1-2 years	20,000
Action 4: Enhance access to investment finances	Activity 4.1: identify, Develop and recommend all financial incentives to Cabinet to assist lowering the cost of on-grid PV PPA. Provide clear justifications for electricity tariffs	Government Development Partner	1-2 years	40,000
	Activity 4.2: Engage in dialogue with development partners to provide subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of on-grid PV in Tonga	Development Partner	2-4 years	40,000
	Activity 4.3: Confirm financing options with international, regional and bilateral donors and development partners	Development Partner	2-4 years	40,000
	Activity 4.4: Prepare Cabinet Approval for possible financing of on-grid PV in the country and its plan to achieve 100%	Development Partner	2-4 years	40,000

	share of RE in the existing electricity Grid.			
Action 5: Design Procure and Install and set up monitoring and maintenance plan and model for all on-grid PV applications in the country	Activity 5.1: Design, procure install the on-grid solar PV	Government and Development Partner	5-10 years	50m USD
	Activity 5.2: Design, procure install the on-grid solar Roof Top on-grid solar PV	Government and Development Partner	5-10 years	30m USD
	Activity 5.3: Design, procure install the on-grid solar applications for individual outer islands	Government and Development Partner	5-10 years	20m USD
	Activity 5.4: Design, Approve and Set up the Monitoring and Maintenance Model for the technology	Government and Development Partner	5-10 years	20m USD
Action 6 : Assess and Identify all the necessary improvement options and technologies for the existing electricity grid in the country in order to meet 100% share of RE.	Activity 6.1: Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid PV through PPA investment in the grid	Government and Development Partner	5-10 years	20m USD
	Activity 6.2: Conduct consultation and meetings on findings of the grid assessment and analysis.	Government and Development Partner	5-10 years	20m USD
	Activity 6.3: Prepare all Policy decisions for government approval	Government and Development Partner	5-10 years	Government and Development Partner
	Activity 6.4: Design, Procure and install all necessary grid improvements to cater for 100% share of RE in total electricity generations	Government and Development Partner	5-10 years	Government and Development Partner

Table 3 : Summary of Designed Technology Action Plan for On-Grid Wind

Sector	Energy
Sub-sector	Electricity
Technology	On-Grid Wind Power for Electricity Generation
Technological Output	TAP for on-grid wind power aims to establish more on-grid wind power projects in the main island of Tongatapu or other outer islands of Tonga after the installation of the China funded on-grid wind projects. Furthermore, these wind power projects are expected to help power utility lower their diesel power energy-related operational expenses by approximately 20%. The estimated funding required for this TAP is around US$23 Millions for new 2.3MW on-grid wind power
	Furthermore, to facilitate this transition to 100% share of RE, a solar rooftop study has been conducted to inform the decisions of the Kingdom's Electricity Boards. We are targeting 2.3 MW of wind farm.
	The TAP aims to enhance socio-economic development by providing approximately 2 MW of on-grid wind electricity to outer island communities for Vavaú and Eua remote islands facing energy poverty, thereby further soliciting the

	complete 100% share of renewable energy.			
	The total cost for on-grid wind projects through TAP is approximately 23m USD for new 2.3 MW on-grid wind power and 20m USD for PV on-grid wind power projects for outer islands of Vavaú and Eua.			
Mitigation Output	The Tonga Energy Efficiency Master Plan indicates that a 50% reduction in emissions by 2030 is achievable, using 2020 as the baseline year (UNCTCN, 2020; GOT, 2020c). This translates to a decrease from the business-as-usual (BAU) emissions of 210,000 metric tonnes of CO2 equivalent per year (UNCTCN,2020). Renewable energy sources are expected to account for 40% of the reductions, or 43,500 metric tonnes of CO2e. On-wind power through TAP aims to establish on-grid wind power projects, targeting a reduction of GHG emissions by roughly 21,750 Metric Tonnes of CO2 equivalent.			
	Tonga INDC report in 2015 reported a total of 69.1 Gigagrams of carbon emissions from electricity and 15.0 Gigagrams of GHG emissions from other energy sources (GOT, 2020a). The Tonga Third National Communication in 2019 reported 40.2 Gigagrams of GHG from electricity and 7.8 Gigagrams of GHG from other energy (GOT, 2020a).			
Actions	Activities	Funding	Timeframe	Budget
Establish a unit under MEIDEC to oversee the implementation of the TAP for on-grid wind power		GoT, Development partners	1-2 years	36,000
Action 1 : Process Recruitment of positions and improve legal and regulatory policy and legislations for on-grid PV investments	Activity 1.1: identify and Confirm positions to be recruited and conduct official process for recruitment.	GoT, Development partners	1-2 years	36,000
	Activity 1.2: Process approval and expenditures for all associated investment and budget for the recruitment	GoT, Development partners	1-2 years	36,000
	Activity 1.3: Identify policy, legislative and regulatory shortfalls for on-grid wind power projects in Tonga and discuss both the shortfalls and improvement steps with key stakeholders for implementation and prepare policy statements for Cabinet endorsement and approvals	GoT, Development partners	1-2 years	36,000
Action 2: Conduct the economic feasibility of on-grid PV applications.	Activity 2.1: Conduct economic feasibility assessment of the on-grid PV , including market assessment and analysis and implement consultations with key stakeholders and prepare meetings to endorse the economic feasibility model for on-grid wind power technology before submission to Cabinet for approval and implementation	GoT, Development partners	1-2 years	150,000

	Activity 2.2: Conduct full assessment of Government Tax and Subsidy Policies for energy supply and services, putting emphasis on identifying viable options for government import policy, tariff policy and investment policy for on-grid PV technology. Conduct consultation on findings and prepare Cabinet paper and recommendations for Cabinet	GoT, Development partners	1-2 years	150,000
	Activity 2.3: Conduct grid-connectivity assessment and analysis of key technical and economic barriers for automatic on-grid wind power penetration to the existing grid from the existing on-grid PPA projects/investment. Prepare submission and recommendation to the Cabinet and the Board	GoT, Development partners	1-2 years	150,000
	Activity 2.4: Identify and conduct computer modelling and testing the most sustainable installed capacities of the specific applications for on-grid wind farm for the capital and other outer islands on-grid wind farm.	GoT, Development partners	1-2 years	100,000
	Activity 2.5: Conduct stakeholders consultations and prepare policy statements and recommendations for Cabinet Approval on stakeholders agreements.	GoT, Development partners	1-2 years	100,000
Action 3: Create public awareness of both developer, and users of the wind-power technology	Activity 3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, and Users) to better inform their decision makings on investment and tariffs imposed on-grid wind power project	GoT, Development partners	1-2 years	30,000
	Activity 3.2: Develop a communication strategy Profile for the target stakeholders particularly PPA owners and possible private sector investors and well known businesses in both overseas and in Tonga.	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Prepare, Agree and Sign Memory of	GoT, Development	1-2 years	20,000

	Understanding with key media agencies and companies on public campaign strategies on on-grid wind power investments and benefits for public domains	partners		
	Activity 3.3: Implement public awareness campaign on regional and national on-grid wind power PPA investments in the country.	GoT, Development partners	1-2 years	20,000
Action 4: Enhance access to investment finances	Activity 4.1: identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on on-grid wind PPA. Provide clear justifications for electricity wind power tariffs	Government Development Partner	1-2 years	40,000
	Activity 4.2: Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of on-grid wind power in Tonga	Development Partner	2-4 years	40,000
	Activity 4.3: Confirm potential financing options with international, regional and bilateral donors and development partners for on-grid wind power.	Development Partner	2-4 years	40,000
	Activity 4.4: Prepare Cabinet Approval for most sustainable financing options of on-grid wind power in the country and its plan to achieve 100% share of RE in the existing electricity Grid.	Development Partner	2-4 years	40,000
Action 5: Design, Procure, Install the monitoring and maintenance plan model for all on-grid wind applications in the country	Activity 5.1: Design, procure install the on-grid wind power installation in the capital.	Government and Development Partner	5-10 years	50m USD
	Activity 5.2: Design, procure install the on-grid wind power installation in the outer islands of Tonga	Government and Development Partner	5-10 years	30m USD
	Activity 5.4: Design, Approve and Set up the Monitoring and Maintenance Model for the technology	Government and Development Partner	5-10 years	20m USD
Action 6 : Assess and Identify all the	Activity 6.1: Assess and Identify the policy, legislative	Government and	5-10 years	20m USD

necessary improvement options and technologies for the existing electricity grid in the country in order to meet 100% share of RE.	and regulatory shortfalls in the implementation of existing on-grid PV through PPA investment in the grid	Development Partner		
	Activity 6.2: Conduct consultation and meetings on findings of the grid assessment and analysis.	Government and Development Partner	5-10 years	20m USD
	Activity 6.3: Prepare all Policy decisions for government approval	Government and Development Partner	5-10 years	Government and Development Partner
	Activity 6.4: Design, Procure and install all necessary grid improvements to cater for 100% share of RE in total electricity generations	Government and Development Partner	5-10 years	Government and Development Partner

Table 4 : Summary of Designed Technology Action Plan for Energy Efficient Home Appliance

Sector	Energy			
Sub-sector	Electricity			
Technology	Energy Efficient Home Appliances			
Technological Output	The aim of the initiative involving LED lights and high-efficient freezers, refrigerators, and air conditioners is to reduce electricity consumption by 20%. The estimated funding required for this initiative is around US$ 30 million. According to Tonga"s Progress on the SDGs Report, Tonga has just passed the energy intensity rate of 4MJ/USD of GDP in 2018 (GOT, 2020b), so we can target the national energy intensity to 3MJ/USD of GDP by 2030, and through this Technology Action Plan, appropriate energy efficient action are essential to reduce from 4MJ/USD in 2018 to 3MJ/USD by 2030. Tonga Energy Road Map Plus Report set up our national energy targets for 2021-2035 is to improve demand side energy efficiency by reducing the total energy consumption from 65GWh in 2021 to 40GWh by 2035 (GOT, 2021b).			
Mitigation Output	This program seeks to potentially lower CO2 equivalent emissions by approximately 20% from the use of high-efficiency freezers, refrigerators, and air conditioners, in addition to an expected 15% reduction from lighting. Furthermore, it is projected that energy-related operational costs for both the power utility and energy consumers could decrease by 20%-30%. The TERMPlus report also set up target to maintain electricity network losses under 8% by 2035 (GOT, 2021B). According to the Tonga Energy Efficiency Master Plan, it is estimated that a GHGs reduction of 50% a year by 2030 is possible using 2020 as the reference year. That represents a reduction from the BAU emissions of 210,000 metric tonnes of CO2e. Action taken in the EE in the electric sector is responsible for 29.6% of the reduction (32,500 metric tonnes CO2e) (GOT, 2021c).			
	Tonga INDC report in 2015 reported a total of 69.1 Gigagrams of carbon emissions from electricity and 15.0 Gigagrams of GHG emissions from other energy sources (GOT, 2020a). The Tonga Third National Communication in 2019 reported 40.2 Gigagrams of GHG from electricity and 7.8 Gigagrams of GHG from other energy (GOT, 2020a).			
Actions	Activities	Funding	Timeframe	Budget
Establish a unit		GoT,	1-2 years	36,000

under MEIDEC to oversee the implementation of the TAP for energy efficient home appliances- [50000 led lights] and high-efficient freezers [5000 freezers], refrigerators [5000 freezers], and air conditioners[5000 conditioners])		Development partners		
Action 1 : Process Recruitment of positions and improve legal and regulatory policy and legislations for energy efficient home appliances investments	Activity 1.1: identify and Confirm positions to be recruited and conduct official process for recruitment.	GoT, Development partners	1-2 years	36,000
	Activity 1.2: Process approval and expenditures for all associated investment and budget for the recruitment	GoT, Development partners	1-2 years	36,000
	Activity 1.3: Identify policy, legislative and regulatory shortfalls for implementation of the energy efficient home appliances pilot projects in Tonga and discuss both the shortfalls and improvement steps with key stakeholders for implementation and prepare policy statements for Cabinet endorsement and approvals	GoT, Development partners	1-2 years	36,000
Action 2: Conduct the economic feasibility of on-grid PV applications.	Activity 2.1: Conduct economic feasibility assessment of the on-grid PV , including market assessment and analysis and implement consultations with key stakeholders and prepare meetings to endorse the economic feasibility model for on-grid wind power technology before submission to Cabinet for approval and implementation	GoT, Development partners	1-2 years	150,000
	Activity 2.2: Conduct full assessment of Government Tax and Subsidy Policies for energy supply and services, putting emphasis on identifying viable options for government import policy, tariff policy and investment policy for on-grid PV technology. Conduct consultation on findings and prepare Cabinet paper and recommendations for Cabinet	GoT, Development partners	1-2 years	150,000

	Activity 2.3: Conduct grid-connectivity assessment and analysis of key technical and economic barriers for automatic on-grid wind power penetration to the existing grid from the existing on-grid PPA projects/investment. Prepare submission and recommendation to the Cabinet and the Board	GoT, Development partners	1-2 years	150,000
	Activity 2.4: Identify and conduct computer modelling and testing the most sustainable installed capacities of the specific applications for on-grid wind farm for the capital and other outer islands on-grid wind farm.	GoT, Development partners	1-2 years	100,000
	Activity 2.5: Conduct stakeholders consultations and prepare policy statements and recommendations for Cabinet Approval on stakeholders agreements.	GoT, Development partners	1-2 years	100,000
Action 3: Create public awareness of both developer, and users of the technology	Activity 3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, and Users) to better inform their decision makings on investment imposed on energy efficient appliances	GoT, Development partners	1-2 years	30,000
	Activity 3.2: Develop a communication strategy Profile for the target stakeholders particularly PPA owners and possible private sector investors and well known businesses in both overseas and in Tonga.	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Prepare, Agree and Sign Memory of Understanding with key media agencies and companies on public campaign strategies on energy efficient appliances investments and benefits residential users	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Implement public awareness campaign on regional and national energy efficient home appliances investments in the country.	GoT, Development partners	1-2 years	20,000
Action 4: Enhance access to	Activity 4.1: identify, Develop and recommend all financial	Government Development	1-2 years	40,000

investment finances	policy incentives to Cabinet to assist lowering the cost of investment on energy efficient home appliances Provide clear justifications for adoption of the energy efficient home appliances.	Partner		
	Activity 4.2: Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of energy efficient home appliances in Tonga	Development Partner	2-4 years	40,000
	Activity 4.3: Confirm potential financing options with international, regional and bilateral donors and development partners for energy efficient home appliances	Development Partner	2-4 years	40,000
	Activity 4.4: Prepare Cabinet Approval for most sustainable financing options of LED lights[50000 led lights] and high-efficient freezers [5000 freezers], refrigerators [5000 freezers], and air conditioners[5000 conditioners]) in the country and its plan to achieve 100% share of RE in the existing electricity Grid.	Development Partner	2-4 years	40,000
Action 5: Design, Procure, Install the monitoring and maintenance plan model for the technology applications in the country	Activity 5.1: Design, procure install the energy efficient home led lights [50000 led lights] installation in the country	Government and Development Partner	5-10 years	50m USD
	Activity 5.2: Design, procure install the high-efficient freezers [5000 freezers], refrigerators [5000 freezers], and air conditioners[5000 conditioners]) installation in the country	Government and Development Partner	5-10 years	30m USD
	Activity 5.4: Design, Approve and Set up the Monitoring and Maintenance Model for the technology LED lights[50000 led lights] and high-efficient freezers [5000 freezers], refrigerators [5000 freezers], and air conditioners[5000	Government and Development Partner	5-10 years	20m USD

	conditioners])			
Action 6 : Assess and Identify all the necessary improvement options and technologies for the existing electricity grid in the country in order to meet 100% share of RE.	Activity 6.1: Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	Government and Development Partner	5-10 years	20m USD
	Activity 6.2: Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	Government and Development Partner	5-10 years	20m USD
	Activity 6.3: Prepare all Policy decisions for government approval	Government and Development Partner	5-10 years	Government and Development Partner
	Activity 6.4: Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	Government and Development Partner	5-10 years	Government and Development Partner

4.6 Transportation Sector

In the transportation sector, the actions comprise a) the institutional strengthening and enhancing the policy, legal, and regulatory framework, b) assessment, identifying financial policy incentives and implementation of economic feasibility of adopting the technology c) create public awareness and communication strategies for promotion of technological investment; d) Enhance accessibility for investment opportunities e) design, procure and installation, monitoring and maintenance of the technology; f) assessment and improvements of national infrastructure . Each action is accompanied by a detailed set of activities aimed at achieving the technology objectives.

Table 5 : Summary of Technology Action Plan for Battery Charged Electric Vehicles.

Sector	Energy
Sub-sector	Transportation Sector
Technology	EVs Battery Charged
Technological Output	Additionally, research will be undertaken to evaluate the economic feasibility of battery powered electric vehicles, along with recommendations for incentives to facilitate their growth. The projected costs for executing this action plan are estimated to be between US$4 million and US$5 million. The plan culminates in a project proposal centered on electric vehicles, named the Tonga Integrated PV Systems and EV Plug-in Demonstration Project (TIPVEV Project).

Mitigation Output	Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e)(UNCTCN,2020). Tonga Energy Road Map Plus (TERMPlus) set out target to limit growth in oil consumption for road transport to an average of 1.4% per year and overall to limit growth to 25% increase by 2035(GOT, 2021b). TERMPlus report set up target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030 (GOT, 2021b).The Electric Vehicle Technology Action Plan (EV TAP) has the capacity to reduce carbon dioxide emissions by approximately 10 kilotons each year. This initiative will build on the findings from the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) research conducted in 2020 and aims to achieve a 10% decrease in greenhouse gas emissions across the Pacific Island Countries. Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e) (UNCTCN,2020) Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e), renewable electricity is responsible for 40% (43,500 metric tonnes CO2e), and EE in the electric sector is responsible for 29.6% of the reduction (32,500 metric tonnes CO2e) (GOT, 2021c).			
Actions	Activities	Funding	Timeframe	Budget
Establish a unit under MEIDEC to oversee the implementation of the TAP for Battery Charged EVs		GoT, Development partners	1-2 years	36,000
Action 1 : Process Recruitment of positions and improve legal and regulatory policy and legislations for Battery Charged EVs	Activity 1.1: identify and Confirm positions to be recruited and conduct/complete official process for recruitment.	GoT, Development partners	1-2 years	36,000
	Activity 1.2: Process approval and expenditures for all associated investment and budget for the recruitment	GoT, Development partners	1-2 years	36,000
	Activity 1.3: Identify policy, legislative and regulatory shortfalls for implementation of the Battery Charged EVs pilot projects in Tonga and discuss both the shortfalls and improvement steps with key stakeholders for implementation and prepare policy statements for Cabinet endorsement and approvals	GoT, Development partners	1-2 years	36,000
Action 2: Conduct the economic feasibility of on-grid PV applications.	Activity 2.1: Conduct economic feasibility assessment of the Battery Charged EVs, including market assessment and analysis and implement	GoT, Development partners	1-2 years	150,000

	consultations with key stakeholders and prepare meetings to endorse the economic feasibility model for Battery Charged EVs technology before submission to Cabinet for approval and implementation			
	Activity 2.2: Conduct full assessment of Government Tax and Subsidy Policies for energy supply and services, putting emphasis on identifying viable options for government import policy, and investment policy for Battery Charged EVs. Conduct consultation on findings and prepare Cabinet paper and recommendations for Cabinet	GoT, Development partners	1-2 years	150,000
	Activity 2.3: Conduct road infrastructure connectivity assessment and analysis of key technical and economic barriers for Battery Charged EVs to the existing road infrastructure in the capital. Prepare submission and recommendation to the Cabinet and the Board	f	1-2 years	150,000
	Activity 2.4: Conduct road infrastructure connectivity assessment and analysis of key technical and economic barriers for Battery Charged EVs to the existing road infrastructure in the main outer islands or other capital districts. Prepare submission and recommendation to the Cabinet and the Board.	GoT, Development partners	1-2 years	100,000
	Activity 2.5: Conduct stakeholders consultations on Tonga Integrated PV Systems and EV Plug-in Demonstration Project (TIPVEV Project). and prepare policy statements and recommendations for Cabinet Approval on stakeholders agreements and implementation procedure of the project	GoT, Development partners	1-2 years	100,000
Action 3: Create public awareness of both developer, and users of the	Activity 3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision	GoT, Development partners	1-2 years	30,000

battery charged EVs. technology	Makers, and Users) to better inform their decision makings on Tonga Integrated PV Systems and EV Plug-in Demonstration Project (TIPVEV Project), and other policy review and investments associated with the project.			
	Activity 3.2: Develop a communication strategy Profile for the target stakeholders particularly PPA owners and possible private sector investors and well known businesses on battery charged EVs in both overseas and in Tonga.	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Prepare, Agree and Sign Memory of Understanding with key media agencies and companies on public campaign strategies on battery charged EVs investments and benefits for users	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Implement public awareness campaign on regional and national battery charged EVs investments in the country.	GoT, Development partners	1-2 years	20,000
Action 4: Enhance access to investment finances	Activity 4.1: identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on battery charged EVs . Provide clear justifications for adoption of the battery charged EVs.	Government Development Partner	1-2 years	40,000
	Activity 4.2: Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of battery charged EVs in Tonga	Development Partner	2-4 years	40,000
	Activity 4.3: Confirm potential financing options with international, regional and bilateral donors and development partners for battery charged EVs	Development Partner	2-4 years	40,000
	Activity 4.4: Prepare Cabinet Approval for most sustainable	Development Partner	2-4 years	40,000

	financing options battery charged EVs and			
Action 5: Design, Procure, Install the monitoring and maintenance plan model for Tonga Integrated PV Systems and EV Plug-in Demonstration Project in the country	Activity 5.1: Design, procure install the Tonga Integrated PV Systems and EV Plug-in Demonstration Project in the country	Government and Development Partner	5-10 years	50m USD
	Activity 5.2: Design, procure install the Tonga Integrated PV Systems and EV Plug-in Demonstration Project	Government and Development Partner	5-10 years	30m USD
	Activity 5.4: Design, Approve and Set up the Monitoring and Maintenance Model for the Tonga Integrated PV Systems and EV Plug-in Demonstration Project	Government and Development Partner	5-10 years	20m USD
Action 6 : Assess and Identify all the necessary improvement options and technologies for the existing road infrastructure and laws in the country	Activity 6.1: Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	Government and Development Partner	5-10 years	20m USD
	Activity 6.2: Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	Government and Development Partner	5-10 years	20m USD
	Activity 6.3: Prepare all Policy decisions for government approval	Government and Development Partner	5-10 years	Government and Development Partner
	Activity 6.4: Design, Procure and install all necessary road infrstructure improvements to cater for reducing demand in the electricity grid.	Government and Development Partner	5-10 years	Government and Development Partner

Table 6 : Summary of Technology Action Plan for On Grid Electric Vehicle

Sector	Energy
Sub-sector	Transportation Sector
Technology	On-Grid Electric Vehicles
Technological Output	The projected costs for executing this TAP are estimated to be between US$10 million and US$20 million. The TAP culminates in a project proposal centered on On-Grid EVs, titled: Tonga On-grid EVs. (TONGREVs Project). Tonga Energy Road Map Plus (TERMPlus) set out target to limit growth in oil consumption for road transport to an average of 1.4% per year and overall to limit growth to 25% increase by 2035(GOT, 2021b). TERMPlus report set up target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030.
Mitigation Output	Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e) (GOT, 2021c).

Actions	Activities	Funding	Timeframe	Budget
Establish a unit under MEIDEC to oversee the implementation of the TAP for on-grid electric vehicle		GoT, Development partners	1-2 years	36,000
Action 1 : Process Recruitment of positions and improve legal and regulatory policy and legislations for on-grid EVs investments	Activity 1.1: identify and Confirm positions to be recruited and conduct official process for recruitment.	GoT, Development partners	1-2 years	36,000
	Activity 1.2: Process approval and expenditures for all associated investment and budget for the recruitment	GoT, Development partners	1-2 years	36,000
	Activity 1.3: Identify policy, legislative and regulatory shortfalls for implementation of the on-grid EVs pilot projects in Tonga and discuss both the shortfalls and improvement steps with key stakeholders for implementation and prepare policy statements for Cabinet endorsement and approvals	GoT, Development partners	1-2 years	36,000
Action 2: Conduct the economic feasibility of on-grid EVs applications.	Activity 2.1: Conduct economic feasibility assessment of the on-grid PV , including market assessment and analysis and implement consultations with key stakeholders and prepare meetings to endorse the economic feasibility model for on-grid EVs technology before submission to Cabinet for approval and implementation	GoT, Development partners	1-2 years	150,000
	Activity 2.2: Conduct full assessment of Government Tax and Subsidy Policies for energy supply and services, putting emphasis on identifying viable options for government import policy, tariff policy and investment policy for on-grid EVs technology. Conduct consultation on findings and prepare Cabinet paper and recommendations for Cabinet	GoT, Development partners	1-2 years	150,000
	Activity 2.3: Conduct grid-connectivity assessment and analysis of key technical and economic barriers for automatic on-grid EVs penetration to the existing grid projects/investment. Prepare	GoT, Development partners	1-2 years	150,000

	submission and recommendation to the Cabinet and the Board			
	Activity 2.4: Identify and conduct computer modelling and testing the most sustainable applications for on-grid EVs for the capital and other outer islands.	GoT, Development partners	1-2 years	100,000
	Activity 2.5: Conduct stakeholders consultations and prepare policy statements and recommendations for Cabinet Approval on stakeholders agreements.	GoT, Development partners	1-2 years	100,000
Action 3: Create public awareness of both developer, and users of the wind-power technology	Activity 3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, and Users) to better inform their decision makings on investment imposed on on-grid EVs	GoT, Development partners	1-2 years	30,000
	Activity 3.2: Develop a communication strategy Profile for the target stakeholders particularly PPA owners and possible private sector investors and well known businesses in both overseas and in Tonga.	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Prepare, Agree and Sign Memory of Understanding with key media agencies and companies on public campaign strategies on on-grid EVs investments and benefits residential users	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Implement public awareness campaign on regional and national on-grid EVs investments in the country.	GoT, Development partners	1-2 years	20,000
Action 4: Enhance access to investment finances	Activity 4.1: identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on energy efficient home appliances Provide clear justifications for adoption of the on-grid EVs.	Government Development Partner	1-2 years	40,000
	Activity 4.2: Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global	Development Partner	2-4 years	40,000

	benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of on-grid EVs in Tonga			
	Activity 4.3: Confirm potential financing options with international, regional and bilateral donors and development partners for on-grid EVs	Development Partner	2-4 years	40,000
	Activity 4.4: Prepare Cabinet Approval for most sustainable financing options of on-grid EVs in the country and its plan to achieve 100% share of RE in the existing electricity Grid.	Development Partner	2-4 years	40,000
Action 5: Design, Procure, Install the monitoring and maintenance plan model for all on-grid wind applications in the country	Activity 5.1: Design, procure install the on–grid EVs in the country	Government and Development Partner	5-10 years	50m USD
	Activity 5.2: Design, procure install the on-grid EVs project and investment in the country	Government and Development Partner	5-10 years	30m USD
	Activity 5.4: Design, Approve and Set up the Monitoring and Maintenance Model for the technology	Government and Development Partner	5-10 years	20m USD
Action 6 : Assess and Identify all the necessary improvement options and technologies for the existing electricity grid in the country in order to meet the EVs investment needs	Activity 6.1: Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of EVs investments in the country	Government and Development Partner	5-10 years	20m USD
	Activity 6.2: Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	Government and Development Partner	5-10 years	20m USD
	Activity 6.3: Prepare all Policy decisions for government approval	Government and Development Partner	5-10 years	Government and Development Partner
	Activity 6.4: Design, Procure and install all necessary grid improvements to cater for on-grdi EVs and reducing demand in the electricity grid.	Government and Development Partner	5-10 years	Government and Development Partner

Table 7 : Summary of Technology Action Plan for Hybrid Vehicle

Sector	Energy
Sub-sector	Transportation Sector
Technology	Hybrid Vehicle

Technological Output	The projected costs for executing this TAP are estimated to be between US$10 million and US$20 million. The TAP culminates in a project proposal centered on Hybrid Vehicles, titled: Tonga Hybrid Vehicle. (TONGAHV Project).			
Mitigation Output	Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e)(UNCTCN,2020). Tonga Energy Road Map Plus (TERMPlus) set out target to limit growth in oil consumption for road transport to an average of 1.4% per year and overall to limit growth to 25% increase by 2035(GOT, 2021b). TERMPlus report set up target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030 (GOT, 2021b).The Hybrid Vehicle Technology Action Plan (HV TAP) has the capacity to reduce carbon dioxide emissions by approximately 10 kilotons each year.			
Actions	Activities	Funding	Timeframe	Budget
Establish a unit under MEIDEC to oversee the implementation of the TAP for HYBRID		GoT, Development partners	1-2 years	36,000
Action 1 : Process Recruitment of positions and improve legal and regulatory policy and legislations for HYBRID VEHICLE investments	Activity 1.1: identify and Confirm positions to be recruited and conduct official process for recruitment.	GoT, Development partners	1-2 years	36,000
	Activity 1.2: Process approval and expenditures for all associated investment and budget for the recruitment	GoT, Development partners	1-2 years	36,000
	Activity 1.3: Identify policy, legislative and regulatory shortfalls for implementation of the Hybrid Vehicle pilot projects in Tonga and discuss both the shortfalls and improvement steps with key stakeholders for implementation and prepare policy statements for Cabinet endorsement and approvals	GoT, Development partners	1-2 years	36,000
Action 2: Conduct the economic feasibility of hybrid vehicle.	Activity 2.1: Conduct economic feasibility assessment of the on-grid PV , including market assessment and analysis and implement consultations with key stakeholders and prepare meetings to endorse the economic feasibility model for hybrid vehicle technology before submission to Cabinet for approval and implementation. Submit stakeholders recommendations for Cabinet Approval	GoT, Development partners	1-2 years	150,000

	Activity 2.2: Conduct full assessment of Government Tax and Subsidy Policies for energy supply and services, putting emphasis on identifying viable options for government import policy, tariff policy and investment policy for hybrid vehicle. Conduct consultation on findings and prepare Cabinet paper and way forward recommendations for Cabinet approval	GoT, Development partners	1-2 years	150,000
	Activity 2.3: Conduct grid-connectivity assessment and analysis of key technical and economic barriers for automatic adoption of hybrid vehicle projects/investment. Prepare submission and recommendation to the Cabinet and the Board	GoT, Development partners	1-2 years	150,000
	Activity 2.4: Identify and conduct computer modelling and testing the most sustainable policy options for adoption of electric vehicle for the capital and other outer islands on-grid wind farm.	GoT, Development partners	1-2 years	100,000
	Activity 2.5: Conduct stakeholders consultations and prepare policy statements and recommendations for Cabinet Approval on stakeholders agreements.	GoT, Development partners	1-2 years	100,000
Action 3: Create public awareness of both developer, and users of the Hybrid Vehicle	Activity 3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, and Users) to better inform their decision makings on investment imposed on hybrid vehicle	GoT, Development partners	1-2 years	30,000
	Activity 3.2: Develop a communication strategy Profile for the target stakeholders particularly PPA owners and possible private sector investors and well known businesses in both overseas and in Tonga.	GoT, Development partners	1-2 years	20,000
	Activity 3.3: Prepare, Agree and Sign Memory of Understanding with key media agencies and companies on public campaign strategies on	GoT, Development partners	1-2 years	20,000

	hybrid vehicle investments and benefits users			
	Activity 3.3: Implement public awareness campaign on regional and national hybrid vehicle investments in the country.	GoT, Development partners	1-2 years	20,000
Action 4: Enhance access to investment finances	Activity 4.1: identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on energy efficient home appliances Provide clear justifications for adoption of the hybrid vehicle.	Government Development Partner	1-2 years	40,000
	Activity 4.2: Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of hybrid vehicle in Tonga	Development Partner	2-4 years	40,000
	Activity 4.3: Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle in the country	Development Partner	2-4 years	40,000
	Activity 4.4: Prepare Cabinet Approval for most sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the transport sector.	Development Partner	2-4 years	40,000
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	Activity 5.1: Design, procure install the Hybrid vehicle promotion and investment initiative in the country	Government and Development Partner	5-10 years	50m USD
	Activity 5.2: Design, Approve and Set up the Monitoring and Maintenance Model for the technology	Government and Development Partner	5-10 years	20m USD
Action 6 : Assess and Identify all the necessary improvement options and technologies for the existing road infrastructure in order to meet the	Activity 6.1: Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	Government and Development Partner	5-10 years	20m USD
	Activity 6.2: Conduct consultation and meetings on	Government and	5-10 years	20m USD

share of carbon emission reductions from this technology	findings of the policy and regulatory assessment and analysis.	Development Partner		
	Activity 6.3: Prepare all Policy decisions for government approval	Government and Development Partner	5-10 years	Government and Development Partner
	Activity 6.4: Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	Government and Development Partner	5-10 years	Government and Development Partner

5 TECHNOLOGY ACTION PLAN AND PROJECT IDEAS FOR ENERGY

5.1 TAP for Energy Sector

The third deliverable is the Technology Action Plans (TAPs) Report, which also encompasses the Project Ideas that detail the essential activities required for the broad dissemination of the chosen technologies. This TAP report is largely based on the insights provided in the second deliverable known as Barrier Analysis report.

5.1.1 : Overview of Energy Sector

The role of the energy sector in reducing/addressing adverse impacts of GHG emissions has already been assessed and documented in various studies and assessments in Tonga. The Tonga NDC Implementation Roadmap and Investment Plan indicated the cumulative GHG emissions reduction by 2030 and investment need are shown below

Table 8: Sequenced Cumulative GHG emissions reduction by 2030 and indicative investment need to 2030 for priority sectors.

Sector	*Cumulative GHG emissions reduction by 2030* ($GgCO_{2\,e}$)	*Indicative Investment Need to 2030 (US$)*
Energy	*579.8*	*60,000,000*
AFOLU	*1025.16*	*5,695,000*
Waste	*25.53*	*11,560,000*
Marine	*40.58*	*12,902,000*

Source: (MEIDECC, 2021)

These policy measures and frameworks include the Tonga Energy Efficiency Master Plan (TEEMP) 2018, the Sustainable Development Goal (SDG) 7 Roadmap 2021, the Tonga Climate Change Policy (TCCP) 2016, the Joint National Action Plan 2 on Climate Change and Disaster Risk Management (JNAP 2) 2018-2028, the Tonga Power Limited (TPL) Business Plan, and the forthcoming Fourth National Communication (4NC). In addition to these, the 'key sector pathway actions over time' encapsulated in the Tonga Low Emission Development Strategy (Tonga LEDS) 2021-2050, and Technology Needs

Assessment (currently in development) will also contribute to execution of GHG mitigation initiatives in the energy sector.

The process of developing the INDC and NDC involved identifying key sectors for mitigation by reviewing a range of documents related to climate change and economic development. The most recent Tonga's third national communication for UNFCCC highlighted the priority sectors for mitigation as Energy, Transport, and (AFOLU), as well as Waste Management as per shown in Table 8. These findings were shared with TNA stakeholders during a sector prioritization workshop conducted in 2023. Energy, Transport, and AFOLU were selected for further focus and development.

5.1.2 : Existing Regulatory Policies

Table 9 : The Existing Policies and Laws for the Mitigation of Emissions

Existing National Policy	Effective Time	Content/Objectives	Priority Actions
National Environmental Policy and Tonga Biodiversity Framework (TBF), National Biodiversity Strategy and Action Plan (NBSAP)	Signed in 1996 ; Adopted in 2006	Tonga's goal for biodiversity conservation has at its heart on the quality of life and well-being of Tonga's people. The revised TBF focuses on nine thematic areas: i. Forestry Ecosystems ii. Marine & Coastal Ecosystems iii. Agro Biodiversity iv. Species Conservation v. Invasive Alien Species vi. Local Community and Civil Society vii. Access and Benefit Sharing from the genetic resources viii. Mainstreaming biodiversity Conservation ix. Financial Resource Mechanisms	i. Waste Management Strategy / Beautification and landscaping – Marine Plastic Pollution; Land-based Pollution; strengthen the no plastic campaign and promote the use of recyclable and cloth bags rather than single use plastic bags for shopping. ii. Pollution free environment – which encompasses human wellbeing iii. Marine Spatial Planning Framework (Sustainable Ocean Policy, Marine Spatial Plan and its legislation); iv. The Tonga Biodiversity Framework (TBF); v. The Fanga'uta Stewardship Action Plan; vi. Community engagement in conservation work - from land to ocean which leads to Livelihood Securities; vii. the National Environment Management Strategy (NEMS) viii. the Nagoya Protocol Programme of Work; ix. the Convention on International Trade of Endangered Species (CITES) Programme of Work; x. Institutional strengthening of EIA processes; xi. Sustainable Development processes – to guide development. xii. Ongoing awareness program - holistic approach that is inclusive of all priority areas i.e. policy and regulations, Ocean management, etc.; focus on increasing outreach to schools on environmental awareness programs from primary to high school level through activities, short videos themed on terrestrial and marine conservation, waste and pollution control etc. xiii. m. Increased awareness of SDGs

			relevant to SDG3, SDG6, SDG13, SDG 14 and SDG 15.
National Climate Change Policy and JNAP II	2016	The policy lays out a strategic 'whole of Tonga' approach where it recognizes that climate change is the single biggest issue that will determine the future of Tonga over the coming decades. The policy objectives become the objectives of the JNAP 2 which are – i. Mainstreaming for a resilient Tonga ii. Implement a coordinated approach to research, monitoring, and management of data & information iii. Resilience-building actions iv. Finance v. Regional and International Cooperation	i. Enactment of Tonga Climate Change Fund Bill; ii. Commitment and contributions of Government of Tonga to the Climate Change Trust Fund; iii. Establishment of climate change staff in the outer islands (Vava'u, Ha'apai, Eua and the Niuas); iv. JNAP 2 and Climate Change Policy Implementation towards achievement of resilience targets; v. Government of Tonga as co-financier future Green Climate Find (GCF) and Adaptation Fund (AF) Projects; vi. CC Vulnerability and Adaptation Assessment, Monitoring and Reporting; vii. ODS Legislation amendment and HFCF Plan implementation; viii. Tonga- Nationally Determined Contributions (NDCs) Update to fulfil Tonga's obligations of the Paris Agreement under the UNFCCC; ix. Endorsement of the Tonga Long term-Low Emission Development Strategy (LT-LEDS) in fulfilment of its obligations under the Paris Agreement; x. Effective communication and sustainable management of climate change data and information; and xi. Establishment of climate change project staff for sustainability reasons.
National Energy Policy/ Tonga Energy Road Map AND Tonga Energy Road Map Plus	2010 and reviewed in 2021	The objective of the TERM is to lay out a least-cost approach and implementation plan to reduce Tonga's vulnerability to oil price shocks and achieve an increase in quality access to modern energy services in a financially and environmentally sustainable manner. Specific objectives involve renewable energy, energy efficiency, equitable access and affordability, institutional reform and affordability and safety of petroleum. TERM encompasses three phases: i. Phase 0: Institutional Strengthening and the Legal Framework ii. Phase 1: Proof of Concept Renewable Energy Projects Implementation iii. Phase 2: Private Sector Participation, Efficiency and Renewable Energy Investments, Institutionalizing Renewable Energy	i. Achieving 50% share of renewable energy generation as first energy to be achieved in 2020 and the second target of reducing to the share of 9% loss in the total power generation; ii. Launching of TERM Plus (2021-2035) , of which included the targets of 70% share of RE by 2025 and 100% share of RE in 2030. iii. Solar Street Lights; iv. Solar Water Pumps; v. Tonga Energy Act 2023 vi. Rural Electrification Policy vii. Tonga Energy Efficiency Master Plan 2021 viii. TERM and NDC climate technologies and mitigation options implemented; ix. Improved research and development of new RE technologies and application; x. SDG 7 Master Plan 2020 xi. Developing of DUMARRAGE Project proposal for 10% loss in price of petrol; and xii. Extension of existing office space for Energy Department to cater for institutionalization of the Energy Act.

5.1.3 Current Electricity Mix

Tonga has a total installed capacity of power generation of about 34MW, including diesel, solar, wind power as well as Battery Energy System Storage. Table 10 indicates the total electricity generation mix in Tonga

Table 10: Current Electricity Mix profile

Fuel Mix for Power Generation		Installed Capacity (MW)		% Contribution
Fossil Fuel	Diesel	23.047		
	Tongatapu		18.730	65
	Vavau		2.872	8
	Haapai		0.672	2
	Eua		0.772	1
Renewable	Solar	9.6		
	Tongatapu Maama Mai		2300	3.64
	Maama Mai BESS		7.2MW/23.9MWh	1.73
	IPP Matatoa		2000	3.76
	Matatoa BESS		9MW/5,3MWh	
	IPP Fualu		2000	4.73
	IPP Masilamea		2000	3.83
	IPP Liukava		2000	1.80
	Vavau Laá Lahi		0.400	0.32
	VavauTREP Solar/BESS		O.250	0.61
	Haapai/BESS		0.500	0.47
	Eua Huelo Óe Laá		0,200	0.29
	TREP/Solar /BESS		0.5	0.75
	Wind			
	I Manumataongo	1	1000	3.81
TOTAL DIESEL POWER			23.047	76%
TOTAL RE			10.6	24%
TOTAL			33.647	100%

5.1.4 Prioritized Technologies for Tonga

The prioritized technologies for the energy sector are (1) On-grid solar (2) On-grid wind (3) Energy Efficient Home Appliances. Therefore these technologies are included in this TAP. The barrier analysis indicated that all three technologies are implemented in Tonga and possess economic viability, as they have played a role in meeting national energy objectives by enhancing the proportion of renewables in the electricity sector and significantly lowering carbon emissions. Consequently, these technologies are included in this TAP.

5.1.4.1 On-Grid PV Solar

On-Grid PV or On-Grid Solar has been adopted in Tonga through government/donor financial assistances and partnerships. The implementation of on-grid solar energy by power utilities and independent power producers (IPP/PPA) is designed to assist in partially replacing the imported diesel utilized for electricity generation within the country. This transition to on-grid solar will also contribute to a reduction in carbon emissions associated with diesel usage, thereby alleviating the strain on fossil fuel reserves. Consequently, this approach will help preserve the carbon dioxide sink and to achieve our national energy targets by increasing share of renewable energy in the electricity grid to reach 100% by 2030. Large electricity consumers in urban areas could benefit from an IPP/PPA on-grid solar farm, allowing them to decrease their reliance on grid electricity. As of the present, the cumulative capacity of on-grid solar power installations in Tonga stands at approximately 9.6 MW, in contrast to the total installed power generation capacity of 33.65 MW within the nation. The Department of Energy (DOE) is presently collaborating in the funding of the establishment of five mini-grids that incorporate diesel generators, alongside an additional nine mini-grids that operate without diesel generators, specifically targeting the remote islands of Tonga. The implementation of mini and micro solar power systems is deemed appropriate for rural regions lacking access to the national grid, where a significant portion of the population relies on wood fuel for cooking, utilizing inefficient traditional stoves.

5.1.4.2 On-Grid Wind Power

Wind energy development in the country remains in its early phases. Of the estimated total installed power generation capacity of 33.65 MW in Tonga, less than 1 MW has been utilized at existing power plants. The Department of Energy (DOE), in collaboration with the People Republic of China, has been financing the research and installation of specific model of wind power in Tonga. Currently, Under this project, Tonga has initiated at least 2 MW of on-grid wind projects, supported by funding from the Chinese Government, result in a total combined wind power capacity of more than 3 MW for wind energy.

5.1.4.3 Energy Efficient Home Appliances

The Department of Energy (DOE), in collaboration with various donors, has been financing research initiatives aimed at enhancing energy efficiency services in Tonga. In 2010, the Government of Tonga established a national energy target to limit electricity losses within the network to 9%, a goal that was successfully met in 2019. The Department of Energy has been conducting feasibility studies on demand-side energy efficiency in Tonga since the 1990s; however, private sector companies have not yet recognized energy efficiency services and technical auditing as viable business opportunities. In partnership with the Department of Energy, the SPC has developed Minimum Energy Performance Standards and Labelling for common household appliances in the country, although implementation is still pending. The government has incorporated energy efficiency objectives into the Tonga Energy Road Map Plus for the period 2021-2035, and a national Renewable Energy and Energy Efficiency Master Plan (TREEEMP) has also been formulated, yet both initiatives await execution. Additionally, UNESCO has assisted the Department of Energy in creating the Tonga SDG 7 Master

Plan, which emphasizes a renewable energy and energy efficiency action plan, but this too has not yet been implemented. While electricity consumers in Tonga have begun to adopt more energy-efficient appliances, many families are still evaluating the cost-benefit ratio of these technologies. The adoption of energy-efficient home appliances is particularly advantageous in areas of the country served by the national grid or mini-grids/micro-grids, where a significant number of households continue to utilize less efficient appliances.

5.1.5 Action Plan for On-Grid PV Power

5.1.5.1 Introduction

The predominant source of renewable energy within the country's electricity portfolio is derived from on-grid solar power. In the initial half of 2024, the overall generation from on-grid photovoltaic (PV) systems accounted for approximately 10% to 15% of the nation's total power output (TPL, 2024a, b, c). The monthly contributions from on-grid PV are detailed in Table 11 below.

Table 11: % Contribution of On-Grid PV to Total Power Generation in 2024

Time	Total Power Generated (kWh)	Total On-Grid PV Generated (kWh)	% of On-grid PV
January	7,741,305	1,183,894	15.29
February	7,477,061	1,094,267	14.63
March	8,232,013	1,011,11`9	12.28
April	7,208,097	1,081,605	15.01
May	7,623,180	819,836	10.75
June	6,794,732	901,205	13.26

The second most significant portion of renewable energy within the nation's electricity mix is derived from on-grid wind power. In the first half of 2024, the total on-grid wind generation accounted for approximately 1% to 2% of the overall power generation in the country (TPL, 2024a, b, c). The monthly contributions of on-grid wind to total power generation are detailed in Table 12 below.

Table 12: % Contribution of On-Grid Wind to Total Power Generation in 2024

Time	Total Power Generated kWh)	Total On-Grid Wind Generated kWh)	% of Wind Power in Total Power Generation
January	7,741305	198.560	2.56
February	7477061	211340	2.83
March	8232013	137790	1.67
April	7,208,097	125,330	1.74
May	7,623,180	195,360	2.56

June	6,794,732	195860	2.88

The predominant source of electricity generation typically arises from diesel power. The specific monthly contribution of diesel-generated electricity to the overall power generation is presented in Table 13 below. Enhancing energy efficiency in residential settings can play a crucial role in decreasing total power demand, a significant portion of which is met by diesel power.

Table 13 % Contribution of Diesel Power to Total Power Generation in 2024

Time	Total Power Generated kWh)	Total On-Grid Diesel Generated kWh)	% of Diesel Power in Total Power Generation
January	7,741305	6,358,851	82.14
February	7477061	6,171,454	82.54
March	8232013	7,083,104	86.04
April	7,208,097	6,001,162	83.26
May	7,623,180	6,607,984	86.68
June	6,794,732	5,697,667	83.85

Tonga Power Limited (Power Utility) has observed a rise in electricity losses, attributed to both network inefficiencies and parasitic losses. Additionally, Tonga is experiencing substantial deforestation daily, driven by the escalating demand for agricultural land and fuelwood. The primary source of carbon emissions in Tonga stems from commercial activities related to agriculture and forestry.

5.1.5.2 Objective of the TAP for On-Grid PV

This action plan outlines the implementation of 10MW of solar energy alongside 20MWh of battery storage capacity. This project aligns with the national energy goal of attaining a 100% renewable energy share by 2035. The emphasis will be placed on the ongoing evaluation and analysis of current on-grid solar power initiatives to guarantee the most sustainable economic benefits and option from solar energy, thereby facilitating the achievement of the 100% renewable energy target by 2035.

5.1.5.3 Action and Activities selected for this TAP.

5.1.5.3.1 Summary of Barriers to On-Grid Solar Power Generation

The Barrier Analysis phase revealed multiple obstacles that could hinder the dissemination of the technology. These obstacles were categorized into financial and fiscal barriers, encompassing cost-related issues, tax impediments, challenges in accessing financing, and inadequate financial policies and regulations. The second category consists of non-financial barriers, which includes policy, regulatory, and legal challenges, institutional obstacles, technical difficulties, market constraints, as well as barriers related to information and public awareness.

5.1.5.3.2 Financial and Fiscal Barriers

5.1.5.3.2.1 Insufficient knowhow on economic and financial viability of the technology

On-grid solar power technology is relatively uncommon, resulting in limited awareness regarding its advantages among both investors and users. A significant challenge lies in attracting investors to this technology while simultaneously encouraging a substantial number of individuals to adopt it, as this could further entice potential investors. There remains a lack of comprehensive understanding and experience regarding the full cost recovery of Power Purchase Agreement (PPA) solar investments for private investors, as well as similar experiences related to government and donor-funded projects. Additionally, there exists a certain level of uncertainty concerning the demand for solar power produced by solar farm for the national grid. The fiscal challenges posed by inflation have exacerbated the rise in petroleum prices, while the electricity market continues to grapple with a shortage of expertise and labour, all amidst the ongoing recovery from cyclone impacts.

5.1.5.3.2.2 High Upfront capital cost technology

The initial investment required for an on-grid solar power plant exceeds that of a diesel power generation system, as the overall expense associated with purchasing and installing a 1 MW diesel power plant is significantly lower than that of a 1 MW on-grid solar power plant. Nevertheless, the operational expenses for a solar power plant are less than those for a diesel power plant, primarily due to reduced maintenance costs and the availability of free fuel of sunlight.

5.1.5.3.2.3 Insufficient Access for finance

The on-grid solar power plant represents a relatively novel technology when compared to diesel generators and other fossil fuel-based power generation methods. Consequently, commercial banks in Tonga exhibit a lack of enthusiasm for financing such projects, with the exception of multilateral banks and institutions. Additionally, the prevailing bank lending rates are excessively high, averaging over 50%, which poses significant challenges for private borrowers. As a result, commercial banks are disinclined to provide the necessary funding for local investors and solar initiatives, as lenders are reluctant to incur debt at such steep interest rates for projects that may become difficult to maintain.

5.1.5.3.3 Non-Financial Barriers

5.1.5.3.3.1 Policy, Regulatory and Legislative

The insufficient electricity tariff policy, along with regulatory and legislative measures, has overlooked the environmental costs, resulting in the externalities linked to fossil fuel combustion not being considered. As a result, the pricing of on-grid solar power does not reflect these environmental costs, making such prices unsustainable from an ecological standpoint, and affected revenue streams. Insufficient policy incentives and support mechanisms, along with ambiguous roles and responsibilities in policy and regulation for photovoltaic (PV) production within the grid, present significant challenges.

5.1.5.3.3.2 Institutional

The energy institutions currently face inadequate capacities, including deficiencies in both technical and managerial expertise, as well as a lack of information and training related

to business management. Additionally, there is insufficient capability to effectively regulate the electricity sector. The existing institutional framework and mandates are ambiguous, hindering the effective implementation of guidelines, milestones, and performance benchmarks necessary to meet our national energy objectives regarding the integration of renewable electricity into the grid. Consequently, this situation delays the establishment of mechanisms to combat the challenges posed by climate change.

5.1.5.3.3.3 Technical

The availability of land poses challenges for the integration of solar power plants with distribution lines and the overall network. Additionally, issues related to grid stability necessitate a thorough assessment of electricity grids. Furthermore, there is a lack of adequate technical expertise within the electricity sector.

5.1.5.3.3.4 Market

Solar energy projects face significant risks and limited profitability, compounded by a deficiency in expertise regarding the factors that affect supply and demand within the market. The pricing in Tonga's market is particularly susceptible to fluctuations in oil prices. Additionally, there is insufficient community engagement in renewable energy decision-making processes.

5.1.5.3.3.5 Information and Public Awareness

Private sector and potential users of technology are not informed of economic viability of this technology. There is also insufficient data to support fixed electricity tariff for all and insufficient data to support the level of tariff adopted. There is also lack of knowledge on renewable energy technologies.

5.1.5.3.4 Summary of Measures to Overcome the Barriers

The subsequent actions were recognized to alleviate obstacles.

5.1.5.3.5 Financial and Fiscal Measures

5.1.5.3.5.1 Insufficient knowhow on economic and financial viability of the technology

State institutions, including the University of the South Pacific, along with regional and international energy organizations, as well as bilateral and multilateral funding bodies, should be motivated to conduct financial feasibility assessments for on-grid solar power and disseminate the findings of these studies. Support in terms of technical and financial resources for these assessments can be pursued from donor agencies. The studies should encompass all pertinent external factors, such as the difficulties in attracting investors, the suitable economic framework for full cost recovery, the integration of maximum demand for on-grid solar into the national electricity grid, and effective strategies to manage inflation in electricity tariffs.

5.1.5.3.5.2 High Upfront Cost of the technology

In the short term, it is advisable to decrease or abolish government taxes on technology imports. Such tax reductions or exemptions would serve as an incentive to facilitate the widespread adoption of on-grid solar power. In the long term, efforts should be directed towards fostering local manufacturing and construction of this technology. Donor agencies tasked with promoting these technologies in developing nations should

contemplate offering financial support to private sector entities, especially those engaged in local manufacturing, under favourable terms to enhance access to these technologies.

5.1.5.3.5.3 Insufficient Access for Finance

Encourage measures to lower borrowing expenses and loans in commercial banks. The Department of Energy ought to collaborate with the Ministry of Finance and the Ministry of Revenue to pinpoint legislative interventions that could facilitate the imports and adoption of renewable technologies, such as on-grid solar farms.

5.1.5.3.6 Non-financial Measures

5.1.5.3.6.1 Policy, Legal and Regulatory Measures

The externalities associated with fossil fuel combustion remain unaccounted for. These externalities encompass environmental impacts and the omission of environmental costs, particularly as diesel power generation continues to receive subsidies reflected in electricity tariffs. It is imperative that the on-grid power tariff incorporates these environmental costs alongside the subsidies for diesel fuel. The failure to account for these external costs renders the use of LPG and unsustainable charcoal significantly more economical compared to renewable energy sources. Establishing effective collaboration among all stakeholders is crucial to tackle the growing challenges related to licensing and the suitability of Power Purchase Agreements (PPAs). Additionally, it is vital to make informed decisions regarding policy incentives and support mechanisms that govern the regulation of on-grid photovoltaic (PV) generation.

5.1.5.3.6.2 Institutional Measures

Enhance the capabilities of institutions by providing technical and business management training, as well as facilitating professional attachments to international organizations. Strengthen the institutional framework to ensure the effective execution of guidelines, milestones, and performance benchmarks, thereby enabling the achievement of national energy objectives and targets

5.1.5.3.6.3 Technical Measures

The current state of technology for on-grid solar power has not yet reached a level of public acceptance. It is essential for relevant research and development institutions to conduct additional studies to overcome technical challenges, particularly those related to the integration of solar power into the electricity grid, especially concerning distribution lines. Enhancing the stability of the electricity grid and increasing the flexibility of diesel power generation to mitigate power interruptions are also critical. Moreover, the government should prioritize the enhancement of technical expertise in the field of on-grid solar power generation

5.1.5.3.6.4 Market Measures

International, regional, and local expertise should evaluate the viability of implementing on-grid photovoltaic systems by analyzing the elements that impact the supply and demand for on-grid solar energy production. Variations in oil prices have had a significant effect on electricity costs; therefore, it is crucial to examine and identify the determinants that influence electricity demand, with consultation from local communities being a vital component of this assessment.

5.1.5.3.6.5 Information and Public Awareness Measures

The convenience and acceptability of on-grid solar power generation among consumers have yet to be assessed. It is imperative for relevant government institutions to formulate a communication strategy, create awareness materials, and implement promotional initiatives to foster public acceptance of on-grid solar power generation. This can be achieved by demonstrating the economic viability of the technology and justifying the adoption of a fixed electricity tariff for all grid-connected customers in key districts. Additionally, the government must enhance essential data collection efforts and address the current lack of expertise in this area.

5.1.5.3.7 Actions Selected To Be Included in the TAP

1. Assess the feasibility of on-grid solar power generation: Currently, the market for compact on-grid solar power generation remains largely uncharted. Investors require confirmation of the business's viability before committing their resources. The studies should encompass all pertinent external factors, such as the difficulties in attracting investors, the suitable economic framework for full cost recovery, the integration of maximum demand for on-grid solar into the national electricity grid, and effective strategies to manage inflation in electricity tariffs. This analysis will not eliminate the need for investors to conduct their own feasibility assessments.

2. Raise awareness among both developers and users of on-grid solar power: It is crucial for both users and innovators to understand not only the potential of this technology but also the advantages it offers. This can be achieved by demonstrating the economic viability of the technology and justifying the adoption of a fixed electricity tariff for all grid-connected customers in key districts. Additionally, the government must enhance essential data collection efforts and address the current lack of expertise in this area.

3. Improve access to financing for on-grid solar power: The prevailing lending rates pose a significant obstacle for investors seeking to enter into long-term financing agreements with commercial banks. Encourage measures to lower borrowing expenses and loans in commercial banks. The Department of Energy ought to collaborate with the Ministry of Finance and the Ministry of Revenue to pinpoint legislative interventions that could facilitate the imports and adoption of renewable technologies, such as on-grid solar farms and timelines.

4. The design and installation of technology must be tailored to align with the institutional, technical, regulatory, and economic frameworks of the country.

5. Evaluation, Maintenance, and Oversight of Technology: The evaluation, maintenance and oversight of the installed technology shall be conducted in accordance with the regulatory, technical, economic and legislative framework of the country. While private investors, donors, and government entities are eager to achieve successful results, it is essential to acknowledge the challenges that may arise and the opportunities available to enhance the policy, legislative, institutional, technical, economic and regulatory environment to fulfil the technology's requirements. Table 14 presents the relevant activities necessary for diffusion of on-grid PV power.

Table 14: Activities to be implemented to enhance diffusion of on-grid PV solar

Technology Action Plan	Activities	Responsible Stakeholder
1. Assess the Feasibility of On-Grid Power Generation	1.1 Conduct the economic, financial and fiscal feasibility of the full cost recovery of On-Grid PV generation in Tonga	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants
	1.2 Carry out Market Survey to ensure business viability of the technology to investors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	1.3 Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
2. Create Awareness of both Developer, and users of the technology	2.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology)	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	2.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	2.3 Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
3. Enhance Access to Financing	3.1 Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.2 Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.3 Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic

		Consultants
4. Design, Procure, Install the monitoring and maintenance plan model for on-grid PV applications in the country	4.1 Design, procure install the on-grid PV investment initiative in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	4.2 Design, Approve and Set up the Monitoring and Maintenance Model for the technology	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
5. Assess and Identify all the necessary improvement options	5.1 Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid PV investment in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	5.2 Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	5.3 Prepare all Policy decisions for government approval	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	5.4 Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

5.1.5.4 Action To Be Implemented as Project Ideas

The aforementioned five actions, specifically the feasibility study, awareness raising, and improved access to financing, design and installation, and finally the assessment, maintenance, and monitoring will be evaluated for implementation as potential project ideas. These actions were identified during the barrier analysis and measures phase in accordance with the TAP preparation guidelines.

5.1.5.5 Stakeholders and Implementation Timelines for the TAP

Table 15 shows the list of stakeholders to implement the TAP

Table 15 List of Activities and Respective Stakeholders to Implement the TAP

Number	Activities	Responsible Body	Timelines
Assess the Feasibility of On-Grid Power Generation	Conduct the economic, financial and fiscal feasibility of the full cost recovery of On-Grid PV generation in Tonga	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants	1-2 Months
	Carry out Market Survey to ensure business viability of the technology to investors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1-2 Months
	Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months
Create Awareness of both Developer, and users of the technology	Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology)	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	6 Months
	Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months
	Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months
Enhance Access to Financing	Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	3 Months
	Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	3 Months
	Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1-2 Months

Design, Procure, Install the monitoring and maintenance plan model for on-grid PV applications in the country	Design, procure install the on-grid PV investment initiative in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1-3 years
	Design, Approve and Set up the Monitoring and Maintenance Model for the technology	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	
Assess and Identify all the necessary improvement options	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of on-grid PV investment in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	3-5 years
	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	
	Prepare all Policy decisions for government approval	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	
	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	

5.1.5.6 : Roles of Stakeholders

The roles of stakeholders are shown in Table 16 below

Table 16 : Roles of On- Grid PV Stakeholders

1	Ministry of Energy	Plan and manage energy policies, energy targets, and assess energy goals and objectives
		Oversee energy projects including on-grid energy projects
		Identify and source funding to implement on-grid energy projects
		Formulate and present energy plan, strategies and programmes to government and seek Cabinet's approval
		Promote public awareness and informed decisions on on-

		grid PV technologies.
2	Department of Climate Change , MEIDECC	Focal Point of the United Nations Convention on Climate Change
		Sourcing funds from climate funds and Global Environmental Facility
		GCF focal point in Tonga
3	Department of Environment , MEIDECC	Responsible for environmental policies and environmental management
4	Ministry of Finance and Planning	Responsible for financial policies and policy incentives for businesses.
5	Ministry of Economic and Trade	Responsible for Business incentive policies
6	Ministry of Foreign Affairs	Responsible for foreign relations with donors and development partners.
7	Tonga Power Limited, TPL	Manage and Plan all grid connected solar power generation project and installations.
8	Tonga Electricity Commission	Responsible for regulatory policies and regulation of on-grid PV
9	University of Tonga and University of the South Pacific	Research and Development
10	Regional Energy Institutions	Responsible for regional energy coordination and general assessment and analysis of on-grid PV projects
11	Development Partners and Donors	Financing of on-grid solar power projects
12	Local NGOs and Consultants	Technical assessment and specific technical analysis of on-grid PV projects
13	Contractor and Subcontractor for technological installation of on-grid PV	Technical installation of the technology

5.1.5.7 : Scheduling of Activities

Table 17 describes the sequence and timing of specific activities and responsibilities

Table 17: Scheduling of Activities

Action	Activities	Planning		Implementation		Responsible Stakeholder
		Start	End	Start	End	
1. Assess the	1.1 Conduct the	2025	2025	2025	2025	DoE, TPL.

Feasibility of On-Grid Power Generation	economic, financial and fiscal feasibility of the full cost recovery of On-Grid PV generation in Tonga					University of Tonga, GCF, SPC and Local Energy Consultants
	1.2 Carry out Market Survey to ensure business viability of the technology to investors	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	1.3 Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
2. Create Awareness of both Developer, and users of the technology	2.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology)	2025	2026	2025	2026	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	2.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the	2025	2025	2026	2026	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

	technology					
	2.3 Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users	2026	2026	2026	2027	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
3. Enhance Access to Financing	3.1 Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology	2024	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.2 Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit	2025	2026	2025	2026	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.3 Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga	2027	2027	2027	2027	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
Design, Procure, Install the monitoring and maintenance plan model for	Design, procure install the on-grid PV investment initiative in the country	2027	2031	2037	2032	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

on-grid PV applications in the country	Design, Approve and Set up the Monitoring and Maintenance Model for the technology					DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
Assess and Identify all the necessary improvement options	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing ON-GRID PV investment in the country	2032	2032	2032	2035	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.					DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	Prepare all Policy decisions for government approval					DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.					DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

5.1.5.8 : Estimation of Resources for Action and Activities

To achieve successful and sustained technology diffusion, it is essential to enhance the capabilities of local technology importers and bidders and installers, especially local suppliers, overseas and local contractors and bidders of the technology, installers, and

maintenance engineers. Furthermore, to facilitate accelerated diffusion, it is necessary to implement a train-the-trainers approach, enabling the replication of training programs across numerous regions.

The activities to be undertaken and their associated costs are presented in Table 18.

Table 18 : Financial considerations associated with the execution of the identified activities.

Action	Activities	Plan	Implementation	Estimated Cost (USD)	Source of Fund	Responsible Stakeholder	Justification
		Start/ End	Start/ End				
1. Institutional Set Up	1.1 Establish an unit to oversee the implementation of TAP	2025/ 2025	2025/ 2025	1,318,000	Donors	DOE, TPL, Donors	Recuited personnel and office furniture and office equipment
2.Assess the Feasibility of On-Grid Power Generation	2.1 Conduct the economic, financial and fiscal feasibility of the full cost recovery of On-Grid PV generation in Tonga	2025/ 2025	2025/ 2025	247,000	Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants	Recruitment of researchers and professional assessors
	2.2 Carry out Market Survey to ensure business viability of the technology to investors	2025/ 2025	2025/ 2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Recruitment of Assessors
	2.3 Conduct the economic feasibility of the adoption of fixed electricity	2025/ 2025	2025/ 2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and	Recruitment of assessors and office equipment

	tariffs in the country and impacts of inflation in the tariffs					Local Business and Economic Consultants	
3.Create Awareness of both Developer, and users of the technology	3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology)	2025/ 2026	2025/ 2026	530,000	Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1.Consultation with stakeholders 2.Publish of public awareness materials
	3.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology	2025/ 2025	2026/ 2026		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Contact address and internet communication links
	3.3 Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users	2026/ 2026	2026/ 2027		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1.Conduct of Trainings 2.Distribution of materials 3.Record and broadcast of Radio and TV programs
4.Enhance Access to	4.1 Develop Financial	2024/ 2025	2025/ 2025	260,000	Donors	DoE, TPL.	1. Meeting

Financing	Policy Incentives to assist lowering the cost of On-Grid PV technology					University of Tonga, GCF, SPC and Local Business and Economic Consultants	2. Consultations 3. Policy Decisions
	4.2 Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit	2025/ 2026	2025/ 2026		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Consultation with stakeholders Formulation of Policies, Regulations and Legislation
	4.3 Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga	2027/ 2027	2027/ 2027		donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Agreed model of PPA supported by international power companies and multilateral donors
Action 5: Design, Procure, Install the monitoring and maintenance plan model for on-grid PV application	Design, procure install the on-grid PV investment initiative in the country	2027/ 2027	2027/ 2031	101 mil	donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consulta	Agreed model of PPA supported by international power companies and multilateral donors

s in the country						nts	
	Design, Approve and Set up the Monitoring and Maintenance Model for the technology						
Action 6 : Assess and Identify all the necessary improvement options	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid PV investment in the country	2031/ 2032	2032/ 2035	1 mil	donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Agreed model of PPA supported by international power companies and multilateral donors
	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.						
	Prepare all Policy decisions for government approval						
	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.						
Total Requested Budget							104,355,000

5.1.5.9 : Stakeholders Timeline for Implementation of TAP

The Department of Energy (DoE), as the executing body for the TNA project, has convened a significant workshop for key stakeholders to discuss the project and the Technology Action Plan (TAP), with the aim of securing input from pertinent stakeholders. Additionally, the DoE is tasked with the development, implementation, and oversight of the six TAP within the Mitigation sector. Consequently, the Department of Energy will pursue financial assistance, facilitate coordination among relevant ministries with defined leadership in critical areas, delineate roles and policy responsibilities across various government ministries and agencies, and ensure that each technology action plan has approval from the government of Tonga. Furthermore, certain technologies will involve consultations and collaborations with other government ministries, which will aid in gathering information for each technology. During the development of specific activities, efforts will be made to actively involve women, ensuring the integration of gender-inclusive practices. There is a pressing need to effectively address the diverse needs and priorities of all stakeholders, which will contribute to a more efficient and equitable strategy for mitigation technologies. All these initiatives are expected to be implemented between 2025 and 2027.

The actions outlined below have been selected to illustrate the essential steps involved in this TAP for consultation with key stakeholders. The initial step is to create an institutional framework to oversee the execution of this Technology Action Plan (TAP). Through barrier analysis and discussions with stakeholders regarding the enabling framework, the consultant and the Department of Energy have identified specific actions as significant obstacles to the dissemination of the technology. To facilitate the formulation of a robust on-grid photovoltaic strategy, all the following stated actions and activities will be considered and discussed by stakeholders.

Table 19 below shows the timeline set by stakeholders for implementation of action plan and activities for on-grid PV technology.

Table 19: Scheduling and Sequencing of specific Activities Set by Stakeholders for On-grid PV.

Actions	Activities	Year (2025-2035)		
1. Institutional Set Up	1.1. Confirm positions for recruitment and advertisement of Positions	2025 ▲	2026	2035
	1.2. Confirm office space for the project team in the Department of Energy	▲		
	1.3. Allocate Budget for Salaries and Recruitment	▲		
	1.4. Meet Cost for office furniture/ equipment	▲		
	1.5. Meet Other Cost for operation and management of the office.	▲		
2. Assess the	2.1. Identify and Confirm TOR and hire			

feasibility of On-grid power generation	consultant to conduct the assessment	▲		
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of On-Grid PV generation in Tonga.	▲		
	2.3. Identify key barriers to the economic and financial feasibility of on-grid PV.	▲		
	2.4. Identify the solutions to the economic and financial feasibility of the on-grid PV	▲		
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.		▲	
	2.6. Identify and present the key factors for business viability of the on-grid PV		▲	
	2.7. Identify policy improvements needed		▲	
	2.8. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs		▲	
	2.9. Identify barriers and solutions to the economic feasibility of the fixed-tariffs		▲	
	2.10. Identify policy improvements 2.10.1. On-grid PV Policy 2.10.2. On-grid PV Legislation 2.10.3. On-Grid PV Regulation		▲	
	2.11. Technical Feasibility	▲		
3. Create Awareness of both Developer, and users of the On-Grid PV technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1 Awareness materials for on-grid PV developers 3.1.2 Awareness materials for on-grid PV dealers 3.1.3 Awareness materials for on-grid PV Users	▲		
	3.2 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.2.1. Develop materials for on-grid PV developers	▲		

	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for on-grid PV developers 3.3.2. Develop materials for on-grid PV dealers 3.3.3. Develop materials for on-grid PV users	▲		
	3.4. Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 3.4.1. Implement awareness campaign for PV developers 3.4.2. Implement Awareness Campaign for PV Dealers 3.4.3. Implement Awareness Campaign for on-grid PV users	▲		
	3.5. Gender Mainstreaming and Social Inclusion	▲		
4. Enhance Access to Financing	4.1. Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of on-grid PV. 4.1.2. Identify possible legislative incentives to assist lowering the cost of on-grid PV. 4.1.3. Identify possible regulatory incentives to assist lowering the cost of on-grid PV		▲	
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported PV components		▲	
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract		▲	

	for on-grid solar power investors and private sectors in Tonga			
	4.3.1. PPA Contract		▲	
	4.3.2. PPA Tariff on active power		▲	
	4.3.3. PPA improvement		▲	
	4.3.4. Electricity permits into grid		▲	
	4.4. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on energy efficient home appliances Provide clear justifications for adoption of the hybrid vehicle.		▲	
	4.5. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of hybrid vehicle in Tonga		▲	
	4.6. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle in the country		▲	
	4.7. Prepare Cabinet Approval for most sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the transport sector.		▲	
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1. Design, procure install the Hybrid vehicle promotion and investment initiative in the country			▲
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology			▲
Action 6 : Assess and Identify all the necessary	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid solar investment in the country			▲

improvement options				
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.			▲
	6.3. Prepare all Policy decisions for government approval			▲
	6.4. Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.			▲

Table 20 shows the stakeholders allocated budget for each activity

Table 20: Actions, Activities, Capacity Building Needs and Associated Costs

Actions	Activities	Capacity Needs	Cost USD
1. Institutional Set Up	1.1. Confirm positions for recruitment and Conduct advertisement	Consultation & Meeting Cost Advertisement Cost	18,000
	1.2. Confirm office space for the project team in the Department of Energy	Rent and Accommodation	200,000
	1.3. Allocate Budget for Salaries and Recruitment	Salaries	800,000
	1.4. Meet Cost for office furniture/ equipment	Office Furniture and Equipment	200,000
	1.5. Meet Other Cost for operation and management of the office.	Electricity and Telecommunication	100,000
2. Assess the feasibility of On-grid power generation	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	Meeting Cost and Consultant Fees	500,000
	2.2. Identify and Justify the economic,	Local Travel, Transportation Cost and Research Cost	150,000

		financial and fiscal feasibility of the Lifecycle Cost of On-Grid PV generation in Tonga.		
	2.3.	Identify/Confirm key barriers to the economic and financial feasibility of on-grid PV.	Workshop and Consultation Cost	50,000
	2.4.	Identify the solutions to the economic and financial feasibility of the on-grid PV	Workshop and Consultation Cost	
	2.5.	Carry out Market Survey to ensure business viability of the technology to investors.	Develop Survey Questionnaire, Survey workshops, Implementation of Survey	300,000
	2.6.	Identify and present the key factors for business viability of the on-grid PV	Finalization and presentation of Survey Report	30,000
	2.7.	Identify operation policy improvements needed	Consultation, Meetings and Cabinet Submissions	20,000
	2.8.	Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	Consultation and Meeting Cost and Consultants Fee	500,000
	2.9.	Identify barriers and solutions to	Workshop Cost	20,000

	the economic feasibility of the fixed-tariffs		
	2.10. Identify policy improvements 2.10.1. On-grid PV Policy 2.10.2. On-grid PV Legislation 2.10.3. On-Grid PV Regulation	Policy, Regulatory and Legal Review of existing policy and legal framework and documents	400,000
	2.11. Technical Feasibility	Assessment Study, of current grid.	500,000
3. Create Awareness of both Developer, and users of the On-Grid PV technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for on-grid PV developers 3.1.2. Awareness materials for on-grid PV dealers 3.1.3. Awareness materials for on-grid PV Users	Consultation and Identification of public awareness materials.	30,000
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.2.1. Develop materials for on-grid PV	Consultancy Fees for development of public awareness materials	200,000

	developers		
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for on-grid PV developers 3.3.2. Develop materials for on-grid PV dealers 3.3.3. Develop materials for on-grid PV users	Consultancy Fees for development of communication profile	200,000
	3.4. Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 3.4.1. Implement awareness campaign for PV developers 3.4.2. Implement Awareness Campaign for PV Dealers 3.4.3. Implement Awareness Campaign for on-grid PV users	Record of Radio and Television Programs, Publication of awareness materials Meetings with stakeholders Other public awareness programs	100,000
4. Enhance Access to Financing	4.1. Identify/Develop Financial Policy Incentives to assist lowering	Policy Dialogue Meetings and consultation with key stakeholders	50,000

	the cost of On-Grid PV technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of on-grid PV. 4.1.2. Identify possible legislative incentives to assist lowering the cost of on-grid PV. 4.1.3. Identify possible regulatory incentives to assist lowering the cost of on-grid PV	Policy Incentives to reduce cost of imports of technology Policy incentives for power purchase agreement (PPA)	
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on	Development partners meetings and workshops on identifying policy incentives and subsidies for import of technology and equipment.	40,000

	policy incentives and subsides on imported PV components		
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga	Stakeholders Consultation on PPA Policy and Regulation.	40,000
	4.3.1. PPA Contract	Consultation and Meetings of PPA Tariff Policy and Implementation	20,000
	4.3.2. PPA Tariff on active power		
	4.3.3. PPA improvement		
	4.3.4. Electricity permits into grid	Consultation on Improvements of process of permits to the national electricity grid	30,000
	4.4. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on on-grid PV 4.5. Provide clear justifications for adoption of the on-grid PV	Workshops/Consultation with key stakeholders and development partners	40,000
	4.6. Engage in dialogue with development partners on suitable adoption of subsidies for the technology	Consultations and Workshops and Meetings	40,000

		as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of technology in Tonga		
	4.7.	Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle in the country on-grid PV		
	4.8.	Prepare Cabinet Approval for most sustainable financing options of the technology in the country and its plan to achieve share of carbon emission reduction in the transport sector.		
Action 5: Design, Procure, Install the on-grid PV pilot project	5.1.	Design, procure install the on-grid PV promotion and investment initiative in the	Consultants Fee Operation and Reporting	101,000,000

	country		
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology		
Action 6 : Maintenance Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid PV	Consultation Fees Assessment, Consultation and Reporting, Data recording	1,000,000
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.		
	6.3. Prepare all Policy decisions for government approval		
	6.4. Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.		
Total Estimated Budget			104,355,000

5.1.6 On-Grid Wind Power

Wind energy development in the country remains in its early phases. Of the estimated total installed power generation capacity of 33.65 MW in Tonga, less than 1 MW has been utilized at existing power plants. The Department of Energy (DOE), in collaboration with the People Republic of China, has been financing the research and installation of specific model of wind power in Tonga. Currently, Under this project, Tonga has initiated at least

2 MW of on-grid wind projects, supported by funding from the Chinese Government, result in a total combined wind power capacity of more than 3 MW for wind energy.

5.1.6.1 Introduction

The second most significant portion of renewable energy within the nation's electricity mix is derived from on-grid wind power. In the first half of 2024, the total on-grid wind generation accounted for approximately 1% to 2% of the overall power generation in the country (TPL, 2024a, b, c). The monthly contributions of on-grid wind to total power generation are detailed in Table 21 below.

Table 21: % Contribution of On-Grid Wind to Total Power Generation in 2024

Time	Total Power Generated kWh)	Total On-Grid Wind Generated kWh)	% of Wind Power in Total Power Generation
January	7,741305	198.560	2.56
February	7477061	211340	2.83
March	8232013	137790	1.67
April	7,208,097	125,330	1.74
May	7,623,180	195,360	2.56
June	6,794,732	195860	2.88

5.1.6.2 Objective of the TAP for On-Grid Wind

This action plan details the deployment of 10 MW of on-grid wind energy in conjunction with 20MWh of battery storage capacity. This initiative is in line with the national objective of achieving a 100% renewable energy portfolio by the year 2035. A significant focus will be directed towards the continuous assessment and analysis of existing on-grid wind power projects to ensure the maximization of sustainable economic advantages and opportunities derived from wind energy, thus supporting the realization of the 100% renewable energy goal by 2035..

5.1.6.3 Action and Activities selected for this TAP.

5.1.6.3.1 Summary of Barriers to On-Grid Wind Power Generation

The Barrier Analysis phase identified several challenges that may impede the spread of the technology. These challenges were classified into two main categories: financial and fiscal barriers, which involve issues related to costs, tax obstacles, difficulties in securing financing, and insufficient financial policies and regulations. The second category encompasses non-financial barriers, including challenges related to policy, regulation, and legal frameworks, institutional hurdles, technical issues, market limitations, as well as barriers associated with information dissemination and public awareness.

5.1.6.3.2 Financial and Fiscal Barriers

5.1.6.3.2.1 Heavily reliance on donor funding and uncertainty on economics of tariffs

On-grid wind power technology is relatively new technology, resulting in limited awareness regarding its advantages among both investors and users. Reliance and Dependence on donor funding but unaffordable tariff rates and no showing of impacts of

fuel saving through consumption of on-grid wind projects on tariffs; and insufficient private sector investment project Additionally, there exists a certain level of uncertainty concerning the economic feasibility of using wind power technology due to subsidized cost of electricity to the consumer /Social Equity Tariffs.

5.1.6.3.2.2 High Upfront capital cost technology

The upfront capital needed for an on-grid wind power facility is greater than that for a diesel power generation system, as the total costs involved in acquiring and setting up a 1 MW diesel power plant are considerably lower than those for a 1 MW on-grid solar power plant. However, the operational and maintenance costs associated with a wind power plant are lower than those of a diesel power plant, mainly due to decreased maintenance requirements and the fact that sunlight is a free energy source..

5.1.6.3.2.3 Lack of Full Cost Recovery Investment

The potential for complete cost recovery in wind projects remains highly uncertain. Consequently, commercial banks are hesitant to extend the required financing to local investors and solar initiatives, as technology is new and lenders are wary of taking on debt at elevated interest rates for projects that could prove challenging to sustain.

5.1.6.3.2.4 Uncertainty of Demand from the Grid

Insufficient and Uncertain Demand from the grid due to inability to maintain stability of the electricity grid.

5.1.6.3.2.5 Inflation due to Increasing fuel prices

Inflation due to increases petroleum prices and Labour Shortage and cyclone recovery

5.1.6.3.3 Non-Financial Barriers

5.1.6.3.3.1 Policy, Regulatory and Legislative

The inadequate electricity tariff policy, coupled with regulatory and legislative measures, has failed to account for environmental costs, leading to the neglect of externalities associated with fossil fuel combustion. The lack of sufficient tariffs and various forms of direct and indirect financial support significantly impacts the feasibility of technology deployment and influences revenue streams. There are inadequate incentives and support mechanisms to foster widespread adoption of these developments. Additionally, challenges in establishing Power Purchase Agreements (PPAs) arise from ambiguous regulatory policies concerning photovoltaic systems. The permitting process is sluggish, compounded by issues related to licensing and the formulation of PPA contracts. Furthermore, there is a deficiency in legislative and regulatory frameworks, as well as specific types of legislation.

5.1.6.3.3.2 Institutional

There are inadequate privatization arrangements by the power utility. There is a lack of sufficient grid connection agreements, particularly concerning the development of Power Purchase Agreements (PPAs) with Independent Power Producers (IPPs).

5.1.6.3.3.3 Technical

Challenges arise in the selection of sites for wind projects, particularly concerning the compatibility of existing infrastructure and distribution lines, as well as the lengthy process associated with wind installations. There is a notable lack of understanding regarding renewable energy wind power generation, compounded by a shortage of spare parts resulting from inadequate investment from the private sector. Additionally, insufficient battery storage capacity contributes to revenue losses during night-time hours.

5.1.6.3.3.4 Market

Limited feasibility studies to understand key requirements need for utility scale deployment and the efficiency gains of the technology in current climate. Insufficient understanding of key factors that influenced electricity supply and demand in Tonga.

5.1.6.3.3.5 Information and Public Awareness

Insufficient data to support fixed tariff for all and insufficient data to support a tariff level that is affordable for users and profitable

5.1.6.3.4 Summary of Measures to Overcome the Barriers

The subsequent actions were recognized to alleviate obstacles.

5.1.6.3.5 Financial and Fiscal Measures

5.1.6.3.5.1 Heavily reliance on donor funding and uncertainty on economics of tariffs

Government institutions, including local banks, should be encouraged to explore opportunities for establishing the Innovation Fund and Loaning Schemes in partnership with regional and international energy organizations, as well as bilateral and multilateral funding agencies. The Government of Tonga must enhance its subsidy policy and implement a commercial model to ensure the full recovery of investment costs. Additionally, financing for the private sector in renewable energy should be increased by refining the government subsidy policy and adopting a commercial approach to recover the total investment costs. Tariff policies can provide a funding source, as Tonga has integrated in-kind contributions to renewable energy projects within its electricity tariffs. Furthermore, donor financial support is essential to create fiscal space to mitigate inflationary pressures.

5.1.6.3.5.2 High Upfront Cost of the technology

It is recommended to reduce or eliminate government taxes on technology imports. Such tax alleviations would act as a catalyst to encourage the extensive adoption of on-grid solar power. Looking ahead, it is essential to focus on promoting local manufacturing and construction of this technology.

5.1.6.3.5.3 Insufficient Access for Finance

Encourage measures to lower borrowing expenses and loans in commercial banks. Donor organizations dedicated to advancing these technologies in developing countries should consider providing financial assistance to private sector companies, particularly those involved in local manufacturing, under advantageous conditions to improve access to these technologies.

5.1.6.3.6 Non-financial Measures

5.1.6.3.6.1 Policy, Legal and Regulatory Measures

Enhance the formulation of public policies to guarantee the prompt establishment and funding of essential infrastructure development. A supportive regulatory framework is crucial for drawing private sector investments into renewable energy. The acceleration of deployment can be achieved by fostering greater predictability and streamlining the permitting process.

5.1.6.3.6.2 Institutional Measures

Enhance the management and regulatory environment for the development of both existing and new renewable infrastructure.

5.1.6.3.6.3 Technical Measures

Ensuring grid stability amidst significant integration of renewable energy necessitates the modeling and assessment of electrical grids at various penetration levels. It is essential to establish standards and certifications for renewable energy technologies. Furthermore, the digitalization of permitting processes, along with providing technical support for grid upgrades and stability, is crucial. Additionally, it is important to enhance capabilities in the design, installation, and maintenance of renewable energy systems, while also developing both short-term and long-term training programs focused on wind power generation.

5.1.6.3.6.4 Market Measures

Enhancing the capacity to assess and interpret data is essential for conducting energy market and policy analysis, which in turn aids in the development of effective policies and scenarios. It is crucial to comprehend the elements that have impacted supply and demand in Tonga. Recent data and information have been gathered through MEIDECC's analysis in preparation for the forthcoming TERM, ensuring alignment with the objectives of SDG7 and the Nationally Determined Contributions (NDCs).

5.1.6.3.6.5 Information and Public Awareness Measures

Regional public information initiatives should be established to provide essential resources and conduct brief training sessions. It is vital for decision-makers in Tonga to be well-informed about suitable energy technologies, especially in the field of wind energy. Additionally, it is important to formalize collaborative efforts for data collection and to clarify the role of MEIDEC in the development of the database. The availability of indicators such as total final energy consumption and energy intensity, in accordance with international standards, can significantly improve evidence-based policy-making. Evidence-based decision-making for policy development relies on the use of relevant and current information, necessitating the institutionalization of data collection and the sharing of data.

5.1.6.4 Actions Selected To Be Included in the TAP

1. Assess the feasibility of on-grid wind power generation and tariff as source of funding. Currently, the market for compact on-grid wind power generation are heavily relying on donor funding without government quarantee on technologies. Private Investors require confirmation of the business's viability before committing their resources. The studies

should encompass all pertinent external factors, such as the difficulties in attracting investors, the suitable economic framework for full cost recovery electricity tariff, the integration of maximum demand for on-grid wind into the national electricity grid, and effective strategies to manage inflation in electricity tariffs.

2. Raise awareness among both developers and users of on-grid wind power: It is crucial for both users and innovators to understand not only the potential of this technology but also the advantages it offers. This can be achieved by demonstrating the economic viability of the technology and justifying the adoption of a fixed electricity tariff for all grid-connected customers in key districts. Additionally, the government must enhance essential data collection efforts and address the current lack of expertise in this area.

3. Improve access to financing for on-grid wind power: The prevailing lending rates pose a significant obstacle for investors seeking to enter into long-term financing agreements with commercial banks. Encourage measures to lower borrowing expenses and loans in commercial banks. The Department of Energy ought to collaborate with the Ministry of Finance and the Ministry of Revenue to pinpoint legislative interventions that could facilitate the imports and adoption of wind technologies, such as on-grid wind farms and timelines.

Table 22: Activities to be implemented to enhance diffusion of on-grid Wind

Technology Action Plan	Activities	Responsible Stakeholder
1. Assess the Feasibility of On-Grid Wind Power Generation	1.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of On-Grid PV Wind power tariff in Tonga 1.1.1 Opportunities for Innovation Fund 1.1.2 Improve Government Subsidy Policy	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants
	1.2 Carry out Market Survey to ensure business viability and lack of government guarantees available for the technology 1.2.1 Commercial Model for full cost recovery investment	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	1.3 Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of high upfront cost and inflation in the tariffs 1.3.1 Identify the appropriate tariff policy	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

2. Create Awareness of both Developer, and users of the technology	2.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 2.1.1 Donors financial opportunities for private sectors 2.1.2 Public policy for national energy infrastructure development and national energy targets 2.1.3 Improve capacity through training on designing, installing and maintenance of wind power projects 2.1.4 Training on capacity to evaluate and interpret wind data in order to formulate effective wind power policies	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	2.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 2.2.1 Improvement needs for Wind power policy, regulation and legislation 2.2.2 Short Term Training materials on on-site experiences as shared regional sources of information and data 2.2.3 Institutionalization of wind data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	2.3 Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 2.3.1 Enabling Legislation and Regulatory Environment 2.3.2 Improvement on accessibility and permitting process for wind power to the electricity grid	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

3. Enhance Access to Financing	3.1 Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology 3.1.1 Improving grid stability policy and accessibility policy for IPP producers	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.2 Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 3.2.1 Ensure accessibility and availability of technical standard and certification for wind energy	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.3 Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid wind power investors and private sectors in Tonga 3.3.1 Availability of digitilization of wind power permitting process 3.3.2 Improvements of national electricity grid	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
Action 4: Design, Procure, Install the monitoring and maintenance plan model for on-grid PV applications in the country	4.1. Design, procure install the on-grid wind investment initiative in the country	
	4.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology	
Action 5 : Assess and Identify all the necessary improvement options	5.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid wind investment in the country	
	5.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	
	5.3. Prepare all Policy decisions for government approval	
	5.4. Design, Procure and install all necessary grid improvements to cater for reducing demand in the	

	electricity grid.	

5.1.6.5 Action To Be Implemented as Project Ideas

The aforementioned three actions, specifically the feasibility study, awareness raising, and improved access to financing, will be evaluated for implementation as potential project ideas.

5.1.6.6 Stakeholders and Implementation Timelines for the TAP

Table 23 shows the list of stakeholders to implement the TAP

Table 23 : List of Activities and Respective Stakeholders to Implement the TAP

Number	Activities	Responsible Body	Timelines
1. Assess the Feasibility of On-Grid Power Generation	1.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of On-Grid PV Wind power tariff in Tonga 1.1.1 Opportunities Innovation Fund Improve Government Subsidy Policy	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants	1-2 Months
	1.2 Carry out Market Survey to ensure business viability and lack of government guarantees available for the technology 1.2.1 Commercial Model for full cost recovery investment	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1-2Months
	1.3 Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of high upfront cost and inflation in the tariffs 1.3.1 Identify the appropriate tariff policy	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months
2.Create Awareness of both Developer, and users of the	2.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users	DoE, TPL. University of Tonga, GCF, SPC and	6 Months

technology	of PV Technology, financial institutions of technology) 2.1.1 Donors financial opportunities for private sectors 2.1.2 Public policy for national energy infrastructure development and national energy targets 2.1.3 Improve capacity through training on designing, installing and maintenance of wind power projects 2.1.4 Training on capacity to evaluate and interpret wind data in order to formulate effective wind power policies	Local Business and Economic Consultants	
	2.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 2.2.1 Improvement needs for Wind power policy, regulation and legislation 2.2.2 Short Term Training materials on on-site experiences as shared regional sources of information and data 2.2.3 Institutionalization of wind data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months
	2.3 Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 2.3.1 Enabling Legislation and Regulatory Environment	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months

	2.3.2 Improvement on accessibility and permitting process for wind power to the electricity grid		
3 Enhance Access to Financing	3.1 Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology 3.1.1 Improving grid stability policy and accessibility policy for IPP producers	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	3 Months
	3.2 Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 3.2.1 Ensure accessibility and availability of technical standard and certification for wind energy	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months
	3.3 Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid wind power investors and private sectors in Tonga 5.4.1 Availability of digitilization of wind power permitting process 5.4.2 Improvements of national electricity grid	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	12 Months
Action 4: Design, Procure, Install the monitoring and maintenance plan model for on-grid PV applications in the country	3.4 Design, procure install the on-grid PV investment initiative in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	12 Months
	3.5 Design, Approve and Set up the Monitoring and Maintenance Model for the		

	technology		
Action 5 : Assess and Identify all the necessary improvement options	3.6 Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid wind investment in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	12 Months
	3.7 Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.		
	3.8 Prepare all Policy decisions for government approval		
	3.9 Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.		

5.1.6.7 : Roles of Stakeholders

The roles of stakeholders are shown in Table 24 below

Table 24: Roles of On- Grid Wind Power Stakeholders

1	Ministry of Energy	Plan and manage energy policies, energy targets, and assess energy goals and objectives
		Oversee energy projects including on-grid energy projects
		Identify and source funding to implement on-grid energy projects
		Formulate and present energy plan, strategies and programmes to government and seek Cabinet's approval
		Promote public awareness and informed decisions on on-grid PV technologies.
2	Department of Climate Change , MEIDECC	Focal Point of the United Nations Convention on Climate Change
		Sourcing funds from climate funds and Global Environmental Facility
		GCF focal point in Tonga
3	Department of Environment , MEIDECC	Responsible for environmental policies and environmental management
4	Ministry of Finance and Planning	Responsible for financial policies and policy incentives for businesses.
5	Ministry of	Responsible for Business incentive policies

	Economic and Trade	
6	Ministry of Foreign Affairs	Responsible for foreign relations with donors and development partners.
7	Tonga Power Limited, TPL	Manage and Plan all grid connected wind power generation project and installations.
8	Tonga Electricity Commission	Responsible for regulatory policies and regulation of on-grid wind
9	University of Tonga and University of the South Pacific	Research and Development
10	Regional Energy Institutions	Responsible for regional energy coordination and general assessment and analysis of on-grid PV projects
11	Development Partners and Donors	Financing of on-grid wind power projects
12	Local NGOs and Consultants	Technical assessment and specific technical analysis of on-grid PV projects
13	Contractor and Subcontractor for technological installation of on-grid Wind	Technical installation of the technology

5.1.6.8 : Scheduling of Activities

Table 25 below describes the sequence and timing of specific activities and responsibilities

Table 25: Scheduling of Activities

Action	Activities	Planning		Implementation		Responsible Stakeholder
		Start	End	Start	End	
1.Assess the Feasibility of On-Grid Power Generation	1.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of On-Grid Wind power tariff in Tonga 1.1.1 Opportunities Innovation Fund 1.1.2 Improve	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants

	Government Subsidy Policy					
	1.2 Carry out Market Survey to ensure business viability and lack of government guarantees available for the technology 1.2.1 Commercial Model for full cost recovery investment	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	1.3 Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of high upfront cost and inflation in the tariffs 1.3.1 Identify the appropriate tariff policy	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
2.Create Awareness of both Developer, and users of the technology	2.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 2.1.1 Donors financial opportunities for private sectors 2.1.2 Public policy for national energy infrastructure	2025	2026	2025	2026	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

	development and national energy targets 2.1.3 Improve capacity through training on designing, installing and maintenance of wind power projects 2.1.4 Training on capacity to evaluate and interpret wind data in order to formulate effective wind power policies					
	2.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 2.2.1 Improvement needs for Wind power policy, regulation and legislation 2.2.2 Short Term Training materials on on-site experiences as shared regional sources of information	2025	2025	2026	2026	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

		and data 2.2.3 Institutionalization of wind data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings					
		2.3 Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 2.3.1 Enabling Legislation and Regulatory Environment 2.3.2 Improvement on accessibility and permitting process for wind power to the electricity grid	2026	2026	2026	2027	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
3	Enhance Access to Financing	3.1 Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology	2024	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic

	3.1.1 Improving grid stability policy and accessibility policy for IPP producers					Consultants
	3.2 Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 3.2.1 Ensure accessibility and availability of technical standard and certification for wind energy	2025	2026	2025	2026	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.3 Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid wind power investors and private sectors in Tonga 3.3.1 Availability of digitilization of wind power permitting process 3.3.2 Improvements of national electricity grid	2027	2027	2027	2027	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

4. Action 4: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	4.1 Design, procure install the on-grid wind promotion and investment initiative in the country	2025	2026	2026	2035	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	4.2 Design, Approve and Set up the Monitoring and Maintenance Model for the technology					
Action 5 : Assess and Identify all the necessary improvement options	5.1 Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	2025	2026	2026	2035	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	5.2 Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.					
	5.3 Prepare all Policy decisions for government approval					
	5.4 Design, Procure and install all necessary grid improvements to					

	cater for reducing demand in the electricity grid.					

Stakeholders were met on 12th , December,2024 to discuss and set timeline for the on-grid wind power. The stakeholders timeline for activities are shown in Table 26 below.

Table 26: Scheduling and Sequencing of specific Activities Set by Stakeholders for On-grid Wind

Actions	Activities	Year (2025-2027)		
1. Institutional Set Up	1.1. Confirm positions for recruitment and advertisement of Positions	2025 ▲	2026	2027
	1.2. Confirm office space for the project team in the Department of Energy	▲		
	1.3. Allocate Budget for Salaries and Recruitment	▲		
	1.4. Meet Cost for office furniture/ equipment	▲		
	1.5. Meet Other Cost for operation and management of the office.	▲		
2. Assess the feasibility of On-grid wind power generation	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	▲		
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of On-Grid Wind generation in Tonga.	▲		
	2.3. Identify key barriers to the economic and financial feasibility of on-grid wind.	▲		
	2.4. Identify the solutions to the economic and financial feasibility of the on-grid wind	▲		
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.	▲		
	2.6. Identify and present the key factors for business viability of the on-grid wind	▲		
	2.7. Identify policy improvements needed	▲		
	2.8. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	▲		
	2.9. Identify barriers and solutions to the economic feasibility of the fixed-tariffs	▲		

	2.10. Identify policy improvements 2.10.1. On-grid Wind Policy 2.10.2. On-grid Wind Legislation 2.10.3. On-Grid Wind Regulation	▲		
	2.11. Identify and Justify the Technical Feasibility of On-Grid wind generation in Tonga 2.11.1. Identify key barriers to the permission of electricity from wind to the grid 2.11.2. Identify key technical solutions to the to the permission of electricity from wind to the grid 2.11.3. Implement and Test key technical solutions		▲	▲
3. Create Awareness of both Developer, and users of the On-Grid PV technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for on-grid wind developers 3.1.2. Awareness materials for on-grid wind dealers 3.1.3. Awareness materials for on-grid wind Users		▲	
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of wind Technology, financial institutions of technology) 3.2.1. Develop materials for on-grid wind developers		▲	
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for on-grid wind developers 3.3.2. Develop materials for on-grid wind dealers 3.3.3. Develop materials for on-grid wind users		▲	
	3.4. Implement awareness campaign on on-grid wind power generation, especially attract attentions of investors and users 3.4.1. Implement awareness campaign for wind developers		▲	

	3.4.2. Implement Awareness Campaign for wind Dealers 3.4.3. Implement Awareness Campaign for on-grid wind users			
	3.5. Gender Mainstreaming and Social Inclusion, training to include local women to gain expertise		▲	
4. Enhance Access to Financing	4.1. Develop Financial Policy Incentives to assist lowering the cost of On-Grid wind technology . Identify all possible policy incentives to assist lowering the cost of on-grid wind 4.1.1. Identify possible legislative incentives to assist lowering the cost of on-grid wind 4.1.2. Identify possible regulatory incentives to assist lowering the cost of on-grid wind		▲	
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported PV components		▲	
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga		▲	
	4.3.1. PPA Contract		▲	
	4.3.2. PPA Tariff on active power		▲	
	4.3.3. PPA improvement		▲	
	4.3.4. Electricity permits into grid		▲	
	4.4. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on energy efficient home appliances Provide clear justifications for adoption of the on-grid wind.	▲		
	4.5. Engage in dialogue with development		▲	

		partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of on-grid wind in Tonga			
	4.6.	Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of on-grid wind in the country	▲		
	4.7.	Prepare Cabinet Approval for most sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the transport sector.		▲	
Action 5: Design, Procure, Install the monitoring and maintenance plan model for on-grid wind applications in the country	5.1.	Design, procure install the on-grid wind promotion and investment initiative in the country		▲	
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology		▲	
Action 6 : Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of on-grid wind investment in the country		▲	
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	▲		
	6.3.	Prepare all Policy decisions for government approval	▲		
	6.4.	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.		▲	

Table 27: Actions, Activities, Capacity Building and Costs for on-grid wind

Actions	Activities	Capacity Needs	Cost USD
1. Institutional Set Up	1.1. Confirm positions for recruitment and Conduct advertisement	Consultation & Meeting Cost Advertisement Cost	18,000
	1.2. Confirm office space for the project team in the Department of Energy	Rent and Accommodation	200,000
	1.3. Allocate Budget for Salaries and Recruitment	Salaries	800,000
	1.4. Meet Cost for office furniture/ equipment	Office Furniture and Equipment	200,000
	1.5. Meet Other Cost for operation and management of the office.	Electricity and Telecommunication	
2. Assess the feasibility of On-grid power generation	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	Meeting Cost and Consultant Fees	500,000
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of On-Grid wind generation in Tonga.	Local Travel, Transportation Cost and Research Cost	150,000
	2.3. Identify/Confirm key barriers to the economic and financial feasibility of on-grid Wind	Workshop and Consultation Cost	50,000
	2.4. Identify the	Workshop and	

	solutions to the economic and financial feasibility of the on-grid Wind	Consultation Cost	
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.	Develop Survey Questionnaire, Survey workshops, Implementation of Survey	300,000
	2.6. Identify and present the key factors for business viability of the on-grid wind	Finalization and presentation of Survey Report	30,000
	2.7. Identify operation policy improvements needed	Consultation, Meetings and Cabinet Submissions	20,000
	2.8. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	Consultation and Meeting Cost and Consultants Fee	500,000
	2.9. Identify barriers and solutions to the economic feasibility of the fixed-tariffs	Workshop Cost	20,000
	2.10. Identify policy improvements 2.10.1. On-grid wind Policy 2.10.2. On-grid wind Legislation 2.10.3. On-Grid wind	Policy, Regulatory and Legal Review of existing policy and legal framework and documents	400,000

	Regulation		
	2.11. Technical Feasibility		100,000
3. Create Awareness of both Developer, and users of the On-Grid PV technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for on-grid wind developers 3.1.2. Awareness materials for on-grid wind dealers 3.1.3. Awareness materials for on-grid wind Users	Consultation and Identification of public awareness materials.	30,000
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of wind Technology, financial institutions of technology) 3.2.1. Develop materials for on-grid wind developers	Consultancy Fees for development of public awareness materials	200,000
	3.3. Develop a communication strategy Profile for target stakeholders particularly the	Consultancy Fees for development of communication profile	

	adopters of the technology. 3.3.1. Develop materials for on-grid wind developers 3.3.2. Develop materials for on-grid wind dealers 3.3.3. Develop materials for on-grid wind users		
	3.4. Implement awareness campaign on on-grid wind power generation, especially attract attentions of investors and users 3.4.1. Implement awareness campaign for wind developers 3.4.2. Implement Awareness Campaign for wind Dealers 3.4.3. Implement Awareness Campaign for on-grid wind users	Record of Radio and Television Programs, Publication of awareness materials Meetings with stakeholders Other public awareness programs	100,000
	3.5. Gender Mainstreaming and Social Inclusion		20,000
4. Enhance Access to Financing	4.1. Identify/Develop Financial Policy Incentives to assist lowering the cost of	Policy Dialogue Meetings and consultation with key stakeholders	50,000

	On-Grid wind technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of on-grid wind. 4.1.2. Identify possible legislative incentives to assist lowering the cost of on-grid wind. 4.1.3. Identify possible regulatory incentives to assist lowering the cost of on-grid wind	Policy Incentives to reduce cost of imports of technology Policy incentives for power purchase agreement (PPA)	
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported wind components	Development partners meetings and workshops on identifying policy incentives and subsidies for import of technology and equipment.	40,000
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid	Stakeholders Consultation on PPA Policy and Regulation.	20,000

	wind power investors and private sectors in Tonga		
	4.3.1. PPA Contract	Consultation and Meetings of PPA Tariff Policy and Implementation	20,000
	4.3.3. PPA Tariff on active power		
	4.3.3. PPA improvement		
	4.8.4. Electricity permits into grid	Consultation on Improvements of process of permits to the national electricity grid	30,000
	4.9. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on on-grid wind 4.10. Provide clear justifications for adoption of the on-grid wind	Workshops/Consultation with key stakeholders and development partners	40,000
	4.11. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of technology in Tonga	Consultations and Workshops and Meetings	40,000
	4.12. Confirm potential financing options with international, regional and		

	bilateral donors and development partners for adoption of hybrid vehicle in the country on-grid wind		
	4.13. Prepare Cabinet Approval for most sustainable financing options of the technology in the country and its plan to achieve share of carbon emission reduction in the transport sector.		
5. Design, Procure, Install the on-grid PV pilot project	5.1. Design, procure install the on-grid wind promotion and investment initiative in the country	Consultants Fee Operation and Reporting	5,000,000
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology		
6. Maintenance Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid wind	Consultation Fees Assessment , Consultation and Reporting	1,000,000
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.		
	6.3. Prepare all Policy		

		decisions for government approval		
	6.4.	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.		

5.1.6.9 : Estimation of Resources for Action and Activities

To achieve successful and sustained technology diffusion, it is essential to enhance the capabilities of local technology importers and bidders and installers, especially local suppliers, overseas and local contractors and bidders of the technology, installers, and maintenance engineers. Furthermore, to facilitate accelerated diffusion, it is necessary to implement a train-the-trainers approach, enabling the replication of training programs across numerous regions.

The activities to be undertaken and their associated costs are presented in Table 28 below.

Table 28: Financial considerations associated with the execution of the identified activities.

Action	Activities	Plan	Implementation	Estimated Cost (USD)	Source of Fund	Responsible Stakeholder	Justified Actions
		Start/ End	Start/ End				
1.Institutional Set Up	1.1 Establish an unit to oversee the implementation of TAP	2025/ 2025	2025/ 2025	1,218,000	Donors	DOE, TPL, Donors	Recruited personnel and office furniture and office equipment
2.Feasibility Study on economic feasibility	2.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of On-Grid PV Wind power	2025/ 2025	2025/ 2025	2,070,000	Donors	DOE, TPL, Donors	

	tariff in Tonga 2.1.1Opportunities Innovation Fund 2.1.2 Improve Government Subsidy Policy						
	2.2.Carry out Market Survey to ensure business viability and lack of government guarantees available for the technology 2.2.1. Commercial Model for full cost recovery investment	2025/ 2025	2025/ 2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants	Recruitment of researchers and professional assessors
	2.3. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of high upfront cost and inflation in the tariffs 2.3.1. Identify the appropriate tariff policy	2025/ 2025	2025/ 2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Recruitment of Assessors
	2.4. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users	2025/ 2025	2025/ 2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Busines	Recruitment of assessors and office equipment

	of PV Technology, financial institutions of technology) 2.4.1. Donors financial opportunities for private sectors. 2.4.2. Public policy for national energy infrastructure development and national energy targets 2.4.3. Improve capacity through training on designing, installing and maintenance of wind power projects 2.4.4. Training on capacity to evaluate and interpret wind data in order to formulate effective wind power policies					s and Economic Consultants	
3.Create Awareness of both Developer, and users of the technology	3.1. Develop a communication strategy Profile for target stakeholders particul	2025/ 2026	2025/ 2026	350,000	Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Econom	1.Consultation with stakeholders 2.Publish of public awareness materials

	arly the adopters of the technology 3.1.1. Improvement needs for Wind power policy, regulation and legislation 3.1.2. Short Term Training materials on on-site experiences as shared regional sources of information and data 3.1.3. Institutionalization of wind data collection and analysis and publication of data analysis and indicators for evidenc					ic Consultants	

	ed policy decision makings						
	3.2. Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 3.2.1. Enabling Legislation and Regulatory Environment 3.2.2. Improvement on accessibility and permitting process for wind power to the electricity grid	2025/2025	2026/2026		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Contact address and internet communication links
	3.3. Develop Financi	2026/2026	2026/2027		Donors	DoE, TPL.	1.Conduct of

	al Policy Incentives to assist lowering the cost of On-Grid PV technology 3.3.1. Improving grid stability policy and accessibility policy for IPP producers					University of Tonga, GCF, SPC and Local Business and Economic Consultants	Trainings 2.Distribution of materials 3.Record and broadcast of Radio and TV programs
4,Enhance Access to Financing	4.1. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.1.1. Ensure accessibility and availabil	2024/2025	2025/2025	240,000	Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Meeting Consultations Policy Decisions

	ity of technical standard and certification for wind energy						
	4.2. Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid wind power investors and private sectors in Tonga 4.2.1. Availability of digitilization of wind power permitting process 4.2.2. Improvements of national electricity grid	2025/2026	2025/2026		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Consultation with stakeholders Formulation of Policies, Regulations and Legislation
	4.3. Conduct the	2027/2027	2027/2027		donors	DoE, TPL.	Agreed model of

	economic, financial and fiscal feasibility of the source of funding and full cost recovery of On-Grid PV Wind power tariff in Tonga 4.3.1. Opportunities Innovation Fund 4.3.2. Improve Government Subsidy Policy					University of Tonga, GCF, SPC and Local Business and Economic Consultants	PPA supported by international power companies and multilateral donors
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1. Design, procure install the EE Home appliances promotion and investment initiative in the country			23 mil	donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	
	5.2. Design, Approve and Set up the						

		Monitoring and Maintenance Model for the technology						
Action 6 : Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country			1 mil	donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis						

	.						
	6.3. Prepare all Policy decisions for government approval						
	6.4. Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.						
Total Estimated Budget							27,828,000

5.1.7 Energy Efficient Home Appliances

According to the report on Tonga's progress regarding the Sustainable Development Goals (SDGs), the nation achieved an energy intensity rate of 4 MJ/USD of GDP in 2018 (GOT, 2020b). Consequently, it is feasible to aim for a national energy intensity target of 3 MJ/USD of GDP by the year 2030. The implementation of this Technology Action Plan is crucial, as it outlines the necessary energy-efficient measures to decrease the energy intensity from 4 MJ/USD in 2018 to 3 MJ/USD by 2030. Furthermore, the Tonga Energy Road Map Plus Report establishes national energy objectives for the period of 2021 to 2035, which include enhancing demand-side energy efficiency by reducing total energy consumption from 65 GWh in 2021 to 40 GWh by 2035 (GOT, 2021b)..

5.1.7.1 Introduction

The TERMPlus report established a goal to keep electricity network losses below 8% by the year 2035 (GOT, 2021B). The Tonga Energy Efficiency Master Plan estimates that it is feasible to achieve a 50% reduction in greenhouse gas emissions annually by 2030, using 2020 as the baseline year. This equates to a decrease of 210,000 metric tonnes of

CO2 equivalent from business-as-usual emissions. Measures implemented in the energy efficiency sector of the electric industry account for 29.6% of this reduction, amounting to 32,500 metric tonnes of CO2 equivalent (GOT, 2021c)..

5.1.7.2 Objective of the TAP for Energy Efficient Home Appliances

The objective of the initiative is to transition to LED lighting and high-efficiency freezers, refrigerators, and air conditioning units, with the goal of achieving a 20% reduction in electricity consumption. The estimated financial requirement for this initiative is approximately US$ 30 million. This program aims to potentially decrease CO2 equivalent emissions by around 20% through the implementation of high-efficiency appliances, alongside an anticipated 15% reduction from improved lighting. Additionally, it is expected that energy-related operational expenses for both the utility provider and consumers could be reduced by 20% to 30%.

5.1.7.3 Action and Activities selected for this TAP.

5.1.7.3.1 Summary of Barriers to Energy Efficient Home Appliances

The Barrier Analysis phase revealed numerous obstacles that could hinder the adoption of the energy efficient home appliances technologies. These obstacles were categorized into two primary groups: financial and fiscal barriers, which pertain to challenges such as inadequate access to financing, the absence of de-risking guarantees, high initial costs for energy-efficient equipment, and local tax impediments. The second group consists of non-financial barriers, which include issues stemming from ineffective public policy, insufficient regulatory and legal frameworks, institutional challenges, technical difficulties, and market constraints related to the inadequate dissemination of information and public awareness. This includes a lack of understanding regarding supply and demand dynamics necessary to support energy-efficient initiatives, as well as barriers linked to the absence of energy efficiency data and stakeholder consultations to inform policy-making.

5.1.7.3.2 Financial and Fiscal Barriers

5.1.7.3.2.1 Insufficient access for finance and lack of De-risking Guarantee

Insufficient Access for Finance and lack of de-risking guarantees available for energy efficient home appliances, resulting in limited awareness regarding its advantages among both investors and users. Additionally, there exists a certain level of uncertainty concerning the economic feasibility of using energy efficient home appliances technology.

5.1.7.3.2.2 High upfront capital cost technology for energy efficient home appliances

The upfront capital needed for energy efficient home appliances facility is still expensive.

5.1.7.3.2.3 Local Tax Policy

Energy efficient home appliances projects offer duty free for government projects but not for private sector companies.

5.1.7.3.3 Non-Financial Barriers

5.1.7.3.3.1 Policy, Regulatory and Legislative

The shortcomings in public policy, combined with limited capabilities within energy institutions, have resulted in regulatory and legislative measures that do not adequately

consider environmental costs. Additionally, there exists a lack of comprehensive legislative and regulatory frameworks, along with certain essential types of legislation..

5.1.7.3.3.2 Institutional

There is a lack of technical and management capacities.

5.1.7.3.3.3 Technical

The design of buildings, the utilization of appliances, and the patterns of energy consumption are often centered on inexpensive and low-energy-efficiency devices. There exists a lack of adequate understanding concerning energy-efficient home appliances.

5.1.7.3.3.4 Market

Limited feasibility studies to understand key requirements need for utility scale deployment and the efficiency gains of the technology in current climate. Insufficient understanding of key factors that influenced electricity supply and demand in Tonga.

5.1.7.3.3.5 Information and Public Awareness

Lack of comprehensive coordination of data collection for policy developments, and minimum consultation with local stakeholders on energy efficient home appliances

5.1.7.3.4 Summary of Measures to Overcome the Barriers

The following subsequent actions were recognized to alleviate obstacles.

5.1.7.3.5 Financial and Fiscal Measures

5.1.7.3.5.1 Insufficient access for finance and lack of De-risking Guarantee

Government entities, such as local banks, ought to be motivated to seek avenues for enhancing financial support to the private sector. The Government of Tonga should refine its subsidy policy and implement a commercial strategy to recoup the full investment costs.

5.1.7.3.5.2 High Upfront Cost of the technology

It is advisable to establish an appropriate regional procurement strategy for energy-efficient (EE) equipment tailored to small island nations, along with a responsible regional transportation system for delivering the procured EE materials to these countries. Additionally, it is essential to implement tariff policies that can provide funding for long-term on-grid solar power initiatives, similar to Tonga's approach of incorporating in-kind contributions into the development of electricity tariffs for EE projects. Furthermore, it is important to eliminate obstacles that hinder private sector participation in EE projects to enhance competition.

Improve financing alternatives for private sector businesses involved in EE projects. Remove barriers that restrict private sector participation in energy efficiency projects to promote greater competition.

5.1.7.3.5.3 Local Tax Policy

Revise tax regulations related to import duties and could possibly improve the government procurement policies for EE equipment.

5.1.7.3.6 Non-financial Measures

5.1.7.3.6.1 Policy, Legislative and Regulatory Measures

Improve public policy development to ensure the timely installation and investment in supporting infrastructure development A regulatory reform and a donor-supported risk reduction facility are essential to facilitate EE investments. An enabling regulatory environment is necessary to attract private sector investments in EE, and a formulation of EE legislation is an obligation for Tonga.

5.1.7.3.6.2 Institutional Measures

Training on innovative approaches to designing and procuring EE projects. Establish a single regulating body, such as a "Ministry of Energy to effectively regulate and enable utilities to operate EE investments independently. Enhancing skills related to the integration and reporting of energy efficient home appliances

5.1.7.3.6.3 Technical Measures

Incorporate energy auditing and energy efficiency standards into the national building code. Establish energy efficiency initiatives that adopt a comprehensive strategy for evaluating energy efficiency capacity development. With significant integration of renewable energy, energy efficiency initiatives can be crucial in supplying energy to island communities. Strengthen the capability to design, install, and maintain energy-efficient household appliances.

5.1.7.3.6.4 Market Measures

The enhancement of skills through regional training initiatives focused on the management of energy service enterprises is essential. It is imperative to gather new data and insights based on the analysis conducted by MEIDECC in preparation for the forthcoming TERM, ensuring alignment with the objectives of SDG7 and the Nationally Determined Contributions (NDCs). Professionals should possess the capability to assess and analyze data, applying it to the evaluation of energy markets and policy frameworks to develop effective strategies and scenarios. Additionally, there is a need to delegate specific responsibilities to the private sector to facilitate infrastructure development.

5.1.7.3.6.5 Information and Public Awareness Measures

Decision makers in Tonga should be provided with comprehensive information on appropriate energy-efficient technologies. It is essential to establish regional public information initiatives that can supply the required resources and facilitate short-term training opportunities.

5.1.7.4 Actions Selected To Be Included in the TAP

1. Assess the feasibility of EE projects and tariff as source of funding. Currently, the market for EE are heavily relying on private projects without government quarantee on technologies. EE users require confirmation of the business's viability before committing their resources. The studies should encompass all pertinent external factors, such as the

difficulties in attracting investors, the suitable economic framework for full cost recovery electricity tariff, the integration of maximum demand for on-grid wind into the national electricity grid, and effective strategies to manage inflation in electricity tariffs.

2. Raise awareness among both developers and users of on-grid wind power: It is crucial for both users and innovators to understand not only the potential of this technology but also the advantages it offers. This can be achieved by demonstrating the economic viability of the technology and justifying the adoption of EE home appliances. Additionally, the government must enhance essential data collection efforts and address the current lack of expertise in this area.

3. Improve access to financing for EE investments: The cost of appliances pose a significant obstacle for investors seeking to enter into long-term financing agreements with financiers. Encourage measures to lower borrowing expenses and loans in commercial banks. The Department of Energy ought to collaborate with the Ministry of Finance and the Ministry of Revenue to pinpoint legislative interventions that could facilitate the imports and adoption of EE Home appliances technologies, such as major home appliances.

Table 29: Activities to be implemented to enhance diffusion of EE home appliances.

Technology Action Plan	Activities	Responsible Stakeholder
1. Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up 1.1.1 Long Term Government Institutional set up and Policy set Up 1.1.2 Development of Ministry of Energy. 1.1.3 Encourage or establish EE design, installation and maintenance companies. 1.1.4 Promote the establishment of energy auditing and energy efficient appliances import companies.	Cabinet, MEIDECC, DoE, SPC GCF, and NGOs and Local Energy Consultants.
2. Assess the economic feasibility of investment on EE Home appliances	2.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of EE projects in Tonga 2.1.1 Opportunities for access financing opportunities. 2.1.2 Feasibility of government de-risking guarantee. 2.1.3 Identify any regulatory and legislative obstacles 2.1.4 Donors supported risk reduction methodology and financial options.	DoE, TPL, University of Tonga, GCF, SPC and Local Energy Consultants
	2.2 Carry out market survey to ensure business viability of government guarantees available for the technology	DoE, TPL. University of Tonga, GCF, SPC and

	2.2.1 Feasible public policy reform options to reduce cost of adoption of EE in Tonga 2.2.2 Commercial model for full cost recovery EE investment	Local Business and Economic Consultants
	2.3 Conduct the economic feasibility of the adoption of EE home appliances in the country and impacts of high upfront cost and inflation in the adoption process 2.3.1 Identify the appropriate EE policy incentives. 2.3.2 Identify the most appropriate source of financing for residential users to address high cost EE investment needs. 2.3.3 EE policy improvements 2.3.4 EE regulatory improvements 2.3.5 EE legislative improvements	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
3. Create Awareness of both Developer, and users of the technology	3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.1.1 Donors financial opportunities for EE development for private sectors 3.1.2 Donors financing options for home appliances energy efficient programs and capacity building programs for designing, installing and maintaining of EE home appliances 3.1.3 public policy improvements for EE project installation to support national energy targets on EE 3.1.4 Improve capacity through training on designing, installing and maintenance of EE projects 3.1.5 Training on capacity to evaluate and interpret EE data in order to formulate effective EE effective and improvement policies. 3.1.6 Encourage training program approaches for EE appliances business opportunities and energy efficient business service delivery.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	3.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 3.2.1 Short Term Training materials on on-	DoE, TPL, University of Tonga, GCF, SPC and Local Business and

	site experiences as shared regional sources of information and data analysis. 3.2.2 Training on innovative approaches for designing, procuring, installation and maintenance of EE projects. 3.2.3 Encourage private sectors EE services and auditing business opportunities. 3.2.4 Institutionalization of EE project data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 3.2.5 Formulation of EE database and analysis of EE data to guide energy efficient service delivery development and business opportunities	Economic Consultants
	3.3 Implement awareness campaign on residential EE projects generation, especially attract attentions of investors and users 3.3.1 Enabling legislation and regulatory environment 3.3.2 Improvement on accessibility and permitting process for wind power to the electricity grid	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
4. Enhance Access to Financing	4.1 Develop Government financial policy incentives to assist lowering the cost of EE technology 4.1.1 Identify and improve commercial banks financing policy and accessibility of residential energy users to EE loaning scheme for EE projects	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	4.2 Engage in dialogue with government development partners to identify possible government incentives and subsidies for the EE technologies as it contributes to global benefit 4.2.1 Ensure accessibility and availability of technical standard and minimum labelling certification for import of EE home appliances to Tonga	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	4.3 Discuss and Justify the adoption of the most suitable adoption model for EE appliances investors and home owners in Tonga 4.3.1 Availability of most feasible financing options for EE projects	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

	4.3.2	Improvements of the national electricity grid for EE projects	
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1.	Design, procure install the EE Home appliances promotion and investment initiative in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
Action 6 : Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	6.3.	Prepare all Policy decisions for government approval	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	6.4.	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

5.1.7.5 Action To Be Implemented as Project Ideas

The aforementioned three actions, specifically the feasibility study, awareness raising, and improved access to financing, will be evaluated for implementation as potential project ideas.

5.1.7.6 Stakeholders and Implementation Timelines for the TAP

Table 30 shows the list of stakeholders to implement the TAP

Table 30: List of Activities and Respective Stakeholders to Implement the TAP

Number	Activities	Responsible Body	Timelines
1. Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up Long Term Government Institutional set up and Policy set Up 1.1.1 Development of Ministry of Energy. 1.1.2 Promote the establishment of energy auditing and energy efficient appliances import companies.	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants	1-3 Months
2. Assess the economic feasibility of investment on EE Home appliances	2.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of EE projects in Tonga 2.1.1 Opportunities for access financing opportunities. 2.1.2 Feasibility of government de-risking guarantee. 2.1.3 Identify any regulatory and legislative obstacles 2.1.4 Donors supported risk reduction methodology and financial options.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2-2Months
	2.2 Carry out market survey to ensure business viability of government guarantees available for the technology 2.2.1 Feasible public policy reform options to reduce cost of adoption of EE in Tonga 2.2.2 Commercial model for full cost recovery EE investment	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	3 Months
3. Create Awareness of both Developer, and users of the technology	3.1 Conduct the economic feasibility of the adoption of EE home appliances in the country and impacts of high upfront cost and inflation in the adoption process	DoE, TPL. University of Tonga, GCF, SPC and Local Business	6 Months

	3.1.1 Identify the appropriate EE policy incentives. 3.1.2 Identify the most appropriate source of financing for residential users to address high cost EE investment needs. 3.1.3 EE policy improvements 3.1.4 EE regulatory improvements 3.3.2. EE legislative improvements	and Economic Consultants	
	3.2 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.2.1 Donors financial opportunities for EE development for private sectors 3.2.2 Donors financing options for home appliances energy efficient programs and capacity building programs for designing, installing and maintaining of EE home appliances 3.2.3 public policy improvements for EE project installation to support national energy targets on EE 3.2.4 Improve capacity through training on designing, installing and maintenance of EE projects 3.2.5 Training on capacity to evaluate and interpret EE data in order to formulate effective EE effective and improvement policies. 3.2.6 Encourage training program approaches for EE appliances business opportunities and energy efficient business service delivery.	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months

	3.3 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 3.3.1 Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 3.3.2 Training on innovative approaches for designing, procuring, installation and maintenance of EE projects. 3.3.3 Encourage private sectors EE services and auditing business opportunities. 3.3.4 Institutionalization of EE project data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 3.3.3. Formulation of EE database and analysis of EE data to guide energy efficient service delivery development and business opportunities	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	2 Months
4. Enhance Access to Financing	4.1 Implement awareness campaign on residential EE projects generation, especially attract attentions of investors and users 4.1.1 Enabling legislation and regulatory environment 4.1.2 Improvement on accessibility and permitting process for wind power to the electricity grid	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	4. Months
	4.2 Develop Government financial policy incentives to assist lowering the cost of EE technology 4.2.1 Identify and improve commercial banks financing	DoE, TPL. University of Tonga, GCF, SPC and Local Business	4 Months

	policy and accessibility of residential energy users to EE loaning scheme for EE projects	and Economic Consultants	
	4.3 Engage in dialogue with government development partners to identify possible government incentives and subsidies for the EE technologies as it contributes to global benefit 4.3.1 Ensure accessibility and availability of technical standard and minimum labelling certification for import of EE home appliances to Tonga	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	12 Months
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1. Design, procure install the EE Home appliances promotion and investment initiative in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1-3 years
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology		
Action 6 : Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1-3 Years
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.		
	6.3. Prepare all Policy decisions for government approval		
	6.4. Design, Procure and install all necessary grid		

	improvements to cater for reducing demand in the electricity grid.		

5.1.7.7 : Roles of Stakeholders

The roles of stakeholders are shown in Table 31 below

Table 31: Roles of EE Home Appliances Power Stakeholders

1	Ministry of Energy	Plan and manage energy policies, energy targets, and assess energy goals and objectives
		Oversee energy projects including EE home appliances energy projects
		Identify and source funding to implement EE projects
		Formulate and present energy plan, strategies and programmes to government and seek Cabinet's approval
		Promote public awareness and informed decisions on on-EE technologies.
2	Department of Climate Change , MEIDECC	Focal Point of the United Nations Convention on Climate Change
		Sourcing funds from climate funds and Global Environmental Facility
		GCF focal point in Tonga
3	Department of Environment , MEIDECC	Responsible for environmental policies and environmental management
4	Ministry of Finance and Planning	Responsible for financial policies and policy incentives for businesses.
5	Ministry of Economic and Trade	Responsible for Business incentive policies
6	Ministry of Foreign Affairs	Responsible for foreign relations with donors and development partners.
7	Tonga Power Limited, TPL	Manage and Plan the national electricity grids and monitor all projects that has capacity to influence the electricity generation and distribution and transmissions.
8	Tonga Electricity Commission	Responsible for regulatory policies and regulation of the national electricity grid.
9	University of Tonga and University of the South Pacific and National consultants	Research and Development.
10	Regional Energy Institutions	Responsible for regional energy coordination and general assessment and analysis of on-grid PV projects.
11	Development	Financing of EE Home appliances projects

	Partners and Donors	
12	Local NGOs and Consultants	Technical assessment and specific technical analysis of EE projects
13	Contractor and Subcontractor for technological installation of on-grid PV	Technical installation of the technology

Action	Activities	Planning		Implementation		Responsible Stakeholder
		Start	End	Start	End	
1. Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up Long Term Government Institutional set up and Policy set Up 1.1.1 Development of Ministry of Energy. 1.1.2 Promote the establishment of energy auditing and energy efficient appliances import companies.	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants
	1.2 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of EE projects in Tonga 1.2.1 Opportunities for access financing opportunities. 1.2.2 Feasibility of government de-risking guarantee. 1.2.3 Identify any regulatory and legislative obstacles 1.2.4 Donors supported risk reduction methodology and financial options.	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

2. Assess the economic feasibility of investment on EE Home appliances	2.1 Carry out market survey to ensure business viability of government guarantees available for the technology 2.1.1 Feasible public policy reform options to reduce cost of adoption of EE in Tonga 2.1.2 Commercial model for full cost recovery EE investment	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	2.2 Conduct the economic feasibility of the adoption of EE home appliances in the country and impacts of high upfront cost and inflation in the adoption process 2.2.1 Identify the appropriate EE policy incentives. 2.2.2 Identify the most appropriate source of financing for residential users to address high cost EE investment needs. 2.2.3 EE policy improvements	2024	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

	2.2.4 EE regulatory improvement 2.2.5 EE legislative improvement					
3. Create Awareness of both Developer, and users of the technology	3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.1.1 Donors financial opportunities for EE development for private sectors 3.1.2 Donors financing options for home appliances energy efficient programs and capacity building programs for designing, installing and maintaining of EE home appliances 3.1.3 public policy improvements for EE project installation to support national energy targets on EE	2024	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

	3.1.4 Improve capacity through training on designing, installing and maintenance of EE projects 3.1.5 Training on capacity to evaluate and interpret EE data in order to formulate effective EE effective and improvement policies. 3.1.6 Encourage training program approaches for EE appliances business opportunities and energy efficient business service delivery.					
4. Enhance Access to Financing	4.1 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 4.1.1 Short Term Training materials on on-site experiences as shared regional sources of	2024	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

	information and data analysis. 4.1.2 Training on innovative approaches for designing, procuring, installation and maintenance of EE projects. 4.1.3 Encourage private sectors EE services and auditing business opportunities. 4.1.4 Institutionalization of EE project data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 4.1.5 Formulation of EE database and analysis of EE data to guide energy efficient service delivery development and business opportunities					
	4.2 Develop Government financial policy	2025	2026	2025	2026	DoE, TPL. University of Tonga, GCF,

	incentives to assist lowering the cost of EE technology 4.2.1. Identify and improve commercial banks financing policy and accessibility of residential energy users to EE loaning scheme for EE projects					SPC and Local Business and Economic Consultants
	4.3 Engage in dialogue with government development partners to identify possible government incentives and subsidies for the EE technologies as it contributes to global benefit 4.3.1. Ensure accessibility and availability of technical standard and minimum labelling certification for import of EE home appliances to Tonga	2027	2027	2027	2027	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
Action 5: Design, Procure, Install the monitoring and maintenance	5.1. Design, procure install the EE Home appliances promotion and					

plan model for hybrid vehicle applications in the country		investment initiative in the country					
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology					
Action 6 : Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country					
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.					
	6.3.	Prepare all Policy decisions for government approval					
	6.4.	Design, Procure and install all necessary grid improvements to cater for					

	reducing demand in the electricity grid.					

5.1.7.8 : Scheduling of Activities

Stakeholders met on 12th December , 2024 to set and confirm the timelines and consider the effectiveness and efficiency of implemented activities. The outcomes of the meeting is the below. Table 32 describes the sequence and timing of specific activities and responsibilities

Table 32: Scheduling and Sequencing of specific Activities Timelines for Energy Efficient Home Appliances

Actions	Activities	Year (2025-2027)		
1. Institutional Set Up	1.1. Confirm positions for recruitment and advertisement of Positions	▲		
	1.2. Confirm office space for the project team in the Department of Energy	▲		
	1.3. Allocate Budget for Salaries and Recruitment	▲		
	1.4. Meet Cost for office furniture/ equipment	▲		
	1.5. Meet Other Cost for operation and management of the office.	▲		
2. Assess the feasibility of EE Home applainces	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	▲		
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of selected EE Home appliances.	▲		
	2.3. Identify key barriers to the economic and financial feasibility of the selected EE Home appliances..	▲		
	2.4. Identify the solutions to the economic and financial feasibility of the selected EE Home appliances	▲		
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.	▲		
	2.6. Identify and present the key factors for business viability of the selected EE Home appliances	▲		
	2.7. Identify policy improvements needed	▲		
	2.8. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the	▲		

	tariffs			
	2.9. Identify barriers and solutions to the economic feasibility of the fixed-tariffs	▲		
	2.10. Identify policy improvements 2.10.1. EE Home appliances Policy 2.10.2. EE Home Appliance Legislation 2.10.3. EE Home appliance Regulation	▲		
	2.11. Technical Feasibility	▲		
3. Create Awareness of both Developer, and users of the On-Grid PV technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for EE Home appliances developers 3.1.2. Awareness materials for EE appliances dealers 3.1.3. Awareness materials for EE appliances Users	▲		
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EE Appliances Technology, financial institutions of technology) 3.2.1. Develop materials for EE appliances developers	▲		
	3.6. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.6.1. Develop materials for EE Appliances developers 3.6.2. Develop materials for EE Appliances dealers 3.6.3. Develop materials for EE appliances users	▲		
	3.7. Implement awareness campaign on EE applainces, especially attract attentions of investors and users 3.7.1. Implement awareness campaign for EE Appliances developers 3.7.2. Implement Awareness Campaign for EE applikances Dealers 3.7.3. Implement Awareness Campaign for EE appliances users	▲		
	3.8. Gender Mainstreaming and Social Inclusion	▲		
4. Enhance Access to	4.1. Develop Financial Policy Incentives to assist lowering the cost of EE		▲	

Financing	technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of EE Home appliances 4.1.2. Identify possible legislative incentives to assist lowering the cost of EE appliances 4.1.3. Identify possible regulatory incentives to assist lowering the cost of EE appliances			
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported EE appliances components		▲	
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for EE investors and private sectors in Tonga		▲	
	4.4. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on energy efficient home appliances Provide clear justifications for adoption of the on-grid wind.		▲	
	4.5. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of EE appliances in Tonga		▲	
	4.6. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of EE in the country	▲		
	4.7. Prepare Cabinet Approval for most	▲		

		sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the energy sector.			
5. Design, Procure, Install the monitoring and maintenance plan model for on-grid wind applications in the country	5.1.	Design, procure install the EE appliances promotion and investment initiative in the country	▲		
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology	▲		
6. Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of EE appliances investment in the country	▲		
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	▲		
	6.3.	Prepare all Policy decisions for government approval	▲		
	6.4.	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	▲		

Table 33: Actions, Activities, Capacity Building and Costs for EE Home Appliances

Actions	Activities		Capacity Needs	Cost USD
1. Institutional Set Up	1.1.	Confirm positions for recruitment and Conduct advertisement	Consultation & Meeting Cost Advertisement Cost	18,000
	1.2.	Confirm office space for the	Rent and Accommodation	200,000

		project team in the Department of Energy		
	1.3.	Allocate Budget for Salaries and Recruitment	Salaries	800,000
	1.4.	Meet Cost for office furniture/ equipment	Office Furniture and Equipment	200,000
	1.5.	Meet Other Cost for operation and management of the office.	Electricity and Telecommunication	10,000
2. Assess the feasibility of selected EE Home appliances	2.1.	Identify and Confirm TOR and hire consultant to conduct the assessment	Meeting Cost and Consultant Fees	500,000
	2.2.	Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of EE appliances in Tonga.	Local Travel, Transportation Cost and Research Cost	150,000
	2.3.	Identify/Confirm key barriers to the economic and financial feasibility of EE	Workshop and Consultation Cost	50,000
	2.4.	Identify the solutions to the economic and financial feasibility of the EE	Workshop and Consultation Cost	
	2.5.	Carry out Market Survey to ensure business viability of the technology to	Develop Survey Questionnaire, Survey workshops, Implementation of Survey	300,000

	investors.		
	2.6. Identify and present the key factors for business viability of the EE	Finalization and presentation of Survey Report	30,000
	2.7. Identify operation policy improvements needed	Consultation, Meetings and Cabinet Submissions	20,000
	2.8. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	Consultation and Meeting Cost and Consultants Fee	500,000
	2.9. Identify barriers and solutions to the economic feasibility of the fixed-tariffs	Workshop Cost	20,000
	2.10. Identify policy improvements 2.10.1. EE Policy 2.10.2. EE Legislation 2.10.3. EE Regulation	Policy, Regulatory and Legal Review of existing policy and legal framework and documents	400,000
	2.11. Technical Feasibility		10,000
3. Create Awareness of both Developer, and users of the On-Grid EE technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for EE developers 3.1.2. Awareness materials for EE	Consultation and Identification of public awareness materials.	30,000

	dealers 3.1.3. Awareness materials for EE Users		
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of wind Technology, financial institutions of technology) 3.2.1. Develop materials for EE developers	Consultancy Fees for development of public awareness materials	200,000
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for EE developers 3.3.2. Develop materials for EE dealers 3.3.3. Develop materials for EE users	Consultancy Fees for development of communication profile	40,000
	3.4. Implement awareness campaign on EE projects, especially attract attentions of	Record of Radio and Television Programs, Publication of awareness materials Meetings with	100,000

	investors and users 3.4.1. Implement awareness campaign EE developers 3.4.2. Implement Awareness Campaign for EE Dealers 3.4.3. Implement Awareness Campaign for EE users	stakeholders Other public awareness programs	
	3.5. Gender Mainstreaming and Social Inclusion		10,000
4. Enhance Access to Financing	4.1. Identify/Develop Financial Policy Incentives to assist lowering the cost of EE technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of EE 4.1.2. Identify possible legislative incentives to assist lowering the cost of EE. 4.1.3. Identify possible regulatory incentives to assist lowering the cost of EE	Policy Dialogue Meetings and consultation with key stakeholders Policy Incentives to reduce cost of imports of technology Policy incentives for power purchase agreement (PPA)	50,000
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit	Development partners meetings and workshops on identifying policy incentives and subsidies for import of technology and equipment.	40,000

	4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported EE components		
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for EE power investors and private sectors in Tonga	Stakeholders Consultation on PPA Policy and Regulation.	40,000
	4.14. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment EE 4.15. Provide clear justifications for adoption of the EE	Workshops/Consultation with key stakeholders and development partners	40,000
	4.16. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for	Consultations and Workshops and Meetings	40,000

	supporting financing of technology in Tonga		
	4.17. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle in the country EE		
	4.18. Prepare Cabinet Approval for most sustainable financing options of the technology in the country and its plan to achieve share of carbon emission reduction in the energy sector.		
5. Design, Procure, Install the on-grid PV pilot project	5.1. Design, procure install the EE promotion and investment initiative in the country	Consultants Fee Operation and Reporting	5,000,000
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology		
6. Maintenance Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing EE	Consultation Fees Assessment , Consultation and Reporting	1,000,000
	6.2. Conduct consultation and meetings on		

	findings of the policy and regulatory assessment and analysis.		
	6.3. Prepare all Policy decisions for government approval		
	6.4. Design, Procure and install all necessary grid improvements to cater for EE projects.		

5.1.7.9 : Estimation of Resources for Action and Activities

To achieve successful and sustained technology diffusion, it is essential to enhance the capabilities of local technology importers and bidders and installers, especially local suppliers, overseas and local contractors and bidders of the technology, installers, and maintenance engineers. Furthermore, to facilitate accelerated diffusion, it is necessary to implement a train-the-trainers approach, enabling the replication of training programs across numerous regions.

The activities to be undertaken and their associated costs are presented in Table 34.

Table 34 : Financial considerations associated with the execution of the identified activities.

Action	Activities	Plan	Implementation	Estimated Cost (USD)	Source of Fund	Responsible Stakeholder	Justified Actions
		Start/End	Start/End				
1.Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up Long Term 1.1.1 Government Institutional set up and Policy set Up 1.1.2 Development of Ministry of Energy. 1.1.3 Promote the establishment of energy auditing and energy efficient appliances import companies.	2025/2025	2025/2025	1,280,000	Donors	DOE, TPL, Donors	Recruited personnel and office furniture and office equipment
2. Feasibility Study for economic feasibility	2.1 Conduct the economic , financial and fiscal feasibility of the source of funding and full cost recovery of EE	2025/2025	2025/2025	1,930,000	Donors	DOE, TPL, Donors	175 *2 125*2 75*4

	projects in Tonga 2.1.1 Opportunities for access financing opportunities. 2.1.2 Feasibility of government de-risking guarantee. 2.1.3 Identify any regulatory and legislative obstacles Donors supported risk reduction methodology and financial options.						
	2.2 Carry out market survey to ensure business viability of government guarantees available for the technology 2.2.1 Feasible public policy reform options to reduce cost of adoption of EE in Tonga 2.2.2 Commercial model for full cost recovery EE investment	2025/2025	2025/2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Energy Consultants	Recruitment of researchers and professional assessors
	2.3 Conduct the economic feasibility of the adoption of EE home appliances in the country and impacts of high upfront cost and inflation in the adoption process 2.3.1. Identify the appropriate EE policy incentives.	2025/2025	2025/2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Recruitment of Assessors
	2.3.2. Identify the most appropriate source of financing for residential users to address high cost EE	2025/2025	2025/2025		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Recruitment of assessors and office equipment

	investment needs. 2.3.3. EE policy improvements 2.3.4. EE regulatory improvements 2.3.5. EE legislative improvements						
3.Create Awareness of both Developer, and users of the	3.1. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology)	2025/2026	2025/226	380,000	Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1.Consultation with stakeholders 2.Publish of public awareness materials
	3.1.1 Donors financial opportunities for EE development for private sectors 3.1.2.Donors financing options for home appliances energy efficient programs and capacity building programs for designing, technology 3.1.3,installing and maintaining of EE home appliances 3.1.4. public policy improvements for EE project installation to support national energy targets on EE 3.1.5. Improve capacity through training on designing,	2025/2025	2026/2026		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Contact address and internet communication links

	installing and maintenance of EE projects 3.1.6. Training on capacity to evaluate and interpret EE data in order to formulate effective EE effective and improvement policies. 3.1.7. Encourage training program approaches for EE appliances business opportunities and energy efficient business service delivery.						
	3.2. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 3.2.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 3.2.2. Training on innovative approaches for designing, procuring,	2026/2026	2026/2027		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1.Conduct of Trainings 2.Distribution of materials 3.Record and broadcast of Radio and TV programs

	installation and maintenance of EE projects. 3.2.3. Encourage private sectors EE services and auditing business opportunities. 3.2.4.Institutionalization of EE project data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 3.2.5. Formulation of EE database and analysis of EE data to guide energy efficient service delivery development and business opportunities						
4, Enhance Access to Financing	4.1. Develop Government financial policy incentives to assist lowering the cost of EE technology 4.1.1. Identify and improve commercial banks financing policy and 4.1.2. accessibility of residential energy users to EE loaning scheme for EE projects	2024/2025	2025/2025	210,000	Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Meeting Consultations Policy Decisions
	4.2. Engage in dialogue with government development partners to identify possible	2025/2026	2025/2026		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and	Consultation with stakeholders Formulation of Policies,

	government incentives and subsidies for the EE technologies as it contributes to global benefit 4.2.1. Ensure accessibility and availability of technical standard and minimum labelling certification for import of EE home appliances to Tonga					Economic Consultants	Regulations and Legislation
	4.3. Long Term Institutional Set Up Long Term Government Institutional set up and Policy set Up 4.3.1. Development of Ministry of Energy. 4.3.2. Promote the establishment of energy auditing and energy efficient appliances import companies.	2027/2027	2027/2027		donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	Agreed model of PPA supported by international power companies and multilateral donors
Action 5: Design, Procure, Install the monitoring and maintenance plan model for	5.1. Design, procure install the EE appliances promotion and investment initiative in	2024/2025	2025/2025	30 mil	donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	

hybrid vehicle applications in the country	the country						
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology						
Action 6 : Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	2024/2025	2025/2025	1 mil	donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.						
	6.3. Prepare all Policy decisions for government						

	approval						
	6.4. Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.						
TOTAL ESTIMATED COST							34,800,000

5.1.7.10 : Management Planning Risks

Table 35 outlines the potential risks associated with the implementation of technology, along with possible measures to mitigate these risks and ensure that the process remains on track.

Table 35: Management Risks and Possible Contingencies

Risk Categories	Current Situation	Contingency Plan
1. Cost of Technology	major cost risk due to increasing cost of EE technology over time	Government plan for increasing cost of technology
2. Scheduling Risks	There may be delays in implementing policies designed to promote the dissemination of technology, including those related to incentives for EE technologies. Additionally, there may be setbacks in carrying out the feasibility study.	Initiate strategic dialogues with the government of Tonga to enable the necessary intervention. Enhance awareness within the Department of Environment, Climate Change, and the Parliamentary Committee on Energy to promote these policies. Formulate a Memorandum of Understanding with pertinent Research and Development organizations to ensure the timely execution of the feasibility study.
3. Implementation and Production Risks	A technology may fail to operate as intended; for instance, it might not	Formulate an agreement with the technology provider to offer after-sales

	perform as expected due to meet the national energy target.	assistance. Develop a mechanism for collecting feedback related to the technology to guarantee that all concerns are resolved in a timely manner.
4. Immediate Requirement Risks	Delay on financing from donors	A project manager ought to be appointed within the MEIDECC Office, with sufficient funding allocated for this role. This individual should be engaged on a full-time basis and provided with the necessary tools and resources, which include access to a financial analyst and proficiency in cost estimation, as well as the requisite hardware and software for planning, scheduling, and project management, in addition to any other immediate tasks that may arise.
5. Changing habits of using technology	Changing to un-efficient energy appliances due to increasing cost of EE technologies	Increasing awareness is crucial, as changing people's habits from using more EE to less efficient could hinder the swift adoption of this technology. More policy incentives on EE technologies.

6 TECHNOLOGY ACTION PLAN AND PROJECT IDEAS FOR TRANSPORT

6.1 TAP for Transport Sector

6.1.1 Battery Charged Electric Vehicles

The TERMPlus report also establishes a goal for the adoption of Low Emission Vehicles, projecting a cumulative reduction of greenhouse gas emissions amounting to 165 GgCO2e by 2030 (GOT, 2021b). Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e), renewable electricity is responsible for 40% (43,500 metric tonnes CO2e), and

EE in the electric sector is responsible for 29.6% of the reduction (32,500 metric tonnes CO2e) (GOT, 2021c. The anticipated expenses for implementing this action plan are estimated to range from US$4 million to US$5 million. This initiative culminates in a project proposal focused on electric vehicles, referred to as the Tonga Integrated PV Systems and EV Plug-in Demonstration Project (TIPVEV Project).

6.1.1.1 Introduction

TERMPlus report set up target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030 (GOT, 2021b).The Electric Vehicle Technology Action Plan (EV TAP) has the capacity to reduce carbon dioxide emissions by approximately 10 kilotons each year.

This initiative will build on the findings from the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) research conducted in 2020 and aims to achieve a 10% decrease in greenhouse gas emissions across the Pacific Island Countries. Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e) (UNCTCN, 2020)

6.1.1.2 Objective of the TAP for Battery Powered Electric Vehicle

Tonga Energy Road Map Plus (TERMPlus) aims to restrict the annual growth of oil consumption in road transport to an average of 1.4%, with an overall target of limiting the increase to 25% by the year 2035 (GOT, 2021b). A study should be conducted to assess the economic viability of battery-powered electric vehicles, accompanied by suggestions for incentives to promote their development.

6.1.1.3 Action and Activities selected for this TAP.

6.1.1.3.1 Summary of Barriers to Battery Powered Electric Vehicle.

The barrier analysis phase revealed numerous obstacles that could hinder the adoption of the battery powered electric vehicles technologies. These obstacles were categorized into two primary groups: financial and fiscal barriers, which pertain to challenges such as high upfront costs due to the expensive manufacturing process, no new financial policy interventions are currently in place, EVs are not economically viable in most Pacific Island Countries due to their higher upfront costs and limited environmental benefit. The second group consists of non-financial barriers, which include issues stemming from current uncertainties in policies have been identified as significant constraints in the market, lack of planning, policy work, and policy actions for electric vehicles, potential conflict between the adoption of EVs and certain NDC targets, policies such as reduced import taxes on EVs , policy, regulatory, and legal obstacles stemming from the necessity to enforce existing regulations, lack of charging infrastructure, limited EV financing options and subsidies, absence of EV regulations and standards, and the absence of endorsed regional or national e-mobility strategies, institutional capacity and insufficient knowledge production, reliance on charging infrastructure availability, scarcity of charging points, lengthy charging times can further impact the reliability of charging, inadequate maintenance of transportation infrastructure contributes to high emissions , new technology and limited expertise in service centres, safety of electric vehicles (EVs) and charging infrastructure, lack of expert assistance when encountering technical issues,

necessity of decentralizing services, the lack of a comprehensive review of motivators and barriers in decision-making processes, novelty of electric vehicle (EV) technology in several nations and its limited adoption among certain demographics, insufficient knowledge and familiarity, potential explosions in extreme circumstances or the potential risks associated with the unique components of EV batteries.

6.1.1.3.2 Financial and Fiscal Barriers

6.1.1.3.2.1 High Upfront Cost

High upfront costs due to the expensive manufacturing process. Additionally, acquisition costs have been identified as major market restraints, which also including fuel charging costs, maintenance costs and environmental costs.

6.1.1.3.2.2 Lack of Financial Policy Interventions

There is no new financial policy interventions currently in place.

6.1.1.3.2.3 Not an economically viable technology

EVs are not economically viable in most Pacific Island Countries due to their higher upfront costs and limited environmental benefit.

6.1.1.3.2.4 Insufficient Existing Government Financial Policies.

The high up front cost technology is also constraint by insufficient government financial policies necessary to support customers in buying the technology.

6.1.1.3.3 Non-Financial Barriers

6.1.1.3.3.1 Lack of Policy Work and Policy Actions

There is lack of planning, policy work, and policy actions for electric vehicles.

6.1.1.3.3.2 Conflict between the adoption of EVs and certain NDC targets.

There is potential conflict between the adoption of EVs and certain NDC targets.

6.1.1.3.3.3 Insufficient policy, and regulatory framework

Policies such as reduced import taxes on EVs, and policies that aim to reduce GHG emissions by improving vehicle fuel economy, diversifying transportation modes, and developing an EV market. Furthermore, policies that ensure that EVs and charging facility are safe, accessible, and affordable.

6.1.1.3.3.4 Lack of Charging Infrastructure

There is lack of charging infrastructure, limited EV financing options and subsidies, absence of EV regulations and standards, and the absence of endorsed regional or national e-mobility strategies.

6.1.1.3.3.5 Lack of Institutional capacity and knowledge

Lack of institutional capacity and insufficient knowledge. Furthermore, the scarcity of charging points can deter consumers from considering purchasing an EV. There is lengthy charging times, which further impact the reliability of charging EV.

6.1.1.3.3.6 Institutional

There is a lack of technical and management capacities, and limited availability of fast charging stations for public use. There is also still insufficient institutional capacity on incorporating renewable energy-based transport systems into the long-term planning of EV battery charging stations.

6.1.1.3.3.7 Absence of EV regulation and Standard

The inadequate maintenance of transportation infrastructure contributes to high emissions. There are still issues on safety of electric vehicles (EVs) and charging infrastructure. There are more concerns about EV models and battery safety. There is lack of expert assistance when encountering technical issues. Limited charging infrastructure in the country are also cited as significant market restraints

6.1.1.3.3.8 Insufficient institutional capacity and knowledge for EV

Limited feasibility studies to understand key requirements need for utility scale deployment and the efficiency gains of the technology in current climate. Insufficient understanding of key factors that influenced electricity supply and demand in Tonga.

6.1.1.3.3.9 Lack of EV Information and Public Awareness

There is new technology and limited expertise in service centres. Novelty of electric vehicle (EV) technology in several nations and its limited adoption among certain demographics. There is insufficient knowledge and familiarity concerning the safety and performance of EVs. Potential explosions in extreme circumstances or the potential risks associated with the unique components of EV batteries.

6.1.1.3.4 Summary of Measures to Overcome the Barriers

The following subsequent actions were recognized to alleviate obstacles.

6.1.1.3.5 Financial and Fiscal Measures

6.1.1.3.5.1 High Upfront Cost of the technology

Enhancing Financial Risk Management to Overcome Fiscal and Financial Obstacles. Incentives primarily come in the form of tax reductions or exemptions. Countries apply various incentives such as import duties, customs taxes, excise taxes, and other tariffs related to international trade to make. EV import should be more affordable and attractive. The exemption of vehicle registration or import fees is suggested as a targeted policy for particular groups that would derive the most benefit from a reduction in vehicle prices. Offering incentives to reduce upfront costs is crucial and furthermore, offering incentives or subsidies for charging stations in specific areas.

6.1.1.3.5.2 Lack of Financial Policy Interventions

Formalize the financial policy package for charging station locations in an official strategic document.

6.1.1.3.5.3 Not an economically viable technology

Reduced or free EV charging at public charging stations, including battery swap stations if applicable, to encourage early EV adoption and investment in public charging infrastructure.

6.1.1.3.5.4 Insufficient Existing Government Financial Policies.

Countries apply various incentives such as import duties, customs taxes, excise taxes, and other tariffs related to international trade to make EV imports more affordable and attractive. The exemption of vehicle registration or import fees is suggested as a targeted policy for particular groups that would derive the most benefit from a reduction in vehicle prices.

6.1.1.3.6 Non-Financial Measures

6.1.1.3.6.1 Lack of Policy Work and Policy Actions

Setting targets and mandates for EV uptake, as well as developing a national policy on implemented EVs actions.

6.1.1.3.6.2 Conflict between the adoption of EVs and certain NDC targets.

Promoting non-motorized and cycling transport options, along with encouraging public adoption of 50% EVs, can contribute to sustainable transportation targets.

6.1.1.3.6.3 Insufficient policy, and regulatory framework

Policies such as reduced import taxes on EVs, and policies that aim to reduce GHG emissions by improving vehicle fuel economy, diversifying transportation modes, and developing an EV market. Furthermore, policies that ensure that EVs and charging facility are safe, accessible, and affordable.

6.1.1.3.6.4 Lack of Institutional capacity and knowledge

Lack of institutional capacity and insufficient knowledge. Furthermore, the scarcity of charging points can deter consumers from considering purchasing an EV. There is lengthy charging times, which further impact the reliability of charging EV. Limited feasibility studies to understand key requirements need for utility scale deployment and the efficiency gains of the technology in current climate. Insufficient understanding of key factors that influenced electricity supply and demand in Tonga

6.1.1.3.6.5 Technical Capacities

There is a lack of technical and management capacities, and limited availability of fast charging stations for public use. There is also still insufficient institutional capacity on incorporating renewable energy-based transport systems into the long-term planning of EV battery charging stations

6.1.1.3.6.6 Market Measures

Experts must have the ability to evaluate and interpret data, utilizing it to assess energy markets and policy frameworks in order to formulate effective strategies and scenarios. Furthermore, it is necessary to assign particular responsibilities to the private sector to promote infrastructure development.

6.1.1.3.6.7 Lack of Charging Infrastructure

There is lack of charging infrastructure, limited EV financing options and subsidies, absence of EV regulations and standards, and the absence of endorsed regional or national e-mobility strategies.

6.1.1.3.6.8 Absence of EV regulation and Standard

The inadequate maintenance of transportation infrastructure contributes to high emissions. There are still issues on safety of electric vehicles (EVs) and charging infrastructure. There are more concerns about EV models and battery safety. There is lack of expert assistance when encountering technical issues. Limited charging infrastructure in the country are also cited as significant market restraints

6.1.1.3.6.9 Lack of EV Information and Public Awareness

There is new technology and limited expertise in service centres. Novelty of electric vehicle (EV) technology in several nations and its limited adoption among certain demographics. There is insufficient knowledge and familiarity concerning the safety and performance of EVs. Potential explosions in extreme circumstances or the potential risks associated with the unique components of EV batteries.

6.1.1.4 Actions Selected To Be Included in the TAP

1. Assess the feasibility of Battery Charged EV projects. Currently, the market for EVs are relying on private use without government quarantee on technologies. EVs users require confirmation of the business's viability before committing their resources. The studies should encompass all pertinent external factors, such as the difficulties in attracting investors, the suitable economic framework for full cost recovery of high upfront cost EVs, and failure to impose right policies, regulation and legislation.

2. Raise awareness among both developers and users of EVs: It is crucial for both users and innovators to understand not only the potential of this technology but also the advantages it offers. This can be achieved by demonstrating the economic viability of the technology and justifying the use of EVs. Additionally, the government must enhance essential data collection efforts and address the current lack of expertise in this area.

3. Improve access to financing for EVs investments: The cost of EVs pose a significant obstacle for investors seeking to enter into long-term financing agreements with financiers. Encourage measures to lower borrowing expenses and loans in commercial banks. The Department of Energy ought to collaborate with the Ministry of Finance and the Ministry of Revenue to pinpoint legislative interventions that could facilitate the imports and adoption of EVs in Tonga. Table 36 shows the activities for diffusion of EVs technologies.

Table 36: Activities to be implemented to enhance diffusion of Battery Charged EVs.

Technology Action Plan	Activities	Responsible Stakeholder
1. Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up 1.1.1 Long Term Government Institutional set up and Policy set Up for Financial Risk Management Team to discuss and confirm tax incentives and tax exemptions policy. 1.1.2 EVs import duties	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga,

	1.1.3 Tax incentives Policy 1.1.4 Other Incentives to reduced Cost of EVs such as reduced import taxes. 1.1.5 Development of Ministry of Energy and other institutional set up of the project. 1.1.5.1 Financial and Institutional Policy for installation of EVs charging stations. 1.1.5.2 Tax Exemption Policies. 1.1.6 Encourage or establish EVs retailers and maintenance companies. 1.1.6.1 Establish policy actions for EVs emissions reduction targets to support the national energy targets and mandates. 1.1.6.2 Promote non-motorized cycling transport options along with adoption of EVs. 1.1.7 Promote the establishment of EVs import companies. 1.1.7.1 Promote safe accessible and affordable charging facility. 1.1.7.2 Promote the adoption of fast battery charging stations and renewable integrated PV charging stations	GCF, SPC,NGOs and Local Energy Consultants
2. Assess the economic feasibility of investment on EVs	2.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of EVs projects in Tonga 2.1.1 Opportunities for access financing opportunities. 2.1.2 Feasibility of government de-risking guarantee. 2.1.3 Identify and address any regulatory and legislative obstacles 2.1.4 Donors supported risk reduction methodology and financial options.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
	2.2 Carry out market survey to ensure business viability of government guarantees available for the technology. 2.2.1 Feasible public policy reform options to reduce cost of adoption of EVs in Tonga 2.2.2 Commercial model for EVs private sector investment	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and

		Local Energy Consultants
	2.3 Conduct the economic feasibility of the adoption of EVs in the country and impacts of high upfront cost and inflation in the adoption process. 2.3.1 Identify the appropriate EE policy incentives. 2.3.2 Identify the most appropriate source of financing to address high cost EVs investment needs. 2.3.3 EE policy improvements 2.3.4 EE regulatory improvements 2.3.5 EE legislative improvements	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
3. Create Awareness of both Developer, and users of the technology	3.1 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs Technology, financial institutions of technology) 3.1.1 Donors financial opportunities for EV development for private sectors 3.1.2 Donors financing options for EVs and capacity building programs for purchasing and maintaining of EVs. 3.1.2.1 EVs Maintenance Services Enterprises. 3.1.3 public policy improvements for EVs project installation to support national energy targets on EVs 3.1.4 Improve capacity through training on designing, installing and maintenance of EVs projects 3.1.5 Training on capacity to evaluate and interpret EVs data in order to formulate effective EV improvement policies. 3.1.6 Encourage training program approaches for EVs business opportunities and business service delivery.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
	3.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 3.2.1 Short Term Training materials on on-site experiences as shared regional sources of information and data analysis.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga,

	3.2.2 Training on innovative approaches for designing, procuring, installation and maintenance of EVs projects. 3.2.3 Encourage private sectors EVs services and business opportunities. 3.2.4 Institutionalization of EVs project data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 3.2.5 Formulation of EVs database and analysis of EVs data to guide service delivery development and business opportunities	GCF, SPC,NGOs and Local Energy Consultants
	3.3 Implement awareness campaign on residential EVs generation, especially attract attentions of investors and users 3.3.1 Enabling legislation and regulatory environment 3.3.2 Improvement on accessibility and permitting process for EVs	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
4. Enhance Access to Financing	4.1 Develop Government financial policy incentives to assist lowering the cost of EVs technology 4.1.1 Identify and improve commercial banks financing policy and accessibility of users to EVs loaning scheme.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
	4.2 Engage in dialogue with government development partners to identify possible government incentives and subsidies for the EVs technologies as it contributes to global benefit 4.2.1 Ensure accessibility and availability of technical standard for EVs projects.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
	4.3 Discuss and Justify the adoption of the most suitable adoption model for EVs investors and home owners in Tonga	DoE(MEIDECC), DoCC (MEIDECC) Ministry of

	4.3.1 Availability of most feasible financing options for EVs projects 4.3.2 Improvements of the national road infrastructure and policies for EVs projects	Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1. Design, procure install the Battery Charged Electric vehicle promotion and investment initiative in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
Action 6 : Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing Battery Charged Electric vehicle investment in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants

	6.3. Prepare all Policy decisions for government approval	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants
	6.4. Design, Procure and install all necessary road infrastructure improvements to cater for EVs	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants

6.1.1.5 Action To Be Implemented as Project Ideas

The aforementioned three actions, specifically the feasibility study, awareness raising, and improved access to financing, will be evaluated for implementation as potential project ideas.

6.1.1.6 Stakeholders and Implementation Timelines for the TAP

Table 37 shows the list of stakeholders to implement the TAP

Table 37 : List of Activities and Respective Stakeholders to Implement the TAP

Number	Activities	Responsible Body	Timelines
1. Establish appropriate institutional set up for the TAP	1.1. Long Term Institutional Set Up 1.1.1. Long Term Government Institutional set up and Policy set Up for Financial Risk Management Team to discuss and confirm tax incentives and tax exemptions policy. 1.1.1.1. EVs import duties 1.1.1.2. Tax incentives Policy 1.1.1.3. Other Incentives to reduced Cost of EVs such as reduced import taxes.	DoE(MEIDECC), Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC and Local Energy Consultants	1-4 Months

	1.1.2. Development of Ministry of Energy and other institutional set up of the project. 1.1.2.1. Financial and Institutional Policy for installation of EVs charging stations. 1.1.2.2. Tax Exemption Policies. 1.1.3. Encourage or establish EVs retailers and maintenance companies. 1.1.3.1. Establish policy actions for EVs emissions reduction targets to support the national energy targets and mandates. 1.1.3.2. Promote non-motorized cycling transport options along with adoption of EVs. 1.1.4. Promote the establishment of EVs import companies. 1.1.4.1. Promote safe accessible and affordable charging facility. 1.1.4.2. Promote the adoption of fast battery charging stations and renewable integrated PV charging stations		
2. Assess the economic feasibility of investment on EVs	2.1. Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of EVs projects in Tonga 2.1.1. Opportunities for access financing opportunities.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of	4-2Months

	2.1.2. Feasibility of government de-risking guarantee. 2.1.3. Identify and address any regulatory and legislative obstacles 2.1.4. Donors supported risk reduction methodology and financial options.	Tonga, GCF, SPC,NGOs and Local Energy Consultants	
	2.2. Carry out market survey to ensure business viability of government guarantees available for the technology. 2.2.1. Feasible public policy reform options to reduce cost of adoption of EVs in Tonga 2.2.2. Commercial model for EVs private sector investment	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	5 Months
3. Create Awareness of both Developer, and users of the technology	3.1. Conduct the economic feasibility of the adoption of EVs in the country and impacts of high upfront cost and inflation in the adoption process. 3.1.1. Identify the appropriate EE policy incentives. 3.1.2. Identify the most appropriate source of financing to address high cost EVs investment needs. 3.1.3. EE policy improvements 3.1.4. EE regulatory improvements 3.1.5. EE legislative improvements	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	6 Months
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs Technology, financial institutions of	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL.	2 Months

	technology) 3.2.1. Donors financial opportunities for EV development for private sectors 3.2.2. Donors financing options for EVs and capacity building programs for purchasing and maintaining of EVs. 3.2.2.1. EVs Maintenance Services Enterprises. 3.2.3. public policy improvements for EVs project installation to support national energy targets on EVs 3.2.4. Improve capacity through training on designing, installing and maintenance of EVs projects 3.2.5. Training on capacity to evaluate and interpret EVs data in order to formulate effective EV improvement policies. 3.2.6. Encourage training program approaches for EVs business opportunities and business service delivery.	University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 3.3.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 3.3.2. Training on innovative approaches for	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	2 Months

	designing, procuring, installation and maintenance of EVs projects. 3.3.3. Encourage private sectors EVs services and business opportunities. 3.3.4. Institutionalization of EVs project data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 3.3.5. Formulation of EVs database and analysis of EVs data to guide service delivery development and business opportunities		
4. Enhance Access to Financing	4.1. Implement awareness campaign on residential EVs generation, especially attract attentions of investors and users 4.1.1. Enabling legislation and regulatory environment 4.1.2. Improvement on accessibility and permitting process for EVs	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	7. Months
	4.2. Develop Government financial policy incentives to assist lowering the cost of EVs technology 4.2.1. Identify and improve commercial banks financing policy and accessibility of users to EVs loaning scheme.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	6 Months
	4.3. Engage in dialogue with government	DoE(MEIDECC), DoCC	12 Months

	development partners to identify possible government incentives and subsidies for the EVs technologies as it contributes to global benefit 4.3.1. Ensure accessibility and availability of technical standard for EVs projects.	(MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	
Action 5: Design, Procure, Install the monitoring and maintenance plan model EVs vehicle applications in the country	5.1. Design, procure install the Battery Charged Electric vehicle promotion and investment initiative in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	3 years
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	
Action 6 : Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing Battery Charged Electric vehicle investment in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	1-3Years

	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	
	6.3. Prepare all Policy decisions for government approval	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	
	6.4. Design, Procure and install all necessary road infrastructure improvements to cater for EVs	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants	

6.1.1.7 : Roles of Stakeholders

The roles of stakeholders are shown in Table 38 below

Table 38: Roles of EVs Stakeholders

1	Ministry of Energy, Ministry of Infrastructure, Traffic Department	Plan and manage energy policies, energy targets, and assess energy goals and objectives
		Oversee energy projects including EVs projects
		Identify and source funding to implement EVs projects

		Formulate and present energy plan, strategies and programmes to government and seek Cabinet's approval
		Promote public awareness and informed decisions on on-EVs technologies.
2	Department of Climate Change , MEIDECC	Focal Point of the United Nations Convention on Climate Change
		Sourcing funds from climate funds and Global Environmental Facility
		GCF focal point in Tonga
3	Department of Environment , MEIDECC	Responsible for environmental policies and environmental management
4	Ministry of Finance and Planning	Responsible for financial policies and policy incentives for businesses.
5	Ministry of Economic and Trade	Responsible for Business incentive policies
6	Ministry of Foreign Affairs	Responsible for foreign relations with donors and development partners.
7	Tonga Power Limited, TPL	Manage and Plan the national electricity grids and monitor all projects that has capacity to influence the electricity generation and distribution and transmissions.
8	Tonga Electricity Commission	Responsible for regulatory policies and regulation of the national electricity grid.
9	University of Tonga and University of the South Pacific and National consultants	Research and Development.
10	Regional Energy Institutions	Responsible for regional energy coordination and general assessment and analysis of EVs projects.
11	Development Partners and Donors	Financing of pilot EVs projects
12	Local NGOs and Consultants	Technical assessment and specific technical analysis of EVs projects
13	Contractor and Subcontractor for EVs operation and maintenance	Technical operation and maintenance of the technology

6.1.1.8 : Scheduling of Activities

Table 39 describes the sequence and timing of specific activities and responsibilities

Table 39: Scheduling of Activities

Action	Activities	Planning		Implementation		Responsible Stakeholder
		Start	End	Start	End	
1. appropriate institutional set up for the TAP	1.1. Long Term Institutional Set Up 1.1.1. Long Term Government Institutional set up and Policy set Up for Financial Risk Management Team to discuss and confirm tax incentives and tax exemptions policy. 1.1.1.1. EVs import duties 1.1.1.2. Tax incentives Policy 1.1.1.3. Other Incentives to reduced Cost of EVs such as reduced import taxes. 1.1.2. Development of Ministry of Energy and other institutional set up of the project. 1.1.2.1. Financial and Institutional Policy for installation of EVs	2025	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	charging stations. 1.1.2.2. Tax Exemption Policies. 1.1.3. Encourage or establish EVs retailers and maintenance companies. 1.1.3.1. Establish policy actions for EVs emissions reduction targets to support the national energy targets and mandates. 1.1.3.2. Promote non-motorized cycling transport options along with adoption of EVs. 1.1.4. Promote the establishment of EVs import companies. 1.1.4.1. Promote safe accessible and affordable charging facility. 1.1.4.2. Promote the adoption of fast battery charging stations and					

	renewable integrated PV charging stations					
2. Assess the economic feasibility of investment on EVs	2.1. Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of EVs projects in Tonga 2.1.1. Opportunities for access financing opportunities. 2.1.2. Feasibility of government de-risking guarantee. 2.1.3. Identify and address any regulatory and legislative obstacles 2.1.4. Donors supported risk reduction methodology and financial options.	2025	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	2.2. Carry out market survey to ensure business viability of government guarantees available for the technology. 2.2.1. Feasible public policy reform options to reduce cost of adoption of EVs in Tonga 2.2.2. Commercial model for EVs private sector investment	2025	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
3. Create Awareness of both Developer, and users of the technology	3.1. Conduct the economic feasibility of the adoption of EVs in the country and impacts of high upfront cost and inflation in the adoption process. 3.1.1. Identify the appropriate EVs policy incentives. 3.1.2. Identify the most appropriate source of financing to address high cost EVs investment needs. 3.1.3. EVs policy improvements 3.1.4. EVs regulatory improvements	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	1.1.1. EVs legislative improvements					
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs Technology, financial institutions of technology) 3.3. Donors financial opportunities for EV development for private sectors 3.3.1. Donors financing options for EVs and capacity building programs for purchasing and maintaining of EVs. 3.3.2. EVs Maintenance Services Enterprises. 3.3.3. public policy improvements for EVs project installation to support national energy targets on EVs 3.3.4. Improve capacity through training on designing, installing and	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	maintenance of EVs projects 3.3.5. Training on capacity to evaluate and interpret EVs data in order to formulate effective EV improvement policies. 3.3.6. Encourage training program approaches for EVs business opportunities and business service delivery.					
4. Enhance Access to Financing	4.1. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 4.1.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 4.1.2. Training on innovative approaches for designing, procuring, installation and maintenance of EVs projects. 4.1.3. Encourage private sectors EVs services and business	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	opportunities. 4.1.4. Institutionalization of EVs project data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 4.1.5. Formulation of EVs database and analysis of EVs data to guide service delivery development and business opportunities					
	4.2. Implement awareness campaign on residential EVs generation, especially attract attentions of investors and users 4.2.1. Enabling legislation and regulatory environment 4.2.2. Improvement on accessibility and permitting process for EVs	2025	2026	2025	2026	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.3. Develop Government financial policy incentives to assist lowering the cost of EVs technology 4.3.1. Identify and	2027	2027	2027	2027	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic

		improve commercial banks financing policy and accessibility of users to EVs loaning scheme.					TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
Action 5: Design, Procure, Install the monitoring and maintenance plan model EVs vehicle applications in the country	4.4.	Design, procure install the Battery Charged Electric vehicle promotion and investment initiative in the country	2027	2027	2028	2031	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.5.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology					
Action 6 : Assess and Identify all the necessary improvement options	4.6.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing Battery Charged Electric vehicle investment in the country	2027	2027	2032	2035	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF,

						SPC,NGOs and Local Energy Consultants Local EVs Business
	4.7. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.					
	4.8. Prepare all Policy decisions for government approval					
	4.9. Design, Procure and install all necessary road infrastructure improvements to cater for EVs					
	4.10.					
	4.11.					
	4.12.					
	4.13.					
	4.14.					
	4.15.					

Transport Stakeholders were met on 12th December , 2024 for workshop to discuss and confirm timelines for the transport technologies. Table 40 shows the set timelines for actions and activities.

Table 40 : Scheduling and Sequencing of specific Activities Timelines set by stakeholders for Battery Charged EVs

Actions	Activities	Year (2025-2027)		
1. Long Term Institutional Set Up	1.1. Confirm positions for recruitment and advertisement of Positions	▲		
	1.2. Confirm office space for the project team in the Department of Energy	▲		
	1.3. Allocate Budget for Salaries and Recruitment	▲		
	1.4. Meet Cost for office furniture/	▲		

	equipment			
	1.5. Meet Other Cost for operation and management of the office.	▲		
2. Assess the feasibility of Battery Charged EVs	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	▲		
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of Battery Charged EVs.	▲		
	2.3. Identify key barriers to the economic and financial feasibility of the selected Battery Charged EVs	▲		
	2.4. Identify the solutions to the economic and financial feasibility of the selected Battery Charged EVs	▲		
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.	▲		
	2.6. Identify and present the key factors for business viability of the Battery Charged EVs	▲		
	2.7. Identify policy improvements needed	▲		
	2.8. Conduct the economic feasibility of the adoption of fast battery charging stations and renewable integrated PV charging stations	▲		
	2.9. Identify barriers and solutions to the economic feasibility Battery Charged EVs	▲		
	2.10. Identify policy improvements 2.10.1. Battery Charged EVs Policy 2.10.2. Battery Charged EVs Legislation 2.10.3. Battery Charged EVs Regulation	▲		
	2.11. Technical Feasibility	▲		
3. Create Awareness of both Developer, and users	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for Battery Charged EVs developers 3.1.2. Awareness materials for EVs	▲		

of the Battery Charged EVs technology	dealers 3.1.3. Awareness materials for EVs Users			
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs Technology, financial institutions of technology) 3.2.1. Develop materials for EVs developers	▲		
	3.9. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.9.1. Develop materials for EVs developers 3.9.2. Develop materials for EVs dealers 3.9.3. Develop materials for EVs users	▲		
	3.10. Implement awareness campaign on EVs, especially attract attentions of investors and users 3.10.1. Implement awareness campaign for EVs developers 3.10.2. Implement Awareness Campaign for EVs appliances Dealers 3.10.3. Implement Awareness Campaign for EVs users	▲		
	3.11. Gender Mainstreaming and Social Inclusion	▲		
4. Enhance Access to Financing	4.1. Develop Financial Policy Incentives to assist lowering the cost of EVs technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of EVs 4.1.2. Identify possible legislative incentives to assist lowering the cost of EVs appliances 4.1.3. Identify possible regulatory incentives to assist lowering the cost of EVs appliances	▲		
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit	▲		

	4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported EVs components			
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for EVs investors and private sectors in Tonga	▲		
	4.4. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on EVs 4.5. Provide clear justifications for adoption of the EVs	▲		
	4.6. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of EVs in Tonga	▲		
	4.7. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of EVs in the country	▲		
	4.8. Prepare Cabinet Approval for most sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the energy sector.	▲		
5. Design, Procure, Install the monitoring and maintenance plan model for EVs in the country	5.1. Design, procure install the EVs appliances promotion and investment initiative in the country	▲		
	5.2. Design, Approve and Set up the		▲	

	Monitoring and Maintenance Model for the technology			
6. Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of EVs investment in the country	▲		
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	▲		
	6.3. Prepare all Policy decisions for government approval	▲		

Table 41: Actions, Activities, Capacity Building and Associated Costs set by stakeholders for EVs

Actions	Activities	Capacity Needs	Cost USD
1. Institutional Set Up	1.1. Confirm positions for recruitment and Conduct advertisement	Consultation & Meeting Cost Advertisement Cost	18,000
	1.2. Confirm office space for the project team in the Department of Energy	Rent and Accommodation	200,000
	1.3. Allocate Budget for Salaries and Recruitment	Salaries	800,000
	1.4. Meet Cost for office furniture/ equipment	Office Furniture and Equipment	200,000
	1.5. Meet Other Cost for operation and management of the office.	Electricity and Telecommunicatio n	50,000
2. Assess the feasibility of Battery Charged EVs	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	Meeting Cost and Consultant Fees	500,000
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of EVs in Tonga.	Local Travel, Transportation Cost and Research Cost	150,000
	2.3. Identify/Confirm key barriers to the	Workshop and Consultation Cost	50,000

	economic and financial feasibility of EVs		
	2.4. Identify the solutions to the economic and financial feasibility of the EVs	Workshop and Consultation Cost	
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.	Develop Survey Questionnaire, Survey workshops, Implementation of Survey	300,000
	2.6. Identify and present the key factors for business viability of the EVs	Finalization and presentation of Survey Report	30,000
	2.7. Identify operation policy improvements needed	Consultation, Meetings and Cabinet Submissions	20,000
	2.8. Conduct the economic feasibility of the fast battery charging stations and renewable integrated PV charging stations	Consultation and Meeting Cost and Consultants Fee	500,000
	2.9. Identify barriers and solutions to the economic feasibility of the integrated PV Charging stations	Workshop Cost	20,000
	2.10. Identify policy improvements 2.10.1. EVs Policy 2.10.2. EVs Legislation 2.10.3. EVs Regulation	Policy, Regulatory and Legal Review of existing policy and legal framework and documents	400,000
	2.11. Technical Feasibility		20,000
3. Create Awareness of both Developer, and users of the On-Grid EE technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for EVs developers 3.1.2. Awareness materials for EVs dealers	Consultation and Identification of public awareness materials.	30,000

	3.1.3. Awareness materials for EVs Users		
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs Technology, financial institutions of technology) 3.2.1. Develop materials for EVs developers	Consultancy Fees for development of public awareness materials	200,000
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for EVs developers 3.3.2. Develop materials for EVs dealers 3.3.3. Develop materials for EVs users	Consultancy Fees for development of communication profile	200,000
	3.4. Implement awareness campaign on EVs projects, especially attract attentions of investors and users 3.4.1. Implement awareness campaign EVs developers 3.4.2. Implement Awareness Campaign for EVs Dealers 3.4.3. Implement Awareness Campaign for EVs users	Record of Radio and Television Programs, Publication of awareness materials Meetings with stakeholders Other public awareness programs	100,000
	3.5. Gender		10,000

	Mainstreaming and Social Inclusion		
4. Enhance Access to Financing	4.1. Identify/Develop Financial Policy Incentives to assist lowering the cost of EVs technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of EVs 4.1.2. Identify possible legislative incentives to assist lowering the cost of EVs 4.1.3. Identify possible regulatory incentives to assist lowering the cost of EVs	Policy Dialogue Meetings and consultation with key stakeholders Policy Incentives to reduce cost of imports of technology Policy incentives for power purchase agreement (PPA)	50,000
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported EVs components	Development partners meetings and workshops on identifying policy incentives and subsidies for import of technology and equipment.	40,000
	4.3. Discuss and Justify the adoption of the most suitable model for EVs investors	Stakeholders Consultation on PPA Policy and Regulation.	30,000

	and private sectors in Tonga		
	4.3.1. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment EVs 4.3.2. Provide clear justifications for adoption of the EVs	Workshops/Consultation with key stakeholders and development partners	40,000
	4.4. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of technology in Tonga	Consultations and Workshops and Meetings	40,000
	4.5. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle EVs in the country		
	4.6. Prepare Cabinet Approval for most sustainable financing options of the technology in the country and its plan to achieve share of carbon emission reduction in the energy sector.		
5. Design, Procure,	5.1. Design, procure install the EVs promotion and	Consultants Fee	500,000

Install the Battery Charged EVs pilot project		investment initiative in the country	Operation and Reporting	
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology		
6. Maintenance Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing EVs	Consultation Fees Assessment , Consultation and Reporting	500,000
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.		
	6.3.	Prepare all Policy decisions for government approval		
	6.4.	Design, Procure and install all necessary grid improvements to cater for EE projects.		
Total Estimated Cost				4,898,000

6.1.1.9 : Estimation of Resources for Action and Activities

To achieve successful and sustained technology diffusion, it is essential to enhance the capabilities of local technology importers and bidders and installers, especially local suppliers, overseas and local contractors and bidders of the technology, installers, and maintenance engineers. Furthermore, to facilitate accelerated diffusion, it is necessary to implement a train-the-trainers approach, enabling the replication of training programs across numerous regions.

The activities to be undertaken and their associated costs are presented in Table 42.

Table 42: Financial considerations associated with the execution of the identified activities.

Action	Activities	Plan	Implementation	Estimated Cost (USD)	Source of Fund	Responsible Stakeholder	Justified Actions
		Start/ End	Start/ End				

1. appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up 1.1.1 Long Term Government Institutional set up and Policy set Up for Financial Risk Management Team to discuss and confirm tax incentives and tax exemptions policy. 1.1.1.1 EVs import duties 1.1.1.2 Tax incentives Policy 1.1.1.3 Other Incentives to reduced Cost of EVs such as reduced import taxes. 1.1.2 Development of Ministry of Energy and other institutional set up of the project.	2025 / 2025	2025 /2025	1,268,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruited personnel and office furniture and office equipment

	1.1.2.1 Financial and Institutional Policy for installation of EVs charging stations. 1.1.2.2 Tax Exemption Policies. 1.1.3 Encourage or establish EVs retailers and maintenance companies. 1.1.3.1 Establish policy actions for EVs emissions reduction targets to support the national energy targets and mandat						

	es. 1.1.3.2 Promote non-motorized cycling transport options along with adoption of EVs. 1.1.4 Promote the establishment of EVs import companies. 1.1.4.1 Promote safe accessible and affordable charging facility. 1.1.4.2 Promote the adoption of fast battery charging stations and renewable integrated PV charging stations						

2. Assess the economic feasibility of investment on EVs	2.1 Conduct the economic, financial and fiscal feasibility of the source of funding and full cost recovery of EVs projects in Tonga 2.1.1 Opportunities for access financing opportunities. 2.1.2 Feasibility of government de-risking guarantee. 2.1.3 Identify and address any regulatory and legislative obstacles Donors supported risk reduction methodology and financial options.	2025 / 2025	2025 / 2025	1,890,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	
3. Create Awareness of both Developer, and users of the technology	3.1 Carry out market survey to ensure business viability of government guarantees available for the technology. 3.1.1 Feasible public	2025 /2025	2025 / 2025	540,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University	Recruitment of researchers and professional assessors

	policy reform options to reduce cost of adoption of EVs in Tonga Commercial model for EVs private sector investment					of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	
	3.2 Conduct the economic feasibility of the adoption of EVs in the country and impacts of high upfront cost and inflation in the adoption process. 3.2.1 Identify the appropriate EE policy incentives. 3.2.2 Identify the most appropriate source of financing to address high cost EVs investment needs. 3.2.3 EVs policy improvements 3.2.4 EVs regulatory improvements 3.2.5 EVs	2025 / 2025	2025 / 2025		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruitment of Assessors

	legislative improvements						
	3.3 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs Technology, financial institutions of technology) 3.4 Donors financial opportunities for EV development for private sectors 3.4.1 Donors financing options for EVs and capacity building programs for purchasing and maintaining of EVs. 3.4.1.1 EVs Maintenance Services Enterprises. 3.4.2 public policy improveme	2025/2025	2025/2025		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruitment of assessors and office equipment

	nts for EVs project installation to support national energy targets on EVs 3.4.3 Improve capacity through training on designing, installing and maintenance of EVs projects 3.4.4 Training on capacity to evaluate and interpret EVs data in order to formulate effective EV improvement policies. 3.4.5 Encourage training program approaches for EVs business opportunities and business service delivery.						
4. Enhance Access to Financing	4.1 Develop a communication strategy Profile for target	2025/2026	2025/226	200,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of	1.Consultation with stakeholders 2.Publish of public

	stakeholders particularly the adopters of the technology 4.1.1 Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 4.1.2 Training on innovative approaches for designing, procuring, installation and maintenance of EVs projects. 4.1.3 Encourage private sectors EVs services and business opportunities. 4.1.4 Institutionalization of EVs project data collection and analysis					Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	awarenes s materials

	and publication of data analysis and indicators for evidenced policy decision makings. 4.1.5 Formulation of EVs database and analysis of EVs data to guide service delivery development and business opportunities						
	4.2 Implement awareness campaign on residential EVs generation, especially attract attentions of investors and users 4.2.1 Enabling legislation and regulatory environment 4.2.2 Improvement on accessibility and permitting	2025/2025	2026/2026		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Contact address and internet communication links

	process for EVs						
	4.3 Develop Government financial policy incentives to assist lowering the cost of EVs technology 4.4 Identify and improve commercial banks financing policy and accessibility of users to EVs loaning scheme.	2026/2026	2026/2027		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1.Conduct of Trainings 2.Distribution of materials 3.Record and broadcast of Radio and TV programs
Design, Procure, Install the Battery Charged EVs pilot project	4.5 Design, procure install the EVs promotion and investment initiative in the country			500,000			
	4.6 Design, Approve and Set up the Monitoring and Maintenance Model for the technology						
Maintenance Assess and Identify all the necessary improvement options	4.7 Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing EVs			500,000			

	4.8 Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.						
	4.9 Prepare all Policy decisions for government approval						
	4.10 Design, Procure and install all necessary grid improvements to cater for EE projects.						
Total Estimated Budget							4,898,000

6.1.2 Hybrid Vehicles

The Hybrid Vehicle Technology Action Plan (HV TAP) has the capacity to reduce carbon dioxide emissions by approximately 10 kilotons each year. TERMPlus report set up target for intake of Low Emission Vehicles to have cumulative GHG emissions reduction of 165 GgCO2e by 2030 (GOT, 2021b).

6.1.2.1 Introduction

The projected costs for executing this TAP are estimated to be between US$10 million and US$20 million. The TAP culminates in a project proposal centered on Hybrid Vehicles, titled: Tonga Hybrid Vehicle. (TONGAHV Project)

This Hybrid Vehicle initiative will build on the findings from the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) research conducted in 2020 and aims to achieve a 10% decrease in greenhouse gas emissions across the Pacific Island Countries.

6.1.2.2 Objective of the TAP for Hybrid Vehicle

Tonga Energy Road Map Plus (TERMPlus) aims to restrict the annual growth of oil consumption in road transport to an average of 1.4%, with an overall target of limiting the increase to 25% by the year 2035 (GOT, 2021b). Action taken in the ground transportation field is responsible for 30.4% of the projected emissions reductions (33,400) metric tonnes CO2e) (UNCTCN,2020).

6.1.2.3 Action and Activities selected for this TAP.

6.1.2.3.1 Summary of Barriers to Hybrid Vehicles

The Barrier Analysis phase revealed numerous obstacles that could hinder the adoption of the hybrid vehicles. These obstacles were categorized into two primary groups: financial and fiscal barriers, which pertain to challenges such as high upfront costs due to the expensive manufacturing process, and lack of new financial policy interventions that are currently in place. The second group consists of non-financial barriers, which include issues like current uncertainties in policies, regulation and legislation, which have been identified as significant constraints in the market, lack of planning, policy work, and policy actions for hybrid vehicles, absence of hybrid vehicle regulation and standard and insufficient regional hybrid vehicle strategies, lack of institutional capacity and knowledge, lack of maintenance knowledge for technicians and private companies, lack of expert assistances, limited availability of hybrid models, underdeveloped hybrid industry, lack of knowledge on safety and performances of hybrid vehicles, lack of capacity to establish evidenced based data collection on hybrid vehicles and lack of consultation with local stakeholders.

6.1.2.3.2 Financial and Fiscal Barrier

6.1.2.3.2.1 High upfront capital cost

The upfront capital needed for hybrid vehicle is still expensive but better than EVs.

6.1.2.3.2.2 Lack of financial policy interventions

Insufficient access for finance and lack of de-risking guarantees available for hybrid vehicles, resulting in limited awareness regarding its advantages among both investors and users. Additionally, there exists a certain level of uncertainty concerning the economic feasibility of hybrid vehicle technology.

6.1.2.3.2.3 Uncertainties of Hybrid Vehicle Policies, legislations and regulations

Duty free for government vehicles but not for private sector companies.

6.1.2.3.3 Non-Financial Barriers

6.1.2.3.3.1 Lack of Policy Work and Policy Actions

The shortcomings in public policy, combined with limited capabilities within energy institutions, have resulted in regulatory and legislative measures that do not adequately consider environmental costs.

6.1.2.3.3.2 Lack of Institutional framework

There is a lack of technical and management capacities.

6.1.2.3.3.3 Lack of Technical Standard and Regulation

There are lack suitable technical standard. There exists a lack of adequate understanding concerning the operation and regulatory roles to be played by government.

6.1.2.3.3.4 Lack of Planning and Policy Work in the Market

Limited feasibility studies to understand key requirements need for utility scale deployment and the efficiency gains of the technology in current climate. Insufficient understanding of key factors that influenced hybrid vehicle in Tonga.

6.1.2.3.3.5 Insufficient knowledge regarding performances and safety

Lack of comprehensive coordination of data collection for policy developments, and minimum consultation with local stakeholders on energy efficient home appliances

6.1.2.3.4 Summary of Measures to Overcome the Barriers

The following subsequent actions were recognized to alleviate obstacles.

6.1.2.3.5 Financial and Fiscal Measures

6.1.2.3.5.1 High Upfront Cost of the technology

Enhancing Financial Risk Management to Overcome Fiscal and Financial Obstacles. Financial incentives primarily come in the form of tax reductions or exemptions.

6.1.2.3.5.2 Lack of financial policies interventions

Government entities, such as local banks, ought to be motivated to seek avenues for enhancing financial support to the private sector. The Government of Tonga should refine its subsidy policy and implement a commercial strategy for investment on hybrid vehicles.

6.1.2.3.2.3 Uncertainties of Hybrid Vehicle Policies, legislations and regulations

Develop coordinated policies, legislations and regulation on hybrid vehicles.

6.1.2.3.6 Non-financial Measures

6.1.2.3.6.1 Policy, Legislative and Regulatory Measures

Setting targets and mandates for hybrid vehicle uptake, as well as developing a national policy on implemented hybrid vehicle actions. Incentivize the adoption of economically hybrid vehicle that offer societal and environmental benefits, such as providing tax incentives

6.1.2.3.6.2 Institutional Measures

In order to accelerate industry growth and hybrid vehicle infrastructure development, a decisive policy push is necessary. Introduction of Hybrid Vehicles in the municipal government fleet can help reduce institutional barriers. Education programs focused on developing maintenance capabilities for Hybrid Vehicle in Tonga should be coordinated by stakeholders.

6.1.2.3.6.3 Technical Measures

On-site training on sustainable maintenance of all vehicles. Ensuring sustainable maintenance of all vehicles. Add services of hybrid vehicles to the core services of the existing service stations. The concept of a private companies delivery service" for hybrid vehicle dealers would likely entail that the ownership and operation of hybrid vehicle services would be under the jurisdiction of the well-known vehicle dealers companies.

6.1.2.3.6.4 Market Measures

By commencing with adoption of hybrid vehicle at government facilities. Tonga's ministries can familiarize themselves with the hybrid vehicle infrastructure and capitalize on their investment. Consider policy incentive for private enterprises engaged. There should be specific percentage of hybrid vehicle tax imports based on the available resources of the Ministry of Revenue and Ministry of Infrastructure to assess Hybrid Vehicle import according to technical standard.

6.1.2.3.6.5 Information and Public Awareness Measures

Raising consumer awareness through a public information campaign to promote hybrid vehicle, and increasing developer awareness by establishing construction requirements for Hybrid vehicle operations and maintenance. Enhancing the collection and management of energy data to support the development of comprehensive energy information, particularly for the transport sector. Public Talk and Involvement on hybrid vehicle maintenance services and operations. Institutionalization of data collection and analysis

6.1.2.4 Actions Selected To Be Included in the TAP

1. Assess the feasibility of Hybrid projects and tariff as source of funding. Currently, the market for hybrid vehicle are heavily relying on private projects without government guarantee on technologies. Hybrid vehicle users require confirmation of the business's viability before committing their resources. The studies should encompass all pertinent external factors, such as the difficulties in attracting investors, the suitable economic framework for investment cost, and effective strategies to manage inflation in electricity tariffs.

2. Raise awareness among both developers and users of hybrid vehicle: It is crucial for both users and innovators to understand not only the potential of this technology but also the advantages it offers. This can be achieved by demonstrating the economic viability of the technology and justifying the adoption of Hybrid vehicle. Additionally, the government must enhance essential data collection efforts and address the current lack of expertise in this area.

3. Improve access to financing for Hybrid vehicle investments: The cost of appliances pose a significant obstacle for investors seeking to enter into long-term financing agreements with financiers. Encourage measures to lower borrowing expenses and loans in commercial banks. The Department of Energy ought to collaborate with the Ministry of Finance and the Ministry of Revenue to pinpoint legislative interventions that could facilitate the imports and adoption of hybrid vehicle.

Table 43: Activities to be implemented to enhance diffusion of Hybrid Vehicle.

Technology Action Plan	Activities	Responsible Stakeholder
1. Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up Long Term Government Institutional set up and Policy set Up 1.1.1 Development of Ministry of Energy.and Project Team together with other stakeholders 1.1.2. Encourage or establish hybrid vehicle purchase and maintenance companies. 1.1.3. Promote the establishment of hybrid vehicle import companies.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business .

2. Assess the economic feasibility of investment on hybrid vehicle.	2.1 Conduct the economic, financial and fiscal feasibility of the source of funding and economics of hybrid vehicle purchase and operation in Tonga 2.1.1 Opportunities for access financing opportunities 2.1.2 Feasibility of government de-risking guarantee. 2.1.3 Identify any regulatory and legislative obstacles 2.1.4 Donors supported risk reduction methodology and financial options.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	2.2 Carry out market survey to ensure business viability of government guarantees available for the hybrid technology 2.2.1 Feasible public policy reform options to reduce cost of adoption of hybrid vehicle in Tonga 2.2.2 Commercial model for full cost recovery hybrid vehicle investment	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	2.3 Conduct the economic feasibility of the adoption of hybrid vehicle in the country and impacts of high upfront cost and inflation in the adoption process 2.3.1 Identify the appropriate hybrid vehicle Financing Risk Management Policy and Incentives 2.3.2 Identify the most appropriate source of financing for private sector companies from local commercial banks . 2.3.3 Subsidy policy for hybrid vehicle investment 2.3.4 Hybrid vehicle policy and regulatory improvements 2.3.5 Hybrid policy legislative improvements 2.3.6 Develop coordinated policies, regulation and legislation for	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	hybrid vehicles	
3. Create Awareness of both Developer, and users of the technology	3.1 Develop awareness material for hybrid vehicle targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.1.1 Setting targets and mandates and national policy for hybrid vehicles 3.1.2 Coordinate donors financial opportunities for hybrid vehicles for private sectors 3.1.3 Donors financing options for hybrid vehicles programs and capacity building programs for designing, installing and maintaining of hybrid vehicles 3.1.4 public policy improvements for hybrid vehicles purchase, operation, and maintenance to support national energy targets on hybrid vehicle emission reductions 3.1.5 Improve capacity through training on designing, purchasing and maintenance of hybrid vehciles 3.1.6 Training on capacity to evaluate and interpret hybrid vehicles performance and maintenance data in order to formulate effective improvement policies for adoption of hybrid vehicles. 3.1.7 Encourage training program approaches for hybrid vehicles business opportunities and business service delivery.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	3.2 Develop a communication strategy Profile for target stakeholders particularly the adopters of the hybrid vehicles 3.2.1 Short Term Training materials on on-site experiences as shared regional sources of	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local

	information and data analysis. 3.2.2 Training on innovative approaches for designing, procuring, and maintenance of hybrid vehicles. 3.2.3 Encourage private sectors hybrid vehicles services and business opportunities. 3.2.4 Institutionalization of hybrid vehicles projects data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 3.2.5 Formulation of hybrid vehicles database and analysis of hybrid vehicles to guide evidences based decision making on service delivery development and business opportunities	Energy Consultants Local EVs Business ts
	3.3 Implement awareness campaign on hybrid vehicle performances especially attract attentions of investors and users 3.3.1 Enabling legislation and regulatory environment 3.3.2 Improvement on accessibility and permitting process for hybrid vehicle infrastructures	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
4. Enhance Access to Financing	4.1 Develop Government financial policy incentives to assist lowering the cost of hybrid vehicles technology 4.1.1 Identify and improve commercial banks financing policy and accessibility to hybrid vehicles loaning scheme	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.2 Engage in dialogue with government development partners to identify possible government incentives and subsidies for the hybrid vehicles 4.2.1 Ensure accessibility and availability of technical	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local

	standard and certification for import of hybrid vehicles to Tonga	Energy Consultants Local EVs Business
	4.3 Discuss and Justify the adoption of the most suitable adoption model for hybrid vehicles investors and home owners in Tonga 4.3.1 Availability of most feasible financing options for hybrid vehicles 4.3.2 Improvements of the national electricity grid for hybrid vehicles	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1. Design, procure install the Hybrid vehicle promotion and investment initiative in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	5.2. Design, Approve and Set up the Monitoring and Maintenance Model for the technology	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
Action 6 : Assess and Identify all the necessary improvement options	6.1. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF,

		SPC,NGOs and Local Energy Consultants Local EVs Business
	6.3. Prepare all Policy decisions for government approval	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	6.4. Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

6.1.2.5 Action To Be Implemented as Project Ideas

The aforementioned three actions, specifically the feasibility study, awareness raising, and improved access to financing, will be evaluated for implementation as potential project ideas.

6.1.2.6 Stakeholders and Implementation Timelines for the TAP

Table 44 shows the list of stakeholders to implement the TAP

Table 44 : List of Activities and Respective Stakeholders to Implement the TAP

Number	Activities	Responsible Body	Timelines
1. Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up Long Term Government Institutional set up and Policy set Up 1.1.1 Development of Ministry of Energy and Project Team together with other stakeholders 1.1.2. Encourage or establish hybrid vehicle purchase and maintenance companies. 1.1.1. Promote the establishment of hybrid vehicle import companies.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business .	1-5 Months

2. Assess the economic feasibility of investment on hybrid vehicle.	2.1 Conduct the economic, financial and fiscal feasibility of the source of funding and economics of hybrid vehicle purchase and operation in Tonga 2.1.1. Opportunities for access financing opportunities 2.1.2. Feasibility of government de-risking guarantee. 2.1.3. Identify any regulatory and legislative obstacles 2.1.4. Donors supported risk reduction methodology and financial options.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1-6 Months
	2.2. Carry out market survey to ensure business viability of government guarantees available for the hybrid technology 2.2.1. Feasible public policy reform options to reduce cost of adoption of hybrid vehicle in Tonga 2.2.2. Commercial model for full cost recovery hybrid vehicle investment	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	2 Months
3. Create Awareness of both Developer, and users of the technology	3.1. Conduct the economic feasibility of the adoption of hybrid vehicle in the country and impacts of high upfront cost and inflation in the adoption process 3.1.1. Identify the appropriate hybrid vehicle Financing Risk Management Policy and Incentives 3.1.2. Identify the most appropriate source of financing for private sector companies from	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	6 Months

	local commercial banks . 3.1.3. Subsidy policy for hybrid vehicle investment 3.1.4. Hybrid vehicle policy and regulatory improvements 3.1.5. Hybrid policy legislative improvements 3.1.6. Develop coordinated policies, regulation and legislation for hybrid vehicles		
	3.2. Develop awareness material for hybrid vehicle targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.2.1. Setting targets and mandates and national policy for hybrid vehicles 3.2.2. Coordinate donors financial opportunities for hybrid vehicles for private sectors 3.2.3. Donors financing options for hybrid vehicles programs and capacity building programs for designing, installing and maintaining of hybrid vehicles 3.2.4. public policy improvements for hybrid vehicles purchase, operation, and maintenance to support national energy targets on hybrid vehicle emission reductions	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	2 Months

	3.2.5. Improve capacity through training on designing, purchasing and maintenance of hybrid vehciles 3.2.6. Training on capacity to evaluate and interpret hybrid vehicles performance and maintenance data in order to formulate effective improvement policies for adoption of hybrid vehicles. 3.2.7. Encourage training program approaches for hybrid vehicles business opportunities and business service delivery.		
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the hybrid vehicles 3.3.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 3.3.2. Training on innovative approaches for designing, procuring, and maintenance of hybrid vehicles. 3.3.3. Encourage private sectors hybrid vehicles services and business opportunities. 3.3.4. Institutionalization of hybrid vehicles projects data collection and analysis and publication of data analysis and indicators for evidenced	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business ts	2 Months

	policy decision makings. 3.3.5. Formulation of hybrid vehicles database and analysis of hybrid vehicles to guide evidences based decision making on service delivery development and business opportunities		
4. Enhance Access to Financing	4.1. Implement awareness campaign on hybrid vehicle performances especially attract attentions of investors and users 4.1.1. Enabling legislation and regulatory environment 4.1.2. Improvement on accessibility and permitting process for hybrid vehicle infrastructures	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	8. Months
	4.2. Develop Government financial policy incentives to assist lowering the cost of hybrid vehicles technology 4.2.1. Identify and improve commercial banks financing policy and accessibility to hybrid vehicles loaning scheme	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	3 Months
	4.3. Engage in dialogue with government development partners to identify possible government incentives and subsidies for the hybrid vehicles 4.3.1. Ensure accessibility and availability of technical	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF,	12 Months

		standard and certification for import of hybrid vehicles to Tonga	SPC,NGOs and Local Energy Consultants Local EVs Business	
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1.	Design, procure install the Hybrid vehicle promotion and investment initiative in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	12 Months
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	12 Months
Action 6 : Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	12 Months

	6.2. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1-2 Months
	6.3. Prepare all Policy decisions for government approval	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	3 Months
	6.4. Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1-5 Months

6.1.2.7 : Roles of Stakeholders

The roles of stakeholders are shown in Table 45 below

Table 45: Roles of Hybrid Vehicles Stakeholders

1	Ministry of Energy	Plan and manage energy policies, energy targets, and assess energy goals and objectives
		Oversee energy projects including hybrid vehicles projects
		Identify and source funding to implement hybrid vehicles
		Formulate and present energy plan, strategies and programmes to government and seek Cabinet's approval
		Promote public awareness and informed decisions on hybrid vehicles technologies.
2	Department of Climate Change , MEIDECC	Focal Point of the United Nations Convention on Climate Change
		Sourcing funds from climate funds and Global Environmental Facility
		GCF focal point in Tonga
3	Department of Environment , MEIDECC	Responsible for environmental policies and environmental management
4	Ministry of Finance and Planning	Responsible for financial policies and policy incentives for businesses.
5	Ministry of Economic and Trade	Responsible for Business incentive policies
6	Ministry of Foreign Affairs	Responsible for foreign relations with donors and development partners.
7	Tonga Power Limited, TPL	Manage and Plan the national electricity grids and monitor all projects that has capacity to influence the electricity generation and distribution and transmissions.
8	Tonga Electricity Commission	Responsible for regulatory policies and regulation of the national electricity grid.
9	University of Tonga and University of the South Pacific and National consultants	Research and Development.
10	Regional Energy Institutions	Responsible for regional energy coordination and general assessment and analysis of hybrid vehicles projects.
11	Development Partners and Donors	Financing of hybrid vehicles projects
12	Local NGOs and Consultants	Technical assessment and specific technical analysis of hybrid vehicles
13	Contractor and dealers for hybrid vehicles	Technical installation of the hybrid vehicles

6.1.2.8 : Scheduling of Activities

Table 46 describes the sequence and timing of specific activities and responsibilities

Table 46: Scheduling of Activities

Action	Activities	Planning		Implementation		Responsible Stakeholder
		Start	End	Start	End	
1. Establish appropriate institutional set up for the TAP Assess the economic feasibility of investment on hybrid vehicle.	1.1 Long Term Institutional Set Up Long Term Government Institutional set up and Policy set Up 1.1.1 Development of Ministry of Energy.and Project Team together with other stakeholders 1.1.2 Encourage or establish hybrid vehicle purchase and maintenance companies. 1.1.3 Promote the establishment of hybrid vehicle import companies.	2025	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	5.1. Conduct the economic, financial and fiscal feasibility of the source of funding and economics of hybrid vehicle purchase and operation in Tonga 1.2.1 Opportunities for access	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants

	financing opportunities 1.2.2 Feasibility of government de-risking guarantee. 1.2.3 Identify any regulatory and legislative obstacles 1.2.4 Donors supported risk reduction methodology and financial options.				TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	
6. Assess the economic feasibility of investment on EE Home appliances	2.1 Carry out market survey to ensure business viability of government guarantees available for the hybrid technology 2.1.1. Feasible public policy reform options to reduce cost of adoption of hybrid vehicle in Tonga 2.1.2. Commercial model for full cost recovery hybrid vehicle investment	2025	2025	2025	2025	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants
	2.2 Conduct the economic feasibility of the adoption of hybrid vehicle in the country and impacts of high upfront cost and inflation in the	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL.

		adoption process 2.2.1 Identify the appropriate hybrid vehicle Financing Risk Management Policy and Incentives 2.2.2 Identify the most appropriate source of financing for private sector companies from local commercial banks . 2.2.3 Subsidy policy for hybrid vehicle investment 2.2.4 Hybrid vehicle policy and regulatory improvements 2.2.5 Hybrid policy legislative improvement 2.2.6 Develop coordinated policies, regulation and legislation for hybrid vehicles					University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
3.	Create Awareness of both Developer, and users of	3.1 Develop awareness material for hybrid vehicle targeting different stakeholders (i.e.	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police

the technology	Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.1.1 Setting targets and mandates and national policy for hybrid vehicles 3.1.2 Coordinate donors financial opportunities for hybrid vehicles for private sectors 3.1.3 Donors financing options for hybrid vehicles programs and capacity building programs for designing, installing and maintaining of hybrid vehicles 3.1.4 public policy improvements for hybrid vehicles purchase, operation, and maintenance to support national energy					and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

		targets on hybrid vehicle emission reductions 3.1.5 Improve capacity through training on designing, purchasing and maintenance of hybrid vehciles 3.1.6 Training on capacity to evaluate and interpret hybrid vehicles performance and maintenance data in order to formulate effective improvement policies for adoption of hybrid vehicles. 3.1.7 Encourage training program approaches for hybrid vehicles business opportunities and business service delivery.					
4.	Enhance Access to Financi	4.1 Develop a communication strategy Profile for target stakeholders	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructur

ng	particularly the adopters of the hybrid vehicles 4.1.1 Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 4.1.2 Training on innovative approaches for designing, procuring, and maintenance of hybrid vehicles. 4.1.3 Encourage private sectors hybrid vehicles services and business opportunities. 4.1.4 Institutionalization of hybrid vehicles projects data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 4.1.5 Formulation					e, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	of hybrid vehicles database and analysis of hybrid vehicles to guide evidences based decision making on service delivery development and business opportunities					
	4.2 Implement awareness campaign on hybrid vehicle performances especially attract attentions of investors and users 4.2.1 Enabling legislation and regulatory environment 4.2.3. Improvement on accessibility and permitting process for hybrid vehicle infrastructures	2025	2026	2025	2026	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.3 Develop Government financial policy incentives to assist lowering the cost of hybrid vehicles technology	2027	2027	2027	2027	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic

	4.3.1 Identify and improve commercial banks financing policy and accessibility to hybrid vehicles loaning scheme					TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	4.4 Design, procure install the Hybrid vehicle promotion and investment initiative in the country	2027	2027	2027	2027	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.5 Design, Approve and Set up the Monitoring and Maintenance Model for the technology					
Action 6 : Assess and Identify all the necessary improvement options	4.6 Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country	2027	2027	2027	2027	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF,

						SPC,NGOs and Local Energy Consultants Local EVs Business
	4.7 Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.					
	4.8 Prepare all Policy decisions for government approval					
	4.9 Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.					

Stakeholders Timelines and Costs for Hybrid Vehicles.

Table 47 : Scheduling and Sequencing of specific Activities for Hybrid Vehicles

Actions	Activities	Year (2025-2027)		
1. Long Term Institutional Set Up	1.1. Confirm positions for recruitment and advertisement of Positions	▲		
	1.2. Confirm office space for the project team in the Department of Energy	▲		
	1.3. Allocate Budget for Salaries and Recruitment	▲		
	1.4. Meet Cost for office furniture/ equipment	▲		
	1.5. Meet Other Cost for operation and management of the office.	▲		
2. Assess the feasibility of Hybrid Vehicles	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	▲		

(HVS)				
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of Hybrid	▲		
	2.3. Identify key barriers to the economic and financial feasibility of the selected Hybrid Vehicles	▲		
	2.4. Identify the solutions to the economic and financial feasibility of the selected Hybrid Vehicles	▲		
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.	▲		
	2.6. Identify and present the key factors for business viability of the Hybrid Vehicles	▲		
	2.7. Identify policy improvements needed	▲		
	2.8. Conduct the economic feasibility of the adoption of Hybrid Vehicles	▲		
	2.9. Identify barriers and solutions to the economic feasibility Hybrid Vehicles	▲		
	2.10. Identify policy improvements 2.10.1. Hybrid Vehicles Policy 2.10.2. HVs Legislation 2.10.3. HVs Regulation	▲		
	2.11. Technical Feasibility	▲		
3. Create Awareness of both Developer, and users of the Battery Charged EVs technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for HVs developers 3.1.2. Awareness materials for HVs dealers 3.1.3. Awareness materials for HVs Users	▲		
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of HVs Technology, financial institutions of technology) 3.2.1. Develop materials for HVs developers		▲	
	3.12. Develop a communication strategy Profile for target stakeholders		▲	

	particularly the adopters of the technology. 3.12.1. Develop materials for HVs developers 3.12.2. Develop materials for HVs dealers 3.12.3. Develop materials for HVs users			
	3.13. Implement awareness campaign on HVs, especially attract attentions of investors and users 3.13.1. Implement awareness campaign for HVs developers 3.13.2. Implement Awareness Campaign for HVs appliances Dealers 3.13.3. Implement Awareness Campaign for HVs users		▲	
	3.14. Gender Mainstreaming and Social Inclusion	▲		
4. Enhance Access to Financing	4.1. Develop Financial Policy Incentives to assist lowering the cost of HVs technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of HVs 4.1.2. Identify possible legislative incentives to assist lowering the cost of HVs appliances 4.1.3. Identify possible regulatory incentives to assist lowering the cost of HVs appliances		▲	
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported HVs components		▲	
	4.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for HVs investors and		▲	

		private sectors in Tonga			
	4.4.	identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on HVs		▲	
	4.5.	Provide clear justifications for adoption of the HVs			
	4.6.	Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of HVs in Tonga		▲	
	4.7.	Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of HVs in the country		▲	
	4.8.	Prepare Cabinet Approval for most sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the energy sector.		▲	
5. Design, Procure, Install the monitoring and maintenance plan model for HVs in the country	5.1.	Design, procure install the HVs appliances promotion and investment initiative in the country		▲	
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology			▲
6. Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of HVs investment in the country			▲
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.			▲
	6.3.	Prepare all Policy decisions for			▲

	government approval			

Table 48 : Actions, Activities, Capacity Building and Costs for HVs

Actions	Activities	Capacity Needs	Cost USD
1. Institutional Set Up	1.1. Confirm positions for recruitment and Conduct advertisement	Consultation & Meeting Cost Advertisement Cost	18,000
	1.2. Confirm office space for the project team in the Department of Energy	Rent and Accommodation	200,000
	1.3. Allocate Budget for Salaries and Recruitment	Salaries	800,000
	1.4. Meet Cost for office furniture/ equipment	Office Furniture and Equipment	200,000
	1.5. Meet Other Cost for operation and management of the office.	Electricity and Telecommunication, Equipment and Maintenance fee, Administrative costs	300,000
2. Assess the feasibility of HVs	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	Meeting Cost and Consultant Fees	500,000
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of HVs in Tonga.	Local Travel, Transportation Cost and Research Cost	150,000
	2.3. Identify/Confirm key barriers to the economic and financial feasibility of HVs	Workshop and Consultation Cost	50,000
	2.4. Identify the solutions to the economic and financial feasibility of the HVs	Workshop and Consultation Cost	
	2.5. Carry out Market Survey to ensure business viability of	Develop Survey Questionnaire, Survey workshops,	300,000

	the technology to investors.	Implementation of Survey	
	2.6. Identify and present the key factors for business viability of the HVs	Finalization and presentation of Survey Report	30,000
	2.7. Identify operation policy improvements needed	Consultation, Meetings and Cabinet Submissions	20,000
	2.8. Conduct the economic feasibility of the Hybrid Vehicles	Consultation and Meeting Cost and Consultants Fee	500,000
	2.9. Identify barriers and solutions to the economic feasibility of the integrated HVs	Workshop Cost	20,000
	2.10. Identify policy improvements 2.10.1. HVs Policy 2.10.2. HVs Legislation 2.10.3. HVs Regulation	Policy, Regulatory and Legal Review of existing policy and legal framework and documents	400,000
	2.11. Technical Feasibility		20,000
3. Create Awareness of both Developer, and users of the HVs technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for HVs developers 3.1.2. Awareness materials for HVs dealers 3.1.3. Awareness materials for HVs Users	Consultation and Identification of public awareness materials.	30,000
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of HVs Technology, financial institutions of technology) 3.2.1. Develop materials	Consultancy Fees for development of public awareness materials	200,000

	for HVs developers		
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for HVs developers 3.3.2. Develop materials for HVs dealers 3.3.3. Develop materials for HVs users	Consultancy Fees for development of communication profile	40,000
	3.4. Implement awareness campaign on HVs projects, especially attract attentions of investors and users 3.4.1. Implement awareness campaign HVs developers 3.4.2. Implement Awareness Campaign for HVs Dealers 3.4.3. Implement Awareness Campaign for HVs users	Record of Radio and Television Programs, Publication of awareness materials Meetings with stakeholders Other public awareness programs Disseminate and Distribution, Translation	100,000
4. Enhance Access to Financing	4.1. Identify/Develop Financial Policy Incentives to assist lowering the cost of HVs technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of HVs 4.1.2. Identify possible legislative incentives to assist lowering the cost of HVs 4.1.3. Identify possible regulatory incentives	Policy Dialogue Meetings and consultation with key stakeholders Policy Incentives to reduce cost of imports of technology Policy incentives for power purchase agreement (PPA)	50,000

	to assist lowering the cost of HVs		
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported HVs components	Development partners meetings and workshops on identifying policy incentives and subsidies for import of technology and equipment.	40,000
	4.3. Discuss and Justify the adoption of the most suitable model for HVs investors and private sectors in Tonga	Stakeholders Consultation on PPA Policy and Regulation.	20,000
	4.3.1. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment HVs 4.3.2. Provide clear justifications for adoption of the HVs	Workshops/Consultation with key stakeholders and development partners	40,000
	4.4. Engage in dialogue with development partners on suitable adoption of subsidies for the	Consultations and Workshops and Meetings	40,000

		technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of technology in Tonga		
	4.5.	Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle HVs in the country		
	4.6.	Prepare Cabinet Approval for most sustainable financing options of the technology in the country and its plan to achieve share of carbon emission reduction in the energy sector.		
5. Design, Procure, Install the HVs pilot project	5.1.	Design, procure install the EVs promotion and investment initiative in the country	Consultants Fee Operation and Reporting	10,000,000
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology		
6. Maintenance Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing HVs	Consultation Fees Assessment , Consultation and Reporting	1,000,000
	6.2.	Conduct		

		consultation and meetings on findings of the policy and regulatory assessment and analysis.		
	6.3.	Prepare all Policy decisions for government approval		
	6.4.	Design, Procure and install all necessary HVs projects.		
Total Estimated Budget				14,968,000

6.1.2.9 : Estimation of Resources for Action and Activities

To achieve successful and sustained technology diffusion, it is essential to enhance the capabilities of local technology importers and bidders and installers, especially local suppliers, overseas and local contractors and bidders of the technology, installers, and maintenance engineers. Furthermore, to facilitate accelerated diffusion, it is necessary to implement a train-the-trainers approach, enabling the replication of training programs across numerous regions.

The activities to be undertaken and their associated costs are presented in Table 49.

Table 49: Financial considerations associated with the execution of the identified activities.

Action	Activities	Plan	Implementation	Estimated Cost (USD)	Source of Fund	Responsible Stakeholder	Justified Actions
		Start/End	Start/End				
1.Establish appropriate institutional set up for the TAP	1.1 Long Term Institutional Set Up Long Term Government Institutional set up and Policy set Up 1.1.1 Development of Ministry of Energy.and Project Team together with other stakeholders	2025/2025	2025/2025	1,518,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruited personnel and office furniture and office equipment

	1.1.2. Encourage or establish hybrid vehicle purchase and maintenance companies. Promote the establishment of hybrid vehicle import companies.						
2.Assess the economic feasibility of investment on hybrid vehicle.	2.1. Conduct the economic, financial and fiscal feasibility of the source of funding and economics of hybrid vehicle purchase and operation in Tonga 2.2. Opportunities for access financing opportunities 2.3. Feasibility of government de-	2025/ 2025	2025/ 2025	1,990,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1,990,000

	risking guarantee. 2.4. Identify any regulatory and legislative obstacles 2.5. Donors supported risk reduction methodology and financial options.						
3. Create Awareness of both Developer, and users of the technology	3.1. Carry out market survey to ensure business viability of government guarantees available for the hybrid technology 3.2. Feasible public policy reform options to reduce	2025/2025	2025/2025	270,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business s	Recruitment of researchers and professional assessors

	cost of adoption of hybrid vehicle in Tonga 3.2.1. Commercial model for full cost recovery hybrid vehicle investment						
	3.3. Conduct the economic feasibility of the adoption of hybrid vehicle in the country and impacts of high upfront cost and inflation in the adoption process 3.4. Identify the appropriate hybrid vehicle Financi	2025/2025	2025/2025		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruitment of Assessors

	ng Risk Management Policy and Incentives 3.4.1. Identify the most appropriate source of financing for private sector companies from local commercial banks . 3.4.2. Subsidy policy for hybrid vehicle investment 3.4.3. Hybrid vehicle policy and regulatory improvements 3.4.4. Hybrid policy legislative improvements 3.4.5. Develop coordin						

	ated policies, regulation and legislation for hybrid vehicles						
	3.5. Develop awareness material for hybrid vehicle targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.5.1. Setting targets and mandates and national policy for hybrid vehicles 3.5.2. Coordinate	2025/2025	2025/2025		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruitment of assessors and office equipment

	donors financial opportunities for hybrid vehicles for private sectors 3.5.3. Donors financing options for hybrid vehicles programs and capacity building programs for designing, installing and maintaining of hybrid vehicles 3.5.4. public policy improvements for hybrid vehicles purchase, operation, and maintenance to support national energy						

	targets on hybrid vehicle emission reductions 3.5.5. Improve capacity through training on designing, purchasing and maintenance of hybrid vehciles 3.5.6. Training on capacity to evaluate and interpret hybrid vehicles performance and maintenance data in order to formulate effective improvement policies for adoption of hybrid						

		vehicles 3.5.7. Encourage training program approaches for hybrid vehicles business opportunities and business service delivery.						
4.	Create Awareness of both Developer, and users of the technology	4.1. Develop a communication strategy Profile for target stakeholders particularly the adopters of the hybrid vehicles 4.1.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 4.1.2. Training on innovative approaches for designing, procuring, and maintenance of hybrid vehicles. 4.1.3.Encourage private	2025/2026	2025/226	190,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1

	sectors hybrid vehicles services and business opportunities. 4.2. Institutionalization of hybrid vehicles projects data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 4.2.1. Formulation of hybrid vehicles database and analysis of hybrid vehicles to guide evidences based decision making on service delivery development and business opportunities						
	4.3. Implement	2025/2025	2026/2026		Donors	DoE(MEIDECC), DoCC (MEIDECC)	Contact address and internet communica

	awareness campaign on hybrid vehicle performances especially attract attentions of investors and users 4.3.1. Enabling legislation and regulatory environment 4.3.2. Improvement on accessibility and permitting process for hybrid vehicle infrastructures					Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	tion links
	4.4. Develop Government financial policy incentives to assist lowering the cost of	2026/2026	2026/2027		Donors	DoE, TPL. University of Tonga, GCF, SPC and Local Business and Economic Consultants	1.Conduct of Trainings 2.Distribution of materials 3.Record and broadcast of Radio and TV programs

	hybrid vehicles technology 4.4.1. Identify and improve commercial banks financing policy and accessibility to hybrid vehicles loaning scheme						
	4.5. Engage in dialogue with government development partners to identify possible government incentives and subsidies for the hybrid vehicles 4.5.1. Ensure accessibility and availability of technical	2024/2025	2025/2025		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Meeting Consultations Policy Decisions

	standard and certification for import of hybrid vehicles to Tonga						
	4.6. Discuss and Justify the adoption of the most suitable adoption model for hybrid vehicles investors and home owners in Tonga 4.6.1. Availability of most feasible financing options for hybrid vehicles 4.6.2. Improvements of the national electricity grid for hybrid	2025/2026	2025/2026		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Consultation with stakeholders Formulation of Policies, Regulations and Legislation

		vehicles						
Action 5: Design, Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	5.1.	Design, procure install the Hybrid vehicle promotion and investment initiative in the country			10 mil			
	5.2.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology						
Action 6 : Assess and Identify all the necessary improvement options	6.1.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances			1 mil			

		investment in the country						
	6.2.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.						
	6.3.	Prepare all Policy decisions for government approval						
	6.4.	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.						
Total Estimated Budget								14,968,00

6.1.3 Grid Connected Electric Vehicles

The anticipated expenses for implementing this TAP are estimated to range from US$10 million to US$20 million. This TAP concludes with a project proposal focused on On-Grid Electric Vehicles, named the Tonga On-grid EVs (TONGREVs Project).

6.1.3.1 Introduction

Tonga Energy Road Map Plus (TERMPlus) established a goal to restrict the increase in oil consumption for road transportation to an average of 1.4% annually, with an overall aim to cap the growth at a 25% increase by the year 2035 (GOT, 2021b).

6.1.3.2 Objective of the TAP for Grid Connected Electric Vehicle

The TERMPlus report also set a target for the adoption of Low Emission Vehicles, aiming for a cumulative reduction of greenhouse gas emissions amounting to 165 GgCO2e by 2030.

6.1.3.3 Action and Activities selected for this TAP.

6.1.3.3.1 Summary of Barriers to Grid Connected Electric Vehicles

The Barrier Analysis phase revealed numerous obstacles that could hinder the adoption of the On-grid electric vehicles technologies. These obstacles were categorized into two primary groups: financial and fiscal barriers, which pertain to challenges such as policies to ensure that on-grid EV and charging facility are safe, accessible and affordable with minimal impacts on national electricity grid. Additionally, the acquisition cost, high upfront cost and absence of policy interventions are major cost-related barriers. The second group consists of non-financial barriers, which include issues stemming from uncertainties in public policies, lack of policy work and actions such as reduced import taxes, reliance on availability of appropriate charging infrastructure, availability of fast charging facility, insufficient institutional capacity and knowledge, absence of vehicles standard and regulation or regional e-mobility strategies, inadequate maintenance of infrastructure, new technology and limited expertise, insufficient review of motivators and barriers in the decision making processes, limited availability of on-grid models, undeveloped industry, limited adoption of on-grid EVs, insufficient knowledge on safety and performance of on-grid EVs, capacity to have evidenced based data collection and limited consultation with local stakeholders, and lack of coordination on data collection for policy development.

6.1.3.3.2 Financial and Fiscal Barriers

6.1.3.3.2.1 Insufficient Policies to ensure safe , accessible and affordable on-grid EVs

Policies that ensure that On-Grid EVs and charging are safe, accessible, affordable, and have positive impacts on the electricity grid.

6.1.3.3.2.2 High upfront cost, Acquisition cost and Absence of policy interventions

High upfront costs due to new infrastructures. Acquisition costs have been identified as major market restraints

6.1.3.3.2.3 Lack of Policy Work and Actions on Import Taxes

No policy interventions in place on on-grid EVs.

6.1.3.3.3 Non-Financial Barriers

6.1.3.3.3.1 Uncertainties in public policies on appropriate on-grid EVs charging infrastructure

The shortcomings in public policy, combined with limited capabilities within energy institutions, have resulted in regulatory and legislative are major market constraint. Additionally, there exists a lack of comprehensive policies and regulatory frameworks, along with certain essential types of legislation..

6.1.3.3.3.2 Institutional

Full reliance on availability of appropriate grid connected infrastructure for grid-connected EVs. Limited availability of infrastructures for public use. Insufficient institutional capacity and knowledge production.

6.1.3.3.3.3 Technical

Absence of vehicles regulation and standards, and the absence of endorsed regional or national e-mobility strategies. Inadequate maintenance of transportation infrastructure which contribute to high emissions. Additionally, this is new technology and we have limited expertise in service centres.

6.1.3.3.3.4 Market

The lack of a comprehensive review of motivators and barriers in decision-making processes. The limited availability of on-grid models and designs further hinders adoption. Furthermore, underdeveloped industry is also cited as significant market restraints.

6.1.3.3.3.5 Information and Public Awareness

The novelty of On-Grid electric vehicle (EV) technology and its limited adoption among certain demographics, and insufficient knowledge and familiarity concerning the safety and performance of on-grid electric vehicles. There ia also lack of capacity to establish an evidenced based data collection and analysis and also there is minimum consultation with local stakeholders on on-grid EVs. There is also lack of comprehensive coordination of data collection for policy developments.

6.1.3.3.4 Summary of Measures to Overcome the Barriers

The following subsequent actions were recognized to alleviate obstacles.

6.1.3.3.5 Financial and Fiscal Measures

6.1.3.3.5.1 Insufficient Policies to ensure safe, accessible and affordable on-grid EVs.

Design and formulate the financial policy framework for On-grid EVs. Design and offering incentives to reduce upfront costs is crucial, as there are price differences between electric vehicles. Policy incentives primarily come in the form of tax reductions or exemptions.

6.1.3.3.5.2 High upfront cost, Acquisition cost and Absence of policy interventions

Enhancing financial risk management to overcome fiscal and financial obstacles, with incentives primarily come in the form of tax reductions or exemptions. Countries apply various incentives such as import duties, customs taxes, excise taxes, and other tariffs related to international trade to make on-grid electric vehicles infrastructure imports more affordable and attractive. The exemption of vehicle registration or import fees is

suggested as a targeted policy for particular groups that would derive the most benefit from a reduction in vehicle prices. Offering incentives to reduce upfront costs is crucial, as the price difference between electric vehicles

6.1.3.3.5.3 Lack of Policy Work and Actions such as Import Taxes Policy

Revise tax regulations related to import duties and could possibly improve the government procurement policies for on-grid EVs.

6.1.3.3.6 Non-financial Measures

6.1.3.3.6.1 Uncertainties in public policies on appropriate on-grid EVs charging infrastructure

Develop coordinated policies. Setting targets and mandates for on-grid EV uptake, as well as developing a national policy on implemented on-grid EVs actions. Incentivize the adoption of economically viable EV types that offer societal and environmental benefits, such as providing tax breaks. There is need for implementation of an EV insurance policy

6.1.3.3.6.2 Institutional Measures

Advantage of on-grid charging facility and introduction of Electric Vehicles (EVs) in the municipal government fleet can help reduce institutional barriers and modelling of these simpler systems, especially in the early stages of vehicle-to-grid development as 24 hours services on-grid EV.

6.1.3.3.6.3 Technical Measures

Develop Standard for on-Grid Electric Vehicle. Ensuring sustainable maintenance of all vehicles maintenance course development for technicians, and Independent companies invest in solar generation and promote daytime EV charging through incentives like time-of-use tariffs and workplace charging infrastructure. Government of Tonga and Private Companies to formally adopt the right model of on-grid vehicle. Tonga could benefit from using the EV Charging and Grid Integration Tool developed by the IEA to assess the grid impacts of EVs and implement strategies to mitigate these impacts. Promotion and Encouraging the adoption of on-grid Electric Vehicles

6.1.3.3.6.4 Market Measures

Government review of market barriers and existing decision making processes for on-grid vehicle. Government Ministries and Private Sector Companies to jointly discuss the issues and come up with solutions. Multi-stakeholders decision making processes on the issue

6.1.3.3.6.5 Information and Public Awareness Measures

Promoting awareness and adoption of EVs and associated measures, while monitoring international advancements and staying updated on relevant global technologies. Raising consumer awareness through a public information campaign to promote electro-mobility, and increasing developer awareness by establishing construction requirements for EV charging stations.Enhancing the collection and management of energy data to support the development of comprehensive energy information, particularly for the transport sector. Institutionalization of data collection and analysis of data and enhancing transport data collection and management. Public Awareness Programs on on-grid EVs and

involvement of key stakeholders in data collection and analysis as well as production of evidenced based decision making.

6.1.3.4 Actions Selected To Be Included in the TAP

1. Assess the feasibility of on-grid EVs as source of funding. Currently, the market for on-grid EVs are heavily relying on private projects without government guarantee on technologies. On-grid EV users require confirmation of the business's viability before committing their resources. The studies should encompass all pertinent external factors, such as the difficulties in attracting investors, the suitable economic framework for full cost recovery electricity tariff, the integration of maximum demand for on-grid wind into the national electricity grid, and effective strategies to manage inflation in electricity tariffs.

2. Raise awareness among both developers and users of on-grid EVs. It is crucial for both users and innovators to understand not only the potential of this technology but also the advantages it offers. This can be achieved by demonstrating the economic viability of the technology and justifying the adoption of on-grid EVs. Additionally, the government must enhance essential data collection efforts and address the current lack of expertise in this area.

3. Improve access to financing for on-grid EVs investments: The cost of on-grid EVs pose a significant obstacle for investors seeking to enter into long-term financing agreements with financiers. Encourage measures to lower borrowing expenses and loans in commercial banks. The Department of Energy ought to collaborate with the Ministry of Finance and the Ministry of Revenue to pinpoint legislative interventions that could facilitate the imports and adoption of on-grid EVs technologies.

Table 50: Activities to be implemented to enhance diffusion of on-grid EVs.

Technology Action Plan	Activities	Responsible Stakeholder
1.Establish appropriate institutional set up for the TAP	1.1. Long Term Institutional Set Up 1.1.1. Long Term Government Institutional set up and financial Policy incentives to address high cost of on-grid EVs, through tax incentives. 1.1.2. Establish the financial risk management policy to address financial and fiscal issues. 1.2. Development of Ministry of Energy to assess and address Lack of Policy Work and Actions 1.2.1. Encourage on-grid EVs design, operation and maintenance services. 1.2.2. Promote the establishment of EVs infrastructure and dealers and EVs services.	DoE (MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business.

2. Assess the economic feasibility of investment on on-grid EVs	2.1. Conduct the economic, financial and fiscal feasibility of the purchase and operation of On-grid EVs in Tonga. 2.1.1. Assess possible financing opportunities for EVs in Tonga, considering lack of policy work and actions, and high upfront cost and acquisition cost. 2.1.2. Assess the suitability of government de-risking guarantee for the technology. 2.1.3. Identify all the insufficient policy, legislative and regulatory obstacles such as import tax policies, tax policy incentives, exemption of vehicle registration and so on. 2.1.4. Identify all possible donors supported risk reduction methodology and financial options.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	2.2. Carry out market survey to ensure business viability of government taxes regulation and import duties to improve procurement policy for on-grid EVs 2.2.1. Identify the uncertainties of public policies and policy options to reduce cost of on-grid EVs in Tonga 2.2.2. Commercial model for full cost recovery of the on-grid EVs	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	2.3. Conduct the economic feasibility of the adoption of on-grid EVs in the country and impacts of high upfront cost and inflation in the adoption process 2.3.1. Identify the appropriate on-grid EVs policy incentives, and institutional improvements. 2.3.2. Identify the most appropriate source of financing for on-grid EVs investment needs. 2.3.3. On-grid EVs coordinated policy improvements for government vehicle fleet 2.3.4. On-grid EVs regulatory improvements for electricity grid	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	operations and assessment of the grid 2.3.5. On-grid EVs legislative improvements for EV charging and grid integration tools	
3. Create Awareness of both Developer, and users of the technology	3.1. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs, local institutions of technology). 3.1.1. Donors financial opportunities for EVs development for joint government/private sector model. 3.1.2. Donors financing options for EVs designing, installing and operation maintenance standards of the technology 3.1.3. public policy improvements for EVs purchase to support national energy targets on EVs 3.1.4. Improve capacity through training on designing, installing and maintenance of EVs 3.1.5. Training on capacity to evaluate and interpret EVs data in order to formulate effective EVs effective and improvement policies. 3.1.6. Encourage training program approaches for EVs business opportunities and business service delivery.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	3.2. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 3.2.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 3.2.2. Training on innovative approaches for designing, procuring, installation and maintenance of EVs. 3.2.3. Encourage private sectors EVs services and auditing business opportunities. 3.2.4. Institutionalization of EVs data	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

	collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 3.2.5. Formulation of EVs database and analysis of EVs data to guide EVs service delivery development and business opportunities	
	3.3. Implement awareness campaign on EVs projects , especially attract attentions of investors and users 3.3.1. Enabling legislation and regulatory environment 3.3.2. Improvement on accessibility and permitting process on-grid EVs infrastructure.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
4. Enhance Access to Financing	4.1. Develop Government financial policy incentives to assist lowering the cost of EVs technology 4.1.1. Identify and improve commercial banks financing policy and accessibility to EVs loaning scheme projects	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.2. Engage in dialogue with government development partners to identify possible government incentives and subsidies for the EVs technologies as it contributes to global benefit 4.2.1. Ensure accessibility and availability of technical standard and minimum labelling certification for import of EVs to Tonga	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.3. Discuss and Justify the adoption of the EVs for investors and users in Tonga 4.3.1. Availability of most feasible financing options for EVs projects 4.3.2. Improvements of the national electricity grid for EVs projects	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants

		Local EVs Business

6.1.3.5 Action To Be Implemented as Project Ideas

The aforementioned three actions, specifically the feasibility study, awareness raising, and improved access to financing, will be evaluated for implementation as potential project ideas.

6.1.3.6 Stakeholders and Implementation Timelines for the TAP

Table 51 shows the list of stakeholders to implement the TAP

Table 51: List of Activities and Respective Stakeholders to Implement the TAP

Number	Activities	Responsible Body	Timelines
1. Establish appropriate institutional set up for the TAP	1.1. Long Term Institutional Set Up 1.1.1. Long Term Government Institutional set up and financial Policy incentives to address high cost of on-grid EVs, through tax incentives. 1.1.2. Establish the financial risk management policy to address financial and fiscal issues. 1.2. Development of Ministry of Energy to assess and address Lack of Policy Work and Actions 1.2.1. Encourage on-grid EVs design, operation and maintenance services. 1.2.2. Promote the establishment of EVs infrastructure and dealers and EVs services.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	3-2 Months
2. Assess the economic feasibility of investment on on-grid EVs	2.1. Conduct the economic, financial and fiscal feasibility of the purchase and operation of On-grid EVs in Tonga. 2.1.1. Assess possible financing opportunities for EVs in Tonga, considering lack of policy work	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local	3-3Months

	and actions, and high upfront cost and acquisition cost. 2.1.2. Assess the suitability of government de-risking guarantee for the technology. 2.1.3. Identify all the insufficient policy, legislative and regulatory obstacles such as import tax policies, tax policy incentives, exemption of vehicle registration and so on. 2.1.4. Identify all possible donors supported risk reduction methodology and financial options.	EVs Business	
	2.2. Carry out market survey to ensure business viability of government taxes regulation and import duties to improve procurement policy for on-grid EVs 2.2.1. Identify the uncertainties of public policies and policy options to reduce cost of on-grid EVs in Tonga 2.2.2. Commercial model for full cost recovery of the on-grid EVs	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	4 Months
3. Create Awareness of both Developer, and users of the technology	3.1. Conduct the economic feasibility of the adoption of on-grid EVs in the country and impacts of high upfront cost and inflation in the adoption process 3.1.1. Identify the	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy	6 Months

	appropriate on-grid EVs policy incentives, and institutional improvements. 3.1.2. Identify the most appropriate source of financing for on-grid EVs investment needs. 3.1.3. On-grid EVs coordinated policy improvements for government vehicle fleet 3.1.4. On-grid EVs regulatory improvements for electricity grid operations and assessment of the grid 3.1.5. On-grid EVs legislative improvements for EV charging and grid integration tools	Consultants Local EVs Business	
4. Create Awareness of both Developer, and users of the technology	4.1. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs, local institutions of technology). 4.1.1. Donors financial opportunities for EVs development for joint government/private sector model. 4.1.2. Donors financing options for EVs designing, installing and operation maintenance standards of the technology 4.1.3. public policy	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	2 Months

	improvements for EVs purchase to support national energy targets on EVs 4.1.4. Improve capacity through training on designing, installing and maintenance of EVs 4.1.5. Training on capacity to evaluate and interpret EVs data in order to formulate effective EVs effective and improvement policies. 4.1.6. Encourage training program approaches for EVs business opportunities and business service delivery.		
	4.2. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 4.2.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 4.2.2. Training on innovative approaches for designing, procuring, installation and maintenance of EVs. 4.2.3. Encourage private sectors EVs services and auditing business opportunities.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	2 Months

	4.2.4. Institutionalization of EVs data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 4.2.5. Formulation of EVs database and analysis of EVs data to guide EVs service delivery development and business opportunities		
5. Enhance Access to Financing	5.1. Implement awareness campaign on EVs projects , especially attract attentions of investors and users 5.1.1. Enabling legislation and regulatory environment 5.1.2. Improvement on accessibility and permitting process on-grid EVs infrastructure.	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	6. Months
	5.2. Develop Government financial policy incentives to assist lowering the cost of EVs technology 5.2.1. Identify and improve commercial banks financing policy and accessibility to EVs loaning scheme projects	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	5 Months
	5.3. Engage in dialogue with government development partners to identify possible government incentives and subsidies for the EVs	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga,	12 Months

	technologies as it contributes to global benefit 5.3.1. Ensure accessibility and availability of technical standard and minimum labelling certification for import of EVs to Tonga	GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	

6.1.3.7 : Roles of Stakeholders

The roles of stakeholders are shown in Table 52 below

Table 52: Roles of EE Home Appliances Power Stakeholders

1	Ministry of Energy	Plan and manage energy policies, energy targets, and assess energy goals and objectives
		Oversee energy projects including on-grid EVs energy projects
		Identify and source funding to implement on-grid EVs
		Formulate and present energy plan, strategies and programmes to government and seek Cabinet's approval
		Promote public awareness and informed decisions on on-on-grid EVs.
2	Department of Climate Change , MEIDECC	Focal Point of the United Nations Convention on Climate Change
		Sourcing funds from climate funds and Global Environmental Facility
		GCF focal point in Tonga
3	Department of Environment , MEIDECC	Responsible for environmental policies and environmental management
4	Ministry of Finance and Planning	Responsible for financial policies and policy incentives for businesses.
5	Ministry of Economic and Trade	Responsible for Business incentive policies
6	Ministry of Foreign Affairs	Responsible for foreign relations with donors and development partners.
7	Tonga Power Limited, TPL	Manage and Plan the national electricity grids and monitor all projects that has capacity to influence the electricity generation and distribution and transmissions.
8	Tonga Electricity Commission	Responsible for regulatory policies and regulation of the national electricity grid.

9	University of Tonga and University of the South Pacific and National consultants	Research and Development.
10	Regional Energy Institutions	Responsible for regional energy coordination and general assessment and analysis of on-grid projects.
11	Development Partners and Donors	Financing of on-grid EVs projects
12	Local NGOs and Consultants	Technical assessment and specific technical analysis of on-grid EVs
13	Contractor and Subcontractor for technological installation of on-grid PV	Technical installation of the technology

6.1.3.8 : Scheduling of Activities

Table 53 describes the sequence and timing of specific activities and responsibilities

Table 53: Scheduling of Activities

Action	Activities	Planning		Implementation		Responsible Stakeholder
		Start	End	Start	End	
1. Establish appropriate institutional set up for the TAP	1.1. Long Term Institutional Set Up 1.1.1. Long Term Government Institutional set up and financial Policy incentives to address high cost of on-grid EVs, through tax incentives. 1.1.2. Establish the financial risk management policy to address financial and fiscal issues. 1.2. Development of Ministry of Energy to assess and address Lack of Policy Work and Actions 1.2.1. Encourage on-	2025	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local

	grid EVs design, operation and maintenance services. 1.2.2. Promote the establishment of EVs infrastructure and dealers and EVs services.					EVs Business
2. Assess the economic feasibility of investment on on-grid EVs	2.1. Conduct the economic, financial and fiscal feasibility of the purchase and operation of On-grid EVs in Tonga. 2.1.1. Assess possible financing opportunities for EVs in Tonga, considering lack of policy work and actions, and high upfront cost and acquisition cost. 2.1.2. Assess the suitability of government de-risking guarantee for the technology. 2.1.3. Identify all the insufficient policy, legislative and regulatory obstacles such as import tax policies, tax policy incentives, exemption of vehicle registration and so on. 2.1.4. Identify all possible donors supported risk	2025	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

		reduction methodology and financial options.					
	2.2. 2.2.1.	Carry out market survey to ensure business viability of government taxes regulation and import duties to improve procurement policy for on-grid EVs Identify the uncertainties of public policies and policy options to reduce cost of on-grid EVs in Tonga i. Commercial model for full cost recovery of the on-grid EVs	2025	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
3. Create Awareness of both Developer, and users of the technology	3.1. 3.1.1. 3.1.2.	Conduct the economic feasibility of the adoption of on-grid EVs in the country and impacts of high upfront cost and inflation in the adoption process Identify the appropriate on-grid EVs policy incentives, and institutional improvements. Identify the most	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local

	appropriate source of financing for on-grid EVs investment needs. 3.1.3. On-grid EVs coordinated policy improvements for government vehicle fleet 3.1.4. On-grid EVs regulatory improvements for electricity grid operations and assessment of the grid 3.1.5. On-grid EVs legislative improvements for EV charging and grid integration tools					Energy Consultants Local EVs Business
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs, local institutions of technology). 3.2.1. Donors financial opportunities for EVs development for joint government/private sector model. 3.2.2. Donors financing options for EVs designing, installing and	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

		operation maintenance standards of the technology 3.2.3. public policy improvements for EVs purchase to support national energy targets on EVs 3.2.4. Improve capacity through training on designing, installing and maintenance of EVs 3.2.5. Training on capacity to evaluate and interpret EVs data in order to formulate effective EVs effective and improvement policies. 3.2.6. Encourage raining program approaches for EVs business opportunities and business service delivery.					
4.	Enhance Access to Financing	4.1. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 4.1.1. Short Term Training materials on on-site experiences as shared regional sources	2024	2025	2025	2025	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF,

	of information and data analysis. 4.1.2. Training on innovative approaches for designing, procuring, installation and maintenance of EVs. 4.1.3. Encourage private sectors EVs services and auditing business opportunities. 4.1.4. Institutionalizatio n of EVs data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 4.1.5. Formulation of EVs database and analysis of EVs data to guide EVs service delivery development and business opportunities					SPC,NGO s and Local Energy Consultant s Local EVs Business
	4.2. Implement awareness campaign on EVs projects , especially attract attentions of investors and users 4.2.1. Enabling legislation and regulatory	202 5	2026	202 5	2026	DoE(MEID ECC), DoCC (MEIDECC) Ministry of Infrastructu re, Ministry of Police and Traffic TPL.

	environment 4.2.2. Improvement on accessibility and permitting process on-grid EVs infrastructure.					University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business
	4.3. Develop Government financial policy incentives to assist lowering the cost of EVs technology 4.3.1. Identify and improve commercial banks financing policy and accessibility to EVs loaning scheme projects	2027	2027	2027	2027	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business

Stakeholders Timelines and Budget Estimate for Activities.

Table 54: Scheduling and Sequencing of specific Activities for On-Grid EVs

Actions	Activities	Year (2025-2027)		
1. Long Term Institutional Set Up	1.1. Confirm positions for recruitment and advertisement of Positions	▲		
	1.2. Confirm office space for the project team in the Department of Energy	▲		
	1.3. Allocate Budget for Salaries and Recruitment	▲		
	1.4. Meet Cost for office furniture/	▲		

	equipment			
	1.5. Meet Other Cost for operation and management of the office.	▲		
2. Assess the feasibility of Grid EVs (HVS)	2.1. Identify and Confirm TOR and hire consultant to conduct the assessment	▲		
	2.2. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of GRID EVs	▲		
	2.3. Identify key barriers to the economic and financial feasibility of the Grid EVs	▲		
	2.4. Identify the solutions to the economic and financial feasibility of the Grid EVs	▲		
	2.5. Carry out Market Survey to ensure business viability of the technology to investors.		▲	
	2.6. Identify and present the key factors for business viability of the Grid EVs	▲		
	2.7. Identify policy improvements needed	▲		
	2.8. Conduct the economic feasibility of the adoption of Grid EVs	▲		
	2.9. Identify barriers and solutions to the economic feasibility Grid EVs	▲		
	2.10. Identify policy improvements 2.10.1. Grid EVs Policy 2.10.2. Grid EVs Legislation 2.10.3. Grid EVs Regulation		▲	
	2.11. Technical Feasibility	▲		
3. Create Awareness of both Developer, and users of the Grid EVs technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for Grid EVs developers 3.1.2. Awareness materials for Grid EVs dealers 3.1.3. Awareness materials for Grid EVs Users	▲		
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of Grid EVs	▲		

	Technology, financial institutions of technology) 3.2.1. Develop materials for Grid EVs developers			
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for Grid EVs developers 3.3.2. Develop materials for Grid EVs dealers 3.3.3. Develop materials for Grid EVs users	▲		
	3.4. Implement awareness campaign on HVs, especially attract attentions of investors and users 3.4.1. Implement awareness campaign for Grid EVs developers 3.4.2. Implement Awareness Campaign for Grid EVs appliances Dealers 3.4.3. Implement Awareness Campaign for Grid EVs users	▲		
	3.5. Gender Mainstreaming and Social Inclusion	▲		
4. Enhance Access to Financing	4.1. Develop Financial Policy Incentives to assist lowering the cost of Grid EVs technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of Grid EVs 4.1.2. Identify possible legislative incentives to assist lowering the cost of Grid EVs appliances 4.1.3. Identify possible regulatory incentives to assist lowering the cost of Grid EVs appliances		▲	
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy		▲	

	incentives and subsides on imported Grid EVs components			
	4.3. Discuss and Justify the adoption of the most suitable model for Grid EVs investors and private sectors in Tonga		▲	
	4.4. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on Grid EVs 4.5. Provide clear justifications for adoption of the Grid EVs		▲	
	4.6. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of Grid EVs in Tonga		▲	
	4.7. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of Grid EVs in the country		▲	
	4.8. Prepare Cabinet Approval for most sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the energy sector.		▲	

Table 55: Actions, Activities, Capacity Building and Costs for Grid EVs.

Actions	Activities	Capacity Needs	Cost USD
1. Institutional Set Up	1.1. Confirm positions for recruitment and Conduct advertisement	Consultation & Meeting Cost Advertisement Cost	18,000
	1.2. Confirm office space for the project team in the Department of Energy	Rent and Accommodation	200,000
	1.3. Allocate Budget for Salaries and Recruitment	Salaries	800,000
	1.4. Meet Cost for office	Office Furniture	200,000

		furniture/ equipment	and Equipment	
	1.5.	Meet Other Cost for operation and management of the office.	Electricity and Telecommunication	
2. Assess the feasibility of Grid EVs	2.1.	Identify and Confirm TOR and hire consultant to conduct the assessment	Meeting Cost and Consultant Fees	500,000
	2.2.	Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of Grid EVs in Tonga.	Local Travel, Transportation Cost and Research Cost	150,000
	2.3.	Identify/Confirm key barriers to the economic and financial feasibility of Grid EVs	Workshop and Consultation Cost	50,000
	2.4.	Identify the solutions to the economic and financial feasibility of the Grid EVs	Workshop and Consultation Cost	
	2.5.	Carry out Market Survey to ensure business viability of the technology to investors.	Develop Survey Questionnaire, Survey workshops, Implementation of Survey	300,000
	2.6.	Identify and present the key factors for business viability of the Grid EVs	Finalization and presentation of Survey Report	30,000
	2.7.	Identify operation policy improvements needed	Consultation, Meetings and Cabinet Submissions	20,000
	2.8.	Conduct the economic feasibility of the Grid EVs	Consultation and Meeting Cost and Consultants Fee	500,000
	2.9.	Identify barriers and solutions to the economic feasibility of the integrated Grid EVs	Workshop Cost	20,000

	2.10. Identify policy improvements 2.10.1. Grid EVs Policy 2.10.2. Grid EVs Legislation 2.10.3. Grid EVs Regulation	Policy, Regulatory and Legal Review of existing policy and legal framework and documents	400,000
3. Create Awareness of both Developer, and users of the HVs technology	3.1. Identify awareness materials for various different stakeholders. 3.1.1. Awareness materials for Grid EVs developers 3.1.2. Awareness materials for Grid EVs dealers 3.1.3. Awareness materials for Grid EVs Users	Consultation and Identification of public awareness materials.	30,000
	3.2. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of Grid EVs Technology, financial institutions of technology) 3.2.1. Develop materials for Grid EVs developers	Consultancy Fees for development of public awareness materials	200,000
	3.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.3.1. Develop materials for Grid EVs developers 3.3.2. Develop materials for Grid EVs dealers 3.3.3. Develop materials for Grid EVs users	Consultancy Fees for development of communication profile	40,000
	3.4. Implement	Record of Radio	100,000

	awareness campaign on Grid EVs projects, especially attract attentions of investors and users 3.4.1. Implement awareness campaign Grid EVs developers 3.4.2. Implement Awareness Campaign for Grid EVs Dealers 3.4.3. Implement Awareness Campaign for Grid EVs users	and Television Programs, Publication of awareness materials Meetings with stakeholders Other public awareness programs	
	3.5. Gender Mainstreaming and Social Inclusion		20,000
4. Enhance Access to Financing	4.1. Identify/Develop Financial Policy Incentives to assist lowering the cost of Grid EVs technology 4.1.1. Identify all possible policy incentives to assist lowering the cost of Grid EVs 4.1.2. Identify possible legislative incentives to assist lowering the cost of Grid EVs 4.1.3. Identify possible regulatory incentives to assist lowering the cost of Grid EVs	Policy Dialogue Meetings and consultation with key stakeholders Policy Incentives to reduce cost of imports of technology Policy incentives for power purchase agreement (PPA)	50,000
	4.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit	Development partners meetings and workshops on identifying policy incentives and subsidies for import of technology and equipment.	40,000

	4.2.1. Consultation with government on policy incentives and subsidies. 4.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.2.3. Consultation with dealers on policy incentives and subsides on imported Grid EVs Vs components		
	4.3. Discuss and Justify the adoption of the most suitable model for Grid EVs investors and private sectors in Tonga	Stakeholders Consultation on Grid Policy and Regulation.	20,000
	4.3.1. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment Grid EVs 4.3.2. Provide clear justifications for adoption of the Grid EVs	Workshops/Consultation with key stakeholders and development partners	40,000
	4.4. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of technology in Tonga	Consultations and Workshops and Meetings	40,000
	4.5. Confirm potential		

	financing options with international, regional and bilateral donors and development partners for adoption of Grid EV s in the country		
	4.6. Prepare Cabinet Approval for most sustainable financing options of the technology in the country and its plan to achieve share of carbon emission reduction in the energy sector.		
Total Requested Budget			4,378,000

6.1.3.9 : Estimation of Resources for Action and Activities

To achieve successful and sustained technology diffusion, it is essential to enhance the capabilities of local technology importers and bidders and installers, especially local suppliers, overseas and local contractors and bidders of the technology, installers, and maintenance engineers. Furthermore, to facilitate accelerated diffusion, it is necessary to implement a train-the-trainers approach, enabling the replication of training programs across numerous regions.

The activities to be undertaken and their associated costs are presented in Table 56.

Table 56 : Financial considerations associated with the execution of the identified activities

Action	Activities	Plan	Implementation	Estimated Cost (USD)	Source of Fund	Responsible Stakeholder	Justified Actions
		Start/ End	Start/End				
1. Establish appropriate institutional set up for the TAP	1.1. Long Term Institutional Set Up 1.1.1. Long Term Government Institutional set up and financial Policy incentives to address high cost of on-grid EVs, through tax incentives. 1.1.2. Establish the financial risk management policy to address financial and fiscal issues. 1.2. Development of Ministry of Energy to assess and address Lack of Policy Work and Actions 1.2.1. Encourage on-grid EVs design, operation and maintenance services. 1.2.2. Promote the establishment of EVs infrastructure and dealers and EVs services.	2025 / 2025	2025/2025	1,318,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruited personnel and office furniture and office equipment
2. Assess	2.1. Conduct the	2025	2025/	2,320,	Donor	DoE(MEIDE	

the economic feasibility of investment on on-grid EVs	economic, financial and fiscal feasibility of the purchase and operation of On-grid EVs in Tonga. 2.1.1. Assess possible financing opportunities for EVs in Tonga, considering lack of policy work and actions, and high upfront cost and acquisition cost. 2.1.2. Assess the suitability of government de-risking guarantee for the technology. 2.1.3. Identify all the insufficient policy, legislative and regulatory obstacles such as import tax policies, tax policy incentives, exemption	/ 2025	2025	000	s	CC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	

		of vehicle registration and so on. 2.1.4. Identify all possible donors supported risk reduction methodology and financial options.						
3. Create Awareness of both Developer, and users of the technology		3.1. Carry out market survey to ensure business viability of government taxes regulation and import duties to improve procurement policy for on-grid EVs 3.1.1. Identify the uncertainties of public policies and policy options to reduce cost of on-grid EVs in Tonga 3.1.2. Commercial model for full cost recovery of the on-grid EVs	2025/2025	2025/2025	530,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruitment of researchers and professional assessors
		3.2. Conduct	2025	2025/		Donor	DoE(MEIDE	Recruitmen

	the economic feasibility of the adoption of on-grid EVs in the country and impacts of high upfront cost and inflation in the adoption process 3.2.1. Identify the appropriate on-grid EVs policy incentives, and institutional improvements. 3.2.2. Identify the most appropriate source of financing for on-grid EVs investment needs. 3.2.3. On-grid EVs coordinated policy improvements for government vehicle fleet 3.2.4. On-grid EVs	/ 2025	2025		s	CC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	t of Assessors

	regulatory improvements for electricity grid operations and assessment of the grid 3.2.5. On-grid EVs legislative improvements for EV charging and grid integration tools						
	3.3. Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of EVs, local institutions of technology). 3.3.1. Donors financial opportunities for EVs development for joint government/private sector model. 3.3.2. Donors	2025/2025	2025/2025		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	Recruitment of assessors and office equipment

	financing options for EVs designing, installing and operation maintenance standards of the technology 3.3.3. public policy improvements for EVs purchase to support national energy targets on EVs 3.3.4. Improve capacity through training on designing, installing and maintenance of EVs 3.3.5. Training on capacity to evaluate and interpret EVs data in order to formulate effective EVs effective and improvement policies. 3.3.6. Encourage						

		raining program approaches for EVs business opportunities and business service delivery.						
4.	Enhance Access to Financing	4.1. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology 4.1.1. Short Term Training materials on on-site experiences as shared regional sources of information and data analysis. 4.1.2. Training on innovative approaches for designing, procuring, installation and maintenance of EVs.	2025/2026	2025/226	210,000	Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1.Consultation with stakeholders 2.Publish of public awareness materials

	4.1.3. Encourage private sectors EVs services and auditing business opportunities. 4.1.4. Institutionalization of EVs data collection and analysis and publication of data analysis and indicators for evidenced policy decision makings. 4.1.5. Formulation of EVs database and analysis of EVs data to guide EVs service delivery development and business opportunities						
	4.2. Implement awareness campaign on EVs projects ,	2025/2025	2026/2026		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of	Contact address and internet communication links

	especially attract attentions of investors and users 4.2.1. Enabling legislation and regulatory environment 4.2.2. Improvement on accessibility and permitting process on-grid EVs infrastructure.					Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	
	4.3. Develop Government financial policy incentives to assist lowering the cost of EVs technology 3.3.1. Identify and improve commercial banks financing policy and accessibility to EVs loaning scheme projects	2026/2026	2026/2027		Donors	DoE(MEIDECC), DoCC (MEIDECC) Ministry of Infrastructure, Ministry of Police and Traffic TPL. University of Tonga, GCF, SPC,NGOs and Local Energy Consultants Local EVs Business	1.Conduct of Trainings 2.Distribution of materials 3.Record and broadcast of Radio and TV programs
Total Requested Budget							4,378,000

6.1.3.10 : Management Planning Risks

Table 57 outlines the potential risks associated with the implementation of technology, along with possible measures to mitigate these risks and ensure that the process remains on track.

Table 57: Management Risks and Possible Contingencies

Risk Categories	Current Situation	Contingency Plan
1. Cost of Technology	major cost risk due to increasing cost of on-grid EVs over time	Government plan for increasing cost of technology
2. Scheduling Risks	There may be delays in implementing policies designed to promote the dissemination of technology, including those related to incentives for on-grid EVs. Additionally, there may be setbacks in carrying out the feasibility study.	Initiate strategic dialogues with the government of Tonga to enable the necessary intervention. Enhance awareness within the Department of Environment, Climate Change, and the Parliamentary Committee on Energy to promote these policies. Formulate a Memorandum of Understanding with pertinent Research and Development organizations to ensure the timely execution of the feasibility study.
3. Implementation and Production Risks	A technology may fail to operate as intended; for instance, it might not perform as expected due to meet the national energy target.	Formulate an agreement with the technology provider to offer after-sales assistance. Develop a mechanism for collecting feedback related to the technology to guarantee that all concerns are resolved in a timely manner.
4. Immediate Requirement Risks	Delay on financing from donors	A project manager ought to be appointed within the MEIDECC Office, with sufficient funding allocated for this role. This individual should be engaged on a full-time basis and provided with the

		necessary tools and resources, which include access to a financial analyst and proficiency in cost estimation, as well as the requisite hardware and software for planning, scheduling, and project management, in addition to any other immediate tasks that may arise.
5. Changing habits of using technology	Changing to other vehicles due to increasing cost of on-grid EVs	Increasing awareness is crucial, as changing people's habits from using on-grid EVs. More policy incentives on on-grid EVs technologies.

7 List of References

1. ADB (2020a) Environmental and Social Monitoring Report, Tonga Outer Island Renewable Energy Report August, 2020.
2. ADB (2021), The Pacific Approach 2021-2025, Guides for Operations of the ADB across the 12 small Pacific island countries (PIC-12), ASIAN DEVELOPMENT BANK 6 ADB Avenue, Mandaluyong City 1550 Metro
3. ADB (2023), Pacific Renewable Energy Investment Facility Annual Report for January–December 2022, ADB Headquarter, Manila, Phillipines
4. Adeoti T, Fantini C, Morgan G, Thacker S, Ceppi P, Bhikhoo N, Kumar S, Crosskey S & O'Regan N., (2020), Infrastructure for Small Island Developing States. UNOPS, Copenhagen, Denmark.
5. Alfieri., A (2017) What is System of Environmental-Economic Accounting, Chief, Environmental Economic Accounts Section, United Nations Statistics Division United Nations Statistics Division
6. Alsaawy, Y.; Alkhodre, A.; Abi Sen, A.; Alshanqiti, A.; Bhat, W.A.; Bahbouh, N.M.A (2022) Comprehensive and Effective Framework for Traffic Congestion Problem Based on the Integration of IT and Data Analytics. Appl. Sci. 2022, 12, 2043. https://doi.org/ 10.3390/app12042043
7. Bryar, T. and Westbury T. (eds.), 2023. The Limits to Adaptation in the Context of Climate Security in the Pacific. International Organization for Migration (IOM), Republic of the Marshall Islands. Produced under the Climate Security in the Pacific project, with support from the Pacific Climate Security Network, June 2023
8. CNBC News, 2023 ; Why automakers are turning to hybrids in the middle of the industry's EV transition PUBLISHED FRI, DEC 8 20233:45 PM UPDATED FRI, DEC 8 20235:14 PM, Detroit , USA.
9. Johnson, Caley, Prateek Joshi, Dustin Weigl, and Eliseo Esparza (2023) Policy Framework to Improve Mobility Efficiency and Electrify Transportation in Tonga. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5400-87827. https://www.nrel.gov/docs/fy24osti/87827.pdf.
10. Economic Consulting Associates (ECA) and Trama TecnoAmbiental (TTA) , ECA and TTA, (2022) Regional e-mobility policy framework and technical guidelines in the Pacific Island Countries Final Report, October 2022
11. Economic Commission for Latin America and the Caribbean (ECLAC) (2020) Strengthening ICT and knowledge management capacity in support of the sustainable development of multi-island Caribbean SIDS, ECLAC SUBREGIONAL
12. Daniel. J, et al, (2020), Tonga Climate Change Policy Assessment, International Monetary Fund Country Report 20/212, Technical Assistance Report collaborated by staff team from IMF and Worked Bank in April 2020.
13. D'Este.,G , MacGeorge, R., and Lomu, M ., (2010) , Tonga National Infrastructure Investment Plan (NIIP), Pacific Region Infrastructure Facility(PRIF), Pacific Infrastructure Advisory Centre (PIAC) in Sydney, Australia

14. ESCAP(2015) Intelligent Transportation Systems for Sustainable Development in Asia and the Pacific, Working Paper by the Information and Communications Technology and Disaster Risk Reduction Division
15. ESCAP (2017), Development of Model Intelligent Transport Systems Deployment for the Asian Highway Network, Bangkok, Thailand
16. ESCAP (2020), Energy Transition Pathways for the 2030 Agenda SDG 7 Roadmap for Tonga, Developed using National Expert SDG7 Tool for Energy Planning (NEXSTEP) , University of Murdoch, Australia, December 2020.

17. EU (2020), EU Media Release on approval of TOP 5.8 million disbursement to Tonga to support renewable energy and energy efficiency , 08 October, 2020, Nukualofa, Tonga.
18. Fairbairn L.P.. .Noss F R., and Abbott D (2010) Feasibility Assessment of Savai'i Biodiesel Plant November 2010 *file:///C:/Users/user/Downloads/savaii_-_samoa_report_-_27_november_2010_altered2(1).pdf*
19. Global Green Growth Institute, GGGI (2022), A Review of GGGI Members' E-Mobility Policy Measures, GGGI Technical Report No. 26, Investment and Policy Solutions Division (IPSD), GGGI, December, 2022.

20. Goransson O., Vierros,, M and Borrevik., C, (2019) Partnership for Small Island Developing States, Department of Economic and Social Affairs Division
21. *Government of Tonga (1988)Tonga Cooperative Societies Act, 2016 , Revised Addition Act ,Kingdom of Tonga*
22. *Government of Tonga (2001) National Compliance Action Plan for Phasing out of Ozone Depleting Substances, Department of Environment, December 2001.*
23. Government of Tonga , GOT (2010a) Tonga Energy Road Map 2010-2020, TERM Plan, Nuku'alofa, Kingdom of Tonga.
24. *Government of Tonga, GOT (2010b) Tonga Ozone Layer Protection Act, 2010 , Act 23 of 2010, Kingdom of Tonga*
25. *Government of Tonga (2016) Tonga incorporated Societies Act, 2016, Revised Addition Act, Kingdom of Tonga*
26. *GOT(2016b), Tonga Climate Change Policy , A Resilient Tonga by 2035, February 2016.*
27. *Government of Tonga ,GOT (2018), Tonga – Green Climate Fund Country Programme, investing in Building a Resilient Tonga,* Country Programme funded by the Green Climate Fund Readiness Preparatory Support Programme, *Department of Climate Change, Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication (MEIDECC), Nuku'alofa, Tonga,*

28. *Government of Tonga (2020a) , Tonga's Second Nationally Determined Contribution (NDC),* Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) TONGA.

29. *Government of Tonga (2020b), Tonga's Progress on the Sustainable Development Goals Report, 2020 Tonga's progress throughout the life time of the Agenda 2030's Sustainable Development Goals (SDGs).Tonga Statistics Department, Nukuálofa, Tonga.*

30. *Government of Tonga (2020c), Government of Tonga Energy Efficiency Master Plan, Climate Technology Centre Network (CTCN), United Nation*
31. *Government of Tonga, GOT (2021a)Tonga Climate Change Fund Act, 2021 , Act 5 of 2021, Kingdom of Tonga*
32. Government of Tonga, GOT (2021b) Tonga Energy Road Map 2021-2035, TERMPLUS,TERM Update , GGGI
33. *Government of Tonga, GOT (2021c), Tonga Low Emission Development Strategy 2021-2050, Nuku'alofa, Tonga*

34. *Ha., T, and Manongdo., P, (2021), Electric vehicles in the Philippines: business opportunities, market barriers, and policy signals, Foreign Commonwealth and Development Office – British Embassy Manilla, Climate Change and Environment Division, UK*

35. International Monetary Fund IMF (2023),2023 Article IV Consultation , Press Release and Staff Report, International Monetary Fund • Publication Services, PO Box 92780 Washington, D.C. 20090, Telephone: (202) 623-7430 • Fax: (202) 623-7201, E-mail: publications@imf.org Web: *http://www.imf.org*

36. International Renewable Energy Agency (IRENA) (2013), Pacific Lighthouses Renewable Energy Roadmapping for Islands, Abu Dhabi

37. Ministry Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications, MEIDECC (2019) , Third National Communication on Climate Change Project, In response to its obligations under the
United Nations Framework Convention on Climate Change (UNFCCC) Funded by Global Environment Facility (GEF) through UNDP, for the Ministry of MEIDECC, P.O. Box 1380, Taufa'ahau Road, Nuku'alofa, TONGA, 2019.

38. Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE, 2020), Regional Electric Mobility Policy for Pacific Island Countries and Territories (PICTs), SPC Technical Report; Prepared as follow-up to the decisions of the Fourth Pacific Regional Energy and Transport Ministers' Meeting, held from 18 to 20 September 2019, in Apia, Samoa

39. Prateek., J and Carishma., G-W (2022), Fundamentals of Electric Vehicles (EVs),National Renewable Energy Laboratory in partnership with the United States Agency for International Development (USAID) ORGANIZED THE

COURSE; Energy Fundamentals Course hosted by the Bangladesh University of Engineering and Technology (BUET) in October 2022

40. Roopa Ravish1, Shanta Ranga Swamy (2021), INTELLIGENT TRAFFIC MANAGEMENT: A REVIEW OF CHALLENGES, SOLUTIONS, AND FUTURE PERSPECTIVES, Department of Computer Science and Engineering, PES University, Bangalore, India, Sciendo Transport and Telecommunication, 2021, volume 22, no. 2, 163–182
41. Shutterstock (2015), Intelligent Transport Systems and traffic management in urban areas , CIVITAS Policy Note, pages: 1, 15, 23, 24, 25, 27, 28, 30, 32.
42. S., Pande, Pat., B and A., Lapthorn (2013), Renewable Energy in the Kingdom of Tonga; National Plan & PV Generation Systems; Fifth International Conference on Power and Energy Systems, Kathmandu, Nepal | 28 - 30 October, 2013

43. *SPC (2013), Draft Minimum Energy Performance Standards and Labelling , AusAID Funded Project jointly manged with SPC.*
44. Swales, C.M. (2009). A Review of The Tonga Electric Power Grid Supply Systems and Load Forecasts. World Bank. Washington DC, USA Available at: *http://siteresources.worldbank.org/INTEAPASTAE/Resources/Tonga-Electric-Supply-System-Forecasts.pdf*
45. Tonga's Second Nationally Determined Contribution (NDC) (2020), Submission under the Paris Agreement, Government of Tonga, December, 2020.
46. Tonga Power Limited (2015), Upgrade of Grid in Preparation for Renewables, Kingdom of Tonga:

47. Tonga Power Limited (2020), 2020 Business Plan, Power the Sustainable Development for our Kingdom, Nuku'alofa, Tonga 2020.

48. Tonga Power Limited (2024a), Boards Report March 2024, Strategic Business Development & Major Projects, Business Plan, Power the Sustainable Development for our Kingdom, Nuku'alofa, Tonga. March 2024
49. Tonga Power Limited (2024b), Boards Report April 2024, Strategic Business Development & Major Projects, Business Plan, Power the Sustainable Development for our Kingdom, Nuku'alofa, Tonga, April 2024.
50. Tonga Power Limited (2024c), Boards Report June 2024, Strategic Business Development & Major Projects, Business Plan, Power the Sustainable Development for our Kingdom, Nuku'alofa, Tonga , June 2024

51. Tukunga., T, (2013); Addressing barriers to sustainable electricity services in the Tongan electricity industry, PhD Thesis, School of Electrical Engineering and Telecommunications, The University of New South Wales, Sydney, Australia, 2013.

52. UNCTCN, (2020) Tonga Energy Efficiency Master Plan, United Nations Climate Technology Centre and Network, Denmark, EU.
53. Wade., H (2004), Tonga National Report, Pacific Regional Energy Assessment 2004, an assessment of the key energy issues, barriers to the development of renewable energy to mitigate climate change, and capacity development needs to removing the barriers
54. World Bank (2010). Kingdom of Tonga: Electric Supply System Load Forecast. Asia Sustainable and Alternative Energy Program, World Bank.
55. World Bank (2012), Project Paper for Small Recipient Executed Trust Fund Grant of 2.90 USD Millions for An Energy Roadmap Institutional and Regulatory Framework Strengthening Project Report No: 69657-TO
56. *World Bank, (2015) How ICTs Can Help Transport Systems Evolve, https://www.worldbank.org/en/news/feature/2015/05/14/information-and-communication-technologies-facilitate-the-evolution-of-transport-systems*
57. Yamaguchi., K,(Undated) Utilization of Energy Data for Tonga's Future Energy Scenarios and Policy Planning, Development Account ; Evidence-based policies for the sustainable use of energy resources in Asia and the Pacific, UNESCAP , Bangkok, Thailand.
58. Technology Needs Assessment Reports For Climate Change Mitigation – Lebanon. You can access the complete report from the TNA project website *http://tech-action.org/*
59. *https://en.wikipedia.org/wiki/Public_good_(economics): Accessed on 16 February, 2024.*

8 Annexes

8.1 : List of Workshop Participants

Technology Needs Assessment (TNA) Stakeholder Consultations. TAP Mitigation Participants. 12th December 2024.

1	Name	Filimone Fifita
	Gender	Male
	Organization	Dept Energy TNA Coordinator
	Email	manafifita@gmail.com
	Signature	
2	Name	Heta Lehuola
	Gender	Female
	Organization	Space-Path Zone Tonga Ltd
	Email	
	Signature	
3	Name	TEVITA PALAVI
	Gender	MALE
	Organization	TOTAL ENERGIES
	Email	Tevita.palavi@totalenergies.com
	Signature	
4	Name	MAIKA LEHTA
	Gender	MALE
	Organization	ASCO MOTORS
	Email	mlehta@asco.com.to
	Signature	
5	Name	Asela Taufa
	Gender	Female
	Organization	MEIDECC
	Email	selaafunia@gmail.com
	Signature	

6	Name	Samiuela Tupou
	Gender	Male
	Organization	MEIDECC - Climate Change
	Email	
	Signature	
7	Name	KIPOLA SOLTANGA.
	Gender	MALE
	Organization	MEIDECC - DEPARTMENT OF ENERGY
	Email	kipolasoltanga@gmail.com
	Signature	
8	Name	MASEFIELD TEUTAU
	Gender	MALE
	Organization	KEC.E.E.S.3
	Email	teutaupe@gmail.com
	Signature	
9	Name	Akesa Fifita
	Gender	Female
	Organization	MEIDECC
	Email	akesafifita@gmail.com
	Signature	
10	Name	Salote Samate
	Gender	Female
	Organization	MEIDECC
	Email	lotelilo.samate@gmail.com
	Signature	

11	Name	GATTON TONGA
	Gender	MALE
	Organization	MEIDECC
	Email	Kztonga@gmail.com
	Signature	
12	Name	Malo Lupe Mcleod
	Gender	Female
	Organization	Energy Department
	Email	malolupe.mcleod94@gmail.com
	Signature	
13	Name	Fesuiniu Laumanei
	Gender	F
	Organization	MEIDECC.
	Email	fesuiniu@yahoo.com.
	Signature	
14	Name	Katalina Lui.
	Gender	F
	Organization	MEIDECC
	Email	luiluli72@gmail.com
	Signature	
15	Name	Opeti Moala
	Gender	Male
	Organization	MEIDECC
	Email	opetimoala3209@gmail.com
	Signature	

16	Name	OFA TAKAI
	Gender	MALE
	Organization	MEIDECC
	Email	ofa.takai@yahoo.com
	Signature	
17	Name	LOUVENE MALOLO
	Gender	FEMALE
	Organization	MEIDECC
	Email	U.fekaosi@gmail.com.
	Signature	
18	Name	TARA FISHER
	Gender	Female
	Organization	MEIDECC
	Email	
	Signature	
19	Name	Annie Marie Malolo
	Gender	female
	Organization	PCREEE
	Email	Malolo.anniemarie@gmail.com
	Signature	
20	Name	TEVITA TUKUNGA
	Gender	M
	Organization	MEIDECC
	Email	
	Signature	

8.2 : Stakeholders Work Template for Activities Timeline

Actions	Activities	Year (2025-2027)		
2. Institutional Set Up	2.1. Confirm positions for recruitment and advertisement of Positions	2025 ▲	2026	2027
	2.2. Confirm office space for the project team in the Department of Energy	▲		
	2.3. Allocate Budget for Salaries and Recruitment	▲		
	1.4. Meet Cost for office furniture/ equipment	▲		
	2.5. Meet Other Cost for operation and management of the office.	▲		
3. Assess the feasibility of On-grid power generation	3.2. Identify and Confirm TOR and hire consultant to conduct the assessment	▲		
	3.3. Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of On-Grid PV generation in Tonga.	▲		
	3.4. Identify key barriers to the economic and financial feasibility of on-grid PV.	▲		
	3.5. Identify the solutions to the economic and financial feasibility of the on-grid PV	▲		
	3.6. Carry out Market Survey to ensure business viability of the technology to investors.		▲	
	3.7. Identify and present the key factors for business viability of the on-grid PV		▲	
	3.8. Identify policy improvements needed		▲	
	3.9. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs		▲	
	3.10. Identify barriers and solutions to the economic feasibility of the fixed-tariffs		▲	
	3.11. Identify policy improvements 3.11.1. On-grid PV Policy 3.11.2. On-grid PV Legislation 3.11.3. On-Grid PV Regulation		▲	
	3.12. Technical Feasibility	▲		
4. Create	4.1. Identify awareness materials for	▲		

Awareness of both Developer, and users of the On-Grid PV technology	various different stakeholders. 3.2.1 Awareness materials for on-grid PV developers 3.2.2 Awareness materials for on-grid PV dealers 3.2.3 Awareness materials for on-grid PV Users			
	3.3 Develop awareness material targeting different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 3.3.3. Develop materials for on-grid PV developers	▲		
	3.4. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 3.4.1. Develop materials for on-grid PV developers 3.4.2. Develop materials for on-grid PV dealers 3.3.3. Develop materials for on-grid PV users	▲		
	4.4. Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 4.4.1. Implement awareness campaign for PV developers 4.4.2. Implement Awareness Campaign for PV Dealers 4.4.3. Implement Awareness Campaign for on-grid PV users	▲		
	4.5. Gender Mainstreaming and Social Inclusion	▲		
5. Enhance Access to Financing	4.8. Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology 4.8.1. Identify all possible policy incentives to assist lowering the cost of on-grid PV. 4.8.2. Identify possible legislative incentives to assist lowering the cost of on-grid PV. 4.8.3. Identify possible regulatory incentives to assist lowering the cost of on-grid PV		▲	

	4.9. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 4.9.1. Consultation with government on policy incentives and subsidies. 4.9.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 4.9.3. Consultation with dealers on policy incentives and subsides on imported PV components		▲	
	4.10. Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga		▲	
	4.3.1. PPA Contract		▲	
	4.3.2. PPA Tariff on active power		▲	
	4.3.3. PPA improvement		▲	
	4.3.4. Electricity permits into grid		▲	
	4.11. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on energy efficient home appliances Provide clear justifications for adoption of the hybrid vehicle.		▲	
	4.12. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of hybrid vehicle in Tonga		▲	
	4.13. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle in the country		▲	
	4.14. Prepare Cabinet Approval for most sustainable financing options of hybrid vehicle in the country and its plan to achieve share of carbon emission reduction in the transport sector.		▲	
Action 5: Design,	5.3. Design, procure install the Hybrid vehicle promotion and investment			▲

Procure, Install the monitoring and maintenance plan model for hybrid vehicle applications in the country	initiative in the country			
	5.4. Design, Approve and Set up the Monitoring and Maintenance Model for the technology			▲
Action 6 : Assess and Identify all the necessary improvement options	6.5. Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing energy efficient home appliances investment in the country			▲
	6.6. Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.			▲
	6.7. Prepare all Policy decisions for government approval			▲
	6.8. Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.			▲

8.3 : Stakeholders Worksheet for Cost/Budget

Actions	Activities	Capacity Needs	Cost USD
4. Institutional Set Up	4.1. Confirm positions for recruitment and Conduct advertisement	Consultation & Meeting Cost Advertisement Cost	18,000
	4.2. Confirm office space for the project team in the Department of Energy	Rent and Accommodation	200,000
	4.3. Allocate Budget for Salaries and Recruitment	Salaries	800,000
	4.4. Meet Cost for office furniture/	Office Furniture and Equipment	200,000

		equipment		
	4.5.	Meet Other Cost for operation and management of the office.	Electricity and Telecommunication	100,000
5. Assess the feasibility of On-grid power generation	5.1.	Identify and Confirm TOR and hire consultant to conduct the assessment	Meeting Cost and Consultant Fees	500,000
	5.2.	Identify and Justify the economic, financial and fiscal feasibility of the Lifecycle Cost of On-Grid PV generation in Tonga.	Local Travel, Transportation Cost and Research Cost	150,000
	5.3.	Identify/Confirm key barriers to the economic and financial feasibility of on-grid PV.	Workshop and Consultation Cost	50,000
	5.4.	Identify the solutions to the economic and financial feasibility of the on-grid PV	Workshop and Consultation Cost	
	5.5.	Carry out Market Survey to ensure business viability of the technology to investors.	Develop Survey Questionnaire, Survey workshops, Implementation of Survey	300,000
	5.6.	Identify and present the key factors for business viability of the on-grid PV	Finalization and presentation of Survey Report	30,000
	5.7.	Identify	Consultation, Meetings	20,000

	operation policy improvements needed	and Cabinet Submissions	
	5.8. Conduct the economic feasibility of the adoption of fixed electricity tariffs in the country and impacts of inflation in the tariffs	Consultation and Meeting Cost and Consultants Fee	500,000
	5.9. Identify barriers and solutions to the economic feasibility of the fixed-tariffs	Workshop Cost	20,000
	5.10. Identify policy improvements 5.10.1. On-grid PV Policy 5.10.2. On-grid PV Legislation 5.10.3. On-Grid PV Regulation	Policy, Regulatory and Legal Review of existing policy and legal framework and documents	400,000
	5.11. Technical Feasibility	Assessment Study, of current grid.	500,000
6. Create Awareness of both Developer, and users of the On-Grid PV technology	6.1. Identify awareness materials for various different stakeholders. 6.1.1. Awareness materials for on-grid PV developers 6.1.2. Awareness materials for on-grid PV dealers 6.1.3. Awareness materials for on-grid PV Users	Consultation and Identification of public awareness materials.	30,000
	6.2. Develop awareness material targeting	Consultancy Fees for development of public awareness materials	200,000

	different stakeholders (i.e. Private Sector, Decision Makers, Users of PV Technology, financial institutions of technology) 6.2.1. Develop materials for on-grid PV developers		
	6.3. Develop a communication strategy Profile for target stakeholders particularly the adopters of the technology. 6.3.1. Develop materials for on-grid PV developers 6.3.2. Develop materials for on-grid PV dealers 6.3.3. Develop materials for on-grid PV users	Consultancy Fees for development of communication profile	200,000
	6.4. Implement awareness campaign on on-grid PV power generation, especially attract attentions of investors and users 6.4.1. Implement awareness campaign for PV developers	Record of Radio and Television Programs, Publication of awareness materials Meetings with stakeholders Other public awareness programs	100,000

	6.4.2. Implement Awareness Campaign for PV Dealers 6.4.3. Implement Awareness Campaign for on-grid PV users		
5. Enhance Access to Financing	5.1. Identify/Develop Financial Policy Incentives to assist lowering the cost of On-Grid PV technology 5.1.1. Identify all possible policy incentives to assist lowering the cost of on-grid PV. 5.1.2. Identify possible legislative incentives to assist lowering the cost of on-grid PV. 5.1.3. Identify possible regulatory incentives to assist lowering the cost of on-grid PV	Policy Dialogue Meetings and consultation with key stakeholders Policy Incentives to reduce cost of imports of technology Policy incentives for power purchase agreement (PPA)	50,000
	5.2. Engage in dialogue with government development partners to provide incentives and subsidies for the technology as it contributes to global benefit 5.2.1. Consultation with government	Development partners meetings and workshops on identifying policy incentives and subsidies for import of technology and equipment.	40,000

	on policy incentives and subsidies. 5.2.2. Consultation with donors on policy incentives and subsidies on donor funding projects. 5.2.3. Consultation with dealers on policy incentives and subsides on imported PV components		
	5.3. Discuss and Justify the adoption of the most suitable model for PPA Contract for on-grid solar power investors and private sectors in Tonga	Stakeholders Consultation on PPA Policy and Regulation.	40,000
	4.3.1. PPA Contract	Consultation and Meetings of PPA Tariff Policy and Implementation	20,000
	4.3.4. PPA Tariff on active power		
	4.3.3. PPA improvement		
	4.18.4. Electricity permits into grid	Consultation on Improvements of process of permits to the national electricity grid	30,000
	4.19. identify, Develop and recommend all financial policy incentives to Cabinet to assist lowering the cost of investment on on-grid PV 4.20. Provide clear justifications for	Workshops/Consultation with key stakeholders and development partners	40,000

	adoption of the on-grid PV		
	4.21. Engage in dialogue with development partners on suitable adoption of subsidies for the technology as it contributes to global benefit; Confirm possible ways and preferred conditions and methodology for supporting financing of technology in Tonga	Consultations and Workshops and Meetings	40,000
	4.22. Confirm potential financing options with international, regional and bilateral donors and development partners for adoption of hybrid vehicle in the country on-grid PV		
	4.23. Prepare Cabinet Approval for most sustainable financing options of the technology in the country and its plan to achieve share of carbon		

		emission reduction in the transport sector.		
Action 5: Design, Procure, Install the on-grid PV pilot project	5.3.	Design, procure install the on-grid PV promotion and investment initiative in the country	Consultants Fee Operation and Reporting	5,000,000
	5.4.	Design, Approve and Set up the Monitoring and Maintenance Model for the technology		
Action 6 : Maintenance Assess and Identify all the necessary improvement options	5.5.	Assess and Identify the policy, legislative and regulatory shortfalls in the implementation of existing on-grid PV	Consultation Fees Assessment, Consultation and Reporting, Data recording	1,000,000
	5.6.	Conduct consultation and meetings on findings of the policy and regulatory assessment and analysis.		
	5.7.	Prepare all Policy decisions for government approval		
	5.8.	Design, Procure and install all necessary grid improvements to cater for reducing demand in the electricity grid.		