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TECHNOLOGY NEEDS ASSESSMENT REPORT

Technology Action Plan (TAP)

MITIGATION

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TNA TECHNOLOGY
NEEDS
ASSESSMENT



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TECHNOLOGY NEEDS ASSESSMENT REPORT

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Foreword

Timor-Leste, classified as a Least Developed Country (LDC) and a member of the Small Island Developing States (SIDS), faces exceptional vulnerability to the impacts of climate change. The nation is experiencing adverse effects from extreme weather events, such as intense storms and rising sea levels. Additionally, certain current practices exacerbate Timor-Leste's susceptibility to climate change, hindering its development. Without addressing the root causes of climate change and providing support to the most vulnerable sectors, these impacts will only worsen.

Currently, Timor-Leste is conducting the Technology Needs Assessment (TNA) to mitigate climate change and enhance adaptation across the country. As part of this effort, national-level consultations with stakeholders were held to identify prioritized technologies under the TNA process. The Minister of Tourism and the Environment (MTE), through the General Directorate of Environment (DGE), recognizes that the TNA project represents the country's first comprehensive national initiative aimed at assessing its climate technology needs. This was followed by the completion of the Barrier Analysis and Enabling Framework (BAEF) as the second phase of the process.

The government of Timor-Leste proudly announces the completion of the third phase of the TNA, known as the Technology Action Plan (TAP). The TAP report for mitigation has been finalized with the support of relevant line ministries, international agencies, non-governmental organizations (NGOs), private sectors, academic institutions, and youth organizations. Through this collaborative effort, there is confidence that the implementation of the mitigation technologies outlined in the TAP report will reduce greenhouse gas emissions. I hope that this document can also serve as a database for the relevant line ministries to mobilize resources to support the work in their respective ministries.

Lastly, I would like to extend my gratitude to the National Directorate for Climate Change (NDCC), particularly the TNA National Team, as well as to the United Nations Environment Programme Copenhagen Climate Centre (UNEP-CCC) and the Asian Institute of Technology (AIT) for their unwavering support and guidance throughout the implementation of the TNA project.



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Abbreviations

ADB	Asian Development Bank
AFOLU	Agriculture, Forestry, and Other Land Use
ALGIS	Agriculture Land Use Information System
BAEF	Barrier Analysis and Enabling Framework
CB-NRM	Community-based Natural Resource Management
CCUs	Carbon Capture and Utilisation
CH ₄	Methane
CNG	Compressed Natural Gas
CSA	Climate-smart agriculture
CO ₂	Carbon Dioxide
DGTC	Directorate-General of Transport and Communications
DGREAS	Direção Geral para a regulação dos setores de electricidade, água, e saneamento (General Directorate for the regulation of the electricity, water, and sanitation sectors)
DNTT	National Directorate of Land Transportation
DPs	Development Partners
DRTL	Democratic Republic of Timor-Leste
EDTL	Electricity of Timor-Leste
EU	European Union
EV	Electric Vehicle
FAO	Food and Agriculture Organization
FFS	Farmer Field Schools
GCF	Green Climate Fund
GDE	General Directorate of En
GDFCIP	General Director of Forest, Coffee, and Industrial Plants
GDS	General Directorate of Statistics
GHG	Greenhouse Gases
GoTL	Government of Timor-Leste

HMI	Ho Musan Ida
INDC	Intended Nationally Determined Contribution
JICA	Japan International Cooperation Agency
LCD	Low Carbon Development
LED	Light-emitting diode
LIFT	Local Initiatives for Food-security Transformation
LPG	Liquefied Petroleum Gas
LTA	Land Transport Authority
LVG	Liquefied Gas for Vehicle
MCA	Multi-criteria Analysis
MALFF	Ministry of Agriculture, Livestock, Fisheries, and Forestry
M&E	Monitoring and Evaluation
MOF	Ministry of Finance
MOTC	Ministry of Transport and Communication
MPs	Micro Programmes
MPW	Ministry of Public Works
MTA	Ministry of Tourism and Environment
NDC	Nationally Determined Contribution
NDCC	National Directorate for Climate Change
NDPC	National Directorate Pollution Control
NGOs	Non-governmental Organizations
N ₂ O	Nitrous oxide
NO _x	Nitrogen Oxides
NPF	National Policy on Forests
PI	Project Idea
PLUP	Participatory Land Use Planning
PTA	Public Transport Authority
OJT	On-Job-Training
ROI	Return on Investment

SALT	Slopping Agricultural Land Technology
SDP	Strategic Development Plan
SNC	Second National Communications
TAP	Technology Action Plan
TNA	Technology Needs Assessment
TOMAK	To'os ba Moris Di'ak
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

Executive Summary

The Technology Action Plan (TAP) is the final step in the Technology Needs Assessment (TNA) process. TAP provides a concise roadmap for the diffusion (transfer) of prioritised technologies to improve a country's social, environmental, and economic development, including climate mitigation. The sectors and technologies presented in this report were developed from the results of the previous two steps through a literature review and stakeholder consultation. In the first step, a list of mitigation technologies was selected, then prioritised and presented in the TNA report. Meanwhile, the second step focussed on the barrier analysis of the transfer and diffusion of the prioritised mitigation technologies in the selected sectors, including the enabling framework and measures for overcoming barriers.

The two (2) sectors selected for Timor-Leste's TNA process are: (1) transportation; and (2) agriculture, land use, and forestry, for a total of eight (8) technologies. However, this TAP report only covers seven (7) technologies because one of the technologies is selected in both mitigation and adaptation, so it was decided to include it in the TNA adaptation report due to its relevance. The seven prioritised technologies for each sector included in TAP are listed below:

Technologies for transportation sectors are:

- i. Develop pollution control Decree-Law
- ii. Low carbon development strategy
- iii. Research on installing solar system-based charging stations
- iv. Public transport maximization

Technologies for Agriculture, land use and forestry are:

- i. Agroforestry
- ii. Participatory Land Use Planning (PLUP)
- iii. Slopping Agricultural Land Technology (SALT)

The TAP was developed using a participatory approach similar to the two previous TNA steps. Multiple stakeholders, including representatives from the public and private sectors, as well as the TNA Steering Committee, were consulted to ensure that the chosen measures are appropriate for the context of Timor-Leste. This process utilized guiding criteria such as:

- Effectiveness: How effectively do these actions contribute to achieving the implementation target?
- Efficiency: Does the action facilitate implementation at the lowest possible cost in terms of human and financial resources?
- Interactions: Does the action align with existing policies?
- Suitability: Are the actions well-suited to the country context?
- Cost and benefits: Do the anticipated benefits outweigh the projected social, environmental, and economic costs?

The selected measures were turned into concrete actions and each was broken down into activities with set deadlines and costs.

TRANSPORTATION SECTOR

The action plan developed for the four technologies of transportation sector is summarized below:

i. Pollution Control Decree-Law

The Pollution Control Decree-Law empowers the government to establish regulations for controlling various forms of pollution, including pollution from transportation, and to hold polluters accountable. Consequently, the objective is to enact an approved Pollution Control Decree-Law and conduct outreach programs to educate the public about the new legislation. The actions chosen for inclusion in the TAP are the development of the Pollution Control Decree-Law and the development of skilled and knowledgeable staffs.

Developing the Pollution Control Decree-Law is identified as the primary step toward successfully implementing this technology. The activities to accomplish this action begin with conducting comprehensive research and analysis, followed by educating and informing relevant stakeholders about the approved Pollution Control Decree-Law. This process is expected to take place over a timeline of 3 years, with an estimated cost of USD 30,000. The main implementing entity responsible for this initiative is the National Directorate of Pollution Control under the Ministry of Tourism and Environment.

ii. Low Carbon Development Strategy

The low-carbon development (LCD) strategy guides Timor-Leste towards low-carbon, green growth, aiming to support long-term decarbonization goals and enhance economic contributions from non-oil sectors, with a focus on gender mainstreaming. Actions in the TAP include formulating the LCD Strategy and developing skilled staff.

Formulating the LCD Strategy is prioritized as the initial step, with activities ranging from expert recruitment to strategy approval by the Ministry of Tourism and Environment (MTE). This process is scheduled from 2024 to 2026, with a total cost of USD 30, 000. The National Directorate of Climate Change under the MTE is the main implementing entity.

iii. Research on installing solar system-based charging station

The study will analyse power reliability, energy costs, and CO2 emissions of a PV-powered station, comparing results to assess GHG reduction, including CO2. The goal is to research solar-powered charging stations to promote renewable energy use and reduce CO2 emissions in Timor-Leste. Actions in the TAP include conducting research on solar system-based charging stations and advocating for the approval of renewable energy legislation.

Research on solar system-based charging stations is prioritized, with activities from expert recruitment to completion of the research. After completing the research, the activities will also involve supporting

the legislation of the Decree-law on renewable energy to ensure its practical application. The estimated cost of these activities is around USD 36,000, with the main implementing entity being DGREAS - Direção Geral para a regulação dos setores de eletricidade, água, e saneamento (General Directorate for the regulation of the electricity, water, and sanitation sectors).

iv. **Public transport maximization**

Maximizing public transport is expected to enhance mobility and accessibility while ensuring safety and inclusivity for women and disadvantaged groups. The ambition is to focus on a minimal timeline for infrastructure enhancements and minimal changes to institutional or regulatory frameworks (e.g., service and routing changes, refining terminal operating protocols, and designing guidelines), which will be implemented by the Ministry of Transport and Communications (MOTC).

The actions selected for the Technology Action Plan (TAP) include finding a strategic and sustainable approach to financing public transport maximization, establishing a new Land Transport Authority (LTA), forming the public transport operator association, and promoting capacity building and training across both the public and private sectors.

Among these above actions, the establishment of a new Land Transport Authority (LTA) has been chosen to be implemented as a project idea. By establishing the LTA first, the implementing entity will have authority over how services are operated and can better improve public transport, especially microlet operations in Dili. The activities will commence with the development of legislation that allows for the establishment of the LTA and will continue until providing training to the LTA staff once it is established. The identified activities are scheduled from 2024 to 2026, with an estimated cost of USD 30,000.

AGRICULTURE, LAND USE AND FORESTRY

Below is a summary of the action plan devised for the three technologies within the agriculture, land use, and forestry sector.

i. **Agroforestry**

The agroforestry system is acknowledged as a form of climate-smart agriculture and a viable option for balancing the socio-economic needs and ecological functions of lands in Timor-Leste. The adaptable nature of agroforestry models allows them to be tailored to various local conditions, including soil types and climates. The ambition for agroforestry is to implement at least 25 hectares of land per year over the next four years in Aileu, Bobonaro, Lautem, and Manufahi municipalities.

The actions selected for the TAP include adopting a value chain approach and promoting cash crops, developing a National Agroforestry Strategy and Action Plan, increasing the number of extensionists with relevant degrees and training, and rehabilitating or maintaining rural roads to enhance market access for agroforestry services.

Adopting a value chain approach and promoting cash crops has been chosen as a project idea for implementation. This action aims to generate income from agroforestry activities beyond the project's duration to address sustainability challenges. The activities will commence with identifying and

engaging a diverse group of stakeholders and strengthening extension services to provide ongoing support to farmers in managing agroforestry systems. The Ministry of Agriculture, Livestock, Fisheries, and Forestry (MALFF) will serve as the main implementing entity. The activities are scheduled from 2024 to 2028, with an estimated cost of USD 510,000.

ii. **Participatory Land Use Planning (PLUP)**

The Participatory Land Use Planning (PLUP) is an interactive process that allows local communities to discuss and determine the management of their community's land and other natural resources. The ambition of this technology is to implement PLUP and Micro Programmes (MPs) in 10 target villages across four high-priority watersheds: Loes, Be Lulik, Seical, and Cuha, over a period of four years, to sustain natural resource management. PLUP will also identify supports and interventions needed for a future land use plan, ultimately contributing to mitigation measures in Timor-Leste.

The actions selected for the Technology Action Plan (TAP) include establishing PLUP at the village level, promoting on-the-job training (OJT) on PLUP and issuing certificates, and conducting awareness programs to encourage participation in the establishment of PLUP.

Establishing PLUP at the village level has been chosen as a project idea for implementation. Prioritizing PLUP implementation over development activities can mitigate the risk of undesirable outcomes. Hence, the activities will range from identifying and conducting consultative meetings with relevant stakeholders to actively involving them in the PLUP process, to regularly monitoring and evaluating the effectiveness of the project. These activities will be implemented by MALFF within the timeline from 2024 to 2028. The estimated cost for this specific project idea is approximately USD 800,000.

iii. **Sloping Agricultural Land Technology (SALT)**

Sloping Agricultural Land Technology (SALT) has been selected as one of the technologies to reduce erosion due to its suitability to biophysical conditions and promising economic, social, and environmental benefits. The ambition of this technology is to implement SALT in high-altitude upland zones, primarily located in Ermera, Aileu, and Ainaro municipalities, targeting 10 villages.

The actions selected for the Technology Action Plan (TAP) include providing subsidies to support rural farmers' transition to SALT on sloping lands, developing a training manual on SALT to promote practices in Timor-Leste, and providing training and technical assistance on SALT to farmers through the Farmer Field School (FFS) approach.

Among these actions, providing training and technical assistance on SALT to farmers through the Farmer Field School (FFS) approach has been chosen as a project idea. The activities involve planning, mobilizing, and initiating the FFS program for SALT implementation, as well as implementing a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS. The Ministry of Agriculture, Livestock, Fisheries, and Forestry (MALFF) is the main implementing entity for these identified activities. The project idea is scheduled to start from 2024 to 2028, with an estimated cost of USD 770,000.

During the TAP consultation with key stakeholders, the most common risks identified were related to cost, politics, and scheduling. Changes in government structure and fixed budget allocations for 2024

were noted as potential factors that could delay the TAP implementation. Therefore, the next step for the National Directorate (TNA National Team) will be to draft a policy paper and initiate a roundtable discussion to garner stakeholder buy-in for the TAP. This process will include exploring potential funding sources to ensure successful implementation.

Chapter 1 Technology Action Plan and Project Ideas for the Transportation Sector

1.1. TAP for the Transportation Sector

1.1.1. Sector overview

In Timor-Leste, the public transport system is served by various modes of public transportation, including buses, microlets, and *angguna*. These services are mostly operated by individual operators or small associations with no fixed service schedules and limited government regulations and oversight in terms of safety, security, and quality of service. The transportation sector generates GHG emissions through fuel combustion, such as gasoline, diesel oil, and jet or kerosene fuel. It is common to use gasoline for road transportation, whereas diesel oil is more common for waterborne vehicles as well as for a few vehicles on the road.

In 2015, greenhouse gas emissions from fuel oil combustion in road and waterborne transportation comprised 63.71% (diesel oil) and 31.80% (gasoline), while the combustion of jet-kerosene for civil aviation contributed 4.49% to emissions. Road transportation and water transportation account for most of those increases. Due to the lack of relevant activity data, the GHG emissions from water and land transportation cannot be reported individually.

In the transportation sector, diesel oil combustion has been the main source of GHG emissions, and it affects the overall amount of GHG emissions from transportation. According to the Timor-Leste GHG inventory, there was a notable increase in greenhouse gas emissions in 2007 caused by burning gasoline. Despite a decline in 2008, emissions continued to rise through 2010 and beyond until 2015 (with the exception of 2012). On the other hand, the trend of greenhouse gas emissions from burning diesel oil rose considerably in 2008 but fell noticeably in 2009. However, it slightly rose in 2009 and beyond until 2015. These erratic variations in the GHG emission level matched the statistics on fuel oil usage.

It is estimated that the average annual growth rate of gasoline-consuming cars is 8% from 2010 to 2017 and 5% from 2020 to 2030, while diesel-oil-fuelled cars grow 5% and motorcycle use rises 8%. With regard to the increase in the number of vehicles, it is projected that 677.4 million litres of fuel will be consumed in 2030, of which 59.7% will come from gasoline and 36.7% from diesel.

According to recent data (DNTT 2022), there were approximately 182,500 vehicles registered in 2022. Motorcycles account for about 73.7% (or about 134,500) of these vehicles, followed by light vehicles (18,8% or 34,400), passenger vehicles (4.8% or 8,800), microlets (0,9% or 1,600), taxis (0.3% or 600), and buses (0,3% or 480). Additionally, the data shows that the number of recently registered cars keeps rising annually, especially from 2015 to 2018 (with a slight decline in 2019 to 2020 during COVID-19). Motorcycles continue to be in high demand (they account for more than 80% of all new vehicle

registrations), demonstrating the nation's ongoing and strong need for two-wheelers. It is anticipated that as the population and economy rise, so will the number of vehicles owned.

Considering the transportation types and fuel usage outlined in the baseline scenario, Timor-Leste could potentially mitigate the impacts of climate change by enhancing the efficiency of mobile combustion technology and transitioning to public transit, such as buses or minibuses. Table 1 serves as a comprehensive overview of the policies and measures already established within the transportation sector, crucially aiding the deployment and diffusion of selected technologies.

Table 1: Existing policies and measures in the Transportation sector

Name of Law and Policy	Enacted and revised	Main contents
Timor-Leste Strategic Development Plan (SDP) 2011–2030	2011	<p>The SDP acknowledges that a greater contribution to climate change mitigation efforts and assistance in meeting our commitments under international climate change agreements will come from increasing the quantity of power produced from wind, solar, hydro, and other renewable energy sources.</p> <p>It also emphasises investments in road infrastructure and prioritises the rehabilitation and improvement (upgrading) of the existing road network. Road networks are necessary for promoting equity in national development, facilitating the transport of goods at a reasonable price, providing government services, and promoting agriculture and private sector growth.</p>
Environmental Basic Law (Decree-Law No. 26/2012)	2012	<p>The law requires that <i>“the state shall implement the measures necessary for climate change adaptation and mitigation in terms of reducing greenhouse gas emissions into the atmosphere and/or their removal by sinks and minimising the negative effects of the impacts of climate change on biophysical and socioeconomic systems.”</i></p> <p>It also requires the state to reduce, control, and maintain the release of greenhouse gas emissions and other polluting substances into the atmosphere within the limits of quality and environmental emissions standards.</p>
Conditions and Procedures to Observe Regarding the	2011	The import of vehicles will contribute to economic growth. It is therefore essential to define the features

Importation of Motor Prohibitions (Decree-Law 30/2011)		<p>of the vehicles to be imported into Timor-Leste to ensure both consumers and the environment are protected.</p> <p>Article 2 states that <i>"it shall be forbidden to import mixed and light passenger vehicles over five years old, as of the date of manufacture."</i></p> <p>Hence, promoting and implementing the current Decree-Law (No. 30.2011) will support the mitigation efforts in the transportation sector.</p>
Basic Law of the Road Transport System (Basic Law) (Decree Law 2/2003)	2003	<p>The Basic Law defines the competence, financial capacity, and professional capacity of companies. This law, which covers a broad range of public transport functions, forms the cornerstone of Timor-Leste's land transport regulatory framework. The legislation provides a high-level overview of key public transport functions, such as fare structures and infrastructure provision (including shelters and passenger amenities).</p>
Ministerial Diploma 3/MOTCOP/2003	2003	<p>This law exemplifies the government's power to direct the timetable and requirements for public transport services. While Timor-Leste does not yet have a schedule, a service schedule is a necessary component of any future public transportation system.</p> <p>This ministerial diploma gives DNTT the authority to make certain service planning decisions.</p>
Ministry of Transport and Communications Decree Law (6/2019)	2019	<p>This law describes the responsibilities and powers of the MOTC, emphasising its divisions, including the Directorate-General of Transport and Communications (DGTC) and the DNTT.</p>
National Climate Change Policy (NCCP)	2021	<p>The policy to mitigate GHG emissions in transportation revolves around two themes:</p> <ol style="list-style-type: none"> (1) reducing GHG emissions from vehicle fleets (public and private); and (2) promoting public transportation in urban areas and between communities. An effort is underway to establish vehicle emission regulations and to promote and implement Decree-Law No. 30/2011 regarding the age of used vehicles imported into Timor-Leste. <p>This policy also acknowledges the development and use of renewable technology to mitigate GHG emissions.</p>

Nationally Determined Contribution (NDC)	2020	<p>As part of its first NDC, Timor-Leste reiterated its mitigation arrangements and options, including actions related to renewable energy, energy efficiency, and transportation efficiency, and the introduction of new waste management policies and methods for low-carbon development.</p> <p>The NDC highlights that to enable the growth of an energy-efficient transport sector, it is necessary to establish vehicle standards and transport system master plans to support climate-friendly public transport options. The plan will create policy entry points for the promotion and support of non-motorised transportation options and public transportation options that are favourable to the environment.</p>
Intended Nationally Determined Contribution (INDC)	2016	<p>The potential mitigation options for transportation are to promote the use of public transport by enabling convenient (routes to all areas) and reliable access to buses and minibuses, constructing appropriate facilities such as proper bus stops and terminals, and establishing necessary regulations to control the transportation system.</p> <p>Another potential mitigation of energy efficiency in the transportation sector is to continue to promote and implement the current Decree-law (No. 30/2011) on used vehicles that are imported into Timor-Leste have less than 5 years of factory production.</p>
Second National Communication (SNC)	2020	<p>Under the SNC, several mitigation options have been identified based on key category analysis and input from the Working Group on National Communication and Government Programs. Regarding transportation, mitigations for reducing “mobile GHG emissions” are through the improvement of transport system efficiency, which includes:</p> <ul style="list-style-type: none"> • Encouraging ‘mode shift’ from private vehicles to public transport (bus, minibus, or microbus); • Increasing the efficiency of fuel combustion in transport by using more efficient vehicles through the restriction of vehicles over the age of 5;

		<ul style="list-style-type: none"> • Replacing old cars with the new ones for taxis through incentives; • Providing pedestrian and bicycle lanes to encourage people to walk or use bicycles; • Replacing oil fuels with gas fuels (LPG, CNG, or LGV) through developing infrastructure for gas utilisation in transport (conversion kits, gas stations, gas supply infrastructures, etc.) <p>The SNC only assesses the mitigation potential of shifting from private vehicles to public transport. Mode shift is assumed in each of traffic mode:</p> <ul style="list-style-type: none"> (i) Private car shifts to bus 20% (ii) Motorcycle shifts to bus 30%, and (iii) Other cars shift to bus 50%
Timor-Leste 2023 Public Transport Master Plan	2023	<p>The Vision of the Timor-Leste Public Transport Master Plan is: <i>"Public transport in Timor-Leste is an attractive, accessible, inclusive, and future-ready transport mode that supports economic growth, urban development, and quality of life across the country."</i></p> <p>One of the key pillars of Timor-Leste's public transport system is a sustainable future. The public transport system is essential to achieving the goals of the Paris Agreement because it promotes mode shift to lower travel-related emissions and makes use of cutting-edge features and new technologies to support climate mitigation and resilience. It emphasises the need to be future-proof against climate change. Ideally, facilities should be located to avoid negative environmental impacts while prioritising access for active travel and future low-emission technologies.</p>

Developing Pollution Control Decree-Law

Decree-law Article 33 of the Environmental Basic Law (Decree-law no. 26/2012) states that "the release of greenhouse gases and other polluting substances into the atmosphere shall be reduced, controlled, and maintained within the limits of quality and environmental emissions standards and other legislation in force."

Timor-Leste does not have vehicle emission standards to restrict the amount of pollution that vehicles or engines may emit. Currently, there is only Decree-Law No. 13/2011 that prohibits the import of light passenger and mixed vehicles that are more than 5 years old (from the date of their original manufacture to the date of import). Therefore, the proposed Pollution Control Decree-Law will

consider the provision of a vehicle emission standard programme that aims to reduce emissions and control pollution from motor vehicles in use.

Having a Pollution Control Decree-Law in place will enable the government to introduce regulations for controlling air, water, and soil pollution, as well as noise pollution. The decree law will also permit the government to regulate polluters and make them pay for the environmental damage they cause.

Low Carbon Development Strategy

The Low Carbon Development (LCD) strategy has been associated with the UNFCCC, which was adopted in Rio in 1992. In the context of UNFCCC, the LCD strategy can also be called green growth plans, climate change plans and strategies, or low emission development strategies (LEDS), which guide countries down a path towards low-carbon green growth. The LCD strategy will support Timor-Leste's development goals in alignment with the Paris Agreement and the 1.5-degree Celsius temperature goal.

The Nationally Determined Contribution (NDC) states that Timor-Leste is fully committed to taking more ambitious climate action on a low-carbon development path with no target for reducing emissions. The ambition will focus primarily on enhancing strategies, plans, and actions for low-carbon development reflecting its national circumstances based on Article 4.6 of the Paris Agreement, which include:

1. Establishing an enabling environment for Low Carbon Transition
2. Scaling up renewable energy technologies
3. Oil and gas industry regulation
4. Energy efficiency improvements
5. Enabling the energy efficient transport sector growth
6. Waste management and waste minimization

Research on installing solar system-based charging station

According to the SNC data, gasoline-consuming cars are predicted to grow about 8% between 2010 and 2017 and 5% between 2020 and 2030, while diesel-oil-fuelled cars will grow 5%. In addition, motorcycles will also rise by 8%. With more cars on the road, it is anticipated that overall fuel consumption will reach 677.4 million litres in 2030, with gasoline accounting for 59.7%, diesel for 36.7%, and jet kerosene for 3.7%. Therefore, the government's intervention will focus on enabling energy-efficient transport sector growth, as mentioned in the NDC.

Timor-Leste is currently making a gradual transition to using electric cars. Many electric motorcycles, known as "ojek" in the local language, have been used as public transportation in a number of municipalities, most notably Liquiça, Manatuto, and Lautem. In the capital city, electric bicycles and scooters are also soon to be widely used. Therefore, in order to promote the use of renewable energy sources and reduce CO₂ emissions, specific solar-system-based charging stations should be designed.

Public Transport Maximization

The public transport system in Timor-Leste is still largely undeveloped. Approximately 60% of all intercity journeys in Timor-Leste are made via public transport, but the service is poor, seats are not guaranteed, departure and arrival times are arbitrary, and passenger comfort is not a top priority. It is common practice for drivers to overload their vehicles in order to maximise revenue. There are no terminals or waiting areas along the itinerary. Furthermore, Dili lacks a central bus station. Three large terminals exist; however, none of them have first-rate amenities. Some have waiting rooms, while others are just by the side of the road.

Timor-Leste's public transport system aims to achieve the objectives of the Paris Agreement by promoting mode shift as a way to lower travel-related emissions. Therefore, the operation of public transportation as well as its facilities, institutions, and supporting infrastructure will be the main emphasis of public transportation maximisation. As of right now, Asian Development Bank (ADB) is helping the National Directorate of Land Transportation (DNLT) create the Timor-Leste Public Transport Master Plan 2023, which should be completed by 2024.

1.1.2. Action Plan for Developing Pollution Control Decree-Law

1.1.2.1. Introduction

Many countries throughout the world have passed legislation to control different types of pollution as well as to lessen the negative consequences of pollution in order to preserve the environment from its harmful effects. The government of Timor-Leste is also committed to ensuring its citizens have clean and safe air as the population grows. Article 33 of the Environmental Basic Law (Decree-law no. 26/2012) states that “the release of greenhouse gases and other polluting substances into the atmosphere shall be reduced, controlled, and maintained within the limits of quality and environmental emissions standards and other legislation in force.”

The idea of a Pollution Control Decree-Law, which empowers the government to introduce regulations for controlling various forms of pollution and hold polluters accountable, aligns with common environmental governance practices around the world. Implementing such laws is crucial for protecting the environment, public health, and promoting sustainable development.

Regarding pollution control in the transportation sector, Timor-Leste does not have vehicle emission standards to limit the amount of pollution that can be emitted by vehicles or engines. Currently, there is only Decree-Law No. 13/2011 that prohibits the import of light passenger and mixed vehicles that are more than 5 years old (from the date of their original manufacture to the date of import). Given the absence of specific vehicle emissions standards in Timor-Leste, this underlines the importance of considering the application of such standards within a broader pollution control regulatory framework.

In addition, the inclusion of vehicle emissions standards in the proposed Pollution Control Decree Law is a laudable step in addressing air pollution and its impact on public health and the environment in Timor-Leste, which ultimately supports a net improvement in economic welfare and saves on medical

expenses for air pollution-related health problems. Establishing motor vehicle emission standards will contribute to reducing the release of pollutants into the air. This includes substances such as nitrogen oxides (NOx), particulate matter, and other harmful pollutants associated with combustion engines. It can also lead to improved local air quality, particularly in urban areas where high concentrations of vehicular traffic can contribute significantly to air pollution.

1.1.2.2. Ambition for the TAP

The Pollution Control Decree-Law allows the government to introduce regulations for controlling various forms of pollution and hold polluters accountable. Hence, the ambition is to have an approved Pollution Control Decree-Law and outreach programs to inform the public about the new decree-law.

The development of the Pollution Control Decree-Law should include:

1. **Preliminary Assessment:** Conduct a comprehensive assessment of the current environmental situation, identifying major sources of pollution and their impact on air, water, soil, and overall public health. This also includes reviewing national laws and regulations related to environmental protection and pollution control, identifying gaps, inconsistencies, and areas that require enhancement.
2. **Stakeholder engagement:** Identify and engage with relevant stakeholders such as government institutions, non-governmental organizations (NGOs), private sectors, and the public, while ensuring representation from both men and women. It is crucial to gather diverse input, including perspectives from women and marginalized groups, to ensure a comprehensive approach that tackles gender disparities and promotes equality.
3. **Public Consultation:** Carry out public consultations to gather input from the general public, affected communities, and civil society. This ensures that the legislation reflects the concerns and expectations of the wider community.
4. **Legal Drafting:** Work with legal experts to draft this decree-law to ensure that it is clear, enforceable, and in line with the country's legal system. Seek input from legal professionals and lawmakers throughout this process.
5. **Government Approval and Adoption:** Submit draft legislation for review, approval, and adoption by the government through appropriate legislative or executive processes
6. **Education and Outreach:** Launch education and outreach programs to provide information to the public, business world and other stakeholders about new laws and regulations. Clarify the goals, requirements and importance of compliance.

1.1.2.3. Actions and Activities selected for inclusion in the TAP

a. Summary of barriers and measures to overcome barriers

The main challenge cited in implementing the Pollution Control Decree-Law is the requirement for financial commitment and information dissemination. Available financial resources for promoting research and development of the decree-law were deemed inadequate. The NDPC receives limited

funding to fulfil its functions and responsibilities. Consequently, no state budget is allocated for developing the decree-law, which is considered a low priority at the ministry level. Another challenge is the limited institutional capacity and technical skills. The NDPC faces constraints in human resource capability due to the complexity of pollution control, encompassing various environmental aspects. Additionally, there is a language barrier hindering comprehension of technical terminology in pollution realms. Technical assistance remains scarce since the National Directorate was established only recently during the previous administration.

To overcome these barriers, the NDPC must undertake several key actions. Firstly, it should raise awareness of available financial support by engaging in meetings with potential donors and strengthening coordination within the ministry to facilitate funding. Additionally, political coordination and institutional capacity within the Ministry of Tourism and Environment (MTE), particularly the NDPC, should be enhanced.

Furthermore, the NDPC needs to prioritize investment in human resource and information management capacity within the pollution control sector, especially concerning climate change. This involves identifying potential partners and individuals who can provide technical services to NDPC staff. Both international and national technical staff should be hired to develop the decree-law and simplify it for public usage after approval.

b. Actions selected for inclusion in the TAP

The following actions are selected to be included as part of the TAP for developing Pollution Control Decree-Law:

- 1. Develop the Pollution Control Decree-Law.** Having the Pollution Control Decree-Law in place allows the institution to regulate air pollution caused by transportation. The National Directorate for Pollution Control is responsible for examining, implementing, and monitoring policies for environmental development and conservation. They also create, enforce, and oversee pollution control standards and regulations. However, some tasks cannot be carried out due to the absence of the law. This technology is considered cost-effective because it only requires funding for consultants to conduct consultations and develop the law.
- 2. Develop a skilled and knowledgeable staff.** Pollution control involves complex technical aspects related to various types of pollutants, their sources, and their environmental and health impacts. Having a skilled and knowledgeable team is crucial for both developing and implementing the Pollution Control Decree-Law effectively, as they possess the expertise required to navigate the technical, legal, and policy complexities associated with pollution control. This measure is vital as it complements and supports the development and the implementation of the Pollution Control Decree-Law.

c. Activities identified for implementation of selected actions

This section presents the actions and activities that have been selected to be included in the development of the Pollution Control Decree-Law. The actions present in Table 2 are linked to the measures identified through detailed analyses of technology barriers and the enabling environments required to promote them, as described in the BAEF report.

Table 2: Summary of Actions and corresponding activities for developing the Pollution Control Decree-Law

Actions	Activities for Action Implementation
<p>Action 1: Develop the Pollution Control Decree-Law</p>	<p>1.1. Conduct comprehensive research and analysis</p> <p>1.2. Conduct stakeholders' consultation, including perspectives from women and marginalized groups</p> <p>1.3. Draft the pollution control decree law with clear objectives, definitions, provisions, and enforcement mechanisms</p> <p>1.4. Conduct stakeholders' consultation for reviewing the draft the pollution control decree law</p> <p>1.5. Finalize the pollution control decree law for submission to the Council of Ministers</p> <p>1.6. Conduct education and outreach among relevant stakeholders on the approved Pollution Control Decree-Law</p>
<p>Action 2: Develop a skilled and knowledgeable staff</p>	<p>2.1. Recruit experts with specialised knowledge in pollution control</p> <p>2.2. Assess existing expertise and areas that require additional training and development, considering gender-specific needs</p> <p>2.3. Develop and implement training programs that specifically address the complexities of pollution control that is gender-responsive</p>

d. Actions to be implemented as Project Ideas

Action 1 is selected to develop the Pollution Control Decree-Law, as this is the primary step toward successfully implementing this technology. The main goal of this technology is to develop and approve the Pollution Control Decree-Law. During the barrier analysis and consultation on the enabling framework with stakeholders, the NDCC acknowledges that insufficient funding from the state budget hinders the initial development of the decree-law. Hence, all activities under the Action 1 will be considered.

1.1.2.4. Stakeholders and Timeline for implementation of TAP

The development of the Pollution Control Decree-Law is carried out by the National Directorate of Pollution Control (NDPC) and the Office of Public Policy, Program Management, Legal Support, and Environmental Procedure under the Ministry of Tourism and Environment (MTE), with approval from the Council of Ministers. To initiate the implementation of Action 1, the National Directorate for Climate Change (NDCC) should organize a stakeholder workshop or roundtable discussion to communicate the project’s objectives and the Technical Assistance Plan (TAP), securing stakeholder buy-in. This involves actively advising the NDPC and the Office of Legal Support during the development of the Pollution Control Decree-Law.

As the governing body overseeing pollution standards and regulations, the NDPC, in collaboration with the Office of Public Policy, Program Management, Legal Support, and Environmental Procedure (MTE), assumes primary responsibility for translating all activities outlined in Action 1 into tangible implementation efforts, considering various perspectives from stakeholders in a gender-sensitive manner. Additionally, the DNTT is a key stakeholder in providing information regarding pollution from public transportation and vehicle emission standards. All these activities are expected to be implemented between 2024 and 2026 (refer to Table 3).

Table 3: Scheduling and sequencing of specific activities

Actions	Scale	Year		
		2024	2025	2026
Develop the Pollution Control Decree-Law	Conduct comprehensive research and analysis	X		
	Conduct stakeholders’ consultation, including perspectives from women and marginalized groups		X	X
	Draft the pollution control decree law with clear objectives, definitions, provisions, and enforcement mechanisms		X	

	Conduct stakeholders' consultation for reviewing the draft the pollution control decree law			X
	Finalize the pollution control decree law for submission to the Council of Ministers			X
	Conduct education and outreach among relevant stakeholders on the approved Pollution Control Decree-Law			X

1.1.2.5. Estimation of Resources Needed for Action and Activities

The estimated cost for developing the Pollution Control Decree-Law is provided below (refer to Table 4). This figure may vary depending on additional variables that are either included or excluded from the costs as outlined below:

Table 4: Actions, activities, capacity building needs and Costs

Action 1: Develop the Pollution Control Decree-Law		
Activities	Capacity building and other needs	Costs (USD)
Conduct comprehensive research and analysis	Consultation cost to develop the Decree-Law	5, 000
Conduct stakeholders' consultation, including perspectives from women and marginalized groups	Workshop and working session	3, 000
Draft the pollution control decree law with clear objectives, definitions, provisions, and enforcement mechanisms	Consultation cost to develop the Decree-Law	10, 000
Conduct stakeholders' consultation for reviewing the draft the pollution control decree law	Workshop and working session	3, 000
Finalize the pollution control decree law for submission to the Council of Ministers	Consultation cost to develop the Decree-Law	4, 000
Conduct education and outreach among relevant stakeholders on the approved Pollution Control Decree-Law	Campaign materials and outreach cost	5, 000
Grand Total:	USD	30, 000

1.1.2.6. Management Planning

a. Risks and contingency planning

- i. **Cost risk:** There is a potential for costs to exceed the budget due to delays in implementing the TAP. To mitigate this risk, the government, particularly the NDPC, should actively seek support from development partners to expedite implementation.
- ii. **Political risk:** Changes in the government structure may lead to delays or disruptions in implementation, driven by shifting political priorities and institutional interests. To address this risk, the NDPC should raise awareness among line ministries about the significance of enacting the Pollution Control Decree-Law.
- iii. **Scheduling risk:** Delays in stakeholder coordination could hinder the implementation of the TAP. As the budget for 2024 is already allocated, new budget items may need to be considered in the next financial year. The NDPC should take a proactive approach to implementing the TAP, ensuring the involvement of all relevant parties from the outset.
- iv. **Financial risk:** There is a risk that sufficient funding may not be available to finance the implementation of the TAP. To mitigate this, the NDPC should actively engage with potential donors to raise awareness of the need for financial support.
- v. **Gender Risk:** Women frequently face underrepresentation in decision-making processes concerning environmental policy and regulation. Therefore, the NDPC should advocate for gender-balanced representation during consultations and ensure that women's perspectives are actively heard and respected throughout the drafting and implementation of the decree-law.

b. Next steps

- i. The General Directorate of Environment (GDE) and NDCC must organize a stakeholders' workshop or roundtable discussion to communicate the Technical Assistance Plan (TAP). The critical step here is to secure buy-in from the stakeholders.
- ii. NDCC (TNA National team) should prepare a policy paper on the TNA project to obtain government approval for the TAP. The critical step lies in securing Cabinet's approval to garner support from other stakeholders for TAP implementation.
- iii. The NDPC should include the implementation budget in its 2025 budget and integrate the TAP implementation plan into its 2025 work plan.
- iv. The NDPC needs to coordinate with the Office of Public Policy, Program Management, Legal Support, and Environmental Procedure (MTE) to commence implementation. The GDE and NDPC should ensure the participation of all major stakeholders.

1.1.2.7.TAP Overview Planning

Table 5: TAP overview table for Pollution Control Decree-law

Sector	Transportation							
Technology	Pollution Control Decree-Law							
Ambition	An approved Pollution Control Decree-Law and outreach programs to inform the public about the new decree-law							
Benefits	Reduce emissions and control pollution from motor vehicles in use							
Actions	Activities to be implemented	Source of funding	Responsible institution & focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Budget (USD)
Action 1: Develop the Pollution Control Decree-Law	Conduct comprehensive research and analysis	GoTL/DPs	NDPC	1 year	Delay in stakeholders' coordination/low interest from stakeholders	Completion of the research within the specified timeframe	Draft research	5, 000
	Conduct stakeholders' consultation, including perspectives from women and marginalized groups	GoTL/DPs	NDPC	1-2 years	low interest from stakeholders/limited budget	Data and inputs are gathered from different stakeholders	Minutes of consultative meeting	3, 000
	Draft the pollution control decree law with clear objectives, definitions, provisions, and	GoTL/DPs	NDPC/legal support	1 year	Lack of funding/lack of coordination	Pollution Control Decree-Law is drafted	Zero draft of Pollution Control Decree-Law	10, 000

	enforcement mechanisms							
	Conduct stakeholders' consultation for reviewing the draft the pollution control decree law	GoTL/DPs	NDPC/legal support	1 year	Delays in stakeholders' consultation/ low interest from stakeholders	Active stakeholders' engagement in providing data and inputs	<ul style="list-style-type: none"> - Minutes of stakeholder's meetings - Minutes of inter-ministerial committee meeting 	3, 000
	Finalize the pollution control decree law for submission to the Council of Ministers	GoTL/DPs	NDPC/legal support	1 year	Insufficient feedback from relevant stakeholders	Pollution Control Decree-Law is approved by Council of Ministers	Pollution Control Decree-Law is developed and validated by stakeholders	4, 000
	Conduct education and outreach among relevant stakeholders on the approved Pollution Control Decree-Law	GoTL/DPs	NDPC/legal support	1-2 years	Lack of funding	Significant improvement in awareness level	Documentation of outreach session	5, 000
Action 2: Develop a skilled and knowledgeable staff	Recruit experts with specialised knowledge in pollution control	GoTL/DPs	NDPC	1 year	Lack of funding	Hired experts	Experts TOR and Contract	

	Assess existing expertise and areas that require additional training and development, considering gender-specific needs	GoTL/DPs		1 year	Lack of funding	Training needs report	Training needs assessment survey/interview	20, 000
	Develop and implement training programs that specifically address the complexities of pollution control that is gender-responsive	GoTL/DPs	NDPC	1-2 years	Lack of funding	Participation rates and training program completion	Completion of training materials and agenda for the training	4, 000

1.1.3. Action Plan for the Low Carbon Development Strategy

1.1.3.1. Introduction

The low-carbon development (LCD) strategy guides countries down a path towards low-carbon, green growth. It is a comprehensive approach that involves transitioning to cleaner energy sources, improving energy efficiency, promoting sustainable practices across sectors, and contributing to global efforts to mitigate climate change. The LCD establishes national targets and goals for low-carbon green growth, sends a signal of credibility and reliability, attracts investments, promotes technological innovations, improves energy efficiency, encourages clean energy adoption, and stimulates job creation and business opportunities. Therefore, the LCD strategy aligns environmental, economic, and social goals to build a more sustainable and resilient future.

As mentioned in the NDC, Timor-Leste is fully committed to taking more ambitious climate action on a low-carbon development path with no target for reducing emissions. In spite of its dependence on oil and negligible contribution to global emissions, and regardless of its status as a LDC, Timor-Leste is willing to develop a long-term approach to domestic mitigation through a low-carbon development strategy and sector-specific initiatives that will enhance the transparency and accuracy of national greenhouse gas emissions accounting. Aligning Timor-Leste's development goals with a low-carbon development strategy is a significant step towards meeting international climate commitments, particularly the Paris Agreement and the 1.5-degree Celsius temperature goals.

1.1.3.2. Ambition for the TAP

The ambition is to formulate a Low Carbon Development (LCD) strategy to support long-term decarbonization objectives and as a means to increase the economic contributions and the size of the non-oil-based economy, with a focus on gender mainstreaming. It should be approved by the Council of Ministers. The formulation of the Low LCD strategy will guide both national mitigation and adaptation commitments, activities, and approaches, ensuring gender considerations are integrated throughout to promote inclusivity and equality. The components of the LCD strategy will include the following elements:

- ✓ Vision/goal
- ✓ Assessment of current situation
- ✓ Emission projections, mitigation potential and costs
- ✓ Vulnerability assessment
- ✓ Priority programmes and policies
- ✓ Finance
- ✓ Institutional arrangement
- ✓ Monitoring and evaluation plans

The LCD strategy will be developed and implemented in a multi-step approach that involves numerous stakeholders.

1.1.3.3. Actions and Activities selected for inclusion in the TAP

a. Summary of barriers and measures to overcome barriers

Due to the complexity of the Low Carbon Development (LCD) strategy, the transfer of this technology is facing a number of barriers, some of which are economic and financial, and others are non-financial. According to the BAEF report, there is no financial support available to promote research and development of the Low Carbon Development (LCD) Strategy. The responsibility for implementing this technology lies with the NDCC. However, the state budget allocated to this directorate is usually divided among three different departments, which is insufficient to fund the development of the LCD strategy. Another barrier is the limited human resource capacity. Developing the LCD strategy necessitates involvement from various sectors to provide data, information, plans, and expertise. However, there is still a shortage of human resources for this development, as technical assistance remains scarce.

To address these barriers, the NDCC must initiate awareness campaigns regarding financial support by organizing meetings with various potential donors and Green Climate Fund projects. The obtained funding will be allocated for research aimed at developing the LCD strategy. Specifically, for the LCD strategy, Timor-Leste requires a climate risk assessment and a national climate information service to enhance understanding and assessment of climate risks. Therefore, it is crucial to identify potential partners and individuals who can provide capacity-building programs for relevant institutions to conduct research related to the six main activities outlined in the general description of the Low Carbon Development Strategy.

Additionally, there is a pressing need for training to enhance institutional capacity through the development of climate-related information systems, information management, monitoring operations, and other components of the LCD strategy.

b. Actions selected for inclusion in the TAP

The following actions have been chosen to be included as part of the TAP for formulating the Low Carbon Development (LCD) Strategy:

- 1. Formulate the Low Carbon Development Strategy.** Conducting thorough research and analysis is essential in developing an LCD strategy. Financial support is necessary to fund studies, data collection, and assessments, which inform the identification of low-carbon technologies, potential emission reduction measures, and sustainable development pathways. Moreover, this process will incorporate a gender perspective to ensure that strategies address the specific needs, priorities, and experiences of both men and women. This technology is regarded as cost-effective,

requiring minimal human and financial resources. Moreover, it interacts effectively with other measures, such as Timor-Leste's Nationally Determined Contributions (NDC), which underscores Timor-Leste's full commitment to pursuing more ambitious climate actions on a low-carbon development pathway, even though it does not specify emission reduction targets.

2. **Develop a skilled and knowledgeable staff.** The successful implementation of the LCD strategy relies on cross-sectoral involvement to provide essential data, information, plans, and expertise. However, due to the limited availability of technical assistance, there is a noticeable lack of human resource capacity. To address this challenge, the relevant organization should seek out suitable partners and individuals to provide capacity-building programs for relevant institutions, ensuring equal participation and opportunities for both men and women in accessing and benefiting from the training resources and opportunities. Furthermore, the recent increase in training programs for scaling up renewable energy technologies, particularly in solar photovoltaic (PV), should be extended to other sectors. This measure is effective as it will contribute to the successful implementation of the LCD strategy once it has been developed and approved.

c. Activities identified for implementation of selected actions

The actions and activities selected for inclusion in the formulation of the LCD strategy are detailed in this section. These actions, as presented in Table 6, are aligned with the measures outlined in the BAEF report and informed by the inputs collected during the TAP consultation.

Table 6: Summary of Actions and corresponding activities for Low Carbon Development (LCD) Strategy

Actions	Activities for Action Implementation
<p>Action 1:</p> <p>Formulate the Low Carbon Development (LCD) Strategy</p>	<p>1.1. Recruit experts with specialised knowledge to formulate low-carbon strategy</p> <p>1.2. Conduct comprehensive research and analysis</p> <p>1.3. Engage stakeholders from various sectors</p> <p>1.4. Draft the LCD strategy</p> <p>1.5. Conduct stakeholders' consultation for reviewing the draft</p> <p>1.6. Finalize the LCD strategy and submit it to the Council of Ministers</p> <p>1.7. Socialize the LCD strategy among relevant ministries</p>
<p>Action 2:</p>	<p>2.1. Assess existing expertise and areas that require additional training and development</p>

Develop a skilled and knowledgeable staff	<p>2.2. Identify potential partners and experts to provide capacity-building programmes</p> <p>2.3. Develop and conduct training programs to fill the skill gaps</p>
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d. Actions to be implemented as project ideas

Action 1 has been chosen to formulate the LCD Strategy because it represents the primary step in this process. The main objective of this action is to develop and approve the LCD strategy. Through barrier analysis and consultations with stakeholders on the enabling framework, the NDCC has identified insufficient state budget funding as a hindrance to the formulation of the LCD strategy. To ensure the development of an effective LCD strategy, all activities within Action 1 will be taken into account.

1.1.3.4. Stakeholders and Timeline for implementation of TAP

As the implementing entity for the TNA project, NDCC will organize a key stakeholders' workshop or roundtable discussion to communicate about the project and the TAP, especially to secure buy-in from relevant stakeholders. Meanwhile, NDCC also serves as the primary entity responsible for developing, implementing, and monitoring the LCD strategy. Therefore, NDCC will seek financial support, coordinate across relevant ministries with clear leadership in key areas, clearly define roles and policy mandates across different government ministries and agencies, and ensure that the LCD strategy is formulated and approved by the council of ministers. Moreover, this technology will aim to collaborate with the Ministry of Public Works, the Ministry of Petroleum and Mineral Resources, the Ministry of Planning and Strategic Investment, the Ministry of State Administration, and the Ministry of Transportation and Communications. These collaborations will assist in providing information related to the six sectors mentioned in the ambition. Efforts will be made during the formulation of the LCD to actively engage diverse voices, including women, to ensure a comprehensive approach to stakeholder consultation for the LCD Strategy. By incorporating gender-inclusive practices, the LCDS can better address the diverse needs and priorities of all stakeholders, leading to a more effective and equitable strategy for low-carbon development. All of these activities are anticipated to be carried out between 2024 and 2026, as outlined in Table 7.

Table 7: Scheduling and sequencing of specific activities

Actions	Scale	Year		
		2024	2025	2026
Formulate LCD Strategy	Recruit experts with specialised knowledge to formulate low-carbon strategy	X		
	Conduct comprehensive research and analysis			

			X	
	Engage stakeholders from various sectors		X	X
	Draft the LCD strategy		X	
	Conduct stakeholders' consultation for reviewing the draft		X	
	Finalize the LCD strategy and submit it to the Council of Ministers			X
	Socialize the LCD strategy among relevant ministries			X

1.1.3.5. Estimation of Resources Needed for Action and Activities

The estimated cost for developing the LCD strategy is outlined below (see Table 8). This amount may vary based on additional variables that are either included or excluded from the costs, as explained below.

Table 8: Actions, activities, capacity building needs and Costs

Action 1: Formulate Low Carbon Development (LCD) Strategy		
Activities	Capacity building and other needs	Costs (USD)
Recruit experts with specialised knowledge to formulate low-carbon strategy	Consultation cost	5, 000
Conduct comprehensive research and analysis	Research cost	5, 000
Engage stakeholders from various sectors	Consumables	2, 000
Draft the LCD strategy	Consultation cost	5, 000
Conduct stakeholders' consultation for reviewing the draft	Workshop and working session	4, 000
Finalize the LCD strategy and submit it to the Council of Ministers	Consultation cost	5, 000

Socialize the LCD strategy among relevant ministries	Campaign materials and outreach cost	4, 000
Grand Total:	USD	30, 000

1.1.3.6. Management Planning

a. Risks and contingency planning

- i. **Cost risk:** There is a risk that the cost of activities might surpass the budget due to delays in implementing the TAP. To counter this, the government, particularly the NDCC, should proactively seek support from development partners or donors to expedite implementation.
- ii. **Political risk:** The changing government structure could lead to delays or disruptions in implementation due to inconsistent political priorities. To mitigate this risk, the NDCC should raise awareness among line ministries about the crucial role of the LCD strategy.
- iii. **Scheduling risk:** With the budget allocated for 2024, new budget items may need to be considered in the following financial year. The NDCC must take the lead in TAP implementation by ensuring early involvement of all relevant parties.
- iv. **Financial risk:** There is a risk that the budget to finance TAP implementation may not be available. NDCC should collaborate with the MTE to prioritize the Low Carbon Development (LCD) Strategy within the existing budget allocation. Additionally, the Government of Timor-Leste (GoTL) should engage with development partners (DPs) to secure support for TAP implementation.
- v. **Gender risk:** Women may encounter barriers in accessing opportunities in low-carbon sectors, such as lack of training or discriminatory hiring practices. Contingencies could involve promoting women's entrepreneurship in green sectors and implementing affirmative action measures to ensure equal employment opportunities.

b. Next step

- i. NDCC (TNA National team) will draft a policy paper outlining the TNA project, seeking government approval for the TAP. Once Cabinet approval is obtained, efforts will focus on engaging other stakeholders to facilitate TAP implementation.
- ii. The General Directorate of Environment (GDE) and NDCC will convene a stakeholders' workshop or roundtable discussion to present the TAP, securing buy-in from key stakeholders.
- iii. NDCC will incorporate the implementation budget into its 2025 budget plan and integrate the TAP implementation plan into its 2025 work plan.
- iv. NDCC will initiate coordination with relevant stakeholders to commence implementation, ensuring involvement of key stakeholders such as DGE and other main stakeholders.

1.1.3.7. TAP overview table

Table 9: TAP overview table for Low Carbon Development Strategy

Sector	Transportation							
Technology	Low Carbon Development Strategy							
Ambition	Formulated and approved Low Carbon Development Strategy							
Benefits	Support long-term decarbonization objectives and as a means to increase the economic contributions and non-oil-based economy's size							
Actions	Activities to be implemented	Source of funding	Responsible institution & focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Budget (USD)
Action 1: Formulate Low Carbon Development (LCD) Strategy	Recruit experts with specialised knowledge to formulate low-carbon strategy	GoTL/DPs/Green Fund	NDCC	1 year	The budget of finance implementation may not be available	Hired experts	Experts TOR and Contract	5, 000
	Conduct comprehensive research and analysis	GoTL/DPs/Green Fund	NDCC	1 year	Delay in stakeholders' coordination/low interest from stakeholders	Completion of the research within the specified timeframe	Draft research	5, 000

	Engage stakeholders from various sectors	GoTL/DPs/Green Fund	NDCC	1 year	Delays in stakeholders' consultation/ low interest from stakeholders	Active stakeholders' engagement in providing data and inputs	- Minutes of stakeholder's meetings Minutes of inter-ministerial committee meeting	2, 000
	Draft the LCD strategy	GoTL/DPs/Green Fund	NDCC	1 year	Lack of funding	Completed LCD strategy	Desk review and data collection	5, 000
	Conduct stakeholders' consultation for reviewing the draft	GoTL/DPs/Green Fund	NDCC	1 year	low interest from stakeholders/limited budget	Active stakeholders' engagement in providing data and inputs	Minutes of stakeholders workshop	4, 000
	Finalize the LCD strategy and submit it to the Council of Ministers	GoTL/DPs/Green Fund	NDCC	1 year	Insufficient feedback from relevant stakeholders	LCD Strategy is approved by Council of Ministers	LCD Strategy is developed and validated by stakeholders	5, 000
	Socialize the LCD strategy among relevant ministries	GoTL/DPs/Green Fund	NDCC	1 year	Lack of funding	Relevant Ministries acknowledge and incorporate the LCD strategy into their programs	Documentation of outreach session	4, 000
Action 2: Develop a skilled and	Assess existing expertise and areas that require	GoTL/DPs	NDCC	1 year	Lack of funding	Training needs report	Training needs assessment survey/interview	5, 000

knowledgeable staff	additional training and development							
	Identify potential partners and individuals to provide capacity-building programmes	GoTL/DPs	NDCC	1 year	Lack of funding	Hired experts	Experts TOR and Contract	10, 000
	Conduct training programs to fill the skill gaps that contribute to the technical gaps in the institutions.	GoTL/DPs/Green Fund	NDCC	1-2 years	Lack of funding	Participation rates and training program completion	Completion of training materials and agenda for the training	

1.1.4. Action Plan for the research on installing solar system-based charging station

1.1.4.1. Introduction

Electric vehicles are now becoming immensely popular, and Timor-Leste is now slowly moving towards the use of electric vehicles. A number of electric motorcycles (ojek) have been operating in various municipalities, primarily in Liquiça, Manatuto, and Lautem, serving as public transportation. Also, the use of electric scooters and bicycles is about to become common in the capital city. Hence, specific solar-system-based charging stations should be developed to encourage the use of renewable energy and lower CO₂ emissions. This is aligned with the government's intervention in enabling energy-efficient transport sector growth.

The research enables the optimisation of solar-based charging stations to maximise energy efficiency. This involves studying factors such as solar panel orientation and tilt, energy storage solutions, and overall charging infrastructure design. It helps determine the cost-effectiveness of solar-based charging states, including evaluating the initial setup cost, operational expenses, and potential long-term savings, providing insights into the economic viability and return on investment.

Research on installing solar-system-based charging stations brings several environmental, economic, and social benefits. Solar charging stations generate electricity from renewable energy sources, thereby reducing dependence on fossil fuels. This, in turn, will result in a significant reduction in greenhouse gas emissions, thereby contributing to climate change mitigation. In terms of economics, it reduces fuel costs, shifts consumption away from imported oil to more locally produced electricity sources, and paves the way for increased usage of CVs and e-bikes. Furthermore, it provides a solution to the world's power shortage concerns, particularly in developing countries like Timor-Leste, whose electricity infrastructure is not sufficiently resilient.

1.1.4.2. Ambition for the TAP

The ambition is to do research on installing solar-system-based charging stations to encourage the use of renewable energy and lower CO₂ emissions. The proposed study will analyse the power reliability, energy cost, and CO₂ emissions of a PV-powered charging station. The system's outcomes will be compared to the other existing approaches to see whether there is a reduction in greenhouse gas (GHG) emissions, including CO₂.

The research should encompass a comprehensive analysis covering technical, economic, environmental, and social aspects, while also recognizing and responding to gender-specific needs, roles, and experiences.

1. Technical: solar system design, charging station technology, grid integration, energy management
2. Economic: cost estimation, return on investment (ROI), operational expenses, financing options
3. Environmental: carbon footprint, resource utilisation, biodiversity impact

4. Social: community impact, job creation, accessibility, safety and security, public health
5. Risk: technical risk, economic risk, environmental risk, social risk

A comprehensive analysis in these areas is essential for gaining insights into the feasibility, benefits, and potential challenges of installing a solar system-based charging station. This thorough approach supports effective decision-making and project management, taking into account gender-specific impacts and considerations

1.1.4.3. Actions and Activities selected for inclusion in the TAP

a. Summary of barriers and measures to overcome barriers

The primary barrier to deploying the technology lies in the requirement for financial commitment in research and demonstration. This encompasses costs for research studies, materials, tools, consultants, workshops, consultations, and consumables. Unfortunately, there are insufficient financial resources available to cover the total expenses associated with researching the solar system-based charging station. Additionally, the absence of legislation or regulation supporting the deployment of charging infrastructure exacerbates the situation, as it is given low priority among other national development goals. The lack of regulation also results in a dearth of inter-ministerial participation to support implementation. Furthermore, the lack of political commitment, as noted in the BAEF report, coupled with inadequate institutional capacity and the absence of legislation, poses further challenges to the process.

Several international agencies and donors are actively supporting clean energy access initiatives in Timor-Leste. Consequently, institutions such as the Secretary of State for Electricity, Water, and Sanitation can leverage these partnerships to secure financial resources for researching the installation of solar system-based charging stations. Strengthening political coordination is imperative to effectively carry out this research and technology development. This effort includes enhancing institutional capacity in financial resource mobilization, cultivating skilled workers for renewable energy projects, and establishing a clear legal framework. Additionally, the competent authority can expedite current plans to promote the approval of a decree-law on renewable energy. This legislation will enhance inter-ministerial engagement in its implementation by creating favorable environmental conditions for renewable investment.

b. Actions selected for inclusion in the TAP

1. **Conduct research on the installation of solar system-based charging stations.** The primary objective of this technology is to promote the adoption of renewable energy in the transportation sector through comprehensive research and analysis. Timor-Leste boasts a variety of renewable energy resources, with solar panels being one of the most widely adopted technologies. Integrating solar energy into the transportation system is not only

crucial for reducing reliance on fossil fuels but also holds the potential to create new job opportunities, particularly for women. These new roles can offer women various avenues for empowerment.

Additionally, improving coordination and consultation efforts is crucial for enhancing the research process regarding the installation of solar system-based charging stations. This research involves gathering extensive data and information across technical, economic, environmental, and social dimensions. The consultation can be done through groups such as the CCWG and other cross-sectoral platforms, with a specific emphasis on ensuring representation from women. This technology is well-suited to the context of Timor-Leste and is efficient in terms of both human and financial resources.

2. **Encourage the approval of the Decree-law in renewable energy.** There is no law or regulation to support the deployment of charging infrastructure due to its low priority among other national development priorities. The absence of the regulation will lead to a lack of inter-ministerial participation to support the implementation. The Ministry of Public Works has drafted a Decree-Law, but it has not been approved by the Council of Ministers. The draft decree-law will require Timor-Leste to give preference to the use and production of renewable energy over any other source of energy. It is also intended to ensure that the electricity institutional framework is effective in delivering the energy investment required to generate national revenue.

c. Activities identified for implementation of selected actions

The actions and activities chosen to be incorporated into research on installing solar system-based charging stations are shown in Table 10. The actions are connected to the measures outlined in the BAEF report and the inputs gathered during the TAP consultation.

Table 10: Summary of Actions and corresponding activities for the research on installing solar system-based charging station

Actions	Activities for Action Implementation
<p>Action 1: Conduct research on the installation of solar system-based charging stations.</p>	<p>1.1. Recruit experts with specialised knowledge in solar system-based charging station</p> <p>1.2. Conduct comprehensive research and analysis</p> <p>1.3. Engage in consultation and discussion with relevant stakeholders</p> <p>1.4. Draft the research on installing solar system-based charging station</p> <p>1.5. Conduct stakeholder’s consultation for reviewing the draft</p> <p>1.6. Finalize the research on installing solar system-based charging station</p>

<p>Action 2:</p> <p>Encourage the approval of the Decree-law in renewable energy</p>	<p>2.1. Establish a strong lobbying effort and coordinate with the Ministry of Public Works</p> <p>2.2. Conduct stakeholder engagement to support the decree law</p> <p>2.3. Contribute to the drafting and refinement of the decree-law</p> <p>2.4. Finalize the decree-law and submit it to the Council of Ministers.</p>
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d. Actions to be implemented as project ideas

The primary goal is to finish the research on installing solar system-based charging stations. Therefore, Action 1 is chosen as the project idea. Activities from Action 1 will be integrated with some from Action 2 to conduct the research effectively, supported by legislation to ensure efficiency.

1.1.4.4. Stakeholders and Timeline for implementation of TAP

To initiate the implementation process, the NDCC, serving as the national directorate responsible for the TNA project, will organize a workshop or roundtable discussion for key stakeholders. The aim is to facilitate communication about the project and the TAP, with a particular focus on gaining stakeholders' buy-in.

For the successful implementation of this technology, the General Directorate for the Regulation of the Electricity, Water, and Sanitation Sectors will collaborate closely with the Electricity of Timor-Leste (EDTL). Together, they will mobilize financial resources, conduct research based on the project's ambition, coordinate across relevant ministries with clear leadership in key areas, recruit experts with specialized skills and knowledge, and ensure that the research is carried out and approved. Additionally, they will partner with the DNTT to provide data and information regarding the public transportation system. The DNTT will inform the implementing entities about the public transportation modes requiring charging stations and assess the necessity of their installation. Furthermore, the technology will involve collaborative consultation from the public, especially in Liquiça, Manatuto, and Lautem, where *ojek* serves as public transportation. This consultation will include representation from drivers, communities, women's groups, and EV consumers to gain a comprehensive understanding of their needs and perspectives. Table 11 outlines the schedule and sequence of specific activities necessary for implementation, expected to commence from 2024 and extend until 2026.

Table 11: Scheduling and sequencing of specific activities

Actions	Scale	Year		
		2024	2025	2026
Conduct research on the installation of solar system-based charging stations.	Recruit experts with specialised knowledge in solar system-based charging station	X		
	Conduct comprehensive research and analysis		X	
	Engage in consultation and discussion with relevant stakeholders		X	X
	Draft the research on installing solar system-based charging station		X	
	Conduct stakeholder's consultation for reviewing the draft		X	X
	Finalize the research on installing solar system-based charging station			X
	Contribute to the drafting and refinement of the decree-law		X	X
	Finalize the decree-law and submit it to the Council of Ministers.		X	X

1.1.4.5. Estimation of Resources Needed for Action and Activities

The implementation of conducting research on the installation of solar system-based charging will rely on recruiting experts from both national and international backgrounds to carry out the study. The breakdown of costs is detailed in Table 12. However, this cost could vary depending on additional variables that are either added or subtracted from the costs as detailed below:

Table 12: Actions, activities, capacity building needs and Costs

Action 1: Conduct research on the installation of solar system-based charging stations		
Activities	Capacity building and other needs	Costs (USD)
Recruit experts with specialised knowledge in solar system-based charging station	Experts cost	10, 000

Conduct comprehensive research and analysis	Consumables	5, 000
Engage in consultation and discussion with relevant stakeholders	Consumables	3, 000
Draft the research on installing solar system-based charging station	Experts cost	5, 000
Conduct stakeholder's consultation for reviewing the draft	Workshop and working session	5, 000
Finalize the research on installing solar system-based charging station	Experts cost	5, 000
Contribute to the drafting and refinement of the decree-law	Consumables	3, 000
Finalize the decree-law and submit it to the Council of Ministers.	Workshop and working session	
Grand Total:	USD	36, 000

1.1.4.6. Management Planning

a. Risks and contingency planning

- i. **Cost risk:** There is a possibility that activity costs could exceed the budget due to delays in TAP implementation. In response, the government, particularly the NDCC, should actively seek support from development partners or donors to expedite implementation.
- ii. **Political risk:** Changes in government structure might cause delays or disruptions in implementation due to shifting political priorities. To mitigate this risk, EDTL and DGREAS should raise awareness among line ministries about the importance of the research.
- iii. **Scheduling risk:** With the budget already allocated for 2024, new budget items may need to be deferred to the following financial year. To address this risk, EDTL and DGREAS should take the lead in TAP implementation, ensuring early involvement of all relevant parties
- iv. **Financial risk:** There's a risk of insufficient budget for TAP implementation. EDTL/DGREAS should collaborate with the Secretary of State for Electricity, Water, and Sanitation to prioritize research on solar system-based charging station installation within the existing

budget. Additionally, engagement with development partners (DPs) is crucial to garner support for TAP implementation

- v. **Gender risk:** Inadequate representation of women in municipal discussions presents a risk. The implementing entity should coordinate with local authorities to prioritize gender balance and ensure the active participation of women

b. Next steps

- i. The NDCC (TNA National team) will draft a policy paper on the TNA project to secure government approval for the TAP.
- ii. The NDCC should collaborate with the General Directorate for the Regulation of Electricity, Water, and Sanitation to organize a stakeholders' workshop or roundtable discussion aimed at communicating the TAP to gain stakeholders' buy-in.
- iii. EDTL and DGREAS should allocate funds for implementation in their 2025 budget. They should also integrate the TAP implementation plan into their respective 2025 work plans.
- iv. EDTL/DGREAS should coordinate with relevant stakeholders to initiate implementation. They should ensure that all key stakeholders are actively involved in the process.

1.1.4.7. TAP overview table

Table 13: TAP overview table for the research on installing solar system-based charging station

Sector	Transportation							
Technology	Research on installing solar system-based charging station							
Ambition	Completed and approved research on installing solar system-based charging station							
Benefits	To encourage the use of renewable energy and lower CO ₂ emissions							
Actions	Activities to be implemented	Source of funding	Responsible institution & focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Budget (USD)
Action 1: Conduct research on the installation of solar system-based charging stations.	Recruit experts with specialised knowledge in solar system-based charging station	GoTL	DGREAS/EDTL	1 year	Lack of funding	Hired experts	Experts TOR and Contract	10,000
	Conduct comprehensive research and analysis	GoTL/DPs	DGREAS/EDTL	1 year	Delay in stakeholders' coordination/low interest from stakeholders	Completion of the research within the specified timeframe	Draft research	5,000
	Engage in consultation and discussion with relevant stakeholders	GoTL/DPs	DGREAS/EDTL	1-2	Delays in stakeholders' consultation/ low interest from stakeholders	Active stakeholders' engagement in providing data and inputs	Minutes of stakeholder's meetings. Minutes of inter-ministerial	3,000

							committee meaning	
	Draft the research on installing solar system-based charging station	GoTL/DPs	DGREAS/EDTL	1 year	Lack of funding	Completed the research	Desk review and data collection	5,000
	Conduct stakeholder's consultation for reviewing the draft	GoTL/DPs	DGREAS/EDTL	1 year	low interest from stakeholders/limited budget	Active stakeholders' engagement in providing data and inputs	Minutes of consultative meeting	5,000
	Finalize the research on installing solar system-based charging station	GoTL/DPs	DGREAS/EDTL	1 year	Insufficient feedback from relevant stakeholders	The research is completed and approved	The research is validated by stakeholders	5,000
Action 2: Encourage the approval of the Decree-law in renewable energy	Establish a strong lobbying effort and coordinate with the Ministry of Public Works	GoTL	DGREAS/EDTL	1 year	Lack of interest	Minister is agreed to proceed with the Decree-law	Minutes of consultative meeting	2,000

	Conduct stakeholder engagement to support the decree law	GoTL	DGREAS/EDTL	1 year	Delay in stakeholders' coordination/low interest from stakeholders	Active stakeholders' engagement	Minutes of consultative meeting	
	Contribute to the drafting and refinement of the decree-law	GoTL	DGREAS/EDTL	1 year	Delay in ministry' level	The Decree-law is drafted	Continues engagement in drafting the Decree-law	3, 000
	Finalize the decree-law and submit it to the Council of Ministers.	GoTL	DGREAS/EDTL	1 year	Delay in ministry' level	The Decree-law is finalised and approved	Feedbacks are incorporated to the draft Decree-law	

1.1.5. Action Plan for the public transport maximization

1.1.5.1. Introduction

One effective way to reduce GHG emissions is by encouraging more people to opt for public transportation instead of driving their own cars. However, the public transport system in Timor-Leste is still largely undeveloped. Approximately sixty percent of all intercity journeys in Timor-Leste are made via public transport, but the service is poor, seats are not guaranteed, departure and arrival times are arbitrary, and passenger comfort is not a top priority.

Maximising public transport contributes to a more sustainable, inclusive, and efficient urban environment, which is beneficial to the economy, the planet, and the well-being of individuals and communities both individually and collectively. Generally, public transport emits fewer greenhouse gases (GHG) per passenger compared to private vehicles. This helps combat air pollution and mitigates the impact of climate change. Economically, public transport can transport a large number of people at a lower cost per capita, especially in densely populated areas. It also boosts employment opportunities, which contributes to economic growth and stability. In addition, public transport enhances accessibility for individuals who may not have access to private vehicles, such as those with disabilities, low-income individuals, the elderly, and women. It also reduces traffic congestion and fosters community connectivity.

The public transport system in Timor-Leste has a vision for meeting the goals of the Paris Agreement, including by encouraging mode shift to reduce the emissions intensity of travel and harnessing new technologies and innovative features to support climate mitigation and resilience.

1.1.5.2. Ambition for the TAP

The Timor-Leste 2023 Public Transport Master Plan is currently being developed. The draft Master Plan outlines action plans and priority improvements for public transport services and facilities through 2035, based on the 2022 Transport Sector Master Plan (PTMP) and updated data, including routing and network assessment, field surveys, engineering studies, costing, legal and regulatory assessment, and institutional capacity assessment.

The ambition of public transport maximisation will focus on the operation of public transport, facilities, institutions, and supporting infrastructure, as described in phases 1 (up to 2025). Phase 1 is a short-term action or initiative that can be adopted quickly to improve service and facilities, with minimal infrastructure enhancement timelines and minimal institutional or regulatory framework changes (e.g., service and routing changes, terminal operating protocol refinements, and design guidelines), possibly implemented by MOTC and the Timorese Government to facilitate larger-scale investment in later phases. The short-term actions/initiatives are expected to enhance mobility and accessibility while ensuring safety and inclusivity for women and disadvantaged groups.

1.1.5.3. Actions and Activities selected for inclusion in the TAP

a. Summary of barriers and measures to overcome barriers

The transfer and diffusion of this technology encounter various barriers, some of which are economic and financial, while others are non-financial. One significant barrier identified during consultations is the high initial capital investment required. This investment covers vehicle procurement, depot provision and operation, as well as infrastructure and facility management. Another obstacle is the weak institutional capacity. DNTT grapples with persistent challenges in regulating and managing the continuously expanding and evolving land transport sector within the civil service setting. Consequently, there is a lack of transparency for stakeholders such as operators, resulting in inconsistent network coordination and quality. Additionally, the directorate lacks direct experience in public transit planning, with most expertise lying in interdisciplinary fields such as public administration, law, and economics. There is also a shortage of highly qualified individuals capable of undertaking analytical and crucial efforts.

To overcome the aforementioned barriers, the Ministry of Transport and Communication (MOTC) must devise a strategic and sustainable financing approach for maximizing public transport. Various national documents have highlighted both public and private funding sources as potential avenues for financing public transport initiatives. Additionally, accessing public funds or loans from institutions such as the World Bank, regional development banks like the ADB, or through bilateral development cooperation agreements is feasible. Climate change funding mechanisms, including the Clean Development Mechanism (CDM), the Global Environment Facility (GEF), and the Green Climate Fund (GCF), could also support transit projects.

To strengthen institutional capacity, establishing a new Land Transport Authority (LTA) is recommended. With clearly defined objectives, functions, responsibilities, and powers, the LTA can emerge as a more effective regulator and manager within the land transport sector. Similarly, the formation of a public transport operator association is crucial for enforcement and regulation. In addition, investing in training and capacity building is imperative for professionalization. This entails providing technical training for drivers, management training for operators, and customer service training for frontline staff. Enhancing the skill set of employees is essential for elevating the level of service and professionalism within the industry.

b. Actions selected for inclusion in the TAP

- 1. Improve microlet services in Dili to maximize public transport usage.** The enhancement of microlet services in Dili involves restructuring the microlet routes to cover a total of 200.9 km, with 13 routes serving key generators and activity centers in Dili. This restructuring aims to improve the efficiency and performance of microlet services by expanding, truncating, rerouting, or combining routes that currently underperform. Additionally, the refinement of

Dili microlet services, including headway and required vehicles, is necessary to meet demand and enhance performance for each route. This process will entail the formulation of design guidelines, ensuring that the needs and considerations of all genders are taken into account in planning the routes and providing the services. Furthermore, the efficiency and performance of microlet services will be improved through adjustments in service frequencies and the deployment of vehicles to ensure the appropriate level of service for each route, considering its existing and future demand characteristics. These actions can be implemented relatively quickly to enhance service and facilities, with minimal timeline required for infrastructure enhancements.

- 2. Establishment of a new Land Transport Authority (LTA).** All levels of government are weak, and they have no authority over how services are provided. The government maintains minimal oversight over fixed microlet services. As an example, the government authorises routes but does not control or establish service standards, vehicle specs, or quality of service. Therefore, the LTA seeks to efficiently regulate and manage the legality, affordability, sustainability, safety, and inclusion of transportation-related issues. The LTA will function as a public institute within Timor-Leste's autonomous agencies, focusing on regulatory responsibilities and powers rather than commercial activities. This approach ensures that transportation-related issues, including gender mainstream inclusion, are effectively addressed. Moreover, this action complements other measures and is suitable to the country context.
- 3. Formation of the public transport operator association.** Timor-Leste's current individual owner-operator model creates incentives for operators that prioritize individual interests, thereby limiting the overall focus on passenger needs within the network. Therefore, the formation of the public transport operator association represents the first step towards establishing a more coordinated and professional operator sector. By joining these associations, operators can coordinate operations, negotiate collectively, and pool resources for their members. This collaboration improves service quality, sustainability, and profitability while also addressing gender-specific concerns, ensuring that public transportation services are safe, accessible, and inclusive for everyone. This measure is relatively effective as it is expected to lead to the goal of technology implementation.
- 4. Promote capacity-building and training across both the public and private sectors.** Capabilities and skills are crucial in both the public and private sectors, especially in nations with comparable levels of development. Currently, there is limited local technological know-how or capacity concerning public transport. Therefore, enhancing education, improving skills, and building overall capacity for both the National Directorate for Land Transport (DNLT) and private sector operators are essential steps in updating the institutional structure that governs public transport. This training should also extend to enforcement officials, covering traffic and public transport laws, including understanding these laws, enforcement methods, and dealing with violations effectively. Additionally, training should include the basic principles of bus timetable development, such as route frequency, peak and off-peak scheduling, and interconnections with other services. It is imperative to ensure that women are included and have equal access to education, training, and opportunities in

the transportation sector. This measure is considered cost-effective as it mainly requires conducting assessments, developing training materials, and conducting training sessions.

c. Activities identified for implementation of selected actions

The actions and activities selected for inclusion in the public transport maximization are detailed in Table 14. These actions are aligned with the measures outlined in the BAEF report and the draft of the Timor-Leste 2023 Public Transport Master Plan, incorporating inputs collected during the TAP consultation.

Table 14: Summary of actions and corresponding activities for the public transport maximization

Actions	Activities for Action Implementation
<p>Action 1:</p> <p>Improve microlet services in Dili to maximize public transport usage.</p>	<p>1.1. Conduct a comprehensive assessment for improving microlet services</p> <p>1.2. Consult with relevant stakeholders, including microlet operators, local authorities, community representatives, and passengers</p> <p>1.3. Restructure Dili microlet routes and operate 200.9 km with 13 routes serving key generators/activity centres in Dili</p> <p>1.4. Refine Dili microlet services (headway/required vehicles) to meet demand</p> <p>1.5. Test proposed route changes or service improvements through pilot programs</p> <p>1.6. Develop and implement multimedia campaign and information session</p> <p>1.7. Conduct monitoring and evaluation</p> <p>1.8. Establish design guidelines for public transport facilities</p> <p>1.9. Increase enforcement efforts for existing laws</p>
<p>Action 2:</p> <p>Establishment of a new Land Transport Authority (LTA)</p>	<p>2.1. Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines.</p> <p>2.2. Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities.</p>

	<p>2.3. Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning</p> <p>2.4. Submit and pass relevant legislation to provide government mandate for LTA establishment</p> <p>2.5. Plan an official launch event to introduce the LTA to the public and stakeholders.</p> <p>2.6. Develop training programs for LTA staff to ensure they have the necessary skills and knowledge for effective operation</p>
<p>Action 3:</p> <p>Formation of the public transport operator association</p>	<p>3.1. Identify key stakeholders, including public transport operators, drivers, and other entities involved in the transportation sector.</p> <p>3.2. Facilitate operator forums to discuss establishment of operator association.</p> <p>3.3. Hold meetings and consultations with potential members to gather input on the association's objectives, functions, and structure.</p> <p>3.4. Launch a membership drive to attract public transport operators to join the association</p> <p>3.5. Develop a constitution that outline the purpose, structure, membership criteria, governance mechanism and operational guidelines of the association</p> <p>3.6. Hold elections or appointments to establish the leadership of the association, including a president, secretary, treasurer, and other key roles</p> <p>3.7. Complete the necessary paperwork to register the Public Transport Operator Association with the Ministry of Justice.</p> <p>3.8. Conduct operator organizational skills training and implement training programs to enhance the skills and capacity of association members.</p>

	<p>3.9. Develop collaborative relationship with government authority, and advocate for and implement sustainable practices within the public transport sector</p>
<p>Action 4: Promote capacity building and training across both the public and private sectors</p>	<p>1.1. Conduct a thorough needs assessment to identify skill gaps and training requirements in both the public and private sectors</p> <p>1.2. Develop a comprehensive training framework that covers various aspects of public transport system</p> <p>1.3. Organize specialised training programs to fill the skills gaps</p> <p>1.4. Foster collaboration between public transport authorities, operators, relevant entities to create a unified approach to training</p> <p>1.5. Introduce certification programs to recognize and validate the skills acquired through training, encouraging continuous professional development.</p> <p>1.6. Implement on-the-job training programs to provide practical experience and hands-on learning opportunities for employees in both public and private roles.</p> <p>1.7. Integrate sustainability and environmental awareness training into programs to promote eco-friendly practices within the public and private transport sectors.</p> <p>1.8. Organize workshops and seminars that bring together professionals from both sectors to share experiences, best practices, and innovations.</p> <p>1.9. Establish training centres equipped with simulation tools and modern training facilities to facilitate effective and practical training.</p> <p>1.10. Seek government support in terms of policy frameworks, funding, and recognition of the importance of capacity building in the public and private transport sectors.</p> <p>1.11. Continuously evaluate the effectiveness of training initiatives, gather feedback from participants and adjust</p>

	programs based on evolving industry needs and technological advancements.
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d. Actions to be implemented as project ideas

Action 2: Establishment of a new Land Transport Authority (LTA) is chosen to be implemented as a project idea. Establishing a new public entity would require it to manage, control, and operate public transport services, such as in the form of a LTA. The establishment of the LTA is aligned with the Timor-Leste 2023 Public Transport Master Plan, which states that the process will begin in Phase 1 (up to 2025). The master plan suggests that a Public Transport Planning and Regulation Department will be established within the LTA to plan, license, regulate, and contract the private sector for operations. By establishing the LTA first, the implementing entity will have authority over how services are operated and can better improve public transport, especially microlet operations in Dili.

1.1.5.4. Stakeholders and Timeline for implementation of TAP

The Ministry of Transport and Communications (MOTC) oversees government activities related to transportation in Timor-Leste through various state administration entities. It includes designing guidelines for public transport facilities, enforces laws, establishes the Land Transport Authority (LTA), and operator associations. The Ministry collaborates with other entities like the Ministry of Public Works (MPW) and the National Procurement Commission (NPC). The DNTT, under the MOTC, manages land transport and plays a key role in planning and developing the public transport network. It is responsible for ensuring efficiency and effectiveness, including route planning and establishment. The Director of DNTT, according to Ministerial Diploma no. 49/2019, is primarily responsible for planning public transport routes and establishing provincial bus and microlet routes accordingly.

Therefore, in carrying out the TAP, the DNTT takes the lead in restructuring microlet routes and refining microlet services. Meanwhile, the MOTC will be responsible for implementing design guidelines, enforcing existing laws, and establishing the Land Transport Authority (LTA) and operator associations. The implementation of the technology will involve collaboration among microlet operators, local authorities, community representatives, and passengers, ensuring gender balance in participation and decision-making processes. Table 15 provides the schedule and sequence of specific activities required for implementation, which are expected to begin in 2024 and continue until 2026.

Table 15: Scheduling and sequencing of specific activities

Actions	Scale	Year		
		2024	2025	2026
Establishment of a new Land Transport Authority (LTA)	Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines	X	X	

	Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities	X	X	
	Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning	X	X	
	Submit and pass relevant legislation to provide government mandate for LTA establishment		X	X
	Plan an official launch event to introduce the LTA to the public and stakeholders.		X	X
	Develop training programs for LTA staff to ensure they have the necessary skills and knowledge for effective operation		X	X

1.1.5.5. Estimation of Resources Needed for Action and Activities

The establishment of the Land Transport Authority (LTA) will involve hiring consultants to develop a legal framework, including conducting stakeholder consultations. The breakdown of costs is provided in Table 16. However, these costs may vary depending on additional variables that are either added to or subtracted from the detailed costs below.

Table 16: Actions, activities, capacity building needs and Costs

Action 1: Establishment of a new Land Transport Authority (LTA)		
Activities	Capacity building and other needs	Costs (USD)
Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines	Consultant cost	10, 000
	Consumables	5, 000
Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities	Workshop and working session	5, 000
Incorporate further detail on public transport responsibilities, functions and		

required roles into LTA Establishment Transition Planning	Consultant cost	\$5, 000
Submit and pass relevant legislation to provide government mandate for LTA establishment		
Plan an official launch event to introduce the LTA to the public and stakeholders.	Launching event	2, 000
Develop training programs for LTA staff to ensure they have the necessary skills and knowledge for effective operation	Training to LTA staffs	3, 000
Grand Total:	USD	30, 000

1.1.5.6. Management Planning

a. Risks and contingency planning

- i. **Cost risk:** The cost of activities may exceed the budgeted due to the delays in the implementation of the TAP. The government, especially the Ministry of Transport and Communications (MOTC) should seek for support from DPs or donors to accelerate the implementation.
- ii. **Political risk:** The changing government structure may delay or disrupt the implementation due to the inconsistency of political priorities. The DNTT should create awareness among line ministries of the importance of maximizing the public transport.
- iii. **Scheduling risk:** The budget for the 2024 has been allocated, hence the new budget items may be looked at in the financial year. The MOTC should take the lead in implementing the TAP by making sure that all relevant parties are involved from the beginning.
- iv. **Financial risk:** The budget to finance the implementation of the TAP may not be available. MOTC should prioritize establishing a new Land Transport Authority (LTA) within existing budget allocation and engage with DPs for support.
- v. **Gender risk:** Disparities in representation and decision-making may neglect women's transportation needs. Ensure gender balance in LTA leadership provide gender-specific training, and involve women's organizations in decision-making processes.

b. Next steps

- i. The NDCC (TNA National team) will draft the policy paper on the TNA project to obtain government approval for the TAP.
- ii. The General Directorate of Environment (GDE) and NDCC will arrange a stakeholders' workshop or roundtable discussion to communicate the TAP.
- iii. MOTC should incorporate the implementation budget into its 2025 budget work plan.
- iv. MOTC should collaborate with relevant stakeholders to initiate implementation.

1.1.5.7. TAP overview table

Table 17: TAP overview table for public transport maximization

Sector	Transportation							
Technology	Public transport maximization							
Ambition	The operation of the public transport, facilities, institutions, and supporting infrastructure, as describe in the phase 1 (up to 2025) of Master Plan							
Benefits	Reduce the emissions intensity of travel and harnessing new technologies and innovative features to support climate mitigation and resilience							
Actions	Activities to be implemented	Source of funding	Responsible institution & focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Budget (USD)
Action 1: Improve microlet services in Dili to maximize public transport usage	Conduct a comprehensive assessment for improving microlet services	GoTL	MOTC	1 year	Delay in stakeholders' coordination/low interest from stakeholders	Completion of the research within the specified timeframe	Draft report	5,000
	Consult with relevant stakeholders, including microlet operators, local authorities, community representatives, and passengers	GoTL	MOTC	1 year	Delays in stakeholders' consultation/ low interest from stakeholders	Active stakeholders' engagement in providing data and inputs	Minutes of stakeholder's meetings. Minutes of inter-ministerial committee meeting	3,000
	Restructure Dili microlet routes and	GoTL	MOTC	1-2 years	Disruption may cause passenger	Efficient and reliable	Number of microlet routes	

	operate 200.9 km with 13 routes serving key generators/activity centers in Dili				dissatisfaction and resistance	transportation network serving key areas of Dili	successfully restructured	
	Refine Dili microlet services (headway/required vehicles) to meet demand	GoTL	MOTC	1-2 years	Inadequate adjustments may cause overcrowding or underutilization	Optimal utilization of microlet services	Increase in passenger ridership during peak hours.	
	Test proposed route changes or service improvements through pilot programs	GoTL	MOTC	1 year	Pilot programs may not accurately reflect real-world conditions	successful implementation and evaluation of proposed route changes/service improvements.	Percentage change in ridership on pilot routes compared to baseline	15,000
	Develop and implement multimedia campaign and information session	GoTL	MOTC	1-2 years	Campaign and sessions may not reach target audience or convey message effectively	Successful dissemination of information and increased public awareness	# participants attending information sessions or accessing campaign materials	10,000
	Conduct monitoring and evaluation	GoTL	MOTC	2 years	Inadequate monitoring and evaluation	Monitoring and evaluation drive data-driven improvements in transport services	Timely reporting and analysis of data	20,000
	Establish design guidelines for public transport facilities	GoTL	MOTC/MPW	1 year	Inadequate or ineffective design guidelines	Establishment of comprehensive design guidelines	Regular reviews and updates of design guidelines	20,000

	Increase enforcement efforts for existing laws	GoTL	MOTC	1 year	Insufficient enforcement efforts	Enhanced compliance with existing laws and regulations	Decrease in law violations	10, 000
Action 2: Establishment of a new Land Transport Authority (LTA)	Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines.	GoTL/DPs	MOTC	1-2 years	Delay in stakeholders' coordination	Completed and approved legislation	Draft of LTA legislation	10, 000
	Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities.	GoTL/DPs	MOTC	1-3 years	Delay in stakeholders' coordination/low priority	<ul style="list-style-type: none"> ➤ Active stakeholders' engagement ➤ Validated LTA establishment 	Minutes of consultative meeting	5, 000
	Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning	GoTL/DPs	MOTC	1 year	Delay in stakeholders' coordination/low priorities	Completed and approved legislation	Draft of LTA Legislation with clear responsibilities and function	\$5, 000

	Submit and pass relevant legislation to provide government mandate for LTA establishment	GoTL/DPs	MOTC	1 year	Delay in approval	Establishment of LTA	Minutes of stakeholder's meetings	
	Plan an official launch event to introduce the LTA to the public and stakeholders.	GoTL/DPs	MOTC	1 year	Delay in stakeholders' coordination	Launched of LTA	Concept note of LTA launching	2, 000
	Develop training programs for LTA staff to ensure they have the necessary skills and knowledge for effective operation	GoTL/DPs	MOTC	1 year	Lack of funding	Effective LTA operation	<ul style="list-style-type: none"> ➤ Developed training materials ➤ Number of trained LTA staffs 	3, 000
Action 3: Formation of the public transport operator association	Identify key stakeholders, including public transport operators, drivers, and other entities involved in the transportation sector.	GoTL	MOTC	1 year	Delays in stakeholders' coordination/ low interest from stakeholders	Active stakeholders' engagement	Minutes of stakeholder's meetings	
	Facilitate operator forums to discuss establishment of operator association.	GoTL/DPs	MOTC	1 year	Delays in stakeholders' coordination/ low interest from stakeholders	Establishment of operation association	Minutes of forum discussion	5, 000

	Hold meetings and consultations with potential members to gather input on the association's objectives, functions, and structure	GoTL/DPs	MOTC	1 year	Delays in stakeholders' coordination/ low interest from stakeholders	Draft of association's constitution	Minutes of stakeholder's meetings	5, 000
	Launch a membership drive to attract public transport operators to join the association	GoTL/DPs	MOTC	1 year	Lack of interest from operators	Membership is launched	Number of operators registered	
	Develop a constitution that outline the purpose, structure, membership criteria, governance mechanism and operational guidelines of the association	GoTL/DPs	MOTC	1-2 years	Lack of funding/low interest	Completed constitution	Draft of constitution	10, 000
	Hold elections or appointments to establish the leadership of the association, including a president, secretary, treasurer, and other key roles	GoTL/DPs	MOTC	1 year	Lack of funding/low interest/lack of coordination	Implementation of a secure and confidential voting process.	Documentation of the nomination process	5, 000
	Complete the necessary paperwork to register the Public	GoTL/DPs	MOTC	1-2 years	Administrative Delays	Successful completion of the registration	Regularly check the status of the	

	Transport Operator Association with the Ministry of Justice.					within the expected timeframe	registration process	
	Conduct operator organizational skills training and implement training programs to enhance the skills and capacity of association members.	GoTL/DPs	MOTC	1-3 years	Lack of funding/time constraints	Successful training	Concept note and invitation distribution	
	Develop collaborative relationship with government authority, and advocate for and implement sustainable practices within the public transport sector	GoTL/DPs	MOTC	1-3 years	Insufficient resources	Successful implementation of sustainable practices	Regularly review resource allocations for sustainability initiatives.	
Action 4: Promote capacity building and training across both the public and private sectors	Conduct a thorough needs assessment to identify skill gaps and training requirements in both the public and private sectors	GoTL/DPs	MOTC	1 year	Lack of Stakeholder Involvement	Active and diverse participation from relevant stakeholders	Needs assessment survey/interview	5,000
	Develop a comprehensive training framework that covers various	GoTL/DPs	MOTC	1 year	Lack of resources	High attendance of training from multiple stakeholders	Concept note and invitation distribution	

	aspects of public transport system							
	Organize specialised training programs to fill the skills gaps	GoTL/DPs	MOTC	1-2 years	Lack of resources	High attendance of training from multiple stakeholders	Concept note and invitation distribution	
	Foster collaboration between public transport authorities, operators, relevant entities to create a unified approach to training	GoTL/DPs	MOTC	1-3 years	Lack of stakeholder's engagement	High levels of active engagement from all key stakeholders.	Participation in collaborative meetings and initiatives.	
	Introduce certification programs to recognize and validate the skills acquired through training, encouraging continuous professional development.	GoTL/DPs	MOTC	1-2 year	Limited Participation	Increased participation rates in certification programs	Track the number of participants in the certification programs	5,000
	Implement on-the-job training programs to provide practical experience and hands-on learning opportunities for employees in both public and private roles.	GoTL/DPs	MOTC	1-3 years	Limited Participation	Increased participation rates	Concept note and invitation distribution	

	Integrate sustainability and environmental awareness training into programs to promote eco-friendly practices within the public and private transport sectors.	GoTL/DPs	MOTC	1 year	Insufficient resources	Successful implementation of sustainable practices	Regularly review resource allocations for sustainability initiatives.	
	Organize workshops and seminars that bring together professionals from both sectors to share experiences, best practices, and innovations.	GoTL/DPs	MOTC	1-2 years	Limited Participation	Increased participation rates	Concept note and invitation distribution	30,000
	Establish training centres equipped with simulation tools and modern training facilities to facilitate effective and practical training.	GoTL/DPs	MOTC	1-3 years	High initial investment and technological challenges	Establishment of training centre	Regular review of budget allocations for the establishment of training centre	
	Seek government support in terms of policy frameworks, funding, and recognition of the	GoTL/DPs	MOTC	1-2 year	Lack of Government Commitment	Evidence of increased funding or resources allocated to	Monitoring government initiatives and funding allocations	

	importance of capacity building in the public and private transport sectors.					capacity-building programs	related to capacity building	
	Continuously evaluate the effectiveness of training initiatives, gather feedback from participants and adjust programs based on evolving industry needs and technological advancements.	GoTL/DPs	MOTC	1-3 years	Inadequate Feedback Mechanisms	Robust and accessible feedback mechanisms in place	Regularly assess the availability and effectiveness of feedback mechanisms	

1.2. Project Ideas for Transportation Sector

1.2.1. Brief Summary of the Project Ideas for Transportation Sector

Timor-Leste's public transport system is currently characterised by disorganised, informal, and largely unregulated services operated by private individuals' operators (including microlets as well as buses). However, most vehicles are old, badly maintained, outdated, polluting, fuel-intensive, and inaccessible. It fails to provide efficient and quality service to passengers, becomes unsafe and insecure, undermines economic competitiveness, and contributes to poverty reduction and community development. As a result, people typically choose private cars over ineffective public transportation options, which causes the number of private vehicles (mainly motorcycles) to rise annually.

As a contribution to maximising public transportation, four (4) project ideas have been proposed for the transportation sector for the implementation of the country's technology action plan. These are:

1. Develop the Pollution Control Decree-Law
2. Formulate Low Carbon Development (LCD) Strategy
3. Conduct research on the installation of solar system-based charging stations
4. Establishing a new Land Transport Authority (LTA)

These project ideas were derived from the four technologies in the transportation sector prioritised in the stakeholder's consultation workshop conducted under Step I of the Technology Needs Assessment (TNA) project. The technology prioritisation was conducted using the Multi-Criteria Analysis (MCA) method. During the consultation workshop, the respective stakeholders discussed the identified criteria and indicators and validated them. The criteria for technology prioritisation for mitigation measures are cost and benefits related to economic, social, environmental, climate, and local contexts. Furthermore, a detailed barrier and enabling framework analysis was also done for each of the prioritised technologies. Summaries of the barriers and measures to overcome them are also presented in the action plan for each technology.

The idea of a Pollution Control Decree-Law, which empowers the government to introduce regulations for controlling various forms of pollution and hold polluters accountable, aligns with common environmental governance practices around the world. While the formulation of a Low Carbon Development (LCD) strategy is to support long-term decarbonisation objectives and as a means to increase the economic contributions and non-oil-based economy's size. The research on installing solar system-based charging stations and the public transport maximisation aim to make combustion technology more efficient and increase the use of public transport. Each of the technologies has a number of actions proposed; however, only four were selected for the project ideas. Each action can be developed into a stand-alone project for further implementation of the TAP. To create an efficient and sustainable public transport system, the implementation of all actions will be required.

1.2.2. Specific Project Ideas

1.1.2.1. Specific Project Idea: Develop the Pollution Control Decree-Law

Table 18: Specific Project Idea for Pollution Control Decree-Law

<p>Introduction/Background</p>	<p>There are no vehicle emission regulations in Timor-Leste to control the amount of pollution that motor vehicles and engines can emit. Currently, there is only Decree-Law No. 13/2011 that prohibits the import of light passenger and mixed vehicles that are more than 5 years old (from the date of their original manufacture to the date of import). Therefore, the proposed Pollution Control Decree-Law will also consider the provision of a vehicle emission standard programme that aims to reduce emissions and control pollution from motor vehicles in use. The inclusion of vehicle emissions standards in the proposed Pollution Control Decree Law is a laudable step in addressing air pollution and its impact on public health and the environment in Timor-Leste, which ultimately support a net improvement in economic welfare and save on medical expenses for air pollution-related health problems.</p> <p>Having a Pollution Control Decree-Law in place will enable the government to introduce regulations for controlling air, water, and soil pollution, as well as noise pollution. The decree law will also permit the government to regulate polluters and make them pay for the environmental damage they cause.</p>
<p>Objectives</p>	<ol style="list-style-type: none"> 1. To provide a framework for establishing vehicle emission standards 2. To introduce regulations for controlling various forms of pollution and hold polluters accountable 3. To reduce emissions and control pollution from motor vehicles in use
<p>What are the outputs and are they measurable?</p>	<ol style="list-style-type: none"> 1. Approved Pollution Control Decree-Law 2. Introduction of vehicle emission standards
<p>Relationship to the country's sustainable development priorities</p>	<p>The project idea aligns with the Timor-Leste Strategic Development Plan (SDP) 2011–2030. Under the SDP, the goal of pollution control in transportation sector is to develop laws to regulate emissions from vehicles. Hence, this Project Idea will act as an entry point to establish and enforce the vehicle emission standards.</p>

Project Deliverables (Value/benefits)	<ol style="list-style-type: none"> 1. Incorporating vehicle emission standards into pollution control laws offers a comprehensive approach to addressing environmental and public health challenges, promoting technological innovation, and fostering sustainable economic development. 2. It empowers the government to introduce regulations for controlling various forms of pollution and holding polluters accountable, aligning with common environmental governance practices around the world. 3. Limit the amount of pollution that can be emitted by vehicles or engines. 4. Reduced greenhouse gas emissions due to controlled pollutants entering the air 	
Project Scope, Possible Implementation	The project can be implemented under the Timor-Leste SDP 2011–2030 because the actions that need to be taken are within the plan. It is feasible because it greatly contributes to the environmental, economic, and social aspects.	
Project Activities	<p>These include:</p> <ul style="list-style-type: none"> ➤ Conduct comprehensive research and analysis ➤ Conduct stakeholders’ consultation, including perspectives from women and marginalized groups ➤ Draft the pollution control decree law with clear objectives, definitions, provisions, and enforcement mechanisms ➤ Conduct stakeholders’ consultation for reviewing the draft the pollution control decree law ➤ Finalize the pollution control decree law for submission to the Council of Ministers ➤ Conduct education and outreach among relevant stakeholders on the approved Pollution Control Decree-Law 	
Timelines	The activities are expected to start in 2024 and run up to 2026	
Budget Resource requirements	Activity/budget line	Budget (USD)
	Conduct comprehensive research and analysis	5, 000
	Conduct stakeholders’ consultation, including perspectives from women and marginalized groups	3, 000
	Draft the pollution control decree law with clear objectives, definitions, provisions, and enforcement mechanisms	10, 000
	Conduct stakeholders’ consultation for reviewing the draft the pollution control decree law	3, 000

	Finalize the pollution control decree law for submission to the Council of Ministers	4,000	
	Conduct education and outreach among relevant stakeholders on the approved Pollution Control Decree-Law	5,000	
The project will be funded by GOTL and DPs			
Measurement/Evaluation	Activity	Monitoring Indicators	Success criteria
	Conduct comprehensive research and analysis	Draft research	Completion of the research within the specified timeframe
	Conduct stakeholders' consultation, including perspectives from women and marginalized groups	Data and inputs are gathered from different stakeholders	Minutes of consultative meeting
	Draft the pollution control decree law with clear objectives, definitions, provisions, and enforcement mechanisms	Zero draft of Pollution Control Decree-Law	Pollution Control Decree-Law is drafted
	Conduct stakeholders' consultation for reviewing the draft the pollution control decree law	- Minutes of stakeholder's meetings - Minutes of inter-ministerial committee meeting	Active stakeholders' engagement in providing data and inputs
	Finalize the pollution control decree law for submission to the Council of Ministers	Pollution Control Decree-Law is developed and validated by stakeholders	Pollution Control Decree-Law is approved by Council of Ministers
	Conduct education and outreach among relevant stakeholders on the approved Pollution Control Decree-Law	Documentation of outreach session	Significant improvement in awareness level
	Possible Challenges	Complications/	<ul style="list-style-type: none"> ➤ Failure to secure funding for implementation of the project ➤ Differences in stakeholder priorities

	<ul style="list-style-type: none"> ➤ Un-coordination among Ministries responsible for implementation ➤ Changing government structure
Responsibilities and coordination	NDPC will coordinate with NDCC, the Office of Public Policy, Program Management, Legal Support and Environmental Procedure (MTA) and DNTT.

1.1.2.2. Specific Project Idea: Formulate Low-Carbon Development (LCD) Strategy

Table 19: Specific Project Idea for Low-Carbon Development (LCD) Strategy

Introduction/Background	<p>The Low Carbon Development (LCD) strategy has been associated with the UNFCCC, which was adopted in Rio in 1992. The LCD strategy guides the country down a path towards low-carbon, green growth. It establishes national targets and goals for low-carbon green growth, sends a signal of credibility and reliability, attracts investments, promotes technological innovations, improves energy efficiency, encourages clean energy adoption, and stimulates job creation and business opportunities.</p> <p>The Nationally Determined Contribution (NDC) states that Timor-Leste is fully committed to taking more ambitious climate action on a low-carbon development path with no target for reducing emissions. In spite of its dependence on oil and negligible contribution to global emissions, and regardless of its status as a LDC, Timor-Leste is willing to develop a long-term approach to domestic mitigation through a low-carbon development strategy and sector-specific initiatives that will enhance the transparency and accuracy of national greenhouse gas emissions accounting. Aligning Timor-Leste's development goals with a low-carbon development strategy is a significant step towards meeting international climate commitments, particularly the Paris Agreement and the 1.5-degree Celsius temperature goals.</p>
Objectives	<ol style="list-style-type: none"> 1. To effectively reduce CO2 emissions while keep economic growth 2. To establish national targets and goals for low-carbon green growth 3. To enhance strategies, plans, and actions for low-carbon development reflecting its national circumstances based on Article 4.6 of the Paris Agreement

What are the outputs and are they measurable?	Completed and approved of Timor-Leste Low-Carbon Development Strategy.	
Relationship to the country's sustainable development priorities	As mentioned in the NDC, Timor-Leste is fully committed to taking more ambitious climate action on a low-carbon development path with no target for reducing emissions. In spite of its dependence on oil and negligible contribution to global emissions, and regardless of its status as a LDC, Timor-Leste is willing to develop a long-term approach to domestic mitigation through a low-carbon development strategy and sector-specific initiatives that will enhance the transparency and accuracy of national greenhouse gas emissions accounting.	
Project Deliverables (Value/benefits)	<ol style="list-style-type: none"> 1. Reducing greenhouse gas emissions and mitigating climate change while promoting sustainable economic growth 2. Sending signals of credibility and reliability, attracting funding, and promoting technological innovations 	
Project Scope, Possible Implementation	The project can be implemented under the Nationally Determined Contributions (NDC) Timor-Leste 2022 – 2030 as all targets are within the plans. It is feasible because it aligns with environmental, economic, and social goals to build a more sustainable and resilient future.	
Project Activities	<p>These include:</p> <ul style="list-style-type: none"> ➤ Recruit experts with specialised knowledge to formulate low-carbon strategy ➤ Conduct comprehensive research and analysis ➤ Engage stakeholders from various sectors ➤ Draft the LCD strategy ➤ Conduct stakeholders' consultation for reviewing the draft ➤ Finalize the LCD strategy and submit it to the Council of Ministers ➤ Socialize the LCD strategy among relevant ministries 	
Timelines	The activities are expected to start in 2024 and run up to 2026	
Budget requirements	Resource	Budget (USD)
	Recruit experts with specialised knowledge to formulate low-carbon strategy	5, 000
	Conduct comprehensive research and analysis	5, 000
	Engage stakeholders from various sectors	2, 000
	Draft the LCD strategy	5, 000

	Conduct stakeholders' consultation for reviewing the draft	4,000	
	Finalize the LCD strategy and submit it to the Council of Ministers	5,000	
	Socialize the LCD strategy among relevant ministries	4,000	
The project will be funded by GOTL and DPs			
Measurement/Evaluation	Activity	Monitoring Indicators	Success criteria
	Recruit experts with specialised knowledge to formulate low-carbon strategy	Experts TOR and Contract	Hired experts
	Conduct comprehensive research and analysis	Draft research	Completion of the research within the specified timeframe
	Engage stakeholders from various sectors	<ul style="list-style-type: none"> - Minutes of stakeholder's meetings - Minutes of inter-ministerial committee meeting 	Active stakeholders' engagement in providing data and inputs
	Draft the LCD strategy	Desk review and data collection	Completed LCD strategy
	Conduct stakeholders' consultation for reviewing the draft	Minutes of stakeholder's workshop	Active stakeholders' engagement in providing data and inputs
	Finalize the LCD strategy and submit it to the Council of Ministers	LCD Strategy is developed and validated by stakeholders	LCD Strategy is approved by Council of Ministers
	Socialize the LCD strategy among relevant ministries	Documentation of outreach session	Relevant Ministries acknowledge and incorporate the

			LCD strategy into their programs
Possible Complications/ Challenges	<ul style="list-style-type: none"> ➤ Failure to secure funding for implementation of the project ➤ Differences in stakeholder priorities ➤ Un-coordination among Ministries responsible for implementation ➤ Changing government structure 		
Responsibilities and Coordination	NDCC will coordinate with Ministry of Public Works, Ministry of Petroleum and Mineral Resources, Ministry of Planning and Strategic Investment, Ministry of State Administration, and Ministry of Transportation and Communications		

1.1.2.3. Specific Project Idea: Conduct research on the installation of solar system-based charging station

Table 20: Specific Project Idea for the research on the installation of solar system-based charging station

Introduction/Background	<p>According to the SNC data, gasoline-consuming cars are predicted to grow about 8% between 2010 and 2017 and 5% between 2020 and 2030, while diesel-oil-fuelled cars will grow 5%. In addition, motorcycles will also rise by 8%. With more cars on the road, it is anticipated that overall fuel consumption will reach 677.4 million litres in 2030, with gasoline accounting for 59.7%, diesel for 36.7%, and jet kerosene for 3.7%. Therefore, the government's intervention will focus on enabling energy-efficient transport sector growth, as mentioned in the NDC.</p> <p>Electric vehicles are now becoming immensely popular, and Timor-Leste is now slowly moving towards the use of electric vehicles. A number of electric motorcycles (ojek) have been operating in various municipalities, primarily in Liquiça, Manatuto, and Lautem, serving as public transportation. Also, the use of electric scooters and bicycles is about to become common in the capital city. Hence, specific solar-system-based charging stations should be developed to encourage the use of renewable energy and lower CO2 emissions. This is aligned with the government's intervention in enabling energy-efficient transport sector growth.</p> <p>The research enables the optimisation of solar-based charging stations to maximise energy efficiency. This involves studying factors such as solar panel orientation and tilt, energy storage solutions, and overall charging infrastructure design. It helps determine the cost-effectiveness of solar-based charging states, including evaluating the initial setup cost, operational expenses, and potential long-term</p>
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	savings, providing insights into the economic viability and return on investment.
Objectives	<ol style="list-style-type: none"> 1. To assess the technical viability of integrating solar power with electric vehicle (EV) charging stations. 2. To conduct a comprehensive cost-benefit analysis to evaluate the economic feasibility of solar system-based charging stations. 3. To quantify the environmental benefits of solar-powered EV charging, including reductions in greenhouse gas emissions and air pollution 4. To evaluate the social acceptance and community impact of solar-powered charging stations
What are the outputs and are they measurable?	Completed and approved research on the installation of solar system-based charging station
Relationship to the country's sustainable development priorities	The project idea aligns with the Second National Communication (SNC) and NDC, which stated that the potential mitigation action in the country regarding the transportation sector can be achieved by increasing efficiency in mobile combustion technology.
Project Deliverables (Value/benefits)	<ol style="list-style-type: none"> 1. Understand the potential of having a solar system-based charging station. 2. Promote cleaner and more sustainable transportation. 3. Advance the integration of renewable energy into the transportation sector. 4. Foster awareness and participation in sustainable transportation initiatives. 5. The deployment of solar charging stations aligns with global climate goals and commitments to mitigate climate change.
Project Scope, Possible Implementation	The project can be implemented under the Nationally Determined Contributions (NDC) Timor-Leste 2022 – 2030 as all targets are within the plans. It is feasible because it aligns with environmental, economic, and social goals to build a more sustainable and resilient future.
Project Activities	<p>These include:</p> <ul style="list-style-type: none"> ➤ Recruit experts with specialised knowledge in solar system-based charging station ➤ Conduct comprehensive research and analysis ➤ Engage in consultation and discussion with relevant stakeholders ➤ Draft the research on installing solar system-based charging station ➤ Conduct stakeholder's consultation for reviewing the draft

	<ul style="list-style-type: none"> ➤ Finalize the research on installing solar system-based charging station ➤ Contribute to the drafting and refinement of the decree-law ➤ Finalize the decree-law and submit it to the Council of Ministers. 		
Timelines	The activities are expected to start in 2024 and run up to 2026		
Budget requirements	Resource	Activity/budget line	Budget (USD)
		Recruit experts with specialised knowledge in solar system-based charging station	10, 000
		Conduct comprehensive research and analysis	5, 000
		Engage in consultation and discussion with relevant stakeholders	3, 000
		Draft the research on installing solar system-based charging station	5, 000
		Conduct stakeholder’s consultation for reviewing the draft	5, 000
		Finalize the research on installing solar system-based charging station	5, 000
		Contribute to the drafting and refinement of the decree-law	3, 000
		Finalize the decree-law and submit it to the Council of Ministers.	
	The project will be funded by GOTL and DPs		
Measurement/Evaluation	Activity	Monitoring Indicators	Success criteria
	Recruit experts with specialised knowledge in solar system-based charging station	Experts TOR and Contract	Hired experts
	Conduct comprehensive research and analysis	Draft research	Completion of the research within the specified timeframe

	Engage in consultation and discussion with relevant stakeholders	<ul style="list-style-type: none"> - Minutes of stakeholder’s meetings. - Minutes of inter-ministerial committee meeting 	Active stakeholders’ engagement in providing data and inputs
	Draft the research on installing solar system-based charging station	Desk review and data collection	Completed the research
	Conduct stakeholder’s consultation for reviewing the draft	Minutes of consultative meeting	Active stakeholders’ engagement in providing data and inputs
	Finalize the research on installing solar system-based charging station	The research is validated by stakeholders	The research is completed and approved
	Contribute to the drafting and refinement of the decree-law	Continues engagement in drafting the Decree-law	The Decree-law is drafted
	Finalize the decree-law and submit it to the Council of Ministers.	Feedbacks are incorporated to the draft Decree-law	The Decree-law is finalised and approved
Possible Complications/ Challenges	<ul style="list-style-type: none"> ➤ Failure to secure funding for implementation of the project ➤ Differences in stakeholder priorities ➤ Un-coordination among Ministries responsible for implementation ➤ Changing government structure 		
Responsibilities and Coordination	The General Directorate for the Regulation of the Electricity, water and Sanitation sector will coordinate with MOTC and NDCC.		

1.1.2.4. Specific Project Idea: Establishing a new Land Transport Authority (LTA)

Introduction/Background	<p>The public transport system in Timor-Leste is still largely undeveloped. Approximately 60% of all intercity journeys in Timor-Leste are made via public transport, but the service is poor, seats are not guaranteed, departure and arrival times are arbitrary, and passenger comfort is not a top priority. The current public transport system fails to provide efficient and quality service to passengers, becomes unsafe and insecure, undermines economic competitiveness, and contributes to poverty reduction and community development. Despite this, all levels of government are weak, and they have no authority over how services are provided. The government maintains minimal oversight over fixed microlet services. As an example, the government authorises routes but does not control or establish service standards, vehicle specs, or quality of service. Therefore, the establishment of the Land Transport Authority (LTA) is key to efficiently regulating and managing the legality, affordability, sustainability, safety, and inclusion of transportation-related issues. The LTA will operate as a public institute inside Timor-Leste's autonomous agencies with regulatory responsibilities and powers, as opposed to a public company that concentrates on commercial activity.</p>
Objectives	<ol style="list-style-type: none"> 1. To effectively regulate and manage the land transport sector 2. To address the needs of transport users and operators 3. To streamline decision-making processes to improve efficiency 4. To enhance effectiveness in revenue collection 5. To engage the private sector to deliver services and develop and operate infrastructure and facilities
What are the outputs and are they measurable?	<ul style="list-style-type: none"> ➤ Approve the proposed legislation related to the establishment of the LTA ➤ Establishment of LTA with clear objectives, powers, structure, and operational guidelines.
Relationship to the country's sustainable development priorities	<p>The project idea aligns with the SDP Timor-Leste 2011–2030. Of the four key national attributes identified in the SDP: political will, economic potential, national integration, and a dynamic population, the national integration aspirations are of particular relevance to Timor-Leste's transport sector.</p>
Project Deliverables (Value/benefits)	<ol style="list-style-type: none"> 1. Approved legislation that establishes the legal framework for the LTA 2. Created sustainable, inclusive, and efficient transportation systems that serve the diverse needs of communities. 3. Encouraged mode shift to reduce the emissions intensity of travel

	<p>4. Harnessed new technologies and innovative features to support climate mitigation and resilience.</p> <p>5. Improved skills and knowledge on sustainable public transport system</p>																		
Project Scope, Possible Implementation	The project can be implemented under the Timor-Leste 2023 Public Transport Master Plan that is currently developing. It is feasible because it aligns with Phase 1 of the draft master plan to regulate and manage the land transport sector.																		
Project Activities	<p>These includes:</p> <ul style="list-style-type: none"> ➤ Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines ➤ Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities ➤ Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning ➤ Submit and pass relevant legislation to provide government mandate for LTA establishment ➤ Plan an official launch event to introduce the LTA to the public and stakeholders. ➤ Develop training programs for LTA staff to ensure they have the necessary skills and knowledge for effective operation 																		
Timelines	The activities are expected to start in 2024 and run up to 2026																		
Budget requirements	<table border="1"> <thead> <tr> <th>Resource</th> <th>Activity/budget line</th> <th>Budget (USD)</th> </tr> </thead> <tbody> <tr> <td></td> <td>Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines</td> <td>15, 000</td> </tr> <tr> <td></td> <td>Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities</td> <td>5, 000</td> </tr> <tr> <td></td> <td>Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning</td> <td>5, 000</td> </tr> <tr> <td></td> <td>Submit and pass relevant legislation to provide government mandate for LTA establishment</td> <td></td> </tr> <tr> <td></td> <td>Plan an official launch event to introduce the LTA to the public and stakeholders.</td> <td>2, 000</td> </tr> </tbody> </table>	Resource	Activity/budget line	Budget (USD)		Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines	15, 000		Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities	5, 000		Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning	5, 000		Submit and pass relevant legislation to provide government mandate for LTA establishment			Plan an official launch event to introduce the LTA to the public and stakeholders.	2, 000
Resource	Activity/budget line	Budget (USD)																	
	Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines	15, 000																	
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	Plan an official launch event to introduce the LTA to the public and stakeholders.	2, 000																	

	Develop training programs for LTA staff to ensure they have the necessary skills and knowledge for effective operation	3,000	
	The activities are expected to start in 2024 and run up to 2026		
Measurement/Evaluation	Activity	Monitoring Indicators	Success criteria
	Develop legislation that establishes the legal framework for the Land Transport Authority, including its objectives, powers, structure, and operational guidelines	Draft of LTA legislation	Completed and approved legislation
	Conduct consultations with key stakeholders, including government agencies, local communities, transport operators, and other relevant entities	Minutes of consultative meeting	<ul style="list-style-type: none"> ➤ Active stakeholders' engagement ➤ Validated LTA establishment
	Incorporate further detail on public transport responsibilities, functions and required roles into LTA Establishment Transition Planning	Draft of LTA Legislation with clear responsibilities and function	Completed and approved legislation
	Submit and pass relevant legislation to provide government mandate for LTA establishment	Minutes of stakeholder's meetings	Establishment of LTA
	Plan an official launch event to introduce the LTA to the public and stakeholders.	Concept note of LTA launching	Launched of LTA

	Develop training programs for LTA staff to ensure they have the necessary skills and knowledge for effective operation	<ul style="list-style-type: none"> ➤ Developed training materials ➤ Number of trained LTA staffs 	Effective operation LTA
Possible Complications/ Challenges	<ul style="list-style-type: none"> ➤ Failure to secure funding for implementation of the project ➤ Differences in stakeholder priorities ➤ Un-coordination among Ministries responsible for implementation ➤ The changing of government structure 		
Responsibilities and Coordination	MOTC will coordinate with the Council of Ministers, MOF, and NDCC		

Chapter 2 Technology Action Plan and Project Ideas for the Agriculture, Land Use and Forestry Sector

2.1. TAP for the Agriculture, Land Use and Forestry Sector

2.1.1. Sector overview

According to the General Directorate of Statistics (GDS), 70 percent of the population lives in rural areas, and 66 percent of Timorese families are involved in agriculture (DRTL 2020b). Most farms are small-scale subsistence farms, with barely 3% producing for sale (GDS 2015). However, the majority of farmers still engage in unsustainable agricultural practices such as cultivation on steep slopes, shifting cultivation or slash-and-burn, uncontrolled grazing on public land, and recurring forest fires. These practices result in leaching, which eventually causes land degradation due to water and wind erosion, excessive runoff, and other factors.

In the meantime, most of Timor-Leste's original forests have also been lost due to human impacts, including burning and clearing land for farming, hunting, and grazing. Very little primary forest remains. Based on the forest and land cover survey conducted by MALFF in 2013, Timor-Leste's forest cover was significantly reduced between 2003 and 2012. Deforestation is widespread in all municipalities with dense and sparse forests, with Lautem, Viqueque, Bobonaro, Covalima, and Manufahi showing the highest degradation rates.

Burning releases large amounts of greenhouse gas emissions into the atmosphere that would otherwise be stored in soils and forests. According to the SNC, agriculture is the second major source of GHG emissions. Total emissions of the three major GHGs (CO₂, CH₄, and N₂O) in 2015 totalled 665.76 GgCO₂e. The emission increased by 19.63% since 2005, by 8.29% compared to 2010, and by 3.87% compared to 2014. Enteric fermentation from livestock makes up the majority (47.03%) of the agriculture sector's sources. Followed by emissions from burning grassland biomass with 17.74%, 16.04% from managing manure's direct N₂O emissions, 10.84% from manure's methane emissions, and 5.84% from rice cultivation.

Timor-Leste's soils have been degraded for many years because of long-term 'slash and burn' agriculture, in which practically all organic matter on the surface of the soil is burned before planting. In general, farmers' efforts to expand their crop production areas through deforestation are the main causes of forest loss and changes in land cover.

The government of Timor-Leste is committed to promoting effective agricultural practices, climate-smart agriculture, agroforestry, composting, and community-led rehabilitation of degraded land. This entails continual multi-stakeholder collaboration, stable financial support, and best practices developed to promote agricultural productivity, livelihoods, and food security. This commitment is mentioned in the Nationally Determined Contribution (NDC) and aligned with the Second National Communication (SNC), which also states that potential mitigations in the Forestry and Other Land Use (AFOLU) sector are:

- Reducing GHG emissions from livestock through biogas and composting activities
- Reducing slash-and-burn practices by introducing permanent agriculture with improved management practices, while in forestry are mainly from the development of agroforestry and community forestry on degraded land.

Table 21 provides a comprehensive summary of the policies and measures that have been implemented within the agriculture, land use, and forestry sector. These policies and measures play a crucial role in facilitating the deployment and diffusion of selected technologies.

Table 21: Existing policies and measures of agriculture, land use and forestry sector

Name of Law or Policy	Enacted & Revised	Main Contents
Timor-Leste Strategic Development Plan (2011 – 2030)	2011	<p>The SDP 2011–2030 acknowledges the need to promote reforestation and sustainable land management practices in Timor-Leste. It outlines several actions that will be undertaken to improve sustainable land management and develop sustainable forestry, such as reforestation of all degraded areas, implementing initiatives to reduce slash-and-burn practices during the dry season, and providing forestry workers with technical and management training.</p> <p>The SDP also proposes strategies and actions for rural development in Timor-Leste to ensure that our agriculture sector develops in a way that minimises damage to the natural environment, as healthy rivers, catchments, forests, and soils are essential for producing healthy, productive crops. It is essential to manage Timor-Leste's land resources so that land degradation is avoided in the long run and environmental damage caused by the use of unnecessary chemicals is minimised.</p>
The Environmental Basic Law (Environmental Framework Law 26/2012)	2012	<p>The Environmental Basic Law (Environmental Framework Law 26/2012) sets out the framework and guiding principles for the conservation and protection of the environment, including the preservation and sustainable use of natural resources, which protect the fundamental rights of the citizens of Timor-Leste. The law mandates the state to implement soil and sub-soil protection measures under Article 26: <i>'The state must implement the necessary preventive and remedial</i></p>

		<i>measures to prevent and minimise the effects of soil and subsoil erosion in order to ensure its productive capacity'. Regarding the implementation approach, the law requires that 'the implementation of environmental, agricultural, forestry, and fisheries policies must be carried out in a compatible and complementary manner'.</i>
National Climate Change Policy	2020	The policy acknowledges that the reduction of GHG emissions from forests and other land uses is concentrated on expanding the use of forests as carbon sinks. While the mitigation policy in agriculture is focused on the introduction of permanent agriculture, emission reduction from slash-and-burn techniques, and promotion of climate-smart agricultural practices.
National Policy on Forests of Timor-Leste (NPF) 2017-2030	2017	<p>The National Policy on Forestry of Timor-Leste is based on a vision derived from the Strategic Development Plan (2011–2030): “building social capital and improving the country's infrastructure, supported by an emphasis on natural resource management strategies and environmental care and protection.”</p> <p>The policy outlines that the most effective way to mitigate the effects of climate change is to improve the sustainability of forest management and use. Mitigating effects will be monitored to demonstrate the contributions of forestry to climate change mitigation.</p> <p>This national policy aims to protect at least 70% of the forest area from environmental degradation and biological imbalance. As a result of forest protection, sustainable forest management will be facilitated; its environmental, social, and economic values will be preserved and maintained, especially for subsistence, economic development of communities, and poverty reduction. Hence, a major component of this policy is the preservation of national forests and the ecological services they provide.</p>

General Forestry Regime (Decree Law No. 14/2017)	2017	<p>The law defines the fundamental principles and standards for the management, protection, conservation, and sustainable use of forestry. The law demands that it be prohibited to ‘burn or perform any other activity of forest destruction’.</p> <p>Regarding forest management, Article 6 states that <i>"sustainable community forest management is given priority by the state"</i> (Alinea 4). While in Article 9, it states that <i>"the government should support communities in the definition of community rules concerning the management of forest resources and water basins, in harmony with the law."</i></p>
National Biodiversity Strategy and Action Plan of Timor-Leste for 2011–2020	2011	<p>According to the policy, unsustainable land management practices have changed Timor-Leste's natural environment, leaving behind a primarily rural agricultural landscape with low productivity and deteriorated grazing land.</p> <p>One of the key components of the priority strategy is the protection of biodiversity and the promotion of sustainable land use, among other things, by promoting traditional conservation knowledge and practices as well as by controlling invasive weeds.</p>
Agricultural Policy and Strategic Framework	2017	<p>A key feature of the Agricultural Policy and Strategic Framework is the integrated approach to the food and agriculture systems. This framework has various objectives, which include sustainable management and use of natural resources, including land, forests, coastal and marine areas, and biodiversity, to provide ecological, social, and economic benefits for the Timorese people.</p> <p>In the meantime, this framework also outlines improving soil fertility and restoring degraded soils through the adoption of climate-smart agriculture (CSA) as part of the main strategic interventions.</p>
National Climate Change Policy (NCCP)	2021	<p>As for forest and other land use within Timor-Leste, the policy regarding GHG emissions is focused on increasing the use of forests as carbon sinks. This policy aims to increase afforestation and reforestation in Timor-Leste, including the planting of 1 million new trees each year. It also involves promoting customary forestry management practices and natural regeneration of forest areas,</p>

		<p>accessing carbon markets (such as those provided by REDD+ mechanisms), and improving the sustainable management of forests and forest lands. As part of broader efforts to increase the resilience of coastal ecosystems, these policies also specifically target carbon sequestration in mangroves.</p> <p>In terms of agriculture, the policy to reduce GHG emissions is focused on the adoption of permanent agriculture and the resulting decrease in emissions from slash-and-burn techniques, the promotion of biogas and composting, and so-called smart agricultural practices.</p>
Nationally Determined Contribution (NDC)	2020	<p>There are four commitment areas in the NDC, and agriculture, land use, and forestry are categorised under positive growth and transition. One of the key activities in this area is to improve sustainable forest management and reduce forest degradation and deforestation. It also includes promoting sustainable and climate-smart agriculture.</p>
Second National Communication (SNC)	2020	<p>The SNC stated that potential mitigation measures in the Forestry and Other Land Use (AFOLU) sector are:</p> <ul style="list-style-type: none"> • Reducing GHG emissions from livestock through biogas and composting activities; • Reducing slash-and-burn practices by introducing permanent agriculture with improved management practices, while forestry is mainly derived from the development of agroforestry and community forestry on degraded land.

Agroforestry

Timor-Leste, the newest country and one of the least developed countries, has faced multidimensional challenges in land use management, including deforestation, land degradation, and poverty. The agroforestry system is recognised as one of the viable options for balancing the socio-economic needs and ecological functions of the lands in Timor-Leste.

Agroforestry is a land management system that integrates trees, agricultural crops, and animal farming in order to provide a diverse range of ecosystem services. It offers great potential for carbon sequestration. Many initiatives on agroforestry have been initiated in Timor-Leste, funded by a variety of donors, with the aim of restoring the landscape, sustaining agriculture, and providing multiple livelihood benefits. For example, the Xpand Foundation and its local partner, the Ho Musan Ida (HMI) Foundation, established the Ho Musan Ida (With One Seed) model over the course of the last nine years. It is a self-sustaining community involvement programme that helps rural Baguia administrative post's subsistence farmers reforest their land, store carbon in new trees, and sell the carbon on the global carbon market.

In Timor-Leste, agricultural activities can be combined with growing valuable tropical trees on an abundance of land with a suitable climate and soil. Timor-Leste has about 32,500 hectares of suitable land that is not currently forested, protected, or cultivated. With this land, agroforestry practices could be implemented on a large scale, which would result in significant job opportunities for 70% of the country's young population.

Participatory Land Use Planning (PLUP)

In the context of Timor-Leste, CB-NRM consists of Participatory Land Use Planning (PLUP) and Micro Programmes (MPs), which are actual undertakings of development activities for sloping agriculture, forestry, and livelihood development. PLUP is an interactive process in which local communities may discuss and decide how to manage their community's land and other natural resources. The same process has been implemented in a number of community-based forest and/or natural resource management initiatives in various countries, resulting in the adoption of sustainable forest and natural resource management at the village level.

Japan International Cooperation Agency (JICA) has assisted the Ministry of Agriculture and Fisheries (MALFF), particularly the National Directorate for Management of Watershed and Mangrove Areas (NDMWMA), under the General Director of Forest, Coffee, and Industrial Plants (GDFCIP), in the promotion of the Community-based Natural Resource Management (CB-NRM) approach on the ground since 2005 to reduce deforestation and forest degradation in the country, especially in hilly and mountainous areas.

GDFCIP aims to mainstream the CB-NRM mechanism as a standard operating procedure for forest management and watershed conservation in Timor-Leste due to its effectiveness and relevance to the socio-economic and cultural setting. In Timor-Leste, the CB-NRM mechanism is planned to serve as the legal basis for sustainable forest management, as outlined in the 2016 Forest Policy Law.

Sloping Agricultural Land Technology (SALT)

Deforestation-related soil erosion from frequent rainfall is a serious problem in many parts of the nation, especially in the uplands. Around 80% of the population lives in rural areas and is engaged in subsistence upland farming as their main source of income. Historically, Timorese farmers used slash-and-burn in their mountains and hills to maintain soil fertility. With fewer people and large areas forested, it offers short-term gains. Despite this, Timor-Leste's population has doubled to 1.1 million in the last 50 years, and forest cover has disappeared in many municipalities. SALT is a package solution for food production and soil conservation that combines various soil conservation techniques in a single location.

Literature reviews show that the introduction of SALT in different parts of Timor-Leste has occurred as early as 2007 through the Local Initiatives for Food Security Transformation (LIFT) Project with the support of the European Commission and Austrian Development Cooperation. USAID's Avansa Agriculture project, implemented between 2016 and 2021, also disseminated information on SALT. However, there are not sufficient accounts of the implementation and results of SALT farming from the relevant projects.

2.1.2. Action Plan for Agroforestry

2.1.2.1. Introduction

Agroforestry is recognized as a type of climate-smart agriculture that not only enhances food security but also delivers environmental benefits, including climate regulation, water conservation, and soil enhancement. It offers great potential for carbon sequestration. In Timor-Leste, this practice, referred to as "*kuda haur*" or mixed planting, has been traditionally embraced.

According to the United Nations Development Programme (UNDP), four diverse agroforestry models are widely practiced in Timor-Leste: (1) Alley cropping in the hilly region to reduce occurrence of landslides and facilitate flow of water in the long term; (2) Hedge-row plantings on steep, hilly areas to conserve soil; (3) Randomly mixed trees and annual crops with irregular spacing in lowland areas; (4) Alternate row planting with seasonal cultivation between rows on flat and wide areas. The primary successful agroforestry systems in Timor-Leste predominantly involve mixed cropping of fruit and timber species alongside spices.

The local communities have greatly benefited from agroforestry's vast range of services. In hilly areas, it is typically used to prevent erosion and lessen flooding. Agroforestry gives farmers many revenue streams by enabling the simultaneous production of fruits, vegetables, timber, and other products. It has a major role in providing fuelwood for home energy and fodder for domesticated livestock. Fruit trees, such as guava and avocado, are preferred by the locals for both home use and selling in rural markets. Hence, agroforestry and carbon farming can benefit both men and women farmers by increasing income, facilitating access to financial services, and challenging gender conventions.

Timor-Leste's government is committed to protecting 73% of its land areas by 2023 so that water resources, soils, and biodiversity can be conserved. These areas include 228,174.57 ha of dense forest cover; 278,999.19 ha of sparse forest cover; and 238,508.55 ha of non-forest areas. According to the Seeds of Life (2018), Timor-Leste delineates six agro-ecological zones (AEZ) based on Altitude and north-south orientation, with areas above 2000 m altitude classified as a temperate zone. Biophysical parameters like altitude, aspect, rainfall, and soil type are crucial for crop selection and agroforestry model suitability, suggesting that aligning agroforestry models with AEZ conditions could optimize agricultural practices in Timor-Leste.

2.1.2.2. Ambition for the TAP

The ambition for agroforestry is to implement at least 25 hectares of land per year over the next 4 years in Aileu, Bobonaro (Loes), Lautem, and Manufahi.

The flexibility of agroforestry models makes them adaptable to different local conditions, including soil types and climates. This adaptability allows municipalities to choose and implement agroforestry systems that best suit their specific environmental, agro-ecological zones, and socio-economic contexts. By tailoring agroforestry models to local conditions and involving communities (especially

women), municipalities can maximise the benefits of these systems for both the environment and the economy.

2.1.2.3. Actions and Activities selected for inclusion in the TAP

a. Summary of barriers and measures to overcome barriers

The significant barriers to agroforestry practice in Timor-Leste encompass a lack of financial access and cash flow. While various agroforestry projects have been initiated across the country with funding from international donors, the challenge lies in sustaining them. Additionally, cultural norms regarding gender further complicate the situation, particularly for women. Weak institutional capacity within government institutions and leading organizations hampers the facilitation of proposed agroforestry programs. These institutions often operate independently, lacking an inter-institutional coordination mechanism.

Furthermore, there is a widespread lack of understanding of agroforestry knowledge among decision-makers, forestry staff, and practitioners in the field. The government's inability to provide technical assistance to local farmers also impedes the growth of agroforestry. This limitation encompasses a lack of differentiation between forestry and agroforestry, insufficient technical skills in crop selection, and inadequate access to market information. Moreover, the absence of legal rights for community-based forest management poses significant barriers to agroforestry development. The unclear and complex land tenure system discourages private investors from engaging in large-scale agroforestry projects.

To overcome these barriers, enhancing the value chain approach is essential. This entails conducting thorough market analysis, developing a robust business plan, investing in infrastructure, securing commitment from beneficiaries, ensuring a minimum production size, and establishing reliability. Another option is to implement a carbon credit or tree farming scheme to generate regular and sustainable income. Additionally, improving market access requires refurbishing and maintaining at least 60 kilometres of rural roads servicing targeted agroforestry areas. This initiative also offers private businesses and communities' opportunities to forge market linkages and access employment prospects.

Moreover, ensuring success involves providing training for both men and women across all levels, actively engaging extension services, coaching farmers, and supporting lead farmers. Utilizing the Agroforestry manual for Timor-Leste can serve as a valuable resource, offering fundamental concepts and principles of agroforestry to develop practical designs for technicians and practitioners. This manual also provides technical guidance on implementing soil conservation techniques and propagating trees and crops, along with governance aspects of agroforestry implementation. Furthermore, Participatory Land Use Planning (PLUP) can play a vital role in mitigating potential land disputes, including issues related to free grazing and slash-and-burn practices.

b. Actions selected for inclusion in the TAP

- 1. Adopt a value chain approach and promote cash crops.** Most of the time, farmers are discouraged from continued participation in agroforestry due to a lack of effective market access for their products. Therefore, it is vital to support the creation of value chains that connect farmers to markets, ensuring fair prices and incentives. Enhancing the value chain approach requires in-depth market analysis, a business plan, infrastructure investment, commitment from beneficiaries, a minimum production size, and reliability. Another option is to utilize a carbon credit or farming scheme for planted trees, which can generate regular and sustainable income. Additionally, women can significantly contribute to household incomes by participating in cash crop production and associated value chain activities, thus enhancing their economic empowerment and financial independence. This measure is not only economically efficient, but also supports the long-term viability and success of agroforestry practices by maintain the balance between supply and demand.
- 2. Develop National Agroforestry Strategy and Action Plan.** In order to preserve the ecological integrity and biological diversity of Timor-Leste's forests, the country has a National Policy on Forests that intends to safeguard at least 70% of the forest area by 2030. However, there is no specific policy or strategy for agroforestry development. Major obstacles to the growth of agroforestry in Timor-Leste include the absence of a proper agroforestry model as an alternative tool to improve community livelihood and the forest area, as well as the lack of legal rights for community-based forest management. The strategy and action plan provide direction and enable the development of local knowledge, capability, resources, and good practices. It will serve as a comprehensive roadmap for sustainable land use, conservation, and development, addressing interconnected challenges and maximising the benefits of agroforestry at the national level. Additionally, by incorporating gender-responsive approaches, it ensures the active participation and empowerment of women in agroforestry initiatives, further enhancing their socioeconomic well-being and contributing to gender equality. This measure is expected to advance the objective of implementing technology.
- 3. Increase the number of extensionists with relevant degrees and training.** Lack of knowledge and experience in enhanced agroforestry systems hinders the country's wider implementation of an agroforestry system. Hence, increasing the number of extensionists with relevant degrees and training is vital to advance their knowledge and skills in the agroforestry system. Agroforestry manual for Timor-Leste can be used to provides technical information on designing soil conservation techniques. Technical assistance is needed to create an environment that is favourable for agroforestry operations along the value chain, as well as to promote the growth of agroforestry, the management of land and natural resources, the development of technical skills, and market connections. The keys to success are to provide training for both men and women at all levels, to actively include extension services, to coach farmers, and to support lead farmers. This measure is relatively cost effective in terms of human and financial resources.

4. **Rehabilitate or maintain rural roads to enhance market access for agroforestry services.** Farmers have trouble selling their agricultural products because 80% of the country is difficult to access due to a lack of effective road networks. Farmers are not receiving fair pricing for their agricultural products due to the involvement of middlemen, which discourages them from investing in enhanced agricultural systems, including agroforestry practices. Therefore, it is crucial to implement capacity-building and labour-based programs aimed at rehabilitating rural roads. This is essential to improve access to agroforestry services, employment, and economic opportunities, particularly for women in rural communities. This measure is well-suited to address the challenges within the country's agriculture sector.

c. Activities identified for implementation of selected actions

The actions and activities selected for inclusion in agroforestry are presented in Table 22. These actions are linked to the measures identified through detailed analyses of technology barriers and enabling environments required to promote them, as described in the BAEF report, including the inputs gathered during the TAP consultation.

Table 22: Summary of Actions and corresponding activities for agroforestry

Actions	Activities for Action Implementation
<p>Action 1:</p> <p>Adopt a value chain approach and promote cash crops</p>	<p>1.1. Identify and engage a diverse group of stakeholders</p> <p>1.2. Conduct in-dept market analysis and survey to smallholder's farmers</p> <p>1.3. Identify and promote the cultivation of suitable cash crops based on climate, soil conditions, and market demand.</p> <p>1.4. Provide training and capacity building to farmers on modern agroforestry practices and quality control</p> <p>1.5. Provide access to quality seeds, fertilizers, and other inputs</p> <p>1.6. Establish mechanism for financial support (e.g. loans or grants) and collaborate with financial institutions to assists farmers</p> <p>1.7. Create linkages between agroforestry producers and buyers</p> <p>1.8. Strengthen extension services to provide ongoing support to farmers in managing agroforestry system</p>
<p>Action 2:</p>	<p>2.1. Identify and engage a diverse group of stakeholders</p>

<p>Develop National Agroforestry Strategy and Action Plan</p>	<p>2.2. Conduct a thorough baseline assessment of the current state of agroforestry in the country</p> <p>2.3. Review existing national policies to identify areas of alignment or potential conflicts with agroforestry objectives</p> <p>2.4. Identify and analyse different agroforestry models suitable for the country's diverse agro-climatic zones</p> <p>2.5. Develop a National Agroforestry Strategy and a detailed Action Plan</p> <p>2.6. Identify capacity-building needs for government agencies, extension services, researchers, and local communities involved in agroforestry</p>
<p>Action 3:</p> <p>Increase the number of extensionists with relevant degrees and training to advance their knowledge and skills in agroforestry</p>	<p>1.1. Conduct a comprehensive assessment of the current capacity of extension services</p> <p>1.2. Develop training materials and conduct training programs to fill the skills gaps</p> <p>1.3. Implement the FFS in demo plots and facilitate exchange visits</p> <p>1.4. Establish mentorship programmes where experienced agroforestry practitioners help extensionists grow professionally</p> <p>1.5. Implement an ongoing evaluation process to assess the effectiveness of training program</p>
<p>Action 4:</p> <p>Rehabilitate/maintain rural road to enhance markets access for agroforestry services</p>	<p>1.1. Conduct a thorough assessment of existing rural roads to identify areas required for rehabilitation/maintenance</p> <p>1.2. Engage local communities, including farmers, community leaders, and other stakeholders in planning and decision-making process</p> <p>1.3. Integrate road rehabilitation plans with agroforestry extension services</p> <p>1.4. Collaborate with government, NGOs, and donors to secure funding</p> <p>1.5. Develop detailed engineering design</p> <p>1.6. Conduct environmental impact assessment</p> <p>1.7. Procure qualified contractors/companies</p>

	<p>1.8. Provide technical support and training to contractors/companies</p> <p>1.9. Infrastructure Rehabilitation/maintenance</p> <p>1.10. Provide capacity Building for Local Maintenance Teams</p> <p>1.11. Establish a monitoring and evaluation framework to assess the impact of road rehabilitation on agroforestry services and market access</p>
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d. Actions to be implemented as project ideas

Action 1: Adopting a value chain approach and promoting cash crops has been selected as a project idea. During the barrier analysis and enabling framework workshop, stakeholders noted that many agroforestry projects depend on short-term funding, posing challenges in sustaining efforts beyond the initial project period. Therefore, stakeholders proposed promoting a value chain approach and cash crops to generate income from agroforestry activities after the project concludes

2.1.2.4. Stakeholders and Timeline for implementation of TAP

To implement agroforestry in Timor-Leste, the National Directorate of Reforestation (NDR) within the Ministry of Agriculture, Livestock, Fisheries, and Forestry (MALFF) serves as the main implementing entity (IE) at the government level for deploying this technology. In this new government, the establishment of the Secretary of State for Forestry (SSF) has occurred, with NDR now operating directly under the SSF to oversee implementation. The IE will collaborate with various ministries, such as the Ministry of Public Works, development partners (such as UNDP, ILO, EU, ADB), and other stakeholders experienced in agroforestry implementation. This collaboration entails joint planning, resource mobilization, and monitoring and evaluation. MALFF will execute stated policies and facilitate the involvement of the private sector, civil society, community-based organizations, women’s group, NGOs, and development partners in agroforestry development in Timor-Leste. Implementation of the technology will also involve farmer collaboration, ensuring gender balance in participation and decision-making processes.

As the primary ministry overseeing agroforestry, MALFF will also mobilize financial resources and administer agroforestry programs, including coordination within and across relevant ministries with clear leadership in key areas, recruitment of experts with specialized skills and knowledge, development of the National Agroforestry Strategy and Action Plan, establishment of a value chain approach, and promotion of cash crops. Table 23 outlines the schedule and sequence of specific activities required for implementation, slated to begin in 2024 and continue until 2026. The Council of Ministers is responsible for approving the proposed National Agroforestry Strategy and Action Plan.

Table 23: Scheduling and sequencing of specific activities

Actions	Scale	Year				
		2024	2025	2026	2027	2028
Adopt a value chain approach and promote cash crop	Identify and engage a diverse group of stakeholders	X	X			
	Conduct in-dept market analysis and survey to smallholder’s farmers		X	X		
	Identify and promote the cultivation of suitable cash crops based on climate, soil conditions, and market demand.			X	X	
	Provide training and capacity building to farmers on modern agroforestry practices and quality control			X	X	X
	Provide access to quality seeds, fertilizers, and other inputs			X	X	X
	Establish mechanism for financial support (e.g. loans or grants) and collaborate with financial institutions to assists farmers			X	X	
	Create linkages between agroforestry producers and buyers			X	X	X
	Strengthen extension services to provide ongoing support to farmers in managing agroforestry system		X	X	X	X

2.1.2.5. Estimation of resources Needed for Action and Activities

The projected cost for adopting a value chain and promote cash crop is detailed in the following table (Table 24). This estimate may fluctuate based on various factors, whether they are incorporated or excluded from the outlined expenses as described below:

Table 24: Actions, activities, capacity building needs and costs

Action 1: Adopt a value chain approach and promote cash crop		
Activities	Capacity building and other needs	Costs (USD)
Identify and engage a diverse group of stakeholders	Consumables	10, 000
Conduct in-dept market analysis and survey to smallholder’s farmers	Market research analysis cost	30, 000

Identify and promote the cultivation of suitable cash crops based on climate, soil conditions, and market demand.	Promotion of cash crop cost for 4 municipalities	50, 000
Provide training and capacity building to farmers on modern agroforestry practices and quality control	Workshop cost	80, 000
Provide access to quality seeds, fertilizers, and other inputs	Purchase and distribution of agricultural products and inputs	100, 000
Establish mechanism for financial support (e.g. loans or grants) and collaborate with financial institutions to assist farmers	Consultative cost	40, 000
Create linkages between agroforestry producers and buyers	Establishing market connection cost	100, 000
Strengthen extension services to provide ongoing support to farmers in managing agroforestry system	Workshop and Working session	50, 000
	Consumables	50, 000
Grand Total:	USD	510, 000

2.1.2.6. Management Planning

a. Risks and contingency planning

- i. **Cost risk:** Delays in TAP implementation may escalate activity costs, necessitating support from DPs or donors to expedite implementation.
- ii. **Scheduling risk:** The budget for the 2024 has been allocated, new budget items may need to be considered in the next financial year. SSF should take the lead in implementing the TAP by ensuring all relevant parties are involved from the beginning
- iii. **Financial risk:** Insufficient or unavailable budget for TAP implementation may arise, prompting SSF to prioritize agroforestry within existing budget allocations.
- iv. **Gender risk:** Unequal participation and benefits between genders pose a potential risk, necessitating mechanisms to ensure women's active involvement in decision-making bodies and project committees.

b. Next steps

- i. **Organize Stakeholder Engagement:** The General Directorate of Environment (GDE) and NDCC will convene a stakeholders' workshop or roundtable discussion to effectively communicate the TAP and garner stakeholder buy-in.
- ii. **Prepare Policy Paper and Seek Approval:** NDCC (TNA National team) will draft the policy paper on the TNA project to secure government approval for the TAP. Cabinet approval will be sought to enlist support from other stakeholders for TAP implementation.
- iii. **Budget Integration and Work Plan Alignment:** SSF will incorporate the implementation budget into its 2025 budget and align the TAP implementation plan with SFF's 2025 work plan to ensure seamless integration and resource allocation.
- iv. **Stakeholder Coordination and Engagement:** SSF, particularly the responsible directorate, will coordinate with relevant stakeholders to initiate TAP implementation. SSF will work to engage all main stakeholders to ensure comprehensive support for the implementation process.

2.1.2.7. TAP overview table

Table 25: TAP overview table for agroforestry

Sector	Agriculture, land use and forestry							
Technology	Agroforestry							
Ambition	Implement at least 25 hectares of land per year over the next 4 years in Aileu, Bobonaro (Loes), Lautem and Manufahi							
Benefits	Benefit both men and women farmers by increasing income, facilitating access to financial services, and challenging gender conventions							
Actions	Activities to be implemented	Source of funding	Responsible institution & focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Budget (USD)
Action 1: Adopt a value chain approach and promote cash crop	Identify and engage a diverse group of stakeholders	GoTL	MALFF	1 year	Financial and Resource Constraints	Signed partnership agreement to provide funding and in-kind supports	Minutes of consultative meeting	10,000
	Conduct in-dept market analysis and survey to smallholder's farmers	GoTL/DPs	MALFF	1 year	imited Access to Information	Completed and validated market research analysis	Draft market analysis and survey	30,000
	Identify and promote the cultivation of suitable cash crops based on climate, soil conditions, and market demand.	GoTL/DPs	MALFF	1-2 years	Climate Variability and Change	Successful production and marketing of cash crop	Potential cash crops are identified and cultivated	50,000
	Provide training and capacity building to farmers on modern agroforestry practices and quality control	GoTL/DPs	MALFF	1-3 years	Budget constraints	Improvement in the quality of agricultural and forest products	% of farmers adopting modern agricultural practices	80,000

	Provide access to quality seeds, fertilizers, and other inputs	GoTL/DPs	MALFF	1-3 years	Budget constraints	Increased crop yields	Farmers access to seeds and inputs	100,000
	Establish mechanism for financial support (e.g. loans or grants) and collaborate with financial institutions to assist farmers	GoTL/DPs	MALFF	1-3 years	Lack of Financial Literacy	Established financial mechanism	Number of farmers accessing financial support	40,000
	Create linkages between agroforestry producers and buyers	GoTL/DPs	MALFF	1-5 years	Market Access Barriers	Quantity of agroforestry products sold in the market	Partnership with producers and buyers	100,000
	Strengthen extension services to provide ongoing support to farmers in managing agroforestry system	GoTL/DPs	MALFF	1-5 years	Limited resources	Increased Agroforestry Adoption Rates	Level of farmer participation	100,000
Action 2: Develop National Agroforestry Strategy and Action Plan	Identify and engage a diverse group of stakeholders	GoTL/DPs	MALFF	1 year	Delays in stakeholders' coordination	Active stakeholders' engagement	3. Minutes of stakeholder's meetings 4. Stakeholders mapping with clear roles and responsibilities	5,000
	Conduct a thorough baseline assessment of the current state of agroforestry in the country	GoTL/DPs	MALFF	1 year	Lack of Stakeholder Involvement	Active and diverse participation from	Needs assessment survey/interview	40,000

						relevant stakeholders		
	Review existing national policies to identify areas of alignment or potential conflicts with agroforestry objectives	GoTL/DPs	MALFF	1 year		Alignment of Policies	Completion of Policy Review	20,000
	Identify and analyse different agroforestry models suitable for the country's diverse agro-climatic zones	GoTL/DPs	MALFF	1 year	Inadequate Stakeholder Consultation	Completion of Model Analysis	Stakeholders' consultation	
	Develop a National Agroforestry Strategy and a detailed Action Plan	GoTL/DPs	MALFF	1 year	Lack of coordination	Completed and approved strategy	Draft strategy	
	Identify capacity-building needs for government agencies, extension services, researchers, and local communities involved in agroforestry	GoTL/DPs	MALFF	1-2 years	Lack of Stakeholder Involvement	Active and diverse participation from relevant stakeholders	Needs assessment survey/interview	
Action 3: Increase number of extensionist with relevant degree, and training to advance their knowledge and skills in agroforestry	Conduct a comprehensive assessment of the current capacity of extension services	GoTL/DPs	MALFF	1 year	Lack of participation	Completed assessment report	Needs assessment survey/interview	100,000
	Develop training materials and conduct training programs to fill the skills gaps	GoTL/DPs	MALFF	1 year	Lack of funding	Participation rates and training program completion	Completion of training materials and agenda for the training	

	Implement the FFS in demo plots and facilitate exchange visits	GoTL/DPs	MALFF	1-3 years	Budget constraints /limited participation	High attendance rates and active involvement	Number of farmers, including women participated in the learning	
	Establish mentorship programmes where experienced agroforestry practitioners help extensionists grow professionally	GoTL/DPs	MALFF	1-3 years	Lack of commitment	Sustained Availability of Mentors	Mentorship Participation Rates	
	Implement an ongoing evaluation process to assess the effectiveness of training program	GoTL/DPs	MALFF	1 year	Inadequate Data Collection	Significant Knowledge and Skill Gains	Participant Satisfaction	
Action 4: Rehabilitate/maintain rural road to enhance markets access for agroforestry services	Conduct a thorough assessment of existing rural roads to identify areas required for rehabilitation/maintenance	GoTL/DPs	MALFF/MPW	1 year	Funding constraints	Completed Comprehensive Assessment	Identification of critical areas	80,000
	Engage local communities, including farmers, community leaders, and other stakeholders in planning and decision-making process	GoTL/DPs	MALFF/MPW	1 year	Limited participation	High community participation and inclusive decision-making	Community Meeting Attendance	40,000
	Integrate road rehabilitation plans with agroforestry extension services	GoTL/DPs	MALFF/MPW	1 year	Lack of coordination	Collaborative Planning and Implementation	Budget Allocation for Integration	20,000

Collaborate with government, NGOs, and donors to secure funding	GoTL/DPs	MALFF/MPW	1-2 years	Limited Funding Opportunities	Increased Funding Portfolio	Diversity of Funding Sources	
Develop detailed engineering design	GoTL/DPs	MALFF/MPW	1-2 years	Budget Overruns	Approved design	Completion of Engineering Design	
Conduct environmental impact assessment	GoTL/DPs	MALFF/MPW	1-2 years	Regulatory Compliance Issues	Approved EIA	Completion of EIA	
Procure qualified contractors/companies	GoTL/DPs	MALFF/MPW	1 year	Delayed Procurement Process	Qualified and Credible Contractor	Completion of Procurement Process:	
Provide technical support and training to contractors/companies	GoTL/DPs	MALFF/MPW	1-2 years	Funding constraints	Improved Contractor Competence	Completion of Training Sessions	
Provide capacity building programme to government staffs involving in the project	GoTL/DPs	MALFF/MPW	1-2 years	Limited participation	High participation rates	Attendance and Participation	
Infrastructure Rehabilitation/maintenance	GoTL/DPs	MALFF/MPW	1-4 years	Budgetary Constraints	Optimal Infrastructure Functionality	Completion of Scheduled Maintenance Tasks	
Provide capacity Building for Local Maintenance Teams	GoTL/DPs	MALFF/MPW	1-2 years	Limited Participation and Interest	High Participation and Engagement	Attendance and Participation Rates	
Establish a monitoring and evaluation framework to assess the impact of road rehabilitation on agroforestry services and market access	GoTL/DPs	MALFF/MPW	1-2 years	Incomplete Data Collection	Goal Achievement	Data Collection Completeness	

2.1.3. Action Plan for Participatory Land Use Planning (PLUP)

2.1.3.1. Introduction

Timor-Leste's forest resources have been steadily declining. A 2013 study reveals that between 2003 and 2012, over 184,000 hectares of forest vanished, and about 170,000 hectares of dense forest were converted into sparse canopy forests. In addition, slash-and-burn agriculture is also one of the biggest dangers to Timor-Leste's natural resources. It was originally a component of a locally adopted sustainable rotational agriculture system, but it is now banned because of concerns surrounding its widespread and frequent use.

Timor-Leste's government (GoTL) needs to address forest degradation and deforestation to achieve sustainable socio-economic development. Community-based natural resource management (CB-NRM) is a conservation strategy that acknowledges the entitlements of local communities to derive advantages from sustainable management of natural resources (such as forests, lands, water, and biodiversity) within a specified area. In the context of Timor-Leste, CB-NRM consists of Participatory Land Use Planning (PLUP) and Micro Programmes (MPs), which are actual undertakings of development activities for sloping agriculture, forestry, and livelihood development. The PLUP has been proven to be an effective method to enhance the capacity of suco leaders and other communities to manage lands and forest-related natural resources in a sustainable manner. While micro-programmes have had positive, tangible impacts on the livelihood of the community, they have specifically empowered women by providing access to resources, training, and opportunities for entrepreneurship. This has contributed to their economic independence and overall well-being.

What makes PLUP unique in the project is that it: i) encourages local communities to develop written village regulations and by-laws, including natural resource management rules, in addition to a future land use plan; ii) assists local communities in holding a traditional ceremony to institutionalise the village regulations in a traditional manner; and iii) assists village leaders in monitoring the enforcement and implementation of the village regulations and future land use plan.

Implementation of PLUP has resulted in a number of successful initiatives relating to converting farmland to permanent terrace farming, replacing open grazing with a livestock system based on households, and designating areas for forest conservation. These activities contribute to mitigation measures in Timor-Leste. Forest conservation reduces the GHG impact, while sustainable terracing reduces emissions by not burning. Given climate-change-related rainfall inconsistencies in a country where nearly all crops are rain-fed, crop variety diversity also mitigates monoculture losses. Forests mitigate soil degradation, runoff, and landslides, which Timor-Leste is susceptible to in extreme weather.

2.1.3.2. Ambition for the TAP

The ambition of this technology is to implement PLUP and Micro Programmes (MPs) in 10 target villages in four high priority watersheds: (1) Loes, (2) Be Lulik, (3) Seical, and (4) Cuha, in 4 years. The fundamental goal is to help target villages adopt a land use plan and community ordinances to sustain natural resource management. PLUP would also identify supports and interventions needed for a future land use plan. Additionally, the initiative aims to ensure that at least 40% of women benefit from the PLUP and micro programs in every village.

2.1.3.3. Actions and Activities selected for inclusion in the TAP

a. Summary of barriers and measures to overcome barriers

The primary barriers to PLUP include limited access to funding, as it has yet to be integrated into the government's agenda, resulting in a lack of reliable long-term financial support for sustainable land management initiatives. Despite support from various development partners such as JICA, FAO, the World Bank, and the EU, greater government engagement is necessary to ensure the sustainability and expansion of PLUP. However, the government's institutional capacity to support PLUP remains insufficient and ineffective. Furthermore, there is a lack of enforcement of existing legal frameworks that would prioritize PLUP at the national level. Additionally, there is no legislative framework mandating project implementers to integrate PLUP into their sustainable natural resource management initiatives. Gender roles in patriarchal Timor-Leste, influenced by social and cultural norms, often result in men making household decisions and earning more in the formal economy, leading to limited participation by women in the PLUP process. Consequently, development partners may overlook the need for ongoing monitoring post-Tara Bandu ceremony.

To tackle this challenge, one option is to enhance coordination within the ministry to secure funding from the state budget. Additionally, the relevant directorate can raise awareness of financial support by engaging with potential donors. Strengthening coordination among stakeholders is crucial to elevate PLUP to a national priority or program. This would facilitate securing the budget for various purposes, including human resource development for field facilitators. Institutionalizing village regulations is also essential to empower community leaders in governing their villages and adapting to the new system. To enhance understanding of PLUP, experienced organizations should provide on-the-job training (OJT) on PLUP to field officers of NGOs and Development Partners (DPs) and issue certificates to them. Regarding women's participation, the PLUP guideline emphasizes achieving 40% female engagement in the process. Moreover, it is essential to promote livelihood improvement among women.

b. Actions selected for inclusion in the TAP

- 1. Establish PLUP at the village level.** According to the MALFF, PLUP is a valuable planning tool for land-based interventions. Hence, PLUP should come before development. Prioritising PLUP implementation above development activities can lower the risk of undesirable outcomes. Examples include reforestation projects where animals brought in by other community members eat the trees grown by local community members. Implementing PLUP first can prevent this issue by promoting community consensus on tree planting locations and understanding their importance before reforestation. Hence, the pertinent ministry should raise awareness of financial support by engaging with potential donors to establish PLUP at the village level. This measure is particularly well-suited to the agricultural context of Timor-Leste due to its focus on engaging local communities, including women, in decision-making processes related to land use. In a country like Timor-Leste, where agriculture plays a crucial role in the livelihoods of many people, PLUP offers a framework for sustainable land management that aligns with the principles of conservation agriculture.
- 2. Promote on-the-Training (OJT) on PLUP and issue certificates.** In Timor-Leste, there is a shortage of skilled facilitators available for PLUP implementation, including women. Additionally, local leaders lack knowledge and information about using PLUP for sustainable forest and natural resource management. Field facilitators for PLUP must possess expertise in participatory planning and real-world natural resource management. The PLUP working group requires competent facilitators, ensuring gender balance, to guide community members, both men and women, through the 10-step activities. Concurrently, enhancing the governance skills of local leaders at the village and post-administrative levels is essential for sustainable forest and natural resource management. This approach ensures cost-effective implementation in terms of both human and financial resources.
- 3. Awareness programs and promotion of participation in the establishment of PLUP.** Lack of awareness usually leads to unintentional violations. As per consultation, the major barrier is to sensitise the whole community and the neighbouring villages to the village regulation and monitor its implementation. If the neighbouring villages do not have Tara Bandu (the customary law), then it becomes a nagging problem for the village with Tara Bandu. There are instances of threats to the forest (illegal felling, forest fires, land disputes, etc.), which come from the neighbouring villages. Hence, it is important to involve the community in the process and address their needs and concerns to build a collaborative and cooperative approach to compliance. Additionally, there is also usually a lack of participation by women in the PLUP process, as men are expected to make household decisions and earn the most in the formal economy. In many communities, women work in agriculture and other land-related fields that generate revenue. Their involvement guarantees that women's economic empowerment and livelihood options are taken into account throughout the planning process. This measure is expected to lead to the goal of PLUP implementation.

c. Activities identified for implementation of selected actions

The selected actions and activities for participatory land use planning (PLUP) are outlined in Table 26. These actions are aligned with the measures identified in the BAEF report, which analysed technology barriers and enabling environments necessary to support them. Additionally, inputs collected during the TAP consultation were considered in this process.

Table 26: Summary of Actions and corresponding activities for Participatory Land Use Planning (PLUP)

Actions	Activities for Action Implementation
<p>Action 1:</p> <p>Establish Participatory Land Use Planning (PLUP) at the village level</p>	<p>1.1. Identify and conduct consultative meeting with relevant stakeholders to actively involve in the PLUP</p> <p>1.2. Conduct Participatory Land Use Planning (PLUP) and climate change vulnerability assessment</p> <p>1.3. Select agricultural or forestry extension services/micro programs</p> <p>1.4. Institutionalize the village regulations</p> <p>1.5. Implement the extension services/micro programs</p> <p>1.6. Monitor and evaluate the PLUP</p>
<p>Action 2:</p> <p>Promote On-Job-Training (OJT) on PLUP and issue certificate to government staffs and local leaders</p>	<p>2.1. Assess existing expertise and specific areas that require additional training and development</p> <p>2.2. Recruit experienced and knowledgeable trainers who can effectively convey the principles and practices of PLUP</p> <p>2.3. Enhance capacity of MALFF field officers and NGOs in target watershed</p> <p>2.4. Organize field visits to previous PLUP projects</p> <p>2.5. Evaluate the results of the training activities and review the training programs</p>

	2.6. Issue certificate to participants upon successful completion of the OJT program
<p>Action 3:</p> <p>Awareness programs and promotion of participation in the establishment of PLUP.</p>	<p>1.1. Conduct socialisation on the village regulations and utilize local communication channels</p> <p>1.2. Organize information session and workshop involving women leaders and role models in the community</p> <p>1.3. Negotiate village regulations with neighbouring villages</p> <p>1.4. Regular monitoring and evaluation the effectiveness of the PLUP</p> <p>1.5. Provide uniforms to the forest guards and recognize them as protectors of the forest</p> <p>1.6. Foster ongoing engagement by establishing mechanism for continuous communication and collaboration</p>

d. Actions to be implemented as project ideas

The chosen project idea is Action 1: Establish PLUP at the village level. Prioritizing PLUP implementation over development activities can mitigate the risk of undesirable outcomes. MALFF and the National Directorate of Forest and Watershed Management (NDFWM) have approved and endorsed several documents, such as policy recommendations, operational manuals, technical manuals, and the Manual for Formation of the Watershed Management Council, to expand the CB-NRM mechanism to more villages throughout the country. Hence, this measure is effective in leading to the successful implementation of the technology. To support the establishment of PLUP at the village level, all activities in Action 1 will be combined with some activities listed in Actions 2 and 3.

2.1.3.4. Stakeholders and Timeline for implementation of TAP

The National Directorate of Forest and Watershed Management (NDFWM) will take the lead in establishing the watershed management council, with support from the MALFF municipal offices and the National Directorate of Nature Conservation (NDNC) acting as co-implementing agencies due to their involvement in sustainable watershed management. At the municipal level, the MALFF municipal office, represented by the municipality director, will assist the NDFWM in conducting field activities for the formation of the watershed management council and the development of a watershed

management plan. This assistance includes providing necessary administrative and financial support to municipal forest officers and forest guards. Additionally, municipal forest officers and forest guards will collaborate with facilitators/NGOs, offer guidance and orientation to local leaders, and monitor implementation. NGOs will play a crucial role in facilitating these activities, given their experienced facilitators who have worked extensively with communities. As JICA has been a pioneer in PLUP implementation, the implementing entity will seek support from JICA to aid in implementation.

The implementation of the technology will require collaboration between local leaders, communities, and stakeholders, ensuring gender balance in participation and decision-making processes. Table 27 outlines the schedule and sequence of specific activities for implementation, scheduled to commence in 2024 and extend through 2028.

Table 27: Scheduling and sequencing of specific activities

Actions	Scale	Year				
		2024	2025	2026	2027	2028
Establish Participatory Land Use Planning (PLUP) at the village level	Identify and conduct consultative meeting with relevant stakeholders to actively involve in the PLUP	X	X	X	X	X
	Conduct Participatory Land Use Planning (PLUP) and climate change vulnerability assessment		X	X		
	Select agricultural or forestry extension services/micro programs			X	X	X
	Institutionalize the village regulations				X	X
	Implement the extension services/micro programs				X	X
	Monitor and evaluate the PLUP			X	X	X
	Enhance capacity of MALFF field officers and NGOS in target watershed		X	X	X	X
	Conduct socialisation on the village regulations and utilize local communication channels				X	X
	Regular monitoring and evaluation the effectiveness of the project			X	X	X

2.1.3.5. Estimation of resources Needed for Action and Activities

Table 28 provides some estimate costs for the implementation of action and activities for the transfer and diffusion of an establishing Participatory Land Use Planning (PLUP) at the village level.

Table 28: Actions, activities, capacity building needs and costs

Action 1: Establish Participatory Land Use Planning (PLUP) at the village level		
Activities	Capacity building and other needs	Costs (USD)
Identify and conduct consultative meeting with relevant stakeholders to actively involve in the PLUP	<ul style="list-style-type: none"> - Consultative cost - Consumables 	50, 000
Conduct Participatory Land Use Planning (PLUP) and climate change vulnerability assessment	<ul style="list-style-type: none"> - Consultative cost - Workshop and working session - Consumables - Study tour cost - Tara Bandu Ceremony - Training cost 	300, 000 <i>(30, 000 per village)</i>
Select agricultural or forestry extension services/micro programs		
Institutionalize the village regulations		
Implement the extension services/micro programs	<ul style="list-style-type: none"> - Consultative cost - Workshop and working session - Micro programs implementation - Consumables 	250, 000 <i>(25, 000 per village)</i>
Monitor and evaluate the PLUP		
Enhance capacity of MALFF field officers and NGOs in target watershed	<ul style="list-style-type: none"> - Consultative cost - Working session and meeting - Consumables 	50, 000
Conduct socialisation on the village regulations and utilize local communication channels	Socialization	50, 000

Regular monitoring and evaluation the effectiveness of the project	Monitoring and evaluation for 2 years	100, 000
Grand Total:	USD	800, 000

2.1.3.6. Management Planning

a. Risks and contingency planning

- i. **Cost risk:** Delays in TAP implementation may escalate activity costs. To mitigate this, MALFF, particularly NDFWM, should seek support from DPs or donors for expedited implementation.
- ii. **Political risk.** Changes in government structure may impede TAP implementation. NDFWM must raise awareness among line ministries about the significance of PLUP.
- iii. **Scheduling risk:** With the 2024 budget allocated, new budget items may be deferred. NDFWM should spearhead TAP implementation, ensuring early involvement of all relevant parties.
- iv. **Financial risk:** Insufficient budget or funding shortfall could impede TAP implementation. The Government of Timor-Leste (GoTL) should work with Development Partners (DPs) to secure financial support, including exploring options like the Green Climate Fund (GCF).
- v. **Gender risk:** Women may be having less influence in decision-making processes. Integrating gender-sensitive metrics into PLUP activities allows for identifying and addressing.

b. Next steps

- i. The General Directorate of Environment (GDE) and NDCC to organize stakeholders' workshop or roundtable discussion to communicate the TAP to Get the stakeholders buy-in
- ii. NDCC (TNA National team) to prepare the policy paper on the TNA project to get government's approval for the TAP. NDFWM to include implementation budget to its 2025 budget. Getting Cabinet's approval to get other stakeholders on board to implement the TAP.
- iii. NDFWM to include implementation budget to its 2025 budget. Integrate TAP implementation plan into NDFWM's 2025 work plan
- iv. NDFWM, especially the responsible directorate, should coordinate with the relevant stakeholders to start the implementation. NDFWM should get all main stakeholders on board.

2.1.3.7. TAP Overview table

Table 29: TAP overview table for Participatory Land Use Planning (PLUP)

Sector	Agriculture, land use and forestry							
Technology	Participatory Land Use Planning (PLUP)							
Ambition	Implement PLUP and Micro Programmes (MPs) in 10 target villages of 4 high priority watershed: (1) Loes, (2) Be Lulik, (3) Seical, and (4) Cuha in 4 years							
Benefits	Help target villages adopt a land use plan and community ordinances to sustain natural resource management. Forest conservation reduces the GHG impact, while sustainable terracing reduces emissions by not burning							
Actions	Activities to be implemented	Source of funding	Responsible institution & focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Budget (USD)
Action 1: Establish PLUP at the village level	Identify and conduct consultative meeting with relevant stakeholders to actively involve in the PLUP	GoTL	NDFWM	1 year	Delays in stakeholders' coordination	Active stakeholder's engagement	Stakeholders mapping with clear roles and responsibilities	50, 000
	Conduct Participatory Land Use Planning (PLUP) and climate change vulnerability assessment	GoTL	NDFWM	1 year	Delays in implementation due to the budget	Established PLUP in target villages	Percentage of community participation and engagement	300, 000 (30, 000 per village)
	Select agricultural or forestry extension	GoTL/DPs	NDFWM /NGOs	1 year	Programs may not meet communities' specific needs	Agricultural or forestry extension	# of community members participating in	

	services/micro programs					services/micro programs	the extension services/micro programs	
	Institutionalize the village regulations	GoTL/DPs	NDFWM /NGOs	1 year	Lack of enforcement	Establishment of clear enforcement mechanism and implementation of M&E system	Level of community involvement in local governance decisions	
	Implement the extension services/micro programs	GoTL/DPs	NDFWM /NGOs	2-3 years	Lack of sustainability	Increased income and improved lives for local women	Inclusion of women in program activities and benefits	250,000 (25,000 per village
	Monitor and evaluate the PLUP	GoTL/DPs	NDFWM /NGOs	2-3 years	Inadequate Resources	Goal achievement	Progress report	
Action 2: Promote On-Job-Training (OJT) on PLUP and issue certificate to government staffs and local leaders	Assessing existing expertise and specific areas that require additional training and development	GoTL/DPs	NDFWM	1 year	Budget constraints	Completion rates	Percentage of staffs participating in the assessment	
	Recruit experienced and knowledgeable trainers who can effectively convey the principles and practices of PLUP	GoTL/DPs	NDFWM	1 year	Budget constraints	Successful implementation of PLUP	Consultancy contract	50,000

	Enhance capacity of MALFF field officers and NGOs in target watershed	GoTL/DPs	NDFWM	1-2 years	Budget constraints	Continuous supports to the target communities	Number of trained MALFF and NGOs staffs	50, 000
	Organize field visits to previous PLUP projects	GoTL/DPs	NDFWM /NGOs	1-5 years	Budget constraints	Farmers adopt the practices	Pre-visit preparation	50, 000
	Evaluate the results of the training activities and review the training programs	GoTL/DPs	NDFWM /NGOs	1 year	Inadequate Feedback Mechanisms	Robust and accessible feedback mechanisms in place	Regularly assess the availability and effectiveness of feedback mechanisms	
	Issue certificate to participants upon successful completion of the OJT program	GoTL/DPs	NDFWM	1 year		High completion rates	Percentage of participants who successfully complete the OJT program	
Action 3: Awareness programs and promotion of participation in the establishment of PLUP	Conduct socialisation on the village regulations and utilize local communication channels	GoTL/DPs	NDFWM /NGOs	1-3 years	Lack of interest/participation	Significant improvement in awareness levels	Documentation of outreach session	50, 000
	Organize information session and workshop involving women leaders and role	GoTL/DPs	NDFWM /NGOs	1-3 years	Low participation from the target participants	High Attendance and Participation	Coordination with target participants	50, 000

	models in the community							
	Negotiate village regulations with neighbouring villages	GoTL/DPs	NDFWM /NGOs	1-3 years	Differing Priorities and Interests	Mutual Agreement on Regulations	Consultation, coordination and progress in agreement	
	Regular monitoring and evaluation the effectiveness of the PLUP	GoTL/DPs	NDFWM	1-3 years	Inadequate Resources	Goal achievement	Progress report	100,000
	Provide uniforms to the forest guards and recognize them as protectors of the forest	GoTL/DPs	NDFWM	1-3 years	Budget constraints	Visible Recognition in the Community	Uniform distribution	50,000
	Foster ongoing engagement by establishing mechanism for continuous communication and collaboration	GoTL/DPs	NDFWM	1-3 years	Lack of participation	Increased Participation Over time	Feedback mechanism	

2.1.4. Action Plan for Slopping Agricultural Land Technology (SALT)

2.1.4.1. Introduction

Cultivation on sloping land is common in Timor-Leste highland agriculture. The NDA estimated that 60% of the approximately 70,000 ha of the total cultivated land area in Timor-Leste is found in sloping areas. Most of the farmers who cultivate in this sloping terrain practice slash and burn where vegetation in a particular plot of land is cut, and fire is set to burn the remaining foliage. Ashes are used as nutrients in the soil for the purpose of planting food crops. Unfortunately, many critics claim that slashing and burning contribute to a number of persistent environmental problems, including soil erosion. This is mainly due to the fact that fields where vegetation is slashed and burned are likely to lose roots and temporary water storage. What is left behind is soil that can no longer prevent nutrients from leaving the area permanently. Overall, this farming system is not effective to meet the demand for crops in the market and subsistence due to low productivity.

Resource conservation technologies such as agroforestry, terrace farming, hedgerow intercropping, and Slopping Agricultural Land Technology (SALT) can reduce soil loss and increase food production. Hence, Slopping Agriculture Land Agriculture (SALT) has been chosen as one of the technologies to reduce erosion due to its suitability to biophysical conditions and promising economic, social, and environmental benefits. SALT, a comprehensive solution for food production and soil conservation, integrates various soil conservation techniques in one location, offering benefits that are particularly advantageous to women, such as improved access to food and enhanced soil fertility for agricultural activities.

SALT is a soil conservation-oriented farming system developed in the Philippines by the Mindanao Baptist Rural Life Centre (MBRLC) in the late 1970s. FAO (2018) defines SALT as a farming system where slopes are divided into strips of land for cultivation and separated by double hedgerows of nitrogen-fixing plants that are planted along the contour lines. These hedgerows act as erosion barriers to stabilise slopes, enrich soil, and provide fodder, fuelwood, and biomass. When the hedgerows grow to 1-2 metres tall, they are trimmed to half a metre, and the biomass is placed in cropping alleys for soil amelioration and nutrient recycling. In comparison to conventional hill slope farming, SALT has lower risk due to crop diversity, high frequency of harvest, regular income, and higher productivity per unit of land achieved without degrading available land resources.

2.1.4.2. Ambition for the TAP

Implementing slope agricultural land technology (SALT) aims to control soil erosion along slopes and improve soil fertility by stabilising the slope and enhancing the terrace or contours. Hence, the ambition of this technology is to implement SALT in high-altitude upland zones. Highland regions are mainly located in Ermera, Aileu, and Ainaro municipalities, with a target of 10 villages. These places receive a very high amount of rainfall, often on steep slopes. Generally, the upper and mountain slopes have better agricultural potential, with soils of adequate agricultural potential on steep to more moderate slopes. Given women's significant role in agricultural activities in Timor-Leste, it is expected

that SALT will offer them additional opportunities for income generation through improved crop yields and diversified farming methods.

2.1.4.3. Actions and Activities selected for inclusion in the TAP

a. Summary of barriers and measures to overcome barriers

There is a lack of financial access and cash flow hindering the adequate implementation of SALT, with the MALFF departments requiring more financial resources to monitor progress. Additionally, the lack of market access poses challenges to sustaining SALT practices. Despite its longstanding presence, government support for SALT implementation remains constrained and ineffective from the national to local levels. While SALT is ideally suited for hilly and mountainous areas where subsistence upland farming is prevalent, many engaged in upland farming are unaware of its benefits. Some farmers hesitate to adopt SALT due to a lack of information and skills required for step-by-step implementation, while limited water resources pose a significant barrier despite farmer interest.

Mobilizing financial resources through the state budget, donors, or green funds is crucial for implementing and monitoring SALT. Adopting a value chain strategy can potentially generate income and jobs in local municipalities by promoting fodder, fuel, timber trees, and cash crops through SALT. Ensuring secure market access for farmers is essential, encouraging the formation of small groups for group marketing and buying to enhance connections with larger consumers and supermarkets. Strengthening coordination among relevant stakeholders and improving institutional development in the agricultural sector are imperative for creating an enabling environment and support services.

Providing continuous training and technical assistance to rural farmers, including women, over at least two years is essential to learning and acquiring SALT techniques. Trainers in these courses, such as MALFF extension officers or NGO technical staff, must possess sufficient knowledge of SALT and facilitation skills. Capacity building of these personnel is necessary to scale up SALT field training nationwide, supported by policy and financial backing from the Government of Timor-Leste for expanding SALT techniques. Enhancing water management and availability for cultivation through improved water supply systems can incentivize farmers to increase local production and productivity, alongside encouraging water source protection and conservation efforts.

b. Actions selected for inclusion in the TAP

1. **Subsidies to support rural farmers' transition to SALT on sloping lands.** Steep slopes of up to 40% are planted for corn, cassava, peanuts, sweet potatoes, and beans, as well as various other food crops in home gardens. However, sloping lands are subjected to slash-and-burn subsistence agriculture. To promote sustainable agriculture on sloping land, the government needs to subsidize rural farmers in adopting SALT on their lands. The measure aims to address farmers' concerns about the disruptions to their source of food and income when they adopt

a new technology. Farmers, both men and women, who choose to adopt SALT will have to halt the planting season to prepare the land. This can potentially reduce their food supply temporarily. In this case, government subsidies can help leverage the transition period through the creation of alternative sources of income to cover a temporary loss of food supply and income. The measure needs to be strategically planned out and implemented to ensure that farmers will not be completely dependent on subsidies and will return to farming using new technology. By subsidising this practice, the government can protect valuable agricultural land from degradation. This measure is considered effective because it enables implementation at the lowest cost and contributes to achieving the goal of technology implementation.

2. **Develop training manual on SALT to promote practices in Timor-Leste.** SALT has been introduced in Timor-Leste for some time, but technical staff from NGOs and MALFF extension workers lack the skills to practice SALT. Some people may confuse SALT with terrace farming. In addition, to date, there are no national standard guidelines or manuals for SALT that reflect the Timor-Leste context for technical staff and farmers to follow. TOMAK is currently developing a SALT manual and is looking forward to coordinating with the MALFF to recognise and approve it as a national standard manual. A SALT manual provides comprehensive guidance on best practices for managing agriculture in sloped areas. It outlines techniques and methods that are proven to be effective in minimising soil erosion, conserving water, and promoting sustainable land use. MALFF extension officers, NGOs, and farmers can refer to the manual for practical insights into implementing these practices in sloping areas. This measure is relatively inexpensive as it mainly requires collaboration and consultation with relevant stakeholders to finalize the manual and obtain approval.
3. **Provide training and technical assistance on SALT to farmers through the Farmers Field School (FFS) approach.** To address the lack of awareness and adoption of Sloping Agriculture Land Agriculture (SALT) among upland farmers, community education and awareness initiatives are crucial. Many upland farmers remain unaware of SALT, and some hesitate to adopt it due to a lack of information and skills. Therefore, promoting awareness of SALT's benefits among subsistence upland farmers is essential. One effective approach is to utilize the Farmer Field School (FFS) method, which has proven successful in sucos where FFS has been established. FFS is a participatory education program that brings together small-scale food producers to address production challenges through sustainable agriculture practices. Through FFS, women can acquire innovative farming techniques that enhance crop yields and diversify agricultural production, leading to additional income opportunities for them and their families. FFS facilitates hands-on group learning, promoting observation, critical analysis, and community decision-making. This approach is well-suited to the context of Timor-Leste, as it promotes sustainable agriculture and empowers communities to address production challenges collaboratively.

c. Activities identified for implementation of selected actions

The selected actions and activities for Sloping Agricultural Land Technology (SALT) are listed in Table 30. These actions are aligned with the measures identified in the BAEF report, incorporating feedback received during the TAP consultation process.

Table 30: Summary of Actions and corresponding activities for Sloping Agricultural Land Technology (SALT)

Actions	Activities for Action Implementation
<p>Action 1:</p> <p>Subsidies to support rural farmers' transition to SALT on sloping lands</p>	<ol style="list-style-type: none"> 1.1. Conduct a comprehensive assessment of the current capacity for farmers who are engaged in subsistence upland farming 1.2. Develop educational programs or training materials to fill the gaps 1.3. Provide subsidized training programs for farmers on SALT technique 1.4. Offer financial incentives (such as direct subsidies or cash payments) to farmers who adopt SALT practices. 1.5. Provide subsidies on seeds, organic fertilizers and other inputs that are essential for SALT practices 1.6. Invest in mini-infrastructure development (e.g. building terraces, check dams, and water harvesting structure) to facilitate the implementation of SALT practices 1.7. Set up demonstration farms where farmers can observe successful implementation of SALT practices 1.8. Collaborate with NGOs and agricultural extension agencies to reach more farmers and leverage their expertise in training and support 1.9. Implement a robust monitoring and evaluation system to assess the impact of the subsidies
<p>Action 2:</p> <p>Develop training manual on SALT to promote practices in Timor-Leste</p>	<ol style="list-style-type: none"> 2.1. Conduct a thorough assessment on the challenges and opportunities related to sloping lands in Timor-Leste 2.2. Collaborate with local agricultural extension services, NGOs, and community leaders to ensure the manual aligns with local needs

	<p>2.3. Develop training manual highlighting the relevance of SALT practices to the specific conditions of Timor-Leste</p> <p>2.4. Organize workshop, roundtable discussions, and consultation sessions to gather inputs from stakeholders and to validate the manual</p> <p>2.5. Distribute Manual to agricultural extension officers, farmers group and other pertinent stakeholders</p> <p>2.6. Conduct training session using the manual</p>
<p>Action 3:</p> <p>Provide training and technical assistance on SALT to farmers through Farmers Field School (FFS) Approach</p>	<p>1.1. Plan, mobilise, and initiate the FFS programme of SALT</p> <p>1.2. Coordinate with stakeholders at municipal level to establish FFS groups or select existing farmer association</p> <p>1.3. Conduct assessment to identify farmers needs in the adoption of SALT</p> <p>1.4. Recruit experts with specialised skills and knowledge to provide training, seminars and workshop to the FFS participants</p> <p>1.5. Develop a curriculum that cover key aspects of SALT</p> <p>1.6. Implement, control and monitor of all FFS in target municipalities</p> <p>1.7. Conduct FFS sessions in the field, allowing participants to learn through hands-on experiences and observation.</p> <p>1.8. Establish demonstration plots where farmers can observe the implementation of SALT practices.</p> <p>1.9. Establish channels for continuous communication with farmers between FFS sessions.</p> <p>1.10. Implement a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS</p>

d. Actions to be implemented as project ideas

Action 1: Providing training and technical assistance on Sloping Agricultural Land Technology (SALT) to farmers through the Farmer Field School (FFS) approach is chosen as a project idea. In rural areas, access to information and knowledge about new technology is often limited, leading to reluctance among farmers to adopt it. Timor-Leste confronts challenges associated with soil erosion and degradation on sloping lands. SALT promotes sustainable agricultural practices aimed at conserving soil, preventing erosion, and enhancing soil fertility. Therefore, training via the FFS approach ensures that farmers, including women, can learn and effectively adopt these practices.

2.1.4.4. Stakeholders and Timeline for implementation of TAP

The Ministry of Agriculture, Livestock, Forestry, and Fisheries (MALFF) will spearhead the effective implementation of SALT in collaboration with development partners such as FAO, JICA, and TOMAK. As the primary ministry responsible for agriculture, MALFF will mobilize financial resources in partnership with development agencies. Additionally, MALFF will coordinate within and across relevant ministries, taking a leadership role in key areas. This includes recruiting experts with specialized skills and knowledge, planning, mobilizing, and initiating the Farmer Field School (FFS) program on SALT. Furthermore, the Agriculture Land Use Information System (ALGIS) will play a crucial role in monitoring land use, agrometeorological, and climatic conditions related to agricultural activities.

The implementation of SALT will also engage the private sector, including supermarkets, NGOs, community-based organizations, and women's groups, to scale up the adoption of SALT in hilly areas, particularly in Ermera, Aileu, and Ainaro municipalities. Table 31 provides an overview of the schedule and sequence of specific activities required for implementation, set to commence in 2024 and extend until 2026.

Table 31: Scheduling and sequencing of specific activities

Actions	Scale	Year				
		2024	2025	2026	2027	2028
Provide training and technical assistance on SALT to farmers through Farmers Field School (FFS) Approach	Plan, mobilise, and initiate the FFS programme of SALT	X	X			
	Coordinate with stakeholders at municipal level to establish FFS groups or select existing farmer association		X	X		
	Conduct assessment to identify farmers needs in the adoption of SALT			X	X	
	Recruit experts with specialised skills and knowledge to provide			X		

	training, seminars and workshop to the FFS participants					
	Develop a curriculum that cover key aspects of SALT			X		
	Implement, control and monitor of all FFS in target municipalities		X	X	X	X
	Conduct FFS sessions in the field, allowing participants to learn through hands-on experiences and observation.			X	X	X
	Establish demonstration plots where farmers can observe the implementation of SALT practices.			X	X	X
	Establish channels for continuous communication with farmers between FFS sessions				X	X
	Implement a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS				X	X

2.1.4.5. Estimation of resources Needed for Action and Activities

The projected cost for providing training and technical assistance on SALT to farmers through Farmers Field School (FFS) Approach is detailed in the Table 32. This estimate may fluctuate based on various factors, whether they are incorporated or excluded from the outlined expenses as described below:

Table 32: Actions, activities, capacity building needs and costs

Action 1: Provide training and technical assistance on SALT to farmers through Farmers Field School (FFS) Approach		
Activities	Capacity building and other needs	Costs (USD)
Plan, mobilise, and initiate the FFS programme of SALT	Consumables	50, 000
	Workshop and Working session	50, 000
	Consultative cost	200, 000
Coordinate with stakeholders at municipal level to establish FFS	Consumables	25, 000
	Consultative cost	

groups or select existing farmer association		
Conduct assessment to identify farmers needs in the adoption of SALT	Workshop and Working session	25, 000
	Consumables	
Recruit experts with specialised skills and knowledge to provide training, seminars and workshop to the FFS participants	Experts cost	40, 000
Develop a curriculum that cover key aspects of SALT		
Implement, control and monitor of all FFS in target municipalities	Consultative cost	200, 000
	Workshop and Working session	
	Consumables	
	Tools and inputs distribution cost	
Conduct FFS sessions in the field, allowing participants to learn through hands-on experiences and observation.	Hand-on training cost	50, 000
Establish demonstration plots where farmers can observe the implementation of SALT practices.	Workshop and Working session Consumables	50, 000
Establish channels for continuous communication with farmers between FFS sessions	Communication cost	50, 000
Implement a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS	M & E cost	30, 000
Grand Total:	USD	770, 000

2.1.4.6. Management Planning

a. Risks and contingency planning

- i. **Cost risk:** Delays in TAP implementation may result in increased costs. To mitigate this risk, MALFF should actively seek support from development partners (DPs) or donors to expedite implementation.
- ii. **Political risk:** Changes in government structure may disrupt implementation. MALFF should raise awareness among line ministries about the importance of SALT to maintain political support and continuity.
- iii. **Scheduling risk:** Budget allocation for 2024 is fixed, potentially delaying new budget items. MALFF should spearhead TAP implementation by engaging all relevant stakeholders from the outset to ensure smooth execution.
- iv. **Financial risk:** The allocated budget for TAP may be insufficient. To address this, MALFF should prioritize SALT within the existing budget and collaborate with DPs, particularly JICA and FAO, to secure additional funding.
- v. **Gender risk:** Unequal access and participation between genders pose a significant risk. To counter this, targeted outreach and capacity-building programs for women farmers should be implemented, ensuring their access to extension services and technical assistance.

b. Next steps

- i. **Stakeholders' roundtable discussion:** The General Directorate of Environment (GDE) and NDCC will organize a stakeholders' workshop or roundtable discussion to garner buy-in for the TAP.
- ii. **Policy Paper Preparation:** NDCC (TNA National Team) will draft a policy paper on the TNA project to obtain government approval for the TAP. This includes seeking Cabinet approval to onboard other stakeholders for TAP implementation.
- iii. **Budget Integration:** MALFF will allocate implementation budget within its 2025 budget. Additionally, the TAP implementation plan will be integrated into MALFF's 2025 work plan.
- iv. **Stakeholder Coordination:** MALFF, particularly the responsible directorate, will coordinate with relevant stakeholders to initiate implementation. MALFF will ensure the involvement of all key stakeholders in the process.

2.1.4.7. TAP overview table

Table 33: TAP overview table for Slopping Agricultural Land Technology (SALT)

Sector		Agriculture, land use and forestry						
Technology		Slopping Agricultural Land Technology (SALT)						
Ambition		Implement SALT in high elevation upland zone, which is located in Ermera, Aileu and Ainaro municipalities						
Benefits		Reduce erosion due to its suitability to biophysical conditions and promising economic, social, and environmental benefits						
Actions	Activities to be implemented	Source of funding	Responsible institution & focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Budget (USD)
Action 1: Subsidises to support rural farmers' transition to SALT on sloping lands	Conduct a comprehensive assessment of the current capacity for farmers who are engaged in subsistence upland farming	GoTL/DPs	MALFF	1 year	Budget constraints	Completion rates	Percentage of farmers participating in the assessment	50, 000
	Develop educational programs or training materials to fill the gaps	GoTL/DPs	MALFF	1 year	Lack of funding	Completion of training materials and agenda for the training	Hired consultant to develop materials	50, 000
	Provide subsidized training programs for farmers on SALT technique	GoTL/DPs	MALFF	1-2 years	Lack of funding	Participation rates and training program completion	Completion of training materials and agenda for the training	
	Offer financial incentives (such as direct subsidies or cash payments) to	GoTL/DPs	MALFF	1-3 years	Budget constraints	A significant increase in the adoption of	Number of farmers actively participating in	100, 000

	farmers who adopt SALT practices.					SALT practices by farmers	the incentive program	
	Provide subsidies on seeds, organic fertilizers and other inputs that are essential for SALT practices	GoTL/DPs	MALFF	1-3 years	Budget constraints	Improved Agricultural Productivity	Farmers' Input Utilization	100,000
	Invest in mini-infrastructure development (e.g. building terraces, check dams, and water harvesting structure) to facilitate the implementation of SALT practices	GoTL/DPs	MALFF	1-5 years	Cost Overruns	Improved Water Management & Increased Agricultural Productivity	Infrastructure Completion	
	Set up demonstration farms where farmers can observe successful implementation of SALT practices	GoTL/DPs	MALFF	1 year	Resource Constraints	Increased Adoption of SALT Practices	Farmer Attendance and Engagement	50,000
	Collaborate with NGOs and agricultural extension agencies to reach more farmers and leverage their expertise in training and support	GoTL/DPs	MALFF	1-5 years	Resource Constraints	Improved Agricultural Practices	Level of community participation in the training and support programs	30,000

	Implement a robust monitoring and evaluation system to assess the impact of the subsidies	GoTL/DPs	MALFF	1-5 years	Time and Resource Constraints	Goal achievement	Progress report	30,000
Action 2: Develop training manual on SALT to promote practices in Timor-Leste	Conduct a thorough assessment on the challenges and opportunities related to sloping lands in Timor-Leste	GoTL/DPs	MALFF	1 year	Budget constraints	Assessment report	Data Collection Completeness	50,000
	Collaborate with local agricultural extension services, NGOs, and community leaders to ensure the manual aligns with local needs	GoTL/DPs	MALFF	1 year	Lack of Community Representation	High level of participation	Minutes consultative meeting	50,000
	Develop training manual highlighting the relevance of SALT practices to the specific conditions of Timor-Leste	GoTL/DPs	MALFF	1 year	Budget constraints	Participation rates and training program completion	Completion of training materials and agenda for the training	
	Organize workshop, roundtable discussions, and consultation sessions to gather inputs from stakeholders and to validate the manual	GoTL/DPs	MALFF	1-3 years	Limited Stakeholder Participation	Manual is validated	Meeting minutes	50,000
	Distribute Manual to agricultural extension officers, farmers group	GoTL/DPs	MALFF	1-3 years	Limited Accessibility	Wide Manual Distribution	Manual Distribution Reach	50,000

	and other pertinent stakeholders							
	Conduct training session using the manual	GoTL/DPs	MALFF	1-2 years	Limited Participant Engagement	Demonstrated Knowledge Application	Level of engagement and participation during training sessions	
Action 3: Provide training and technical assistance on SALT to farmers through Farmers Field School (FFS) Approach	Plan, mobilise, and initiate the FFS programme of SALT	GoTL/DPs	MALFF	1-5 years	Insufficient Funding	Project kick-off meeting	Project document and stakeholders' engagement	300,000
	Coordinate with stakeholders at municipal level to establish FFS groups or select existing farmer association	GoTL/DPs	MALFF	1 year	Limited Stakeholder Engagement	Establishment of FFS groups	Minutes of consultative meeting	25,000
	Conduct assessment to identify farmers needs in the adoption of SALT	GoTL/DPs	MALFF	1 year	Limited Farmer Participation	% of farmers completing needs assessment surveys or interview	High completion rates	25,000
	Recruit experts with specialised skills and knowledge to provide training, seminars and workshop to the FFS participants	GoTL/DPs	MALFF	1 year	Budget constraints	Organized training, seminars and workshop	Consultancy contract	40,000
	Develop a curriculum that cover key aspects of SALT	GoTL/DPs	MALFF	1 year	Budget constraints	Positive participants feedback	Documentation of the curriculum	

	Implement, control and monitor of all FFS in target municipalities	GoTL/DPs	MALFF	1-5 years	Budget constraints	Goal achievement	Progress report	200,000
	Conduct FFS sessions in the field, allowing participants to learn through hands-on experiences and observation.	GoTL/DPs	MALFF	1-3 years	Budget constraints /limited participation	High attendance rates and active involvement	Number of farmers, including women participated in the learning	50,000
	Establish demonstration plots where farmers can observe the implementation of SALT practices.	GoTL/DPs	MALFF	1-3 years	Budget constraints	Positive changes in farm practices	Accessibility of demonstration plots for farmers	50,000
	Establish channels for continuous communication with farmers between FFS sessions.	GoTL/DPs	MALFF	1-5 years	Information overload	Significant improvement in awareness levels	Documentation of outreach session	50,000
	Implement a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS	GoTL/DPs	MALFF	1-5 years	Incomplete or Inaccurate Data Collection	Goal achievement	Progress report	30,000

2.2. Project Ideas for Agriculture, Land use and Forestry

2.2.1. Brief Summary of the Project Ideas for Agriculture, Land use and Forestry sector

According to the General Directorate of Statistics (GDS), 70 percent of the population lives in rural areas, and 66 percent of Timorese families are involved in agriculture (DRTL 2020b). Most farms are small-scale subsistence farms, with barely 3% producing for sale (GDS 2015). However, the majority of farmers still engage in unsustainable agricultural practices such as cultivation on steep slopes, shifting cultivation or slash-and-burn, uncontrolled grazing on public land, and recurring forest fires. These practices result in leaching, which eventually causes land degradation due to water and wind erosion, excessive runoff, and other factors. Additionally, 70% of the land area in Timor-Leste has a slope of over 26%, which is home to the majority of rural households. In most cases, soil erosion and limited moisture retention lead to degrading land resources. This increases the likelihood of food shortages and adds to low yields. In terms of forestry, the majority of forests have suffered significant degradation due to intensive logging, firewood extraction, and grazing. Land degradation and deforestation have affected Timor-Leste's indigenous trees, including teak, mahogany, and sandalwood. This condition also causes soil degradation, a decrease in groundwater, threats to wildlife, and decreases in food sources.

Based on the above rationale, three (3) project ideas have been proposed for the agriculture, land use, and forestry sectors for the implementation of the country's Technology Action Plan. These are:

- Adopt a value chain approach and promote cash crops
- Establish Participatory Land Use Planning (PLUP) at the village level
- Provide training and technical assistance on SALT to farmers through Farmers Field School (FFS) Approach

These project ideas were derived from the three technologies of agriculture, land use, and the forestry sector prioritised in the stakeholder's consultation workshop held during the first part of the Technology Needs Assessment (TNA) project. Technology prioritisation was conducted using the Multi-Criteria Analysis (MCA) method. During the consultation workshop, the pertinent stakeholders discussed the identified criteria and indicators and validated them. The criteria for technology prioritisation for mitigation measures are cost and benefits related to economic, social, environmental, climate, and local contexts. Furthermore, a detailed barrier and enabling framework analysis was also done for each of the prioritised technologies. Summaries of the barriers and measures to overcome them are also presented in the action plan for each technology.

As the newest and one of the least developed countries (LCD), Timor-Leste faces multiple challenges in land use management, including deforestation, land degradation, and poverty. The agroforestry system is considered one of the best ways to balance socioeconomic needs with ecological functions in Timor-Leste. Additionally, the PLUP has been proven to be an effective method to enhance the capacity of suco leaders and other communities to manage lands and forest-related natural resources in a sustainable manner. While SALT is one of the most effective

measures to reduce soil loss and increase food production. Each of the technologies has a number of actions proposed; however, only three were selected for the project ideas. Each action can be developed into a stand-alone project for further implementation of the TAP. Implementation of all actions will be required to create a sustainable agriculture, land use, and forestry system in Timor-Leste.

2.2.2. Specific Project Ideas

2.2.2.1. Specific Project Idea: Adopt a value chain approach and promote cash crops

Table 34: Specific Project Idea for Agroforestry

<p>Introduction/Background</p>	<p>According to the SNC, agriculture is the second major source of GHG emissions. Total emissions of the three major GHGs (CO₂, CH₄, and N₂O) totalled 665.76 GgCO₂e in 2015. They increased by 19.63% from 2005 to now, by 8.29% from 2010 to now, and by 3.87% from the year before. Additionally, Timor-Leste's dense forests are easily accessible and, as a result, are vulnerable to logging, extensive deforestation, overgrazing, agricultural land expansion, increasing demand for firewood and charcoal, and urbanisation that contribute to deforestation and forest degradation. Hence, the agroforestry system is considered to be the most viable option for balancing the socio-economic needs and ecological functions of the land. It also offers great potential for carbon sequestration, and it was considered one of the key interventions to enhance ecosystem services.</p> <p>Nevertheless, many agroforestry projects in Timor-Leste rely on short-term funding, making it difficult to sustain efforts beyond the initial project period. Also, there are some donor-funded schemes that offer incentives to farmers, but their sustainability has been questioned. Most of the time, a lack of effective market access for agroforestry products discourages farmers from continued participation. Therefore, it is vital to support the creation of value chains that connect farmers to markets, ensuring fair prices and incentives.</p>
<p>Objectives</p>	<ol style="list-style-type: none"> 1. To increase overall agricultural productivity by optimising land use through agroforestry 2. To improve the livelihood of farmers by diversifying income sources 3. To contribute to carbon sequestration

	<ol style="list-style-type: none"> 4. To reduce pressure on natural forests and restore forest and land degradation
What are the outputs and are they measurable?	<ol style="list-style-type: none"> 1. Implemented agroforestry in targeted municipalities 2. Improved livelihoods for smallholder farmers 3. Restored natural forests 4. GHG emission is reduced
Relationship to the country's sustainable development priorities	<p>This project is in line with Timor-Leste's Strategic Development Plan (SDP) 2011–2030. The SDP outlines the need to prepare a forestry management plan that will encourage reforestation and sustainable land management practices in Timor-Leste. This document outlines areas suitable for small- and large-scale commercial forestry, selects the best species for buildings, agroforestry, and hardwoods, and identifies possible markets. In addition, this strategy also includes increasing the production of cash crops, similar to food crop production.</p>
Project Deliverables (Value/benefits)	<ol style="list-style-type: none"> 1. Diversify income streams by mixing tree crops and cash crops. 2. Increase profitability by integrating high-value cash crops within agroforestry systems. 3. Create employment opportunities in processing, marketing, and related sectors, contributing to rural economic 4. Contribute to carbon sequestration, helping to mitigate climate change by capturing and storing carbon dioxide. 5. Contribute to improved livelihoods by offering a mix of products.
Project Scope, Possible Implementation	<p>The project can be implemented under the Timor-Leste SDP 2011–2030, including the National Policy on Forests, because actions that need to be taken are within the plan. It is feasible because it greatly contributes to the environmental, economic, and social aspects.</p>
Project Activities	<p>These include:</p> <ul style="list-style-type: none"> ➤ Identify and engage a diverse group of stakeholders ➤ Conduct in-dept market analysis and survey to smallholder's farmers ➤ Identify and promote the cultivation of suitable cash crops based on climate, soil conditions, and market demand ➤ Provide training and capacity building to farmers on modern agroforestry practices and quality control

	<ul style="list-style-type: none"> ➤ Provide access to quality seeds, fertilizers, and other inputs ➤ Establish mechanism for financial support (e.g. loans or grants) and collaborate with financial institutions to assist farmers ➤ Create linkages between agroforestry producers and buyers ➤ Strengthen extension services to provide ongoing support to farmers in managing agroforestry system 		
Timelines	The activities are expected to start in 2024 and run up to 2028		
Budget Resource requirements	Activity/budget line	Budget	
	Identify and engage a diverse group of stakeholders	10, 000	
	Conduct in-dept market analysis and survey to smallholder's farmers	30, 000	
	Identify and promote the cultivation of suitable cash crops based on climate, soil conditions, and market demand	50, 000	
	Provide training and capacity building to farmers on modern agroforestry practices and quality control	80, 000	
	Provide access to quality seeds, fertilizers, and other inputs	100, 000	
	Establish mechanism for financial support (e.g. loans or grants) and collaborate with financial institutions to assist farmers	40, 000	
	Create linkages between agroforestry producers and buyers	100, 000	
	Strengthen extension services to provide ongoing support to farmers in managing agroforestry system	100, 000	
	The project will be funded by GOTL and DPs		
Measurement/Evaluation	Activity	Monitoring Indicators	Success criteria
	Identify and engage a diverse group of stakeholders	Minutes of consultative meeting	Signed partnership agreement to provide

			funding and in-kind supports
	Conduct in-dept market analysis and survey to smallholder's farmers	Draft market analysis and survey	Completed and validated market research analysis
	Identify and promote the cultivation of suitable cash crops based on climate, soil conditions, and market demand	Potential cash crops are identified and cultivated	Successful production and marketing of cash crop
	Provide training and capacity building to farmers on modern agroforestry practices and quality control	% of farmers adopting modern agricultural practices	Improvement in the quality of agricultural and forest products
	Provide access to quality seeds, fertilizers, and other inputs	Farmers access to seeds and inputs	Increased crop yields
	Establish mechanism for financial support (e.g. loans or grants) and collaborate with financial institutions to assist farmers	Number of farmers accessing financial support	Established financial mechanism
	Create linkages between agroforestry producers and buyers	Partnership with producers and buyers	Quantity of agroforestry products sold in the market
	Strengthen extension services to provide ongoing support to farmers in managing agroforestry system	Level of farmer participation	Increased Agroforestry Adoption Rates
Possible Challenges	Complications/	<ul style="list-style-type: none"> ➤ Failure to secure funding for implementation of the project ➤ Limited infrastructure ➤ Land tenure issues ➤ Differences in stakeholder priorities 	

	<ul style="list-style-type: none"> ➤ Un-coordination among Ministries responsible for implementation ➤ Changing government structure
Responsibilities and coordination	Ministry of Agriculture, Livestock, Fisheries, and Forestry

2.2.2.2. Specific Project Idea: Establish Participatory Land Use Planning (PLUP) at the village level

Table 35: Specific Project Idea for Participatory Land Use Planning (PLUP)

Introduction/Background	<p>Forest resources in Timor-Leste continue to decline. Deforestation and forest degradation have caused soil erosion, landslides, and flash floods, which have had a negative impact on the lives of local communities. The main causes of deforestation and forest degradation are forest fires, conversion of forests to agricultural land, shifting cultivation, collection of firewood, illegal logging, and free grazing of animals.</p> <p>Timor-Leste's government (GoTL) needs to address forest degradation and deforestation to achieve sustainable socio-economic development. Community-based natural resource management (CB-NRM) through PLUP has been proven to be an effective method to enhance the capacity of suco leaders and other communities to manage lands and forest-related natural resources in a sustainable manner.</p> <p>According to the MALFF, PLUP is a valuable planning tool for land-based interventions. Hence, PLUP should come before development. Prioritising PLUP implementation above development activities can lower the risk of undesirable outcomes. Examples include reforestation projects where local community members' trees are eaten by animals brought by other community members. Implementing PLUP first can prevent this issue by promoting community consensus on tree planting locations and understanding their importance before reforestation. Therefore, the pertinent ministry should raise awareness of financial support by engaging with potential donors to establish PLUP at the village level.</p>
Objectives	<ol style="list-style-type: none"> 1. To orient local communities to manage their natural resources sustainably

	<ol style="list-style-type: none"> 2. To formulate future land use plans and village regulations 3. To enhance local governance capacity for sustainable natural resource management 4. To improve rural communities' livelihoods by implementing micro programs 5. To reduce the GHG emissions from forest degradation and deforestation
What are the outputs and are they measurable?	<ol style="list-style-type: none"> 1. Implemented PLUP in targeted villages 2. Improved management and protection of existing natural resources 3. Formulated future land use planning with the village regulations 4. Enhanced governance capacity of local leaders for natural resource management 5. Enhanced livelihood diversification for vulnerable communities 6. GHG emission reduction
Relationship to the country's sustainable development priorities	<p>This project is in line with Timor-Leste's Strategic Development Plan (SDP) 2011–2030. The SDP acknowledges the need to manage Timor-Leste's land resources to avoid land degradation and minimise the risk of environmental damage. This document outlines the plans that will promote reforestation and sustainable land management practices in Timor-Leste.</p>
Project Deliverables (Value/benefits)	<ol style="list-style-type: none"> 1. Involve local communities in the decision-making process regarding land use 2. Encourage sustainable and responsible management of natural resources 3. Enable communities to discuss and resolve potential conflicts over land use and resource access 4. Recognize and formalize customary law 5. Improve livelihoods by combining agriculture, forestry and other income-generating activities 6. Incorporate climate change considerations into land use planning
Project Scope, Possible Implementation	<p>The project can be implanted under the Timor-Leste SDP 2011 – 2030, including National Policy on Forest because actions need to be taken are within the plan. It is feasible because it greatly contributes to the environmental, economic, and social aspects.</p>
Project Activities	<p>These include:</p>

	<ul style="list-style-type: none"> ➤ Identify and conduct consultative meeting with relevant stakeholders to actively involve in the PLUP ➤ Conduct Participatory Land Use Planning (PLUP) and climate change vulnerability assessment ➤ Select agricultural or forestry extension services/micro programs ➤ Institutionalize the village regulations ➤ Implement the extension services/micro programs ➤ Monitor and evaluate the PLUP ➤ Enhance capacity of MALFF field officers and NGOS in target watershed ➤ Conduct socialisation on the village regulations and utilize local communication channels ➤ Regular monitoring and evaluation the effectiveness of the project 		
Timelines	The activities are expected to start in 2024 and run up to 2028		
Budget Resource requirements	Activity/budget line		Budget (USD)
	Identify and conduct consultative meeting with relevant stakeholders to actively involve in the PLUP		50,000
	Conduct Participatory Land Use Planning (PLUP) and climate change vulnerability assessment		300,000 <i>(30,000 per village)</i>
	Select agricultural or forestry extension services/micro programs		
	Institutionalize the village regulations		
	Implement the extension services/micro programs		250,000 <i>(25,000 per village)</i>
	Monitor and evaluate the PLUP		
	Enhance capacity of MALFF field officers and NGOS in target watershed		50,000
	Conduct socialisation on the village regulations and utilize local communication channels		50,000
Regular monitoring and evaluation the effectiveness of the project		100,000	
The project will be funded by GOTL and DPs			
Measurement/Evaluation	Activity	Monitoring Indicators	Success criteria

	Identify and conduct consultative meeting with relevant stakeholders to actively involve in the PLUP	Stakeholders mapping with clear roles and responsibilities	Active stakeholder's engagement
	Conduct Participatory Land Use Planning (PLUP) and climate change vulnerability assessment	Percentage of community participation and engagement	Established PLUP in target villages
	Select agricultural or forestry extension services/micro programs	# of community members participating in the extension services/micro programs	Agricultural or forestry extension services/micro programs
	Institutionalize the village regulations	Level of community involvement in local governance decisions	Establishment of clear enforcement mechanism and implementation of M&E system
	Implement the extension services/micro programs	Inclusion of women in program activities and benefits	Increased income and improved lives for local women
	Monitor and evaluate the PLUP	Progress report	Goal achievement
	Enhance capacity of MALFF field officers and NGOS in target watershed	Number of trained MALFF and NGOS staffs	Continuous supports to the target communities
	Conduct socialisation on the village regulations and utilize local communication channels	Documentation of outreach session	Significant improvement in awareness levels
	Regular monitoring and evaluation the effectiveness of the project	Progress report	Goal achievement
Possible Challenges	Complications/	<ul style="list-style-type: none"> ➤ Failure to secure funding for implementation of the project ➤ Differences in stakeholder priorities 	

	<ul style="list-style-type: none"> ➤ Un-coordination among Ministries responsible for implementation ➤ Changing government structure
Responsibilities and coordination	NDFWM - Ministry of Agriculture, Livestock, Fisheries, and Forestry

2.2.2.3. Specific Project Idea: Provide training and technical assistance on SALT to farmers through Farmers Field School (FFS) Approach

Table 36: Specific Project Idea for Sloping Agricultural Land Technology (SALT)

Introduction/Background	<p>Cultivation on sloping land is common in Timor-Leste highland agriculture. The NDA estimated that 60% of the approximately 70.000 ha of the total cultivated land area in Timor-Leste is found in sloping areas. Most of the farmers who cultivate in this sloping terrain practice slash and burn where vegetation in a particular plot of land is cut, and fire is set to burn the remaining foliage. Ashes are used as nutrients in the soil for the purpose of planting food crops. Unfortunately, many critics claim that slashing and burning contribute to a number of persistent environmental problems, including soil erosion. This is mainly due to the fact that fields where vegetation is slashed and burned are likely to lose roots and temporary water storage. What is left behind is soil that can no longer prevent nutrients from leaving the area permanently.</p> <p>Resource conservation technologies such as Sloping Agricultural Land Technology (SALT) can reduce soil loss and increase food production. Hence, SALT has been selected as one of the technologies to reduce erosion due to its suitability to biophysical conditions and promising economic, social, and environmental benefits. However, most people who are engaged in upland farming are not aware of SALT. Some farmers are not adopting SALT because of a lack of information and skills to implement it step by step. Therefore, community education and awareness about the benefits of SALT should be promoted to those who are engaged in subsistence upland farming. This should be done through the Farmer Field School (FFS) approach, as success has been achieved in the sucos, which have provided support to establish FFS. The FFS approach is a participatory education programme that brings together small-scale food producers to tackle production challenges</p>
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	through sustainable agriculture. This approach allows hands-on group learning to promote observation, critical analysis, and community decision-making.
Objectives	<ol style="list-style-type: none"> 1. Introduce farmers to sustainable agricultural practices in sloping areas. 2. Teach farmers techniques to prevent soil erosion, enhance soil conservation, and improve water management. 3. Empower farmers with knowledge and skills through participatory and experiential learning methods. 4. Foster community engagement where farmers can learn together, share experiences, and collectively address challenges. 5. Improve yields and livelihoods in sloping years 6. Enhance carbon sequestration
What are the outputs and are they measurable?	<ol style="list-style-type: none"> 1. Increased adoption of SALT practices in targeted sloping areas 2. Improved soil conservation and enhanced water management 3. Increased knowledge and understanding of SALT practices 4. Reduction of slash-and-burn practices 5. Strengthened community engagement and collaboration among farmers 6. Improved crop yields and enhanced livelihood in sloping areas 7. Enhanced carbon sequestration through the integration of agroforestry into SALT
Relationship to the country's sustainable development priorities	This project aligns with Timor-Leste's Strategic Development Plan (SDP) 2011–2030. SDP recognises that Timor-Leste's land area slopes more than 26% and is largely degraded, leading to low crop yields and high vulnerability to food shortages. Therefore, the document reinforces the need to provide information to farmers and access the best information about crop and seed varieties to succeed in a particular area. This document also outlines strategies and actions to carry out reforestation throughout degraded areas, especially on slopes, including introducing programmes to reduce the practice of burning forests or grass during the dry season.
Project Deliverables (Value/benefits)	<ol style="list-style-type: none"> 1. Farmers gain a deeper understanding of SALT practices 2. Improves soil conservation, ensuring the long-term productivity of the land and preventing degradation by adopting SALT

	<ol style="list-style-type: none"> 3. Foster community engagement and collaboration, creating a shared learning environment. 4. Improve crop yields and diversify income sources, leading to more sustainable livelihoods 5. Contribute to the conservation of natural resources, including soil, water and biodiversity 6. Contribute to the reduction of GHG emissions 	
Project Scope, Possible Implementation	The project can be implemented under the Timor-Leste SDP 2011–2030, including the National Policy on Forests, because actions that need to be taken are within the plan. It is feasible because it greatly contributes to the environmental, economic, and social aspects.	
Project Activities	<p>These include:</p> <ul style="list-style-type: none"> ➤ Plan, mobilise, and initiate the FFS programme of SALT ➤ Coordinate with stakeholders at municipal level to establish FFS groups or select existing farmer association ➤ Conduct assessment to identify farmers needs in the adoption of SALT ➤ Recruit experts with specialised skills and knowledge to provide training, seminars and workshop to the FFS participants ➤ Develop a curriculum that cover key aspects of SALT ➤ Implement, control and monitor of all FFS in target municipalities ➤ Conduct FFS sessions in the field, allowing participants to learn through hands-on experiences and observation. ➤ Establish demonstration plots where farmers can observe the implementation of SALT practices. ➤ Establish channels for continuous communication with farmers between FFS sessions ➤ Implement a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS 	
Timelines	The activities are expected to start in 2024 and run up to 2028	
Budget Resource requirements	Activity/budget line	Budget
	Plan, mobilise, and initiate the FFS programme of SALT	300, 000
	Coordinate with stakeholders at municipal level to establish FFS groups or select existing farmer association	25, 000

	Conduct assessment to identify farmers needs in the adoption of SALT	25, 000	
	Recruit experts with specialised skills and knowledge to provide training, seminars and workshop to the FFS participants	40, 000	
	Develop a curriculum that cover key aspects of SALT		
	Implement, control and monitor of all FFS in target municipalities	200, 000	
	Conduct FFS sessions in the field, allowing participants to learn through hands-on experiences and observation.	50, 000	
	Establish demonstration plots where farmers can observe the implementation of SALT practices.	50, 000	
	Establish channels for continuous communication with farmers between FFS sessions	50, 000	
	Implement a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS	30, 000	
	The project will be funded by GOTL and DPs		
Measurement/Evaluation	Activity	Monitoring Indicators	Success criteria
	Plan, mobilise, and initiate the FFS programme of SALT	Project document and stakeholders' engagement	Project kick-off meeting
	Coordinate with stakeholders at municipal level to establish FFS groups or select existing farmer association	Minutes of consultative meeting	Establishment of FFS groups
	Conduct assessment to identify farmers needs in the adoption of SALT	% of farmers completing needs assessment surveys or interview	High completion rates
	Recruit experts with specialised skills and knowledge to provide training, seminars and workshop to the FFS participants	Consultancy contract	Organized training, seminars and workshop
	Develop a curriculum that cover key aspects of SALT	Documentation of the curriculum	Positive participants feedback

	Implement, control and monitor of all FFS in target municipalities	Progress report	Goal achievement
	Conduct FFS sessions in the field, allowing participants to learn through hands-on experiences and observation.	Number of farmers, including women participated in the learning	High attendance rates and active involvement
	Establish demonstration plots where farmers can observe the implementation of SALT practices.	Accessibility of demonstration plots for farmers	Positive changes in farm practices
	Establish channels for continuous communication with farmers between FFS sessions	Documentation of outreach session	Significant improvement in awareness levels
	Implement a monitoring and evaluation system to assess the progress of each farmer and the overall effectiveness of the FFS	Progress report	Goal achievement
Possible Complications/ Challenges	<ul style="list-style-type: none"> ➤ Failure to secure funding for implementation of the project ➤ Differences in stakeholder priorities ➤ Un-coordination among Ministries responsible for implementation ➤ Changing government structure ➤ Limited infrastructure ➤ Land tenure issues 		
Responsibilities and coordination	Ministry of Agriculture, Livestock, Fisheries, and Forestry		

Chapter 3 Cross-cutting Issues

The TAP proposes multiple actions for each of the prioritised technologies, of which four are selected to be implemented as stand-alone projects. The TAP needs to have stakeholder buy-in at the beginning of its implementation. To promote energy efficiency in transportation and scale up sustainable agriculture, land use, and forestry in Timor-Leste, all actions must be implemented. Table 37 outlines some common barriers among these two sectors: (1) transportation; (2) agriculture, land use, and forestry. This section details common measures, actions, and activities to address these barriers.

Table 37: Common barriers, actions, and activities

Common barrier	Actions	Activities
Lack of finance access	Creating awareness of financial support and adopt value chain approach	<ul style="list-style-type: none"> ➤ Seek external funding through international grants, partnership, or collaboration with development agencies ➤ Advocate and raise awareness among policymakers to build support for increased funding ➤ Use existing budget allocation ➤ Establish mechanism for financial support and collaborate with financial institutions ➤ Create linkages between producers and buyers
Limited institutional capacity	Strengthen institutional capacity	<ul style="list-style-type: none"> ➤ Develop legislation that establishes the legal framework ➤ Develop training programs to staffs ➤ Identify and engage a diverse group of stakeholders with clear roles and responsibilities ➤ Implement monitoring and evaluation system
Limited human resources	Provide training and technical assistance	<ul style="list-style-type: none"> ➤ Recruit experts with specialised skills and knowledge ➤ Conduct a stakeholder analysis to identify all relevant parties ➤ Collaborate with international experts to improve data and analysis ➤ Organize workshop, roundtable discussions, and consultation session to gather input from stakeholders ➤ Strengthen extension services to provide ongoing support ➤ Conduct sessions in the field, allowing participants to learn based on experience
Lack of public awareness	Develop and implement public awareness initiatives	<ul style="list-style-type: none"> ➤ Conduct socialization and utilize local communication channels ➤ Establish channels for continuous communication

Chapter 4 Conclusion

The Technology Action Plan (TAP) report signifies the culmination of the Technology Needs Assessment (TNA) process, which used a consultative methodology. This approach adhered to the guidelines outlined in the "Guidance for Preparing a Technology Action Plan" handbook, with the goal of enhancing the TNA process to facilitate improved project implementation. Recognizing the necessity to offer guidance on translating TNA results, especially TAPs, into actionable projects was acknowledged.

The mitigation TAP report outlines the final selection of seven technologies for the concluding phase of the TNA process, intended for government review. These technologies encompass critical solutions across transportation, agriculture, land use, and forestry sectors, for which the government may seek funding support. The technologies included in the TAP are as follows:

❖ Transportation Sector

1. Develop pollution control Decree-Law
2. Low carbon development strategy
3. Research on installing solar system-based charging stations
4. Public transport maximization

❖ Agriculture, land use and forestry

1. Agroforestry
2. Participatory Land Use Planning (PLUP)
3. Slopping Agricultural Land Technology (SALT)

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Annex I. List of stakeholders involved and their contacts

I. One-on-One Consultation Stakeholders

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9.	Mr. Januario Marcal	MALFF – Extension	National Director	
10.	Mr. Renato Zrnic	TOMAK	Team Leader	renato.zrnic@tomak.org
11.	Mr. Lucio Nuno	MALFF	Chief Department	
12.	Mr. Lucio	MALFF	National Director	
13.	Mr. Martinho Laurentino	MALFF	DG Agriculture	
14.	Mr. Pedro Marcal	NDA	President	a.04sta@gmail.com
15.	Mr. Adelino	MALFF	Chief of Department	

II. Participants of Consultation Workshop

No.	Name	Institution	Type of Stakeholder
1.	Zenildo A. Smith	EDTL	Government Institution
2.	Estefania da C. Soares	EDTL	Government Institution
3.	Graciano da Silva	MALFF	Government Institution
4.	Olimpio da Silva Pinto	Similie Timor	Private Sector
5.	Junior Gama Pinto	Youth Network	Youth Group
6.	Fidelia Raquela	Trobas	NGO
7.	Maria Lurdes de Araujo	Trobas	NGO
8.	Gabriela Vidigal X. Trindade	DNCP	Government Institution
9.	Moises de Sá	GJPA	Government Institution
10.	Alito Rosa	KFF	NGO
11.	Maria A. Vitor	DNTT	Government Institution
12.	Nelson S. Martins	DNTT	Government Institution
13.	Ponciano A.	DGREAS	Government Institution
14.	Profirio F. Xavier	DNTT	Government Institution
15.	Lucia Lemos Saldanha	DNCP	Government Institution
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17.	Amaro Soares Salsinha	DNCP	Government Institution
18.	Albino da Silva Barbosa	MALFFPF-Floresta	Government Institution
19.	Armando Barreto	MTA-DNAC	Government Institution
20.	Elvis A. Sarmento	IOM	UN Agency
21.	Frederico dos Reis da Silva	DGRE	Government Institution
22.	Agustinus Bruno Halle	DNTT	Government Institution
23.	Joana de Jesus	FCOTI	Foundation
24.	Andre F. do Rego	MALFFPF	Government Institution
25.	Rob Williams	Ai-Com	Programme
26.	Luis Pereira	Ai-Com	Programme
27.	Chelsea Cardoso	NDA	Government Institution
28.	Zacarias Bosco	DNRE	Government Institution
29.	Justina Aurea Belo	NDCC	Government Institution
30.	Vicente S. Soares	DGFCPI	Government Institution

31.	Abraao de Sá	NDCC	Government Institution
32.	Martinho Baptista	NDCC	Government Institution
33.	Ana Soares	Similie	Private Sector
34.	Delvio da. C. Sequeira	Defeza Ambiental	Youth Group
35.	João Carlos Soares	Diretor Geral do Ambiente	Government Institution
36.	Liberio A. T. do Rosario	FCOTI	Foundation
37.	Francisco Poto	GJPA	Government Institution
38.	Valeria Lobo e Brito	NDA	Government Institution
39.	Florindo Ribeiro	Pro Natureza	NGO
40.	Milenia Leonor de C. G. Luis	NDCC	Government Institution