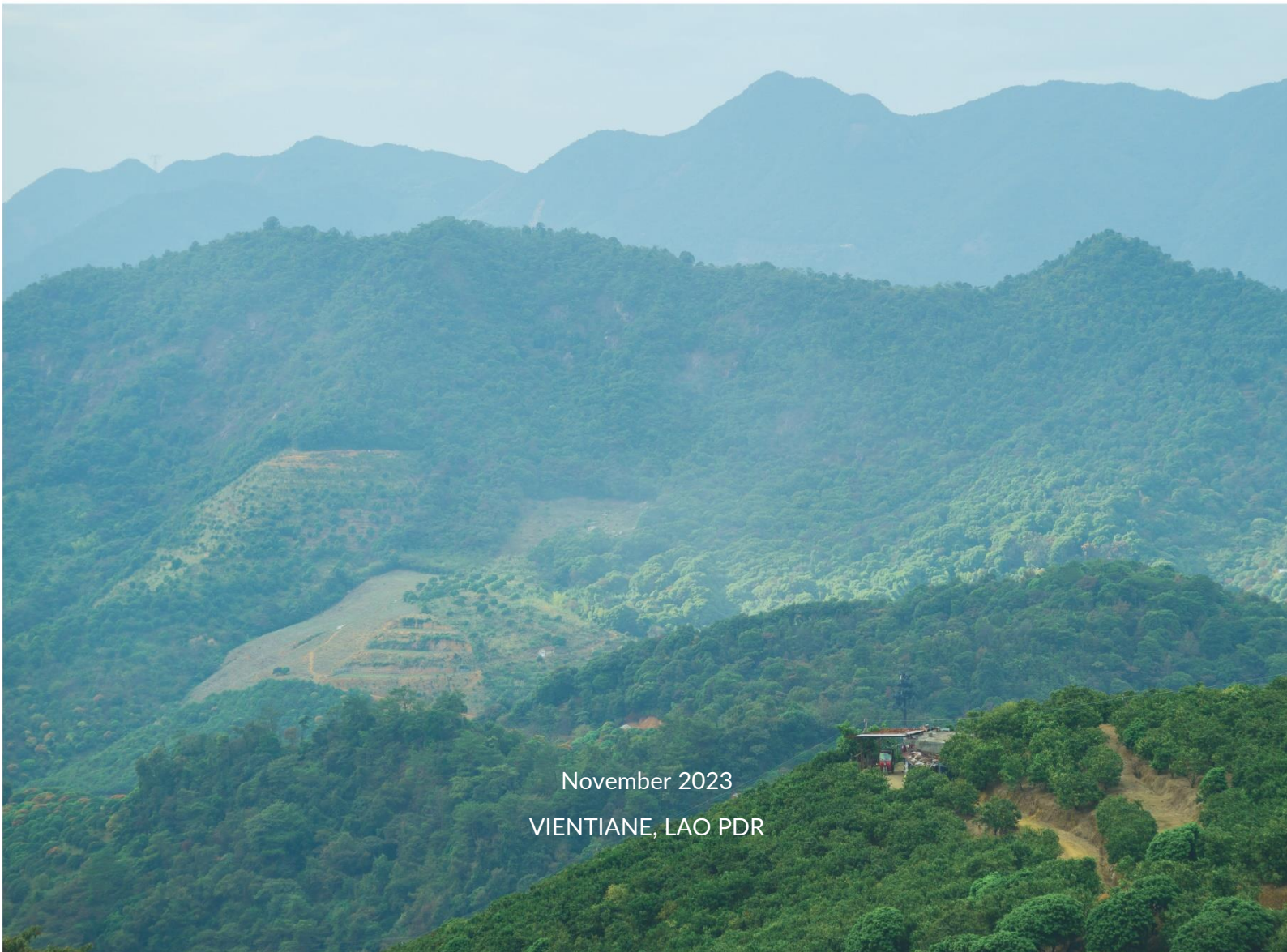
Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Implementation Plan for the Nationally Determined Contributions of Lao PDR



November 2023

VIENTIANE, LAO PDR

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Abbreviations

ADB	Asian Development Bank
AFOLU	Agriculture, Forestry, and Land Use
BAU	Business-As-Usual
CCEFCF	Canadian Clean Energy and Forest Climate Facility
DCC	Department of Climate Change
DHUP	Department of Housing and Urban Planning
DOF	Department of Forestry
DWR	Department of Water Resources
EPF	Environmental Protection Fund
GCF	Green Climate Fund
GEF	Global Environmental Facility
GGGI	Global Green Growth Institute
GHG	Greenhouse Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HCWH	Health Care Without Harm
Lao PDR	Lao People's Democratic Republic
MAF	Ministry of Agriculture and Forestry
MoNRE	Ministry of Natural Resources and Environment
MoLSW	Ministry of Labor and Social Welfare
MPWT	Ministry of Public Works and Transport
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NSCC	National Strategy on Climate Change
PONRE	Provincial Office of Natural Resources and Environment
ROK	Republic of Korea
SCI	Save the Children
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	The United Nations Framework Convention on Climate Change
VCOMS	Vientiane City Office for Management and Service
WB	World Bank
WHO	World Health Organization

Foreword

Lao PDR has been susceptible to the impacts of climate change, especially flash flooding and landslides due to typhoons. Approximately 70% of the population are still highly dependent on natural resources for their income and livelihood, and this makes them more vulnerable to the impacts of climate change.

As a Party to the Paris Agreement, Lao PDR remains strongly committed to limiting global temperature rise to within 1.5°C, and therefore Lao PDR's updated Nationally Determined Contribution (NDC), submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in March 2021, demonstrates increased climate ambition through national targets across priority sectors for both climate change mitigation and adaptation. In doing so, our NDC aims to reduce greenhouse emissions and build resilience to climate change by 2030. It also lays out an important target of achieving net-zero emission by 2050.

To support implementation of our NDC targets, we are proud to have developed this NDC Implementation Plan. The plan is a tool to track progress and prioritize action towards our mitigation and adaptation targets during the next five years. The plan highlights climate change mitigation and adaption programs and projects that are contributing to achieving the current NDC's targets and lays out strategic initiatives related to institutional arrangement, and monitoring, reporting and verification. The plan also identifies key gaps as well as priority actions reflecting sectoral needs to achieve NDC targets.

As a developing country, Lao PDR cannot achieve all of its ambitious targets without technical and financial support from the international community. The NDC estimates that it will cost USD 4.7 billion for Lao PDR to achieve its conditional climate mitigation target of 45,691 ktCO2e/year during 2020-2030. More funding and technical assistance are needed for Lao PDR to enhance its resilience to climate change.

As the Minister of Natural Resources and Environment (MONRE) and a national focal point for the United Nations Framework Convention on Climate Change (UNFCCC) and on behalf of the Government of Lao PDR, it is indeed an honor and a privilege to present Lao PDR's NDC Implementation Plan. I would like to extend my sincere thanks to my colleagues at the Department of Climate Change, MONRE for their efforts in coordinating with other line ministries and leading the successful development of NDC Implementation Plan. In addition, I would like to acknowledge and thank the NDC Partnership and the Global Green Growth Institute (GGGI) for their support in developing the plan. My sincere thanks are also extended to all the national and international stakeholders who contributed their time to attend technical and consultation workshops and provided valuable insights and expertise into completing this important document.

Vientiane Capital, 30 November 2023

Minister of Natural Resources and Environment

H.E. Mrs. Bounkham VORACHIT

Executive Summary

The Government of Lao PDR (GoL) submitted its enhanced NDC to the UNFCCC in March 2021. The enhanced NDC includes three national level greenhouse gas (GHG) emissions scenarios, namely a baseline emissions scenario, an unconditional mitigation scenario to 2030 and a more ambitious conditional mitigation scenario to 2030. The ambitious conditional scenario reflects the country's anticipated GHG emission reductions contingent upon increased levels of financial support from development partners within an overall goal of achieving net-zero GHG emissions by 2050. The NDC Implementation Plan preparation was led by the Department of Climate Change (DCC) within the Ministry of Natural Resources and Environment, supported by line ministries, GGGI and other key development partners. The Plan describes the roadmap which will guide the implementation, monitoring, evaluation, and reporting of the Lao PDR NDC targets in the next 5 years. During the Plan development processes, a broad stock-taking exercise was undertaken involving all key relevant partners in reviewing and assessing progress towards each target. Based on the consultations conducted to identify needs and gaps, the Plan was developed putting forward priority actions for identified key sectors in the NDC against the target.

This Plan is structured in 3 main parts as the following:

Mitigation action plans:

AFOLU: The achievement status of NDC targets is identified as 'Needs attention'. The priority action for AFOLU sector is aimed at scaling up investment into sustainable forest plantations, strengthening MRV capacity of existing forestry projects, restoring encroached and degraded forestland, developing a large-scale methane mitigation project in the rice sector, and encouraging and promoting the use and more research to improve drought-tolerant rice varieties.

Energy: Based on identified contributing projects, NDC targets are 'On track' to be achieved, especially a target on 13 GW installed capacity of hydropower is assessed as 'Exceeded'. The action plan for Energy sector is more focused on enhancing regional cooperation to facilitate renewable energy exports, introducing clean and energy efficient cook stoves, promoting wind and solar projects investment, introducing wood pellet for biomass, and developing financing facility to support energy efficiency technologies.

Transport: The existing Vientiane Bus Rapid Transit system and Lao-China Railway are progressing on track with unconditional targets set in the enhanced NDC. In opposition with conditional targets are identified as 'Needs attention'. To achieve set targets in the enhanced NDC, action plan is laid out as developing feeder electric public transit options, increasing access use and ridership, increasing availability of charging infrastructure, increasing credit availability and financing for electric vehicles, and developing large-scale agriculture sector for biofuel project.

Waste: The status for achieving the NDC target is 'On track'. The Waste sector's action plan includes increasing access to adequate waste collection services, significantly increasing waste-to-energy project investment, scaling up organic waste recycling project investment, developing an institutional mechanism to support and capacitate the local level in implementing solid waste management, and developing landfill management and regulations and strengthening enforcement capacity.

Adaptation action plans:

Agriculture: Based on identified contributing projects, the Short-term target is considered as 'On track' to achieve, while the Long-term targets are still assessed as 'Needs attention'. Agriculture sector's priority action focuses on preparing operational and annual plans for mainstreaming climate adaptation in sectoral plans, setting up model resilient farms, upgrading nurseries to include resilient crop varieties, promoting solar irrigation technologies to improve agricultural resilience to draught, and promoting and distributing climate resilient crop varieties to farmers.

Land Use Change and Forestry: The Short-term target is considered as 'On track' to achieve, while the Long-term targets are still considered as 'Needs attention' based on identified contributing projects. The action plan of the LUCF sector proposes preparing operational and annual plans for mainstreaming climate adaptation in sectoral plans, establishing new buffer zones around protected areas, build new forestry reserves on degraded and unused lands, rolling out forestry and climate change training program, and enhancing resilient agroforestry expansion programs to improve the resilience of agroforestry investments.

Water resources: Based on identified contributing projects, the Short-term target is 'On track' to achieved set enhanced NDC's target. The target to increase water resource infrastructure resilience through nature-based solutions is also considered as 'On track', while other Long-term targets are still considered as 'Needs attention'. The Water resources sector's action plan includes preparing operational and annual plans for mainstreaming climate adaptation in sectoral plans, setting up national water resources inventory and information system, developing integrated water resources plans, rolling out canal construction and waterway rehabilitation programs, and installing early warning systems on remaining rivers.

Transport and Urban development: Based on identified on-going and pipeline contributing project, the Short- and Long-term targets are on track to achieve set NDC targets. The action plan for Transport and Urban Development includes preparing operational and annual plans for mainstreaming climate adaptation in sectoral plans, assessing and proposing innovations in urban adaptation financing, delivering provincial government training program on urban adaptation and resilience, with a priority in flood resilient infrastructure, developing rural village settlement resilience plans or strategies, and dissemination of urban ecosystem-based adaption good practices.

Public health: Considering identified existing initiatives, the Short- and Long-term targets are on track to achieve set NDC targets. The action plan for Public health sector is more focusing on operationalizing the strategy through resilient health sector investment plans, developing and disseminating lessons learned from the implementation of the 'Scaling-up Water Supply, Sanitation and Hygiene' project, strengthening public health infrastructure resilience, rolling out trainings for health personnel in climate- responsive health programs, and strengthening the information system in detecting the diseases such as the early warning system for climate sensitive diseases.

Energy: Based on the assessment climate change adaptation has not mainstreamed into strategy and action plan for Energy sector, which resulted the achievement status of Short-term target as 'Needs attention'. Although the target on building resilience to climate change in hydropower sector through improved dam safety regulations and guidelines is 'On track' to be achieved, other Long-term targets are identified as 'Needs attention' given that no contributing projects identified. The action plan of Energy sector focuses on developing energy

sector climate resilience plan, undertaking national dam safety assessment and develop regulation, delivering training program on energy sector resilience, developing and delivering integrated reservoir management programs, and setting-up financing facility for integrated reservoir management.

Mean of Implementation:

To accomplish the NDC targets, sectoral ministries will be responsible for data collection and submission to MoNRE for reporting by applying existing sector coordinating institutions. The role of provincial and local government, including the private sector, development partners, academics, experts, is crucial to for the NDC Implementation Plan.

The Prime Minister Office (PMO) provides overall management and monitoring of NDC implementation progress, as well as decision makings on behalf of the Government of Lao PDR, including policies, strategic plans, regulations. MONRE has been assigned by the PMO to take direct responsibility and coordination with relevant ministries, development partners and local authorities.

The Department of Climate Change (DCC) within MONRE acts as coordination focal point on the implementation of NDC, including developing and maintaining data and information in close coordination with relevant ministries, mass organizations and local authorities. These subnational entities are responsible for managing, implementing and reporting on climate change within their respective localities. The Department of Climate Change will be supported by the Technical Working Group on Climate Change on the provision of technical data, advisory and recommendations on their sectoral strategies and plans linked to climate change.

1. Introduction

1.1. Lao PDR's Changing Climate

The Lao People's Democratic Republic (Lao PDR) is characterized by a tropical climate influenced by the southeastern monsoon, resulting in high humidity and high levels of precipitation. There are two distinct seasons: the rainy season or monsoon from May to September, the dry cool season from October to April. Average rainfall of 1,900 millimeters (mm) per year. The average temperature is as high as 31°C and as low as 27°C.

Lao PDR is amongst the most vulnerable countries to climate change. Its communities face significant climate-related risks, exacerbating issues of poverty, marginalization, poor health and challenging access, especially in rural areas. Over the last decade, annual economic loss and damage from disaster events, especially flood and drought, had almost quadrupled from about $94 million in 2009, to $200 million in 2011 and $371.5 million in 2018 which was equivalent to 2.1% of the country's projected 2018 GDP, and 10.2% of its 2018 budget[1]. While Lao PDR contributes only around 0.03% of global greenhouse gas emissions annually, the country has ambitious plans to reduce emissions by increasing total forest coverage to 70% of the national land area by 2035, as well as achieving net zero emissions by 2050.

1.2. Enhanced NDC of Lao PDR

In 2020, Lao PDR updated its Nationally Determined Contributions (NDC) to what is now the 'enhanced NDC' to align with the Paris Agreement. The document was submitted to the UNFCCC in March 2021 following the endorsement by the Prime Minister's Office. The enhanced NDC includes three national level greenhouse gas (GHG) emissions scenarios, namely a baseline emissions scenario, an unconditional mitigation scenario to 2030 and a more ambitious conditional mitigation scenario to 2030. Lao PDR's unconditional mitigation scenario reflects the GHG emission reductions that Lao PDR can commit to by 2030 using its own resources and existing levels of support from development partners. The ambitious conditional scenario reflects the country's anticipated GHG emission reductions contingent upon increased levels of financial support from development partners within an overall goal of achieving net-zero GHG emissions by 2050[2]. With the submission of the enhanced NDC in 2021, the Government of Lao PDR is now expected to move ahead with implementation of the enhanced NDC targets.

1.3. NDC Implementation Plan Development Process

The development of this NDC Implementation Plan was led by the Department of Climate Change, Ministry of Natural Resources and Environment, with support from the Global Green Growth Institute (GGGI) and funding from the NDC Partnership under its Partnership for Action Fund (PAF). It was prepared in close consultation with line ministries and departments, international organizations, development partners, non-governmental organizations and the

[1] GFDRR 2019 (online), *Post Disaster Needs Assessment in Lao PDR – Helping Flood Recovery and Resilience Building*, accessed on 13 June 2023, available: Post-Disaster Needs Assessment in Lao PDR | GFDRR
[2] Lao PDR's Nationally Determined Contribution (NDC), March 09, 2021

private sector during late 2022 and early 2023. The first stakeholder consultation and kick-off workshop took place in June 2022, at Landmark Hotel, Vientiane Capital. It was attended by representatives from line Ministries and development partners. At this workshop, the updated 2020 NDC of Lao PDR was presented to a broad set of stakeholders, along with information on the development process of the NDC Implementation Plan. In addition, public and private stakeholders had an opportunity to share their existing and planned activities that contribute to the NDC targets. The second consultation was conducted in March 2023 through Key Informant Interviews (KIIs) with line Ministries and development partners to discuss and agree on the proposed priority actions in the first draft of NDC Implementation Plan. The third meeting was held in August 2023 to validate the NDC Implementation Plan.

The NDC Implementation Plan is the roadmap which will guide the implementation, monitoring, evaluation, and reporting of the Lao PDR NDC targets. As a result, the plan is started with a broad stock-taking exercise focused on reviewing and assessing progress towards each target. Based on the needs and gaps identified, the plan was developed putting forward priority actions for relevant sectors of the NDC to focus on, aligned with each target.

1.4. Governance

A Technical Working Group on Climate Change (TWGCC)[3] was constituted which included representatives from several ministries and agencies namely Electricite du Laos (EDL), the Lao Women's Union (LWU), Ministry of Agriculture and Forestry (MAF), the Ministry of Public Works and Transport (MPWT), the National Agriculture and Forest Research Institute (NAFRI), the Ministry of Energy and Mines (MEM), and the Ministry of Education and Sport (MOES)[4]. The TWGCC is tasked by DCC with overseeing implementation of the NDC, especially in terms of monitoring, evaluation, and reporting (MER). Relevant sectoral actors at all levels are responsible for implementation and MER in accordance with roles and responsibilities, as laid out in Chapter 4.1 of this plan.

2. Mitigation Assessment and Actions

2.1. Introduction

Lao PDR contribution to greenhouse gas emissions is negligible at 0.03% of annual GHG emission globally. The Second National Communication for Lao PDR, submitted to UNFCCC in June 2013 showed that total greenhouse emissions (GHG) was amounted to 50,742,000 tCO2e per year in 2000. Over 95% of the total GHG are from Land Use Change & Forestry (LUCF) and Agriculture, especially forest losses due to timber harvesting, shifting cultivation, forest fire, forest encroachment and development projects.

[3] TWGCC was formed according to the Agreement on the Establishment of the Technical Working Group on Climate Change No. 1098/MONRE, dated 22 February 2013

[4] Lao PDR and GGGI Work Together to Make Progress on NDC Implementation to Tackle Climate Change. (2018, March). GGGI. Retrieved January 23, 2023 from https://gggi.org/lao-pdr-and-gggi-work-together-to-make-progress-on-ndc-implementation-to-tackle-climate-change/

The updated NDC estimated the national GHG emissions in 2020 to reach around 82,000 ktCO2e and 104,000 ktCO2e in 2030, with a contribution from Land Use Change & Forestry (LUCF), Agriculture, Energy and Transport sectors. In year 2000, total LUCF emissions and removal were 44,805 ktCO2e and 2,244 ktCO2e respectively, or net emissions of 42,758 ktCO2e, while average annual emissions and removals between 2005 and 2015 were 41,013 ktCO2e and 7,533 ktCO2e respectively, or net emissions of 33,479 ktCO2e. Nevertheless, in 2015, forest coverage amounted to only 58% of total land areas of Lao PDR, while the target set in the updated NDC is 70% by 2030. In addition, the total number of vehicles registered in the country grew drastically from 367,900 in the year 2004 to 2,133,500 in 2017, which constitutes a 480% increase. The transport fuel consumption grew from 855 million liters in 2013 to 1,442 million liters in 2016. Although the waste sector only contributed to less than 1% of GHG, emissions of methane associated with open burning of waste as well as disposing organic waste in solid waste disposal sites without landfill gas flaring are expected to keep growing steadily.

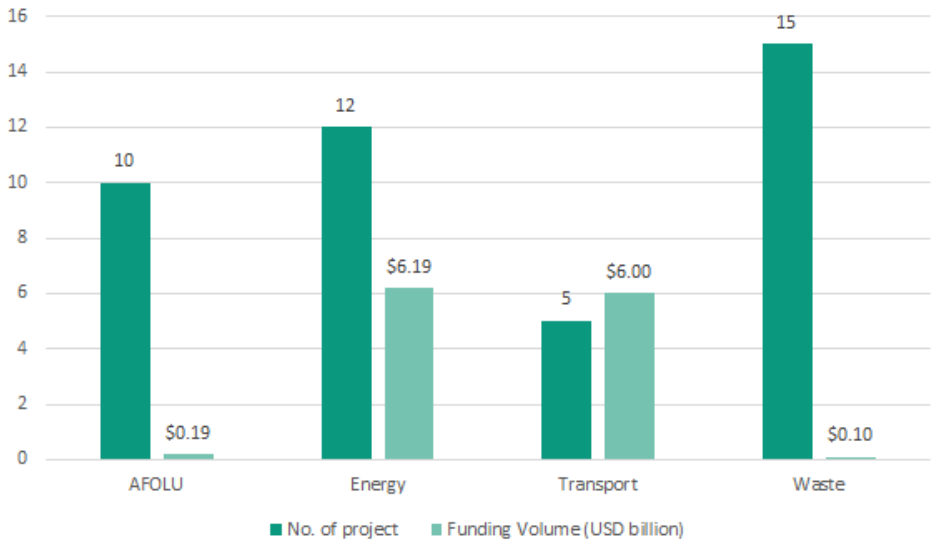
Greenhouse gas emissions from LUCF and Agriculture sector can be reduced through the implementation of the national policy on reforestation and deforestation, sustainable use of forests and forest resources, and the use of forest environmental services, including REDD+. In addition, the on-going projects namely "Implementation of the Lao PDR Emission Reductions Programme through improved governance and sustainable forest landscape management (I-GFLL Project)", as well as the World Bank's "Lao Landscapes and Livelihoods Project (LLL)" can significantly contribute to GHG emissions reduction and sequestration in the forestry sector. In addition, the GHG emissions from Energy and Transport sectors can be reduced though the execution of the Clean Energy Promotion Policy in Transportation which has set a vision to move towards a pollution-free state, reduce the use of fossil fuels in the transport sector. The Policy also targets to reach 30% clean energy vehicles and 500 new charging stations nationwide by 2030. Emissions reduction from energy sector can be enhanced and diversified the utilization of clean energy sources with the government's efforts through the Renewable Energy Development Strategy 2011 which promotes renewable energy consumption to account for 30% of the total energy consumption and 10% share of biofuel consumption in the transport sector. Moreover, the government has also adopted in 2016 the National Policy on Energy Efficiency and Conservation. This Policy sets a 10% reduction target in energy consumption by 2030 compared to business-as usual scenario. Furthermore, the Sustainable Solid Waste Management Strategy and Action Plan for Vientiane Capital has been approved in 2021. The strategy aims to increase the waste collection services, minimize waste generation and promote waste recovery through waste-to-resource initiatives.

Mitigation has been one of Lao PDR's priorities which is demonstrated in its National Green Growth Strategy through encouraging the economic growth that causes low greenhouse gas emissions to climate change mitigation through promoting the use of advanced techniques and technologies which are efficiency, effective, producing less wastes, energy-saving and using clean energy; and promoting the protection and expansion of the sources of absorption of greenhouse gases. The 9th Five-year National Socio-Economic Development (2021-2025) also set priority actions for climate mitigation for each key sector to contribute to achieving targets set in the updated NDC.

2.2. Current Funding and Project Flow

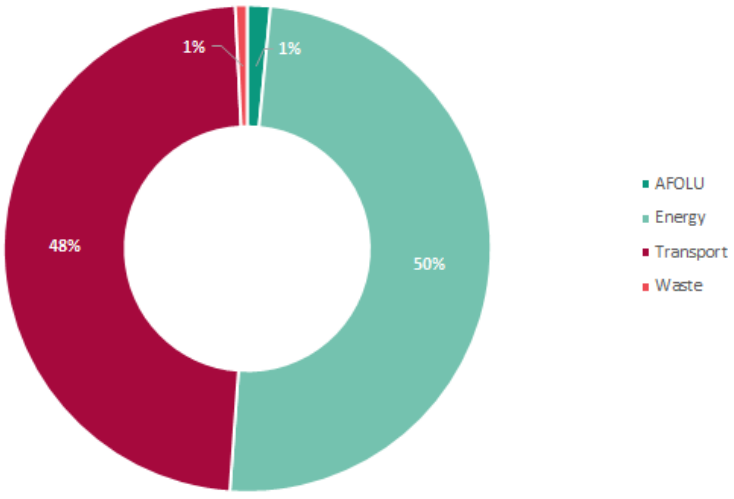
Based on the information available on the existing and pipeline investment projects funded by the public and private sector, bilateral and multi-development banks, it is found that over USD 12 billion funding is earmarked for climate mitigation activities in key sectors over the upcoming years. The greatest share of this funding is anticipated for the energy sector, which accounts for more than USD 6 billion; followed by the transport sector, with approximately USD 6 billion funding is anticipated to fund five mitigation projects. The funding for Agriculture, Forestry and Land Use (AFOLU) and waste account for a little below USD 0.3 billion, while the project volume of the two sectors combined doubles the project volume of energy. Figure 1 shows the total funding volume by sector and project volume by sector.

***Figure 1*: Number of projects and amount of funding in billion USD by mitigation target area**



Of the total funding for mitigation, the energy and transport sectors account for 50 percent and 48 percent respectively, while more than 1.5 percent is expected to flow to the AFOLU sector, and the rest will go to the waste sector. Figure 2 shows funding share by sector.

***Figure 2*: Distribution of financing requirement by mitigation target area**



Figures 1 and 2 reveal that most of the funding in the mitigation target area flows into the energy and transport sectors. Given that the mitigation projects in the AFOLU and waste sectors are more than those in the energy and transport sectors, the funding accounts for much less. This disproportion in channeling the funding is due to the size and the development costs of the projects in the energy and transport sectors. One mitigation project in the energy alone, for instance, the 600 MW monsoonal wind farm, accounts for almost USD 1 billion. In the transport sector, Lao-China Railway is the largest project among all the mitigation projects, with a development cost of almost USD 6 billion. Even without this outlier, the energy sector is still, by far, the most funded – both in terms of project volume and funding volume. This reflects the Lao PDR's overall environmental and economic priorities.

2.3. AFOLU Sector

2.3.1. NDC Targets

Forests provide vital ecosystem services for the Lao people, and the objective of the government, as stated in the Forestry Strategy to 2020 and National REDD+ Strategy to 2030, is to increase forest coverage to 70% of total land area in Lao PDR. The AFOLU sector is the main source of GHG emissions in the country. Forests also have high potential for carbon sequestration and will play the key role in achieving the net zero objective. For example, Madagascar, which is also classified as a Least Developed Country with similar sub-tropical climate like Lao PDR, is already a carbon sink and reported negative emissions in its NDC.

Two sets of targets were defined in the 1st Update of the NDC in 2021 for this sector, namely unconditional and conditional targets. The sectoral targets are presented in Table 1 below:

***Table 1**: Unconditional and conditional mitigation targets for the AFOLU sector*

Unconditional Targets		
Land Use Change and Forestry	**Mitigation measure (2020-2030)**	**Emissions reductions (tCO2e)/year**
	-4.5%/year average CO2 emissions through reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, and enhancement of forest carbon stocks	1,100,000
Conditional Targets		
Land Use Change and Forestry	**Mitigation measure (2020-2030)**	**Emissions reductions (tCO2e)/year**
	Increased forest cover to 70% of the total land area (i.e. to 16.58 million hectares) through reduced emissions from deforestation and forest degradation, forest conservation, sustainable management of forests, and enhancement of forest carbon stocks or REDD+,	45,000,000
Agriculture	50,000 hectares adjusted water management practices in lowland rice cultivation	128,000

2.3.2. Progress Towards Targets

The following projects contribute to the achievement of the mitigation targets for the AFOLU sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sectors have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[5].

There are 10 projects with a total funding volume of USD 190.5 million as of early 2023.

Project #	M.AF1
Name	Implementation of the Lao PDR Emission Reductions Programme through improved governance and sustainable forest landscape management (I-GFLL Project)
Description	This project is part of a broader program designed to provide a strategic opportunity to achieve a paradigm shift in the forest and land-use sector of Lao PDR. The project aims to 1) strengthen an enabling environment for REDD+ by enhancing the availability of finance and strengthening the forestry sector's legal and regulatory framework; 2) support deforestation-free agriculture and agroforestry by enhancing agricultural productivity; and 3) support the implementation of sustainable forest landscape management (SFM) and forest landscape restoration (FLR).
Type	REDD+
Timeline	2020-2024
Emission Reductions	1,400,000 tCO2/ year on average over 4 years implementation
Budget	65,200,000 (EUR)
Agencies	Department of Forestry, Ministry of Agriculture and Forestry GIZ, JICA
Funding sources	GCF:15,200,000 (EUR); GoL:11,800,000 (EUR); BMZ:10,000,000 (EUR); JICA: 1,600,000 (EUR); ADB: 12,300,000 (EUR); IFAD: 7,700,000 (EUR); Private: 6,600,000 (EUR)

Project #	M.AF2
Name	Lao Landscapes and Livelihoods Project (LLL)
Description	The objectives of this project consist of promoting sustainable forest management, improving protected area management, and enhancing livelihood opportunities in selected landscapes in Lao PDR. The project aims to achieve different outcomes, including building natural capital from improved forest landscape management, strengthening sustainable forest management and landscape restoration, improving smart livelihood opportunities, strengthening institutions, policies, incentives, and information for sustainable forest landscapes, and maintaining project management and monitoring.
Type	REDD+

[5] For more information on the data collection, review and assessment process, please see Annex 1.

Timeline	2021-2027
Emission Reductions	10,000,000 tCO2e total over 7 years
Budget	57,366,976 (USD)
Agencies	Ministry of Agriculture and Forestry; EPF, MONRE, MPI, Ministry of Finance, Ministry of Public Security, PONRE, DONRE
Funding sources	World Bank, IDA: 34,000,000 (USD); CCEFCC: 16,000,000 (USD); GEF: 7,366,976 (USD)

Project #	**M.AF3**
Name	Scaling up the Implementation of the Lao PDR Emission Reductions Program through improved governance and sustainable forest landscape management
Description	This project is the second phase of the broader program in the M.AF1, designed to provide a strategic opportunity to achieve a paradigm shift in the forest and land-use sector of Lao PDR. This project aims to 1) strengthen an enabling environment for REDD+, 2) support further implementation of integrated and improved land use planning processes, 3) support deforestation-free and climate resilience agriculture and agroforestry, and 4) support the implementation of sustainable forest management and forest landscape restoration.
Type	REDD+
Timeline	Mid 2024-End 2029 (Phase 2 of Project #1)
Emission Reductions	1,940,000 tCO2 per year over 3.5 years, i.e. 6.7M tCO2e total
Budget	37,840,000 (EUR)
Agencies	Department of Forestry (DoF), Ministry of Agriculture and Forestry (MAF); GIZ
Funding sources	GCF funding: 30,010,000 (EUR) + BMZ: 850,000 (EUR); GoL: 7,830,000 (EUR)

Project #	**M.AF4**
Name	Greater Mekong Subregion Biodiversity Conservation Corridors Project – Additional Financing
Description	This project is the second phase of the Greater Mekong Subregion Biodiversity Conservation Corridor. The additional financing resources will be used to scale up sustainable forest management activities of the original project. The aims of the project include 1) strengthening institutions and communities for biodiversity corridor management; 2) restoring, protecting, and managing sustainable biodiversity corridors; 3) improving livelihood and provision of small-scale infrastructure; and 4) operating project management and support services, intending to strengthen REDD+ readiness and implementation capacity in selected districts and amongst targeted project beneficiaries.
Type	REDD+
Timeline	2017 - 2022
Emission Reductions	Unquantified
Budget	USD 12,900,000
Agencies	Department of Forestry (MAF), ADB
Funding sources	ADB (Strategic Climate Fund): USD 12,840,000; GoL: USD 60,000

Project #	M.AF5
Name	Financing Agrochemical Reduction and Management (FARM)
Description	The FARM in Lao PDR is part of a broader program that aims to catalyze a framework for investment in the agriculture sector, which looks to detoxify the sector by eliminating the use of the most harmful inputs to food production systems. The program plan to achieve its targets by enabling conditions for the management of chemicals and waste, establishing sustainable financing for the transition to low/no-chemical agriculture, building capacity, and making knowledge accessible on the management of chemicals and waste. The FARM project in Lao PDR aims to strengthen beneficiaries' capacity on issues relevant across multiple crop supply chains and landscapes. These activities will contribute to the global component's focus on knowledge sharing with local and global practitioners and decision-makers from governments, CSOs, and businesses along the agricultural value chain involved in the global FARM program.
Type	Capacity building, establish sustainable financing, knowledge sharing
Timeline	2021 – 2026 (60 months)
Emission Reductions	Unquantified
Budget	USD 4,000,000
Agencies	UNDP; Department of Agriculture (MAF)
Funding sources	GEF

Project #	M.AF6
Name	Support Scaling-up Sustainable and Low-Carbon Agricultural Practices and Improving Food Security in Lao PDR
Description	The project's objective is to support Lao PDR to meet both the 9th NSEDP and its NDC goal for the agriculture sector piloting innovative digital solution that promote sustainable farming, reduce greenhouse gas emissions and other forms of pollution, and improve farm productivity and profitability. Smallholder farmer's access to finance will be supported to promote green recovery and low-carbon solutions in the agricultural sector in Lao PDR and food security.
Type	Capacity building; access to financing
Timeline	2024-2027
Emission Reductions	Unquantified
Budget	USD 3,300,000
Agencies	UNDP; DoF
Funding sources	Republic of Korea

Project #	M.AF7
Name	Enhancing Integrated Water Management and Climate Resilience in Vulnerable Urban Areas of the Mekong River Basin (Lao PDR and Cambodia)
Description	The project's objective is to strengthen the climate and disaster resilience of people and communities in vulnerable regions of Lao PDR and Cambodia through improved risk and vulnerability

	assessment and advancing an integrated approach to water resources management. The project comprises of a set of measures that span three key outputs: 1) Inclusive assessment of water-related climate risks completed in the priority river basins. 2) Enabling environment for gender-responsive climate risk-informed integrated water resources management developed. 3) Funding proposal for priority risk reduction measures developed.
Type	Planning, water resources management, information sharing
Timeline	2022-2025
Emission Reductions	Unquantified
Budget	USD 1,400,000
Agencies	UNDP, MONRE
Funding sources	Republic of Korea

#	Project	Budget (USD)	Agencies
M.AF8	Climate Promise	500,000	MONRE; UNDP; BMUZ
M.AF9	GEF-Biodiversity	300,000	MONRE; UNDP, GEF
M.AF10	Small Grant Programme	500,000	UNDP; GEF

2.3.3. Gaps, Barriers, and Needs

Unconditional Targets

The 1.1M tCO2e/year between 2020 and 2030 average emission reductions target could be achieved through successful implementation of M.AF1 and M.AF2 listed in section 2.3.2, which are fully financed. M.AF1 is expected to reduce emissions by 5.6M tCO2e over 4 years[6] , or 1.4M tCO2e per year. M.AF2 is expected to reduce emissions by 10M tCO2e in total between 2020 and 2027, or 1.4M tCO2e/y on average[7] . GHG emissions reductions from both projects combined would yield 15.6 M tCO2e reductions in total over the 10-year NDC implementation period, or 1.56 M tCO2e on average annually, thus meeting the 2030 unconditional target.

However, although carbon sequestration from forestry projects is challenging to monitor on an annual basis due to the very nature of tree growth, it is noted that none of the two projects has claimed any emission reductions in their first periodic performance reports. It is then recommended to strengthen the capacity of the government implementing agency to monitor, report and verify their sequestration performance as part of the project implementation on an annual or bi-annual basis, rather than only at the end of the projects, to reduce the risk of underperformance.

Conditional Targets:

Forestry: Considering on-going projects and information available with regard to initiatives under preparation, additional efforts would be required to meet the conditional 70% forest coverage target. According to GIZ, a follow-up to M.AF1 is under design as described in M.AF3 above. The related GCF Concept Note has been submitted to Lao GCF Focal Point at MONRE.

[6] Implementation of the Lao PDR Emission Reductions Programme through improved governance and sustainable forest landscape management. GCF. Retrieved February 6, 2023 from https://www.greenclimate.fund/project/fp117
[7] Lao Landscapes and Livelihoods Project – Project Implementation Status and Results Report, June 2022. World Bank. Retrieved February 6, 2023 from https://projects.worldbank.org/en/projects-operations/project-detail/P170559

The new initiative is expected to sequester 6.7 MtCO2e in total over its 3.5 years lifetime, or 1,940,000 tCO2 per year over 3.5 years.

Nevertheless, with this new initiative average annual emission reductions would reach 2.2 M tCO2e, which is significantly lower than the 45 MtCO2e conditional target. Consequently, stakeholders must identify new mitigation opportunities in the forestry sector, under the guidance from the Ministry of Forestry and Agriculture, then develop associated funding proposals.

Over the past few decades, Lao PDR has sought to improve forest cover, after experiencing rapid declines in coverage during the 2000s and 2010s. Overall, net forest coverage has been reducing, with the country losing some 4 million hectares of forest between 2000-2021. According to the Ministry of Agriculture and Forestry, forest cover was 82% in 2000; it declined to 48% in 2010 and rose again to 62% by 2020. As such, while the reversal in declines is encouraging, a substantial increase in coverage is still needed to reach the target of 70% by 2030.

Agriculture: No project, either existing or under design, contributing to the NDC mitigation target in the agriculture sector has been identified through the consultation of stakeholders. It is recommended that MONRE and MAF coordinate and discuss with development partners and the communities to design a project which could directly achieve the NDC target which involves establishing "50,000 hectares adjusted water management practices in lowland rice cultivation". In irrigated rice cultivation, switching from conventional farming practices to applying Alternate Wetting and Drying (AWD) on laser land-levelled fields can significantly reduce methane emissions.

This is summarized in Table 2 below.

***Table 2*: Achievement status of mitigation targets**

Sector	Target Type	Target	Contributing Projects	Achievement Status
Agriculture, Forestry and Land-Use (AFOLU)	Unconditional	-4.5%/year average CO2 emissions through reduced emissions from deforestation and forest degradation, forest conservation, sustainable management of forests, and enhancement of forest carbon stocks	M.AF1; M.AF2; M.AF3; M.AF4	Needs attention
	Conditional	Increased forest cover to 70% of land area (i.e., to 16.85 million hectares) through reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, and enhancement of	M.AF1; M.AF2; M.AF3; M.AF4	Needs attention

		forest carbon stocks (REDD+).		
	Conditional	50,000 hectares adjusted water management practices in lowland rice cultivation	None	Needs attention

2.3.4. AFOLU Sector Mitigation Actions

***Table 3*: Action plan for AFOLU sector mitigation**

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Estimated budget (million USD)
-4.5%/year average CO2 emissions through reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, and enhancement of forest carbon stocks	**Significantly scale up investment into sustainable forest plantations** Update and improve forestry investment opportunities across Lao PDR to facilitate reforestation and forest rehabilitation	MAF	MONRE, NAFRI	2
	Strengthen MRV capacity of existing forestry projects Initiate mapping and inventory of deforestation and forest degradation	MAF	MONRE, NAFRI	3
Increased forest cover to 70% of total land area (i.e. to 16.58 million hectares) by 2030 through reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, and	**Restore encroached and degraded forestland** Develop deforestation-free agricultural models and invest heavily in restoration of degraded forests.	MAF	MONRE, NAFRI	100

enhancement of forest carbon stocks.				
50,000 hectares adjusted water management practices in lowland rice cultivation	**Develop a large-scale methane mitigation project in the rice sector** Introduce water saving techniques and technologies to lowland rice cultivation, such as Alternate Wet Dry Cultivation practices	MAF	NAFRI	65
	Encourage and promote the use and more research to improve drought-tolerant rice varieties Promote the use and more researches of drought-tolerant rice varieties to lowland rice cultivators.	MAF	NAFRI	5

2.4. Energy Sector

2.4.1. NDC Targets

The country has large untapped renewable energy resources, not only in hydropower, but also solar, wind and biomass. Energy efficiency has not been a priority due to relatively low-cost electricity and fuelwood prices. The development of new hydropower plants has significantly contributed to mitigate the emissions of greenhouse gases over the past 10 years. However, new coal plants have been built in order to diversify the grid mix.

The sectoral targets, unconditional and conditional, are presented in Table below:

***Table 4*: Unconditional and conditional mitigation targets for the energy sector**

Unconditional Targets		
Hydropower	**Mitigation measure (2020-2030)**	**Emissions reductions (tCO2e)/year**
	13 GW installed capacity of hydropower	2,500,000
Energy efficiency	Introduction of 50,000 energy efficient clean cook stoves	50,000
Conditional Targets		
Other renewables	**Mitigation measure (2020-2030)**	**Emissions reductions (tCO2e)/year**
	Solar and wind: 1GW installed capacity	100,000
	Biomass: 300MW installed capacity, including through utilization of agricultural residues to reduce slash and burn practices and air pollution	84,000
Energy efficiency	10% reduction of final energy consumption compared to business-as-usual scenario	280,000

2.4.2. Progress Towards Targets

The following projects contribute to the achievement of the mitigation targets for the energy sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[8].

There are 12 projects with a total funding volume of more than USD 6.2 billion as at early 2023. This includes a project, M.EN1, which aggregates funding into the hydropower sector.

Project #	M.EN1
Name	Aggregate new hydropower development to 2030
Description	This is the aggregated new hydropower development projects across the Mekong mainstream and its tributaries until 2030. The aggregation of these hydropower projects includes both under-construction and planned hydropower projects. Data retrieved from the MRC Data Portal demonstrate that currently, 15 hydropower plants are under construction (1,576 MW), and 18 projects are planned (6,945 MW) to construct by 2030[9].
Type	Hydropower
Timeline	2020-2030
Emission Reductions	Unquantified
Budget	Unknown
Agencies	EDL, MEM
Funding sources	Private sector, Independent Power Producers

[8] For more information on the data collection, review and assessment process, please see Annex 1.
[9] MRC Data Portal. Mekong River Commission. Retrieved March 6, 2023 from https://portal.mrcmekong.org/hydropower/table.

Project #	M.EN2
Name	Lao PDR Clean Cook Stove Initiative[10]
Description	The objective of this project is to generate environmental and gender benefits for targeted households through a switch to clean, energy-efficient gasifier cookstoves using biomass pallets across selected provinces. The project aims to achieve its targets through the following components: 1) carbon finance capacity building, 2) project management and implementation of the carbon finance operation, and 3) carbon emission reduction program.
Type	Energy efficiency – switch to the forced-draft gasifier cookstoves from traditional charcoal cookstove.
Timeline	2019 – 2025
Emission Reductions	50 ktCO2e/y or 558,648 tCO2e in total over project lifetime
Budget	6,440,000 USD
Agencies	Department of Energy Business, Ministry of Energy and Mines
Funding sources	World Bank Ci-Dev

Project #	M.EN3
Name	600 MW Monsoon Wind Farm[11]
Description	This project entails a wind power project with a contracted capacity of 600-megawatt to be constructed in Lao PDR that will export and sell electricity to Viet Nam. It will provide a substantial source of clean, renewable energy supply to Viet Nam to help meet the country's growing energy demand. The project will also help unlock Lao PDR's significant untapped wind resource potential and provide social and economic benefits to the country in the form of employment, improved infrastructure, increased regional connectivity, and revenues through the collection of royalties, lease payments, and taxes.
Type	Wind power generation
Timeline	2022-2047 (25 years)
Emission Reductions	1,400,000 tCO2e per annum
Budget[12]	USD 959,000,000
Agencies	BCPG Public Co Ltd + Impact Energy Asia Development Limited (IEAD)
Funding sources	ADB; AIIB; Private (Mitsubishi)

Project #	M.EN4
Name	50MW Solar Attapeu Power Project (SAPP)
Description	This project will be the first utility-scale solar photovoltaic power plant in Lao PDR. The project is located in Attapeu Province, with a total electricity generation of approximately 128 GWh per year. The project is among the keys to ensuring energy security and reliability in the country while also increasing renewable energy capacity.

[10] Lao PDR Clean Cook Stove Initiative. ADB. Retrieved February 6, 2023 from https://projects.worldbank.org/en/projects-operations/project-detail/P169538
[11] Lao PDR: Monsoon 600 ME Cross-border Wind Power Project. AIIB. Retrieved February 6, 2023 from https://www.aiib.org/en/projects/details/2022/approved/Lao-PDR-Monsoon-600MW-Cross-border-Wind-Power-Project.html
[12] Lao PDR: Monsoon 600 ME Cross-border Wind Power Project. AIIB. Retrieved February 6, 2023 from https://www.aiib.org/en/projects/details/2022/approved/Lao-PDR-Monsoon-600MW-Cross-border-Wind-Power-Project.html

Type	On-grid solar power generation
Timeline	Completion by 2023 – 30 years operation
Emission Reductions	128 GWh of power annually 47,9000t CO_2e/year
Budget	USD 69.2 million
Agencies	EDL, private sector
Funding sources	Solar Attapeu Power Sole Company (SAPC)

Project #	**M.EN5**
Name	1.2 GW Wind farm in Laos[13]
Description	This project aims to diversify and increase Lao PDR's renewable energy capacity. The wind station will have an installed capacity of 1.2 GW and an approximate construction cost of USD 2.15 billion. The construction is scheduled to be completed at the end of 2025. The electricity will be generated from wind power and consumed within the country, as well as exported to Viet Nam.
Type	Wind power generation
Timeline	Construction will be completed by 2025
Emission Reductions	Unquantified
Budget	USD 2.15 billion
Agencies	Savan Vayu Renewable Company, LTM Lao Company
Funding sources	GoL, Private

Project #	**M.EN6**
Name	2 GW Geothermal energy development [14]
Description	The 2 GW geothermal energy project is designed to be in 2 phases – phase 1 in the north and phase 2 in the south of Lao PDR. The geothermal project is part of the agreement for Lao PDR to supply 5 GW of electricity to Viet Nam. The project will use GEIOS' advanced geothermal system, a hybrid thermal solar closed-loop system. The technology targets deep-hot-dry rock and hot sediment aquifers. It does not need to inject water inside the rock to reuse the steam.
Type	Geothermal
Timeline	Unknown
Emission Reductions	Unquantified
Budget	USD 3 billion
Agencies	LDIC; GEIOS; Wealth-Power Group Vietnam
Funding sources	Private

Project #	**M.EN7**
Name	240 MW floating solar[15]
Description	The development of a 240 MW floating solar project will be co-located with a 1,08 GW hydropower plant in Khammouane Province,

[13] Vongphachanh, M. (2022). Laos to invest over USD 2 billion in Wind Power Project. Laotian Times. Retrieved February 7, 2023, from https://laotiantimes.com/2022/09/16/laos-to-invest-over-usd-2000-million-in-wind-power-project/
[14] Yap, C. (2022). Laos geothermal – details revealed. IJGlobal. Retrieved February 7, 2023 from https://www.ijglobal.com/articles/166105/laos-geothermal-details-revealed
[15] Scully, J. (2021). EDF to develop 240MWCp floating solar project paired with hydro plants in Laos. PVTech. Retrieved February 7, 2023 from https://www.pv-tech.org/edf-to-develop-240mwp-floating-solar-project-paired-with-hydro-plant-in-laos/

	on the reservoir of the Nam Theun 2 hydropower. The construction began in late 2022 and is expected to be completed by 2024. Upon completion, the installation will be the world's largest hybrid floating solar project. The hybrid installation has the potential to save water. It also contributes no major environmental or social impacts.
Type	Solar power generation
Timeline	Construction will be completed by 2024
Emission Reductions	Unquantified
Budget	Unknown
Agencies	Electricite De France (EDF); Lao Holding State Enterprise (LHSE); Thailand Electricity Generating Public Company (EGCO)
Funding sources	Private

Project #	**M.EN8**
Name	Introduction of 14 MW floating solar power system in Vientiane[16]
Description	This project will install a 14 MW floating solar power system on three unused water ponds in Vientiane. The lower temperature of water ponds enables more efficient power generation than on land. This power system has the ability to increase total output by suppressing negative effects caused by variations of each panel's capability and function to cut power flow in case of submerging. The project aims to replace grid electricity and help reduce GHG emissions.
Type	Solar power generation
Timeline	2017 – (operational lifetime: 17 years)
Emission Reductions	6,838 tCO2/year
Budget	Unknown
Agencies	JCM; TPG Lao Co., Ltd; TSB Co., Ltd
Funding sources	JCM

Project #	**M.EN9**
Name	Reducing of greenhouse gas (GHG) emissions in the industrial sector through palletization technology in Lao PDR
Description	This project is designed to contribute to sustainable energy usage practices in Lao PDR. It aims to promote the production and usage of industrial-grade solid biofuel for thermal energy methods. The project will employ a two-pronged strategy of removing technological barriers for both producers and end users and improving policies to expedite investments in the production and use of solid biofuels.
Type	Capacity development, knowledge sharing
Timeline	2015 - 2022
Emission Reductions	Direct: 182,455 tCO2 over the lifetime (15 yrs) (12,163 tCO2/yr) Indirect: 912,225 tCO2 over the lifetime (60,815 tCO2/yr)
Budget	USD 7,958,539
Agencies	UNIDO, DOIH, MOIC, REMI
Funding sources	GEF: USD 1,268,539; co-finance: USD 6,690,000

[16] Introduction of 14MW floating solar power system in Vientiane. JCM. Retrieved February 7, 2023 from https://gec.jp/jcm/projects/17pro_lao_01/

#	Project	Budget (USD)	Agencies
M.EN10	Market Preparation for Industrial Energy Efficiency in Lao PDR	299,457	MOIC, GGGI
M.EN11	Energy Management System (EMS) Promotion in Lao PDR	500,000	New Zealand
M.EN12	Energy Transition Master Plan[17] (Integrated Energy Master Plan towards Sustainable Carbon Neutral Society)	Unknown	JICA

2.4.3. Gaps, Barriers, and Needs

Supported by the National Energy Development Strategy from 2021-2030, the energy sector has grown rapidly and largely dominated by private players and investors. There is a degree of confidentiality during the project development and financing of projects and therefore it is challenging to report thoroughly about all the projects that are in the pipeline. Nevertheless, there is a clear power development strategy prepared by the government which can be used to assess whether the country is on track to meet the NDC objectives in this sector.

[17] NA. (2022). Signing of Record of Discussions on Technical Cooperation for Development Planning with Laos: Integrated Energy Master Plan towards Sustainable Carbon Neutral Society. JICA. Retrieved February 7, 2023 from https://www.jica.go.jp/english/news/press/2022/20220902_41.html

Unconditional Targets

Limited information from official sources is publicly available with regard to hydropower installed capacity in 2022, the latest EDL statistics report available online being dated 2019. That said, an August 2022 article from Vientiane times[18] reports a total installed capacity of 11 GW in Lao PDR, all types of plants included, as well as an indication that 81% of total installed capacity is from hydropower. It can then be deducted that the 2022 hydropower installed capacity is around 8.91 GW. Considering that total installed capacity (all types of plants) reported by EDL in 2019 was 9 GW, the installed capacity increased by approximately 7% per year between 2019 and 2022. Assuming a similar growth rate in the coming years, the 2030 NDC target of 13GW would be achieved around 2026. Such estimate bears significant uncertainty, which could be reduced by enhanced engagement with the Ministry of Energy and Mines (MEM) as well as EDL-GEN, as the two main government bodies regulating the construction of new hydropower plants in the country, including privately invested plants.

The Lao PDR Clean Cook Stove Initiative rolled out the first 300 cook stoves in April 2022 and will continue to scale up the cook stove rollout to 50,000 in phase II of the project respectively. With the project being implemented, the NDC unconditional target of 50,000 tCO2e reduction per year will be achieved by 2030. The latest progress report[19] from the World Bank on the cookstoves project does not bring forward any emission reductions as of February 2022. The project is expected to launch the first 300 cook stoves roll-out on the ground in 2022 which will form the basis for the scale-up 50,000 cook stoves roll-out. Nevertheless, the project implementation is rated as 'satisfactory', and therefore reaching the NDC target is considered on track. In the event the carbon credits would be sold to an entity other than the Government of Lao PDR, related emission reductions could not be claimed as achieved under the unconditional target. Project proponents have requested that the project be moved from unconditional to conditional section in the next revision of the NDC.

Conditional Targets

Solar and wind: 1GW installed capacity: National Electricity Company of Vietnam has agreed to offtake the power generated by the 600 MW monsoon wind farm in southern Laos which is under construction. For solar power, total installed capacity is still limited to around 100MW across the whole country, whereas the potential is high. Constraints include the low cost of hydropower generation, intermittency of solar and wind power, and lack of domestic demand. Rooftop solar power generation is largely untapped in the country. 2030 NDC target can still be met provided that regional cooperation is enhanced for the export of clean electricity to neighboring countries which do not benefit from similar potential. Intermittency could be resolved by the introduction of smart grids and floating solar. Capacity building and awareness raising on rooftop solar are needed to unlock opportunities.

Other renewable energy*:* 600 MW Monsoon Wind Farm is under preparation with an estimated lifespan of 25 years. This project will contribute to achieving more than 50 percent of the NDC target, with more than 1.4 Mt CO2e reduced per year. In addition, the 50 MW solar power project in which the construction is scheduled to be completed by 2023 will contribute an additional 47,900t CO2e reduction per year. Although the emission reduction of

[18] Pongkhao, S. (2022) Govt to focus on development of renewable energy. Vientiane Times. Retrieved February 7, 2023 from https://www.vientianetimes.org.la/freeContent/FreeConten158_Govtto.php#:~:text=There%20are%20currently%2090%20energy,1%20coal%2Dfired%20power%20plant.

[19] Lao PDR Clean Cook Stove Initiative. ADB. Retrieved February 7, 2023 from https://documents1.worldbank.org/curated/en/099646004262221280/pdf/P1695380bcf8840b90840308bb53e15e5da.pdf

the 600 MW Monsoon Wind Farm alone could achieve the NDC emission reduction target, there are many more renewable energy projects planned and under construction, which could help offset the NDC targets from other sectors. Besides the monsoonal wind farm and solar project in Attapeu province, the 1.2 GW wind farm and 240 MW floating solar project initiated by Nam Theun 2 Power Company in Khammouane Province is also under preparation and the construction is expected to be completed by 2025 and 2024, respectively. Another renewable energy project with an investment budget of USD 3 billion is under preparation and will become an alternative to the current renewable energy options in Lao PDR.

Biomass: The project led by UNIDO, Reducing of Greenhouse Gas Emissions in the Industrial Sector through Palletization Technology in Lao PDR, has been successfully implemented with the project lifetime of 15 years. The emission reduction of this project is 12,163 tCO2e per year, with 15 years lifetime, the project is estimated to reduce 182,445 tCO2e by 2030. With this project in place, the NDC target on biomass would be achieved by 2030 and even exceeding the target. In addition, farmers have traditionally burn their agricultural residues such as rice husks and cut trees/shrubs to enhance soil nutrients before growing their crops. Although the combustion of biomass from agricultural residues cannot be quantified, it certainly contributes to the slash and burn practices and recently became problematic due to population growth and limited land availability making the slash and burn agriculture or rotational farming is no longer sustainable and lead to widespread air pollution with high concentration of Particulate Matter of less than 2.5 microns (PM2.5). According to the WHO, poor air pollution exposure can increase risks for adverse pregnancy outcomes such as low-birth weight, small for gestational age, other cancers, diabetes, cognitive impairment and neurological diseases. The PM2.5 air pollutants can be inhaled deep into the respiratory system and lungs that can cause irritation, stinging nose, the buildup of phlegm, coughing, sneezing, asthma attacks, cardiac arrest, ischemic strokes and, most dangerous of all, lung cancer. Therefore, there is a need to improve the management of the agricultural byproduct replacing conventional agricultural residue combustion.

Energy efficiency: Although there is no energy efficiency project being implemented or planned, the Government of Lao PDR (MEM) constantly promotes the efficient consumption of energy to reduce the peak load as part of the demand side management. According to the National Energy Strategy, the government aims to reduce the energy consumption in the industrial sector, residential and office buildings, as well as in the transport sector by 10% in 2030 through the use of energy saving and energy efficiency appliances and motors (for factories and vehicles). However, the increasing number of residential buildings, factories and the urban sprawl causing more reliance on fossil fuel vehicles in absence of public transport provision could become a challenge to this target.

Table 5: Achievement status of mitigation targets

Sector	Target Type	Target	Contributing Projects	Achievement Status
Energy	Unconditional	13 GW installed capacity of hydropower	M.EN1	Exceeded
	Unconditional	Introduction of 50,000 energy efficient cook stoves	M.EN2	On track
	Conditional	Solar and wind: 1 GW installed capacity	M.EN3; M.EN4; M.EN5;	On track

			M.EN7; M.EN8	
	Conditional	Biomass: 300 MW installed capacity, including through utilization of agricultural residues to reduce slash and burn practices and air pollution	M.EN9	On track
	Conditional	10% reduction of final energy consumption compared to business-as-usual scenario	M.EN11	On track

2.4.4. Energy Sector Mitigation Actions

***Table 6*: Action plan for energy sector mitigation**

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Estimate budget (million USD)
13 GW installed capacity of hydropower	**Enhance regional cooperation to facilitate renewable energy exports** Develop fast track approval guidelines for international energy trading, transmission, and distribution, while developing environmental, social and safety guidelines to ensure that the proposed hydropower plants are sustainable	MEM	EDL	10
Introduction of 50,000 energy efficient cook stoves	**Introduce clean and energy efficient cook stoves** Promote the use of clean cook stoves for households in rural areas that rely on inefficient wood charcoal cook stoves, while exploring carbon trading opportunities	MEM	MOIC, World Bank	5
Solar and wind: 1GW installed capacity	**Promote wind and solar projects investment** Encourage domestic and international private sector investment into large-scale renewable energy, especially Solar and Wind through innovative auction mechanisms	MEM	EDL	10
Biomass: 300MW installed	**Introduce wood pellet for biomass**	MOIC	MEM, NAFRI, MAF	40

capacity, including through utilization of agricultural residues to reduce slash and burn practices and air pollution	Promote the use of biomass energy through organic agricultural waste at industrial sector			
10% reduction of final energy consumption compared to business-as-usual scenario	**Develop financing facility to support energy efficiency technologies** Develop and capitalize a facility to provide financing support to entities seeking to install and improve energy efficiency at site level.	MEM	MOIC, MONRE	65

2.5. Transport Sector

2.5.1. NDC Targets

The transport sectoral targets have been identified as two sets of targets, including unconditional and conditional targets in the 1st updated NDC. The sectoral targets are presented in Table below:

***Table 7*: Transport sector NDC mitigation targets**

UNCONDITIONAL TARGET		
Transport	Mitigation measures (2020-2030)	Emissions reductions (tCO2e)/year
	New Bus Rapid Transit system in Vientiane Capital and associated Non-Motorized Transport (NMT) component	25,000
	Lao-China Railway	300,000
CONDITIONAL TARGETS		
Transport	Mitigation measures (2020-2030)	Emissions reductions (tCO2e)/year
	30% Electric Vehicles penetration for 2-wheelers and passengers' cars in national vehicles mix	30,000
	Biofuel to meet 10% of transport fuels	29,000

2.5.2. Progress Towards Targets

The following projects contribute to the achievement of the mitigation targets for the transport sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets.

Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[20].

There are 5 projects with a total funding volume of USD6 billion as of early 2023.

Project #	M.TR1
Name	Lao-China Railway
Description	The Lao-China Railway is part of China's Belt and Road Initiative. The project helps connect Lao PDR to other trade partners. It also helps attracting foreign investment and enhancing Lao PDR's economy, including trade and tourism. Additionally, the electrified high-speed railway was designed to contribute to emission reductions in the transport sector.
Type	Infrastructure delivery
Timeline	2016 – 2021
Emission Reductions	300,000 tCO2e/year
Estimated Budget	5.9 billion (USD)
Agencies	Ministry of Public Works and Transport
Funding sources	China Aid

Project #	M.TR2
Name	Vientiane Sustainable Urban Transport Project (VSUTP)
Description	This project aims to improve the quality of life in Vientiane by improving access and mobility. The project will achieve its targets by establishing a sustainable urban transport agency, a high-quality public bus transport system, a parking management system, and a national electronic vehicle registration system and by improving traffic management and accessibility for pedestrians and nonmotorized transport.
Type	Infrastructure delivery
Timeline	2016 – 2024
Emission Reductions	Direct: 1,210,000 tCO2e over the lifetime (32 years) [baseline: 0.8Mt; GEF funded: 0.41Mt] Indirect: 1,570,000 tCO2e over the lifetime
Estimated Budget	78.74 million (USD)
Agencies	Ministry of Public Works and Transport
Funding sources	ADB, EIB

Project #	M.TR3
Name	Premium Alternative Fuel Helimax[21]
Description	This project will help Lao PDR to decrease its dependence on imported fossil fuels. This is a 12-year biofuel project which will enable the country to produce 500,000 liters of biogasoline a day, an equivalent to 12.5 million liters a month. This project will also help the country to tackle any shortage or financial difficulties arising from a global rise in oil prices.

[20] For more information on the data collection, review and assessment process, please see Annex 1.
[21] Paul, A. (2022) Laos Collaborates with South Korea to Produce Biofuel. The Laotian Times. Retrieved February 7, 2023 from https://laotiantimes.com/2022/11/03/laos-collaborates-with-south-korea-to-produce-biofuel/

Type	Biofuel
Timeline	(12 years)
Emission Reductions	unquantified
Estimated Budget	20 million (USD)
Agencies	Lao State Fuel Company; GAIA Petro Co., Ltd.
Funding sources	Lao State Fuel Company; GAIA Petro Co., Ltd., local investors

#	Project	Budget (USD)	Agencies
M.TR4	Groundwork for E-mobility Investment in Lao PDR	300,000	MPWT, GGGI

#	Project	Budget (USD)	Agencies
M.TR5	Strengthening capacity to decarbonize the transport sector in Lao PDR	350,000	UNIDO

2.5.3. Gaps, Barriers, and Needs

Unconditional target

With Laos-China Railway beginning its operation in late 2021, it can be assumed that the NDC target to reduce 300,000 tCO2e/year is now achieved. While the Vientiane Sustainable Urban Transport Project is under preparation, upon completion, the project will reduce 25,000 tCOe/year. With additional funding from GEF supporting the improvement of pedestrian facilities and the modern Pedicab System, the emission would be further reduced by 12,800 tCO2e/year, which will exceed the NDC unconditional target for the transport sector.

Conditional target

According to the EV imported statistics by the MOIC, a total of 3201 EVs, including 4-wheeler, 2-wheeler, and e-truck, were imported into Lao PDR as of January 2023. The total number of EVs imported into the country accounted for less than 1 percent of the total mix vehicles currently registered. The fluctuation of fuel prices seems to be the incentive for people to shift to EVs. However, the lack of charging stations is a major challenge preventing people from purchasing and shifting to EVs. According to MEM, currently, a total of 20 EV charging stations are distributed through Vientiane and other major cities in Lao PDR. Although the government plans to engage with the private sector to increase the provision of EV charging stations to 100 stations by 2030, the incentive still does not appeal to those in the other provinces. In addition, limited automotive manufacturing and lack of user experience are also the major challenges to increasing EV penetration in the national vehicle mix. To raise EV consumption to meet the 30% target, government support through the development of incentive policies for EV deployment, technical capacity buildings, and communication campaigns to raise awareness of EV benefits are needed.

Petroleum production demand in the transport sector exceeded 1,000 ktoe in 2018[22] and is likely to increase based on the increasing number of vehicles registered on the road. Ten

[22]MEM. (2018). Energy Demand and Supply of the Lao People's Democratic Republic 2010-2018 – ERIA Research Project Report. ERIA. Retrieved February 7, 2023 from https://www.eria.org/uploads/media/Research-Project-Report/Energy-Demand-and-Supply-of-the-Lao-Peoples-Democratic-Republic-2010-2018.pdf

percent of the current transport fuels is estimated to be roughly 100 ktoe. The 12-year Premium Alternative Fuel Helimax, which is expected to produce 10 million liters of biogasoline per month or roughly 103 ktoe[23] per year, would help achieve the NDC conditional target of the transport sector. However, such an estimate bears significant uncertainty because this is the only biofuel processing plant under preparation, and there is no precedented biofuel project being initiated in Laos PDR.

***Table 8*: Achievement status of mitigation targets**

Sector	Target Type	Target	Contributing Projects	Achievement Status
Transport	Unconditional	New Bus Rapid Transit system in Vientiane Capital and associated Non-Motorized Transport (NMT) component	M.TR2	On track
	Unconditional	Lao-China Railway	M.TR1	On track
	Conditional	30% Electric Vehicles penetration for 2-wheelers and passengers' cars in national vehicles mix	M.TR4	Needs attention
	Conditional	Biofuel to meet 10% of transport fuels	M.TR3	Needs attention

2.5.4. Transport Sector Mitigation Actions

***Table 9*: Action plan for transport sector mitigation**

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Estimated budget (million USD)
New Bus Rapid Transit system in Vientiane Capital and associated Non-Motorized Transport (NMT) component	**Develop feeder electric public transit options** To support the BRT, additional electric public transport services can feed into the BRT nodes and routes	MPWT	Vientiane Capital	30
Lao-China Railway	**Increase access, use and ridership** In order to increase use of the asset, it is important to increase conversion of road transport to rail transport for freight services between Lao PDR and China.	MPWT	MOIC	30

[23] Tonne of oil equivalent. Retrieved February 7, 2023 from https://en.wikipedia.org/wiki/Tonne_of_oil_equivalent

	Similarly, improving access to each station will encourage use			
30% Electric Vehicles penetration for 2-wheelers and passengers' cars in national vehicles mix	**Increase availability of charging infrastructure** Engage with private sector to significantly increase provision of electric vehicle charging infrastructure in cities and towns throughout Lao PDR	MEM	MPWT	200
	Increase credit availability and financing for electric vehicles Develop electric vehicle financing options, including concessional credit, and complement this with fiscal stimulus (tax incentives), and technical inspection and maintenance, and other access privileges	MPWT	MEM, MoF, MOIC	50
Biofuel to meet 10% of transport fuels	**Develop large-scale agriculture sector biofuel project** Identify and execute a large-scale project on developing agricultural products and residues for the production of biofuel	MEM	MAF, MONRE	65

2.6. Waste Sector

2.6.1. NDC Targets

In the updated Lao NDC 2021 has identified a conditional target for waste sector. The sectoral target is presented in Table below:

***Table 10*: Waste sector NDC mitigation target**

CONDITIONAL TARGET		
Waste	Mitigation measure (2020-2030)	Emissions reductions (tCO2e)/year
	Implementation of 500 tons/day sustainable municipal solid waste management in Vientiane Capital.	40,000

2.6.2. Progress Towards Targets

The following projects contribute to the achievement of the mitigation targets for the waste sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[24].

There are 15 identified projects with a total funding volume of USD 98 million as of early 2023.

Project #	M.WA1
Name	Establishment of large-scale material recovery facilities[25]
Description	The objective of this project is to improve large-scale waste separation thereby recovering high-value recyclables and organic waste prior to being disposed of at the landfill.
Type	Infrastructure delivery
Timeline	2023 – 2030
Emission Reductions	unquantified
Estimated Budget	USD 20,000,000
Agencies	Vientiane Capital Office for Management and Service (VCOMS), Department of Public Works and Transport, Department of Natural Resources and Environment, Department of Industry and Commerce, and Department of Planning and Investment of Vientiane Capital.
Funding sources	Unknown

[24] For more information on the data collection, review and assessment process, please see Annex 1.
[25] Kim. S. (2022). Sustainable Solid Waste Management Strategy and Action Plan for Vientiane 2021-2030. GGGI. Retrieved February 7, 2023 from https://gggi.org/wp-content/uploads/2022/02/SWM_Strategy_ENG.pdf

Project #	M.WA2
Name	Lao Environmental and Waste Management Project (EWMP)[26]
Description	This project aims to strengthen Lao PDR's capacity for waste and pollution management, improve municipal solid waste management in targeted areas in Lao PDR, and provide an immediate and effective response in case of an Eligible Crisis or Emergency.
Type	Capacity building, planning, infrastructure investment
Timeline	2023 – 2030
Emission Reductions	unquantified
Estimated Budget[27]	USD 39,080,000
Agencies	Ministry of Public Works and Transport, Environmental Protection Fund (EPF).
Funding sources	World Bank

Project #	M.WA3
Name	Mechanical and Biological Treatment facility in Vientiane[28]
Description	This project targets the development of a large scale financially sustainable Mechanical and Biological Treatment (MBT) facility to process waste into multiple useable streams, including compost and refuse-derived fuel for use at cement kilns. The project will be executed via a partnership between the Vientiane City Office of Services and Management (VCOMS), the Ministry of Natural resource and Environment, the private sector, and KOICA.
Type	Infrastructure delivery
Timeline	Unknown
Emission Reductions	1.1 million tCO2e over the life of the project (23 years) – 47,000 tCO2e/year
Estimated Budget	USD 22,600,000
Agencies	KOICA, MONRE, VCOMS, private sector
Funding sources	GCF: USD 5,000,000; KOICA, Korean Energy Agency, private sector: USD 17,600,000

Project #	M.WA4
Name	Set-up of citywide source separation mechanisms and the distribution of proper bins for source separation
Description	This project aims to encourage households, public buildings, and business entities to separate recyclable materials from residual waste at the source. The project will achieve its targets through a set of activities, including the distribution of smart bins to store food waste at the household level, the distribution of bio-degradable bags at large waste generators for organic waste collections, and deploying smart recyclable bins in public spaces through the city.
Type	Infrastructure delivery
Timeline	2023-2026

[26] Lao Environmental and Waste Management Project. World Bank. Retrieved February 7, 2023 from https://projects.worldbank.org/en/projects-operations/project-detail/P175996

[27] (2021). Lao Environmental and Waste Management Project – Project Information Document. World Bank. Retrieved February 7, 2023 from https://documents1.worldbank.org/curated/en/310511624943226772/pdf/Concept-Project-Information-Document-PID-Lao-Environmental-and-Waste-Management-Project-P175996.pdf

Emission Reductions	Unquantified
Estimated Budget	USD 2,600,000
Agencies	VCOMS, DONRE
Funding sources	Unknown

Project #	M.WA5
Name	Decentralized waste collection services with the engagement of the informal sector
Description	This project aims to support the provision of waste collection services to non-serviced areas and improve the efficiency of the collection routes. The project will achieve its targets through a set of activities, including deploying decentralized waste collection services in partnership with informal waste pickers/street sweepers, establishing feeder points for the collection of separated wet/dry waste and garden waste, and scaling up the service upon the assessment of the pilot initiatives.
Type	Infrastructure delivery
Timeline	2021 – 2024
Emission Reductions	Unquantified
Estimated Budget	USD 4,500,000
Agencies	VCOMS
Funding sources	Unknown

Project #	M.WA6
Name	Decentralized organic waste collection and treatment system
Description	This project aims to identify and promote nationally appropriate decentralized biological treatment approaches. The project will achieve its targets through a set of activities, including deploying decentralized composting/bio-gas plants at commercial and residential buildings, introducing and promoting home composting, and establishing basic windrow organic composting facilities at the transfer center.
Type	Infrastructure delivery
Timeline	2021 – 2024
Emission Reductions	Unquantified
Estimated Budget	USD 2,000,000
Agencies	VCOMS, DONRE, DAF
Funding sources	Unknown

Project #	M.WA7
Name	Set-up of transportation mechanisms that ensure source separation and separate disposal of waste
Description	This project aims to establish waste transportation mechanisms to prevent a scenario where segregated waste streams are mixed up with unsegregated waste during transportation. The project will achieve its targets through a set of activities, including deploying separate collections of organic waste and dry waste, developing technical standards on waste transportation vehicles, enforcing vehicles that meet the technical standards for the separate collection

	of organic/dry waste, and enforcing separate collection and disposal of hazardous health care waste from hospitals, households, and other service facilities.
Type	Infrastructure delivery
Timeline	2021 - 2024
Emission Reductions	Unquantified
Estimated Budget	USD 2,000,000
Agencies	VCOMS, DONRE, DPWT
Funding sources	Unknown

#	Project	Budget (USD)	Agencies
M.WA8	ASEAN Korea Cooperation Fund (AKCF)	350,000	MPWT, MONRE
M.WA9	Law enforcement and awareness raising	300,000	VCOMS
M.WA10	Engagement with consumer goods industries and retailers to provide options for end-user consumers to reuse, reduce, and recycle materials	300,000	VCOMS, DOIC, DES

#	Project	Budget (USD)	Agencies
M.WA11	Identification/establishment of adequate waste recovery and treatment facilities at the landfill	300,000	VCOMS, DOIC
M.WA12	Integration of the informal sector into the municipal waste collection services	100,000	VCOMS, DONRE
M.WA13	Development of a new waste collection service charge structure	50,000	VCOMS, DONRE
M.WA14	Development of waste collection service charge payment mechanism	50,000	VCOMS, banks, private sector operators
M.WA15	Set-up of a target for an absolute cap for waste generation as a whole	20,000	VCOMS, DONRE

2.6.3. Gaps, Barriers, and Needs

Identified projects that will contribute to the achievement of sectoral target have been divided between large-scale projects under preparation, smaller scale projects under implementation and smaller scale projects under preparation.

Conditional target

The 40,000 tCO2e/year between 2020-2030 average emission reductions under conditional target could be achieved through successful implementation of the Mechanical and Biological Treatment Facility in Vientiane. The infrastructure of this project is expected to last for 23 years, and over the lifetime it is estimated to reduce 1.1 million tCO2e or equivalent to 47,826 tCO2e/year. This project alone could easily achieve the NDC target, however, it also bears

significant uncertainty as it does not have a clear timeline of the project starting date and the time it takes to complete the infrastructure.

In addition, the lack of supportive regulatory framework, in particular an adoption of waste-to-resource provides a significant policy barrier to minimize waste generation. Low waste collection coverage, especially in low-income settlements and peri-urban areas is largely limited.

Table 11: Achievement status of mitigation targets

Sector	Target Type	Target	Contributing Projects	Achievement Status
Waste	Conditional	Implementation of 500 tons/day sustainable municipal solid waste management in Vientiane Capital	M.WA1; M.WA2; M.WA3; M.WA4; M.WA5; M.WA6; M.WA7	On track

2.6.4. Waste Sector NDC Implementation Plan

Table 12: Action plan for waste sector mitigation

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Estimated budget (million USD)
Implementation of 500 tons/day sustainable municipal solid waste management in Vientiane Capital.	**Increase to access to adequate waste collection services** Develop new waste collection services by integrating informal waste collectors into municipal waste collection services and improving payment system.	MPWT	MONRE, City Offices	3
	Significantly increase waste-to-energy project investment Identify potential waste for a conversion to energy through a promotion of biomass and biogas technologies at household and	MONRE	MPWT, MEM, MOIC	50

	industrial level, and introduction of RDF technology for cement sector			
	Significantly scale up organic waste recycling project investment Build decentralized municipal waste treatment facilities to process organic waste, such as food waste, across the country at district and village level.	MPWT	MONRE	200
	Develop an institutional mechanism to support and capacitate the local level in implementing solid waste management Setup clear institutional structure to support waste management, and conduct outreach capacity building activities	MPWT	MONRE, local authorities	5
	Develop landfill management and regulations and strengthen enforcement capacity In order to improve the overall quality and management of Lao PDR's landfills, it is necessary to develop and implement regulations for private and public entities involved in transporting MSW to landfill and managing the landfill asset	MPWT	City offices	5

3. Adaptation Assessment and Actions

3.1. Introduction

Lao PDR is already affected by climate change, and its population remains extremely vulnerable to adverse climate effects, especially floods and droughts. This is because more than 70% of livelihoods are associated with some form of agricultural activity. A particular priority for actions to improve climate resilience is the agricultural sector, which accounts for 29.9% of the country GDP and engages about 70% of the population[29].

Flooding is a major climate risk in the country and flash floods occurred in 1995, 1996, 2000, 2002 and 2005. However, small floods occur almost every year. The country's annual rainfall is expected to increase, and as temperatures rise, it can have a significant impact on water resources, ecosystems and agricultural production. In addition, floods adversely affect housing, health and education, industrial activities, and infrastructure (transportation, water, and sanitation). For example, the flooding in 2005 caused widespread turmoil with an estimated economic cost of USD 29 million. Droughts are another climate risk affecting the country and severe droughts were experienced in 1996, 1998 and 2003[30]. Six of the 17 provinces are already estimated to be at high risk of drought. Droughts usually occur from mid-June to mid-July when the monsoon moves from southeast to southwest. Late season drought commonly occurs when the regular monsoon rain ends early. Droughts affect water resources and agricultural production, leading to widespread economic losses.

The National Adaptation Action Program (2009) is a national initiative to address the pressing needs associated with current and projected climate change adaptation needs in the areas of agriculture, forestry, water and water resources, and public health by 2020. The adaptation programme was further developed in the National Strategy on Climate Change (NSCC) to cover the key sectors of the economy identified as agriculture, forestry and land use change, water, transport and energy, urban development, industry, and public health sectors.

The National Adaptation Plan (NAP) is currently being developed by the Government of Lao PDR to adapt to the effects of climate change by implementing the necessary adaptation measures at all levels. It is also expected to serve as a national tool for adaptive communication, which is a requirement of the Paris Agreement under the UNFCCC. It aims to strengthen the institutional and technical capabilities of Lao stakeholders and governments to advance the NAP process. The goal of the NAP will be achieved by enhancing the access to improved climate information and early-warning systems at regional, national, sub-national and local levels, strengthen institutional and technical capacities and human skills to identify, prioritize, implement, monitor, and evaluate adaptation strategies and measures and set up the institutional arrangements to lead, coordinate and support the integration of climate change adaptation into relevant policies and plans.

Adaptation is a top priority in Lao PDR as demonstrated through its commitment towards developing normative frameworks for mainstreaming climate change. In November 2000, Lao PDR submitted its First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), identifying the need for a vulnerability and impact assessment on climate change risk. Later on, Lao PDR prepared a National Adaptation

[29] UNDP, Improving the Resilience of the Agriculture Sector in Lao PDR to Climate Change Impacts
[30] The National Adaptation Programme of Action to Climate Change, Lao PDR, April 2009

Programme of Action (NAPA, 2009) after establishing a National Steering Committee on Climate Change. Finally, in 2010, the National Strategy on Climate Change (NSCC) was signed off by the government. Through this framework, seven priority areas for adaptation and mitigation were identified: agriculture and food security; forestry and land use change; water resources; energy and transport; industry; urban development; and public health.[31]

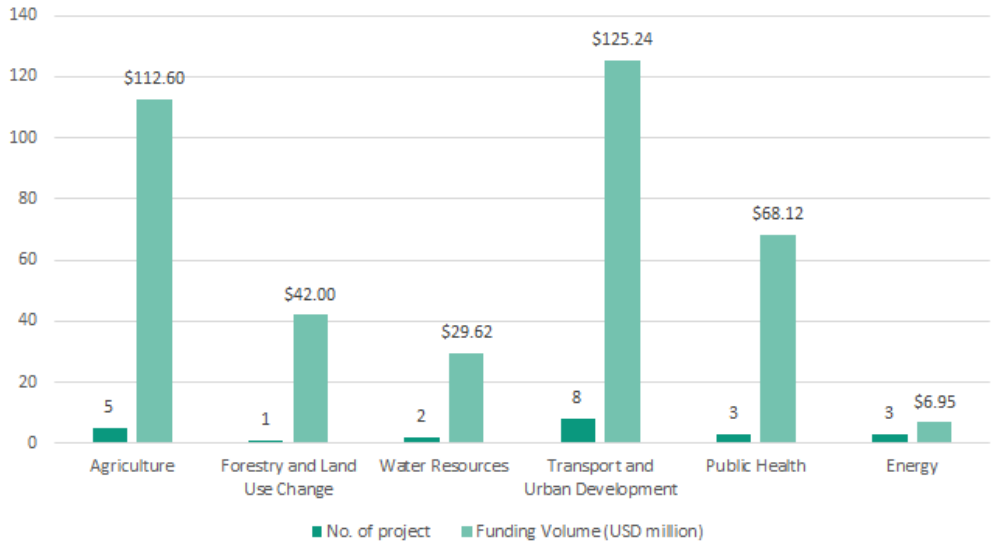
Taking into consideration the 10-year National Socio-Economic Development Strategy 2015 – 2025 and the next 5-year National Socio-Economic Development Plan 2021 – 2025, priority adaptation objectives in key sectors set out in the 2015 NDC are updated to include measures that could reduce risks and provide long-term solution to enhance resilience especially in the Energy Sector. Adaptation objectives for key sectors are summarized in the Table below. Moreover, the 2020 NDC as well as the upcoming National Adaptation Plan (NAP) will strive to facilitate their implementation as well as their measurement, reporting and verification. The NAP will support the development and review of adaptation plans at the national and sub-national levels.

3.2. Current Funding and Project Flow

In total, over USD 380 millions of funding is expected to flow into adaptation over the upcoming several years[32]. The greatest share of this funding, some USD 68 million is anticipated for public health. The transport and urban development and agriculture sectors receive a majority of the funding in the adaptation sector, in which over USD 125 million goes to the transport and urban development, and over USD 112 million goes to the agriculture sector. The public health sector receives USD 68 million, followed by the forestry and land use sector, with funding of approximately USD 42 million, and the rest goes to the water resources and energy sectors. The water resources and transport and urban development sectors are expected to receive roundly equal amounts of funding of USD 19 million each, across some 9-10 projects for each sector. Given the total volume of projects, these two sectors are the highest, with an average project size of approximately USD 2.2 million. Figure 3 shows total funding volume by sector and project volume by sector.

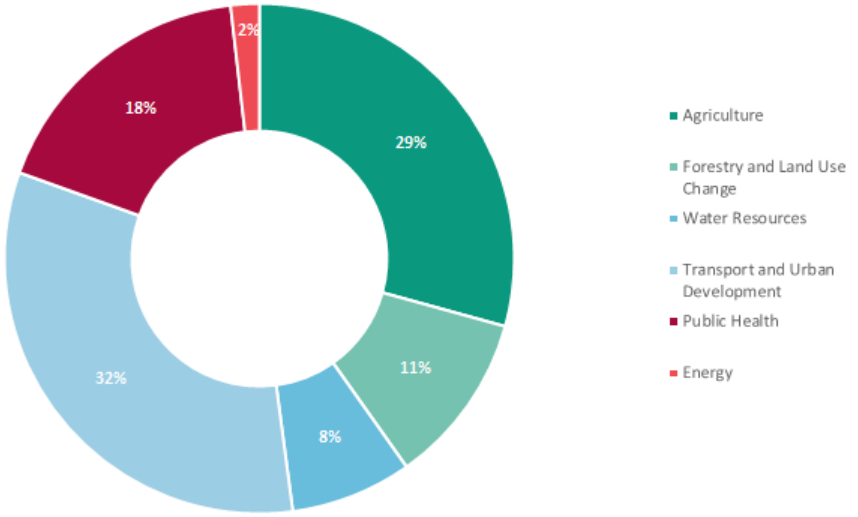
***Figure 3**: Number of projects and amount of estimated funding needs by adaptation target area*

[31] Sengchandala, S. (2010). Climate Change Policy of Lao PDR. Presentation to the 8th Workshop on GHG Inventories in Asia, Lao Plaza, 13-16 July 2010. Retrieved from http://www-gio.nies.go.jp/wgia/wg8/pdf/0-3_syamphone_segchandala.pdf
[32] As per data collected by GGGI in the "NDC Project Database" (2023) from underlying project sources.



Of the total funding to adaptation through to 2030, 32% is expected to flow to the transport and urban development sector, followed by the agriculture and public health sectors receiving 29% and 18%, followed by other sectors with smaller shares. Figure 4 shows funding share by sector.

***Figure 4:** Projected funding distribution by adaptation target area*



Figures 3 and 4 reveal that overall funding volume varies considerably, and a few very larger projects dominate the funding stream, notably a single project worth USD 40 million for the public health sector. Still, removing this outlier, the water resources and transport and urban development sectors are by far the most funded sectors – both in terms of project volume and funding volume. There are, for instance, almost three times more projects in these sectors than in other sectors. This reflects the overall policy priorities and socio-environmental realities of Lao PDR. It may also be noted that having more, smaller projects require increased coordination from the relevant line ministry.

3.3. Agriculture Sector

3.3.1. NDC Targets

Two sets of targets were defined in the 2021 NDC for the agriculture sector, namely a shorter-term target and a longer-term target. These targets are essentially qualitative targets or objectives, guiding the sector's efforts to achieve improved resilience. These targets are presented in the table below.

***Table 13:** Short- and long-term targets for the agriculture sector*

Sector	Target Type	Target
Agriculture	Short-term target (2025)	• Mainstream climate change adaptation in sectoral strategy and action plan, including through results-based management framework.
Agriculture	Long-term target (2030)	• Promote climate resilience in farming systems and agriculture infrastructure. • Promote appropriate technologies for climate change adaptation, including nature-based and circular economy solutions.

3.3.2. Progress Towards Targets

The following projects contribute to the achievement of the targets for the agriculture sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[33]. It is also worth noting that some projects contribute to two or more adaptation sectors, as defined in the NDC. For example, a project may contribute to both water resources management and urban adaptation, thereby supporting two target areas of the NDC. In such a case, the project is listed in both sectoral assessments, and funding allocations are apportioned accordingly to avoid double-counting.

There are 6 projects with a total funding volume of USD 112.6 million as of early 2023.

Project #	A.A1
Name	Strengthening agro-climatic monitoring and information systems (SAMIS) to improve adaptation to climate change and food security in LAO PDR
Description	The project builds on the National Adaptation Plan for Action (NAPA) to address the urgent needs for climate change adaptation in the Lao PDR agricultural sector. The project framework consists of three components namely information systems; institutional and technical capacity building including development of Land

[33] For more information on the data collection, review and assessment process, please see Annex 1.

	Resources Information Management Systems (LRIMS) and Agri-Ecological Zoning (AEZ); knowledge management and dissemination.
Type	Capacity building, information systems
Timeline	End 2022
Adaptation Sector	Agriculture
Budget	USD 21,609,452
Agencies	FAO, MONRE, MAF
Funding sources	GEF: USD 5,479,452; co finance: USD 16,130,000
Status	Completed

Project #	A.CC1
Name	Support for mainstreaming climate change adaptation into sectoral planning in Lao PDR
Description	This project aims to support sectoral adaptation planning in some key sectors in line with the short-term adaptation targets set out in the 2020 Update of the Lao PDR Nationally Determined Contribution. In line with the gaps identified in the NDC: (i) institutional capacity and coordination; (ii) information; and (iii) adaptation financing, both UN-Habitat and GGGI have built synergies and prepared GCF Readiness complementary activities that will be implemented in close coordination to strengthen knowledge sharing and capacity at different levels.
Type	Planning, capacity building
Timeline	36 months (2022-2024)
Adaptation Sector	Transport and Urban Development, Water Resources, Agriculture, Forestry and Land Use Change
Budget	USD 1,000,000*
Agencies	GGGI
Funding sources	GCF
Status	Under implementation

Project #	A.A2
Name	Climate smart agriculture alternatives for upland production systems in Lao PDR
Description	This project aims to enhance the resilience of vulnerable upland communities to climate change impacts through CSA practices in upland production systems. It consists of three main components: 1) strengthening the enabling environment to promote uptake of more integrated climate-smart land-use approaches; 2) integrating climate-smart land-use planning and incentives for resilient

	commodity value chains in the northern uplands; 3) enhancing the capacity of northern upland farmers and local communities and extension services to implement CCA approaches and practices.
Type	Planning, capacity building, knowledge sharing and learning
Timeline	60 months (2021-2026)
Adaptation Sector	Agriculture, forestry and land use change
Budget	USD 18,502,968
Agencies	FAO
Funding sources	GEF
Status	Under implementation

Project #	A.A3
Name	Integrated programme for climate resilience and empowerment in Attapeu province: Building climate resilient and eco-friendly agriculture systems and livelihoods (Climate REAL)
Description	This project aims to address gaps and weaknesses in the current agriculture system in Attapeu province by achieving the three expected outcomes: 1) climate-resilient and eco-friendly agriculture production and agriculture business management improved; 2) household and community water management and disaster resilience enhancement; and 3) local government and communities' capacities for disaster risk management and climate change adaptation in the agriculture sector strengthened.
Type	Capacity building, policy support, infrastructure investment
Timeline	2020-2023
Adaptation Sector	Agriculture, water resources
Budget	USD 2,000,000
Agencies	FAO
Funding sources	KOICA
Status	Under implementation

Project #	A.A4
Name	Greater Mekong Subregion cross-border livestock health and value chains improvement project
Description	This project aims to reduce transboundary animal diseases (TAD), food safety, and zoonotic disease risks and strengthen livestock value chains and COVID-19 responses through investments in infrastructure, capacity building, and policy support. The project will help improve health, value chains, and the formal trade of livestock and livestock products. It will align with the GMS vision as

	a leading supplier of safe and environmentally friendly agriculture products realized.
Type	Capacity building, policy support, infrastructure investment
Timeline	2020-XX
Adaptation Sector	Agriculture
Budget	USD 50,400,000
Agencies	MAF
Funding sources	ADB
Status	Under preparation

Project #	A.A5
Name	Climate adaptation in wetlands areas
Description	This project aims to reduce the climate change vulnerability of communities and the fragile wetland ecosystem upon which they depend. The project consists of three main components: 1) development of appropriate methodology and capacities for climate change vulnerability assessment in wetlands agro-ecosystems; 2) integrated climate change adaptation for wetlands and associated farming and livelihoods systems; and 3) development of suitable tools and capacities for long term planning of climate change adaptation in wetlands agro-ecosystems.
Type	Capacity building, knowledge sharing and learning
Timeline	2015-2021 (6.5 years) due to covid-19, the project extended to 2022
Adaptation Sector	Water Resources, Agriculture, Forestry and Land Use
Budget	USD 20,084,959
Agencies	MONRE; IUCN
Funding sources	FAO, GEF: USD 4,717,579; co-finance: USD 15,367,380
Status	Closed (December 2022)

**The assessment assumes that 25% of this funding flows to agriculture sector. **Project information has been sourced as described in Annex 2.*

3.3.3. Gaps, Barriers and Needs

Given the qualitative nature of the NDC targets, a qualitative assessment of gaps, barriers and needs follows. Overall, the agriculture sector is making progress towards achieving both long- and short-term targets, though significant efforts remain to be made.

Short-Term Target: In terms of the short-term target, GGGI's new project on sectoral adaptation planning for the agriculture sector (project A.A2) will involve the production of a sectoral adaptation strategy and action plan, as well as establish a results-based management framework for the sector. This largely achieves this target, which means that the target can be classified as on track.

Long-Term Target: In terms of the first long-term target, both project A.A1 and A.A2 will broadly promote climate resilience in farming systems through planning activities and capacity building. Project A.A1 will support improvements in information systems. However, additional efforts are required to reach farmers and agribusinesses and ensure that resilience is promoted to farming systems on the ground. In terms of the second long-term target, both projects A.A1 and A.A2 will be promoting resilient technologies broadly, but efforts must also include promotion and outreach to farmers and agribusinesses. As such, both targets are classified as needing attention.

This is summarized in table 14 below.

***Table 14*: Achievement status of adaptation targets**

Sector	Target Type	Target	Contributing Projects	Achievement Status
Agriculture	Short-Term	Mainstream climate change adaptation in sectoral strategy and action plan, including through results-based management framework	Project A.A1, A.A2	On track
	Long-Term	Promote climate resilience in farming systems and agriculture infrastructure	Project A.A1, A.A2, A.A3, A.A4	Needs attention
	Long-Term	Promote appropriate technologies for climate change adaptation, including nature-based and circular economy solutions	Project A.A2	Needs attention

3.3.4. Agriculture Sector Adaptation Actions

Given the above assessment of progress towards targets, the following table presents the five key priority actions for the sector. These actions have been explored, reviewed and validated through both technical and multi-stakeholder consultations involving government, non-government and private sector partners.

***Table 15*: Action plan for agricultural sector adaptation**

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Budget (million USD)
Mainstream climate change adaptation in sectoral strategy and action plan, including through results-based	**Prepare operational and annual plans** Project A.A2 will largely achieve this target, however the operationalization of the sectoral strategy should also be prioritized through the development of annual operational plans to support implementation.	MAF	MONRE, NAFRI	0.4

management framework				
Promote climate resilience in farming systems and agriculture infrastructure	**Set up model resilient farms** Develop model farms to showcase adaptative agricultural practices, including improved soil health for improved water retention, as well as act as outreach and extension points within rural and farming communities for adaptation technologies. One such farm per district could be targeted. This project could include financing facility.	MAF	NAFRI	12
	Upgrade nurseries Upgrade nurseries to include resilient crop varieties, especially of key subsistence crops, such as rice, as well as vegetable and fruit varieties.	MAF	NAFRI	1
Promote appropriate technologies for climate change adaptation, including nature-based and circular economy solutions	**Promote solar irrigation** Promote priority technologies such as solar irrigation to improve agricultural resilience to draught. Such technologies can be promoted through a national solar irrigation subsidy program or other such project.	MAF	MPI, MOF	35
	Promote and distribute climate resilient crop varieties to farmers Undertake extension services to promote resilient crop varieties to farmers and farm operators.	MAF	Rice Institute	4

3.4. Forestry and Land-Use Change Sector

3.4.1. NDC Targets

Two sets of targets were defined in the 2021 NDC for the forestry and land-use change sector, namely a shorter-term target and a longer-term target. These targets are essentially qualitative targets or objectives, guiding the sector's efforts to achieve improved resilience. These targets are presented in the table below.

***Table 16*: Short- and long-term targets for the forestry and land-use change sector**

Sector	Target Type	Target
Forestry and land-use change	Short-term target (2025)	• Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework
Forestry and land-use change	Long-term target (2030)	• Promote climate resilience in forestry production and forest ecosystems, including in buffer zones of protected areas and other forested areas • Promote technical capacity in the forestry sector for managing forest for climate change adaptation • Promote integrated land use planning, natural resources and environment management

3.4.2. Progress Towards Targets

The following projects contribute to the achievement of the targets for the forestry and land-use change sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[34]. It is also worth noting that some projects contribute to two or more adaptation sectors, as defined in the NDC. In such a case, the project is listed in both sectoral assessments, and funding allocations is apportioned accordingly to avoid double-counting.

There are 2 projects with a total funding volume of USD 42 million as at early 2023.

Project #	A.F1
Name	FCPF Carbon Fund: Lao PDR Northern Laos Emission Reductions Payments Project
Description	*(mitigation 84%; adaptation 17%)

[34] For more information on the data collection, review and assessment process, please see Annex 1.

	This project aims to make payments to the Program Entity for measured, reported, and verified Emission Reductions (ER) from reduced deforestation, forest degradation, and enhancement of forest carbon stock (REDD+) in six Lao PDR provinces and to distribute ER payments in accordance with an agreed benefit sharing plan (BSP).
Type	Rural infrastructure and service delivery
Timeline	2020-2025
Adaptation Sector	Forestry
Budget	USD 42,000,000
Agencies	MAF; MOF
Funding sources	World Bank
Status	Under implementation

Project #	A.CC1
Name	Support for mainstreaming climate change adaptation into sectoral planning in Lao PDR
Description	This project aims to support sectoral adaptation planning in some key sectors in line with the short-term adaptation targets set out in the 2020 Update of the Lao PDR Nationally Determined Contribution. In line with the gaps identified in the NDC: (i) institutional capacity and coordination; (ii) information; and (iii) adaptation financing, both UN-Habitat and GGGI have built synergies and prepared GCF Readiness complementary activities that will be implemented in close coordination to strengthen knowledge sharing and capacity at different levels.
Type	Planning, capacity building
Timeline	36 months (2022-2024)
Adaptation Sector	Transport and Urban Development, Water Resources, Agriculture, Forestry and Land Use Change
Budget	USD 1,000,000*
Agencies	GGGI
Funding sources	GCF
Status	Under implementation

3.4.3. Gaps, Barriers and Needs

Given the qualitative nature of the NDC targets, a qualitative assessment of gaps, barriers and needs follows. Overall, the forestry and land-use change sector [has made limited progress] towards achieving both long- and short-term targets.

Short-Term Target: In terms of the short-term target, GGGI's new project on sectoral adaptation planning for the agriculture sector (project A.A2) will involve the production of a sectoral adaptation strategy and action plan, as well as establish a results-based management

framework for the sector. This largely achieves this target, which means that the target can be classified as on track.

Long-Term Target: To date, limited progress has been made on long-term targets, with no dedicated projects addressing these areas. As such, long-term targets require urgent attention.

This is summarized in table 17 below.

Table 17: Achievement status of adaptation targets

Sector	Target Type	Target	Contributing Projects	Achievement Status
Forestry and land-use change	Short-term	Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework	A.CC1	On track
	Long-term	Promote climate resilience in forestry production and forest ecosystems, including in buffer zones of protected areas and other forested areas		Needs attention
	Long-term	Promote technical capacity in the forestry sector for managing forest for climate change adaptation		Needs attention
	Long-term	Promote integrated land use planning, natural resources and environment management		Needs attention

3.4.4. Forestry and Land-Use Change Sector Adaptation Actions

Given the above assessment of progress towards targets, the following table presents the five key priority actions for the sector. These actions have been explored, reviewed and validated through both technical and multi-stakeholder consultations involving government, non-government and private sector partners.

Table 18: Action plan for forestry and land-use change sector adaptation

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Budget (million USD)
Mainstream climate change adaptation in sectoral strategy and action plan including through results-based	**Prepare operational and annual plans** Project A.A2 will largely achieve this target, however the operationalization of the sectoral strategy should also be prioritized through the development of annual operational plans to support implementation.	MAF	MONRE, NAFRI	0.4

management framework				
Promote climate resilience in forestry production and forest ecosystems, including in buffer zones of protected areas and other forested areas	**Establish new buffer zones around protected areas** Set up buffer zones around protected areas throughout Lao PDR, with a focus on protected areas experiencing higher degrees of degradation and develop buffer zone management plans to increase resilience and adaptation benefits.	MAF		3
	Establish new forestry reserves on degraded and unused lands Establish new forestry reserves to reforest degraded and used lands and introduce increased monitoring of reserves and protected areas.	MAF		5
Promote technical capacity in the forestry sector for managing forest for climate change adaptation	**Roll out forestry and climate change training program** Design and deliver a training program on climate change adaptation in the forestry sector for forestry officials at central and provincial level.	MAF	MONRE	0.5
Promote integrated land use planning, natural resources and environment management	**Roll out resilient agroforestry expansion programs** Develop agroforestry extension programs designed to improve the resilience of agroforestry investments and activities, including with improved pasture and fertilizer management.	MAF		*6*

3.5. Water Resources Sector

3.5.1. NDC Targets

Two sets of targets were defined in the 2021 NDC for the water resources sector, namely a shorter-term target and a longer-term target. These targets are essentially qualitative targets or objectives, guiding the sector's efforts to achieve improved resilience. These targets are presented in the table below.

***Table 19*: Short- and long-term targets for the water resources sector**

Sector	Target Type	Target
Water resources	Short-term target (2025)	• Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework
Water resources	Long-term target (2030)	• Strengthen water resource information systems for climate change adaptation • Manage surface water, groundwater and wetland for climate change resilience • Increase water resource infrastructure resilience to climate change, including through nature-based solutions • Strengthen early warning systems in a timely manner

3.5.2. Progress Towards Targets

The following projects contribute to the achievement of the targets for the water resources sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[35]. It is also worth noting that some projects contribute to two or more adaptation sectors, as defined in the NDC. For example, a project may contribute to both water resources management and urban adaptation, thereby supporting two target areas of the NDC. In such a case, the project is listed in both sectoral assessments, and funding allocations is apportioned accordingly to avoid double-counting.

There are 6 projects with a total funding volume of USD 29.6 million as at early 2023.

Project #	A.CC1
Name	Support for mainstreaming climate change adaptation into sectoral planning in Lao PDR

[35] For more information on the data collection, review and assessment process, please see Annex 1.

Description	This project aims to support sectoral adaptation planning in some key sectors in line with the short-term adaptation targets set out in the 2020 Update of the Lao PDR Nationally Determined Contribution. In line with the gaps identified in the NDC: (i) institutional capacity and coordination; (ii) information; and (iii) adaptation financing, both UN-Habitat and GGGI have built synergies and prepared GCF Readiness complementary activities that will be implemented in close coordination to strengthen knowledge sharing and capacity at different levels.
Type	Planning, capacity building
Timeline	36 months (2022-2024)
Adaptation Sector	Transport and Urban Development, Water Resources, Agriculture, Forestry and Land Use Change
Budget	USD 1,000,000*
Agencies	GGGI
Funding sources	GCF
Status	Under implementation

**The assessment assumes that 25% of this funding flows to agriculture sector.*

***Project information has been sourced as described in Annex 2.*

Project #	A.CC2
Name	Building climate and disaster resilience capacities of vulnerable small towns in Lao PDR
Description	This project's objective is to build climate resilience in small towns along the east-west economic corridor in the central region of Lao PDR, with a focus on Savannakhet Province. This will be achieved by providing climate-resilient water infrastructure and mainstreaming climate change into urban planning.
Type	Capacity building, planning, infrastructure
Timeline	2019-2023
Adaptation Sector	Transport and Urban Development, Water Resources
Budget	USD 5,500,000
Agencies	UN-Habitat
Funding sources	Adaptation Fund
Status	Under implementation

Project #	A.WR1
Name	Enhancing integrated water management and climate resilience in vulnerable urban areas of the Mekong River Basin

Description	The main objective of the project is to strengthen the climate and disaster resilience of people and communities in vulnerable regions of Lao PDR and Cambodia through improved risk and vulnerability assessment and advancing an integrated approach to water resources management.
Type	Planning, capacity building, access to financing
Timeline	2022-2026
Adaptation Sector	Water resources
Budget	USD 4,286,730
Agencies	UNDP, MONRE
Funding sources	Ministry of Environment ROK Laos allocation: 1,475,024 Regional: 821,286; Cambodia: 1,633,590; and fees
Status	Under implementation

Project #	A.WR2
Name	Integrated Water Resource Management and Ecosystem-based Adaptation (EbA) in Xe Bang Hieng River Basin and Luang Prabang
Description	This project aims to promote integrated management of sites in the Mekong River Basin for increased climate resilience in Savannakhet Province and Luang Prabang communities vulnerable to floods and droughts, which are expected to worsen under future scenarios. The project will help 1) enhance national and provincial capacities for integrated catchment management and integrated water resource management; 2) reduce flood risk and create climate-resilient alternative livelihoods; and 3) promote effective knowledge management and monitoring and evaluation.
Type	Planning, capacity building, infrastructure delivery
Timeline	2022-2026 (48 months)
Adaptation Sector	Water resources
Budget	USD 32,792,037
Agencies	UNDP, DWR, MONRE
Funding sources	GEF: 5,329,452; co finance (GoL, WSC, UNEP, UNDP): 27,462,585
Status	Under implementation

Project #	A.CC3
Name	Nature-based solutions for urban adaptation (NATURA) in Lao PDR
Description	This project aims to enhance the climate adaptation of urban communities and economies in Lao PDR, with the target to 1) build capacity and knowledge of nature-based solutions; 2) strengthen the regulatory and fiscal tools for the deployment of nature-based

	solutions; 3) reduce flood risk and enhance the well-being of urban residents; and 4) integrate nature-based solutions into government, multilateral and private sector urban development investment pipelines, leading to widespread replication.
Type	Infrastructure, capacity building, policy
Timeline	2023-2028
Adaptation Sector	Transport and urban development, Water Resources
Budget	USD 6.2 million
Agencies	GGGI
Funding sources	New Zealand Ministry of Foreign Affairs and Trade
Status	Under preparation

Project #	A.A5
Name	Climate adaptation in wetlands areas
Description	This project aims to help local communities in two important wetland areas of Lao PDR adapt to the impact of climate change, and contribute to the sustainability of their livelihoods, by supporting the restoration and sustainable management of the Ramsar-designated wetlands on which they depend. The project will use an ecosystem-based adaptation (Eb-A) approach to sustain and replicate the benefits of the wetlands.
Type	Capacity building, knowledge sharing and learning
Timeline	2015-2021 (6.5 years) due to covid-19, the project extended to 2022
Adaptation Sector	Water Resources, Agriculture, Forestry and Land Use
Budget	USD 20,084,959
Agencies	MONRE; IUCN
Funding sources	FAO, GEF: 4,717,579; co-finance: 15,367,380
Status	Closed (December 2022)

3.5.3. Gaps, Barriers and Needs

Given the qualitative nature of the NDC targets, a qualitative assessment of gaps, barriers and needs follows. Overall, the water resources sector is making progress towards achieving both long- and short-term targets, though significant efforts remain to be made.

Short-Term Target: In terms of the short-term target, GGGI's new project on sectoral adaptation planning for the water resources sector (project A.A2) will involve the production of a sectoral adaptation strategy and action plan, as well as establish a results-based management framework for the sector. This largely achieves this target, which means that the target can be classified as on track.

Long-Term Target: In terms of the first long-term target, on information systems, no current projects are engaged on this issue. However, for the second long-term target, integrated water resources management practices can be further improved, and require additional support. To date, there is limited project activities focused on this area. For the third long-term target, several projects are contributing to the development of improved water resources infrastructure, both with urban and rural setting. It is worth noting that, especially within urban areas, there is some overlap between this target, and those of the 'Transport and Urban Development' sector targets. Projects A.CC1, A.WU3, and A.WU4 are all contributing to the realization of this target. As such, this target is broadly on track. For the fourth and final long-term target, on early warning systems, no ongoing projects are contributing, and, based on a review of the extent of installation and operationalization of early systems nationally, this target needs attention. This is summarized in table 20 below.

***Table 20**: Achievement status of adaptation targets*

Sector	Target Type	Target	Contributing Projects	Achievement Status
Water resources	Short-term	Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework	A.CC1	On track
	Long-term	Strengthen water resource information systems for climate change adaptation		Needs attention
	Long-term	Manage surface water, groundwater and wetland for climate change resilience		Needs attention
	Long-term	Increase water resource infrastructure resilience to climate change, including through nature-based solutions	A.CC3	On track
	Long-term	Strengthen early warning systems in a timely manner		Needs attention

3.5.4. Water Resources Sector Adaptation Actions

Given the above assessment of progress towards targets, the following table presents the five key priority actions for the sector. These actions have been explored, reviewed and validated through both technical and multi-stakeholder consultations involving government, non-government and private sector partners.

***Table 21**: Action plan for water resources sector adaptation*

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Budget (million USD)
Mainstream climate	**Prepare operational and annual plans**	MONRE		0.4

change adaptation in sectoral strategy and action plan including through results-based management framework	Project A.A2 will largely achieve this target, however the operationalization of the sectoral strategy should also be prioritized through the development of annual operational plans to support implementation.			
Strengthen water resource information systems for climate change adaptation	**Set up national water resources inventory and information system** Collect data on all national water resources and compile inventory, underpinned by GIS and associated information management systems.	MONRE	MEM	1
Manage surface water, groundwater and wetland for climate change resilience	**Develop integrated water resources plans** Develop integrated water resources management plans for key water resources at provincial and/or local level.	MONRE		1
Increase water resource infrastructure resilience to climate change, including through nature-based solutions	**Roll out canal construction and completion programs** Construct additional canals, and ensure canal networks are adequately connected in urban areas for improved flood management.	Provincial and district govs.	MPWT, MONRE	100
	Roll out waterway rehabilitation programs Rehabilitate key urban waterways using nature-based solutions such as improved natural retention ponds, embankment plantings, and stream dredging for improved flood management.	Provincial and district govs.	MPWT, MONRE	30
Strengthen early warning systems in a timely manner	**Install early warning systems on remaining rivers** Complete coverage of national rivers with early warning systems, monitoring systems, and associated community-level response training.	MONRE	MOHA	10

3.6. Transport and Urban Development Sector

3.6.1. NDC Targets

Two sets of targets were defined in the 2021 NDC for the transport and urban development sector, namely a shorter-term target and a longer-term target. These targets are essentially qualitative targets or objectives, guiding the sector's efforts to achieve improved resilience. These targets are presented in the table below.

***Table 22*: Short- and long-term targets for the transport and urban development sector**

Sector	Target Type	Target
Transport and urban development	Short-term target (2025)	• Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework
Transport and urban development	Long-term target (2030)	• Increase the resilience of urban development and infrastructure to climate change, including through the use of green infrastructure and nature-based solutions • Promote ecosystem-based adaptation solutions

3.6.2. Progress Towards Targets

The following projects contribute to the achievement of the targets for the transport and urban development sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[36]. It is also worth noting that some projects contribute to two or more adaptation sectors, as defined in the NDC. For example, a project may contribute to both water resources management and urban adaptation, thereby supporting two target areas of the NDC. In such a case, the project is listed in both sectoral assessments, and funding allocations is apportioned accordingly to avoid double-counting.

There are 8 projects with a total funding volume of USD 125 million as of early 2023.

Project #	A.TU1
Name	Enhancing the climate and disaster resilience of the most vulnerable rural and emerging urban human settlements in Lao PDR
Description	The project aims to enhance the climate and disaster resilience of the most vulnerable human settlements in Southern Laos (namely in Sekong, Saravan and Attapeu provinces) by increasing sustainable access to basic infrastructure systems and services, emphasizing

[36] For more information on the data collection, review and assessment process, please see Annex 1.

	resilience to storms, floods, droughts, landslides, and disease outbreaks.
Type	Capacity building, planning, infrastructure delivery
Timeline	2017-2022
Adaptation Sector	Transport and Urban Development
Budget	USD 4,500,000
Agencies	UN-Habitat
Funding sources	Adaptation Fund
Status	Under implementation

Project #	A.CC2
Name	Building climate and disaster resilience capacities of vulnerable small towns in Lao PDR
Description	This project's objective is to build climate resilience in small towns along the east-west economic corridor in the central region of Lao PDR, with a focus on Savannakhet Province. This will be achieved by providing climate-resilient water infrastructure and mainstreaming climate change into urban planning.
Type	Capacity building, planning, infrastructure
Timeline	2019-2023
Adaptation Sector	Transport and Urban Development, Water Resources
Budget	USD 5,500,000
Agencies	UN-Habitat
Funding sources	Adaptation Fund
Status	Under implementation

Project #	A.CC1
Name	Support for mainstreaming climate change adaptation into sectoral planning in Lao PDR
Description	This project aims to support sectoral adaptation planning in some key sectors in line with the short-term adaptation targets set out in the 2020 Update of the Lao PDR Nationally Determined Contribution. In line with the gaps identified in the NDC: (i) institutional capacity and coordination; (ii) information; and (iii) adaptation financing, both UN-Habitat and GGGI have built synergies and prepared GCF Readiness complementary activities that will be implemented in close coordination to strengthen knowledge sharing and capacity at different levels.
Type	Planning, capacity building
Timeline	36 months (2022-2024)

Adaptation Sector	Transport and Urban Development, Water Resources, Agriculture, Forestry and Land Use Change
Budget	USD 1,000,000*
Agencies	GGGI
Funding sources	GCF
Status	Under implementation

**The assessment assumes that 25% of this funding flows to agriculture sector. **Project information has been sourced as described in Annex 2.*

Project #	A.TU2
Name	Building climate resilience of urban systems through Ecosystem-based Adaptation in the Asia-Pacific region (Lao PDR Project)
Description	The aim of the project is to reduce the vulnerability of poor urban communities in Asia-Pacific Least Developed Countries (LDCs) to climate change impacts using Ecosystem-based Adaptation (EbA), with interventions in selected municipalities including Lao PDR. Vulnerability is reduced by protecting, maintaining and rehabilitating priority ecosystems such as wetlands, forests, and agroecological systems.
Type	Technical and institutional capacity building; delivery of urban EBA interventions; knowledge production
Timeline	2019-2023
Adaptation Sector	Transport and Urban Development
Budget	USD 94,190,417[37]
Agencies	MONRE and UNEP
Funding sources	Laos allocation - GEF: 1,500,000; Co finance - GoL: 2,274,000; whole project: 4,396,417; other national budget: 82,520,000 (Bhutan, Cambodia, Myanmar)
Status	Under implementation

Project #	A.TU3
Name	Advancing Lao PDR's National Adaptation Plan (NAP) through climate change vulnerability assessments for disaster risk management in human settlements
Description	This project focuses on institutional capacity building, with a strong focus on coordination. The project will increase policymakers and

[37] Building climate resilience of urban systems through Ecosystem-based Adaptation (EbA) in the Asia-Pacific region. GEF. Retrieved February 7, 2023 from https://publicpartnershipdata.azureedge.net/gef/PMISGEFDocuments/Climate%20Change/Regional%20-%20%285815%29%20-%20Building%20Climate%20Resilience%20of%20Urban%20Systems%20throu/UNEP_Asia_Urban_EbA_CEO_Endorsement_request_23Nov2016_clean.pdf

	decision-makers awareness of climate vulnerability, gender and people's inclusion, and adaptation planning, within human settlements contexts. This project is designed to complement and Project A.CC1 (GCF for GGGI).
Type	Institutional development
Timeline	36 months (2022-2024)
Adaptation Sector	Transport and Urban Development (water resources, agriculture, forestry and land use)
Budget	USD 1,998,869
Agencies	UN-Habitat
Funding sources	GCF
Status	Under implementation

Project #	A.TU4
Name	Building resilience of urban populations with ecosystem-based solutions in Lao PDR
Description	This GCF project implemented by UNEP aims at addressing the increasing impacts of climate change-induced floods on urban areas in Laos. The project objective is to establish integrated flood management practices that includes the use of urban ecosystem-based adaptation (EbA) in four major cities: Vientiane, Paksan, Savannakhet and Pakse. This objective will be achieved through Component 1. Technical and institutional capacity building to plan, design, implement and maintain integrated urban Ecosystems-based Adaptation (EbA) interventions to reduce climate change-induced flooding; and Component 2. Rehabilitation and protection of ecosystems in response to climate variability and change
Type	Planning, capacity building, delivery of EBA interventions
Timeline	2022-2027
Adaptation Sector	Transport and Urban Development
Budget	USD 11,500,000
Agencies	MONRE and UNEP
Funding sources	GCF: USD 10,000,000; MoNRE: USD 1,500,000
Status	Under implementation

Project #	A.TU5
Name	Urban climate change resilience in cities along the Greater Mekong Sub-region East-West Economic Corridor (EWEC) in Lao PDR
Description	The aim of this project is to strengthen the local and institutional capacity for stimulating climate change resilience investment flows along the EWEC in Lao PDR. The project will lay the groundwork for

	future adaptation investments in resilience infrastructure and urbanization in the rapidly growing area of Lao PDR. With increased capacity and financing, the EWEC in Lao PDR offers considerable potential for climate resilience economic growth and sustainable development.
Type	Capacity building, institutional development
Timeline	2020-2022 (18 months)
Adaptation Sector	Transport and Urban Development
Budget	USD 349,992
Agencies	UN-Habitat
Funding sources	GCF
Status	Under implementation

Project #	A.CC3
Name	Nature-based solutions for urban adaptation (NATURA) in Lao PDR
Description	This project aims to enhance the climate adaptation of urban communities and economies in Lao PDR, with the target to 1) build capacity and knowledge of nature-based solutions; 2) strengthen the regulatory and fiscal tools for the deployment of nature-based solutions; 3) reduce flood risk and enhance the well-being of urban residents; and 4) integrate nature-based solutions into government, multilateral and private sector urban development investment pipelines, leading to widespread replication.
Type	Infrastructure, capacity building, policy
Timeline	2023-2028
Adaptation Sector	Transport and urban development, Water Resources
Budget	USD 6.2 million
Agencies	GGGI
Funding sources	New Zealand Ministry of Foreign Affairs and Trade
Status	Under preparation

3.6.3. Gaps, Barriers and Needs

Given the qualitative nature of the NDC targets, a qualitative assessment of gaps, barriers and needs follows. Overall, the transport and urban development sector is making progress towards achieving both long- and short-term targets.

Short-Term Target: In terms of the short-term target, GGGI's new project on sectoral adaptation planning for the agriculture sector (project A.A2) will involve the production of a sectoral adaptation strategy and action plan, as well as establish a results-based management framework for the sector. This largely achieves this target, which means that the target can be classified as on track.

Long-Term Target: In terms of the long-term, several projects notably A.CC5, A.TU2, A.TU3, and A.TU4 are all contributing to a significant improvement in urban infrastructure resilience, notably for flood management. This target is broadly on track. Additionally, the second long-term project is broadly on track, thanks to projects A.TU6, and A.CC2, which are focused on ecosystem-based adaptation and nature-based solutions for urban resilience.

This is summarized in table 23 below.

***Table 23**: Achievement status of adaptation targets*

Sector	Target Type	Target	Contributing Projects	Achievement Status
Transport and Urban Development Sector	Short-Term	Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework	A.CC1	On track
	Long-Term	Increase the resilience of urban development and infrastructure to climate change, including through the use of green infrastructure and nature-based solutions	A.CC3	On track
	Long-Term	Promote ecosystem-based adaptation solutions	A.CC3	On track

3.6.4. Transport and Urban Development Sector Adaptation Actions

Given the above assessment of progress towards targets, the following table presents the five key priority actions for the sector. These actions have been explored, reviewed and validated through both technical and multi-stakeholder consultations involving government, non-government and private sector partners.

***Table 24**: Action plan for transport and urban development sector adaptation*

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Budget (million USD)
Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework	**Prepare operational and annual plans** Project A.A2 will largely achieve this target, however the operationalization of the sectoral strategy should also be prioritized through the development of annual operational plans to support implementation.	MPWT	Vientiane Capital	0.4

Increase the resilience of urban development and infrastructure to climate change, including through the use of green infrastructure and nature-based solutions	**Assess and propose innovations in urban adaptation financing** Given ongoing fiscal constraints, urban adaptation infrastructure financing needs to be assessed, and innovations in financing models developed to support longer-term capital expenditure as well as operation.	MPWT	MONRE, MPI	0.3
	Deliver provincial government training program Support provincial governments (especially provincial Department of Public Works and Transport) to build capacity on urban adaptation and resilience, with a priority on flood resilient infrastructure.	MPWT	MONRE	0.5
	Develop rural village settlement resilience plans or strategies Support rural communities to undertake hazard and risk maps and prepare associated resilience plans or strategies.	MPWT	MONRE	5
Promote ecosystem-based adaptation solutions	**Disseminate urban ecosystem-based adaptation good practices** Develop case studies, undertake reviews and build handbooks and/or other knowledge products on relevant ecosystem-based adaptation and hold dissemination events, including study tours to facilitate broader uptake.	MPWT	MONRE	0.2

3.7. Public Health Sector

3.7.1. NDC Targets

Two sets of targets were defined in the 2021 NDC for the public health sector, namely a shorter-term target and a longer-term target. These targets are essentially qualitative targets or objectives, guiding the sector's efforts to achieve improved resilience. These targets are presented in the table below.

***Table 25*: Short- and long-term targets for the public health sector**

Sector	Target Type	Target
Public health	Short-term target (2025)	• Implement the Strategy on Climate Change and Health Adaptation to 2025. • Implementation of the "Scaling-Up Water Supply, Sanitation and Hygiene" Project.
Public health	Long-term target (2030)	• Increase the resilience of public health infrastructure and water supply system to climate change. • Improve public health services for climate change adaptation and coping with climate change induced impacts.

3.7.2. Progress Towards Targets

The following projects contribute to the achievement of the targets for the public health sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[38]. It is also worth noting that some projects contribute to two or more adaptation sectors, as defined in the NDC. In such a case, the project is listed in both sectoral assessments, and funding allocations are apportioned accordingly to avoid double-counting.

There are 3 projects with a total funding volume of USD 68 million as at early 2023 as detailed below.

Project #	A.PH1
Name	Strengthening Climate Resilience of the Lao PDR Health System
Description	This project will strengthen the climate resilience of the health system through multiple, related approaches: strengthening climate-resilient leadership and governance in the health system; improving health information systems; upgrading 180 health facilities in 60 of the most climate-vulnerable districts in the country with climate-resilient infrastructure; strengthening health

[38] For more information on the data collection, review and assessment process, please see Annex 1.

	service delivery in rural areas to manage climate-related disease burdens; and improving communities' knowledge of, and capacity to respond to, the impacts of climate change on their health.
Type	Planning, capacity building
Timeline	5 years (project lifespan: 15 years)
Adaptation Sector	Public health
Budget	USD 41,920,000
Agencies	MOH, MPWT, MOES, SCI (Australia)
Funding sources	GCF: USD 38,150,000; co finance (GoL, WHO, SCI): USD 3,770,000
Status	Under implementation

Project #	A.PH2
Name	Enhancing Lao PDR National Capacity and Coordination in Health and Climate Change
Description	This readiness project is designed to strengthen the capacity of national technical units to manage the National Health Adaptation Plan implementation successfully and access climate finance securely. The project will ensure the enhanced capacity of early intervention of the target climate-sensitive diseases and systematized knowledge sharing mechanism with stakeholders and other relevant sectors.
Type	Capacity building, knowledge sharing and learning, strategic frameworks
Timeline	2021-2023 (18 months)
Adaptation Sector	Public health
Budget	USD 300,762
Agencies	WHO, MOH
Funding sources	GCF
Status	Under implementation

Project #	A.PH3
Name	Scaling-up water supply, sanitation and hygiene project
Description	This project aims to provide access to improved water supply, sanitation and hygiene services in selected areas identified for nutrition convergence and to strengthen the capacity of selected institutions to improve service delivery.
Type	Infrastructure delivery
Timeline	2019-2024

Adaptation Sector	Public health
Budget	USD 25.9 million
Agencies	MPWT, MOH
Funding sources	World Bank (IDA)
Status	Under implementation

**The assessment assumes that 25% of this funding flows to agriculture sector.*

***Project information has been sourced as described in Annex 2.*

3.7.3. Gaps, Barriers and Needs

Given the qualitative nature of the NDC targets, a qualitative assessment of gaps, barriers and needs follows. Overall, the agriculture sector is making progress towards achieving both long- and short-term targets, though significant efforts remain to be made.

Short-Term Target: In terms of short-term targets, the first target has been started, and project A.PH2 supports ongoing implementation. The second target, regarding implementation of project A.PH3, is progressing well under the overall management of MOH . As such, both these targets are track.

Long-Term Target: In terms of the first long-term target, on increasing resilience of public health infrastructure, project A.PH3 in particular is progressing well. For the second target, on public health services, project A.PH1 is focused on this work, and with USD 37 million in funding over 5 years, is expected to make significant progress. Similarly, A.PH2 also supports improvements in services. Both these targets are broadly on track.

This is summarized in table 26 below.

***Table* : Achievement status of adaptation targets**

Sector	Target Type	Target	Contributing Projects	Achievement Status
Public Health	Short-Term	Implement the Strategy on Climate Change and Health Adaptation to 2025	A.PH2	On track
	Short-Term	Implementation of the "Scaling-Up Water Supply, Sanitation and Hygiene" Project	A.PH3	On track
	Long-Term	Increase the resilience of public health infrastructure and water supply system to climate change	A.PH1	On track
	Long-Term	Improve public health services for climate change adaptation and coping with climate change induced impacts	A.PH3, A.PH2	On track

3.7.4. Public Health Sector Adaptation Actions

Given the above assessment of progress towards targets, the following table presents the five key priority actions for the sector. These actions have been explored, reviewed and validated through both technical and multi-stakeholder consultations involving government, non-government and private sector partners.

Table 26: Action plan for public health sector adaptation

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Estimated Budget (million USD)
Implement the Strategy on Climate Change and Health Adaptation to 2025	**Operationalize the strategy through resilient health sector investment plans** Operationalize the strategy through the development of concrete long-term private-sector oriented investment plans	MOH	WHO	5
Implementation of the "Scaling-Up Water Supply, Sanitation and Hygiene" Project	**Develop and disseminate lessons learned and case studies** Based on project deliver, develop key knowledge products to support ongoing learning and dissemination of good practices.	MOH	MONRE	0.2
Increase the resilience of public health infrastructure and water supply system to climate change	**Strengthen public health infrastructure resilience** Review all public health infrastructure, as both central and provincial level, for key climate vulnerabilities and risks, and formulate recommendations accordingly. Recommendations can also be structured into provincial health infrastructure resilience plans.	MOH	MONRE, MPWT	3
Improve public health services for climate change adaptation and coping with climate change induced impacts	**Train health personnel in climate-responsive health programs** Develop health programs which consider the impacts of a changing climate in Lao PDR on long-term public health and build capacity of health official and practitioners for implementation. **Strengthen the information system in detecting the diseases such as**	MOH	MONRE	0.5

	the early warning system for climate sensitive diseases Track the early warning systems by using weather forecast data; promote equal access to data/cross sectoral data sharing			

3.8. Energy Sector

3.8.1. NDC Targets

Two sets of targets were defined in the 2021 NDC for the energy sector, namely a shorter-term target and a longer-term target. These targets are essentially qualitative targets or objectives, guiding the sector's efforts to achieve improved resilience. These targets are presented in the table below.

***Table 27*: Short- and long-term targets for the energy sector**

Sector	Target Type	Target
Energy	Short-term target (2025)	• Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework
Energy	Long-term target (2030)	• Build resilience to climate change in hydropower sector through improved dam safety regulations and guidelines • Strengthen technical capacity to use new and innovative technologies to enhance climate resilience and sound management in energy sector • Promote multipurpose use of reservoirs to enhance resilience of surrounding communities and maximize benefits for other sectors

3.8.2. Progress Towards Targets

The following projects contribute to the achievement of the targets for the energy sector. These projects are either a) recently completed; b) currently under implementation; or c) expected to start in the short-term, with a high degree of probability. As such, these projects collectively describe the extent to which the sector has advanced towards the sectoral targets. Note that projects from both the public and private sector have been included in this review and assessment, with data collected through a range of workshops, focus group discussions and key informant interviews[39]. It is also worth noting that some projects contribute to two or more adaptation sectors, as defined in the NDC. In such a case, the project is listed in both

[39] For more information on the data collection, review and assessment process, please see Annex 1.

sectoral assessments, and funding allocations is apportioned accordingly to avoid double-counting.

There are 3 projects with a total funding volume of USD 6.95 million as of early 2023.

Project #	A.EN1
Name	Dam Safety Technical and Institutional Assistance in Lao PDR (DSTIA)
Description	The overall goal of the project is to increase the safety of dams by strengthening the capacity of Laos to protect people, property and the environment from harmful effects of poor design, operation or failure in the maintenance of hydropower dams.
Type	Capacity building
Timeline	2021-2026
Adaptation Sector	Energy, Water Resources
Budget	CHF 5,367,000
Agencies	Swiss Agency for Development and Cooperation, Swiss NGO, private sector
Funding sources	Swiss Agency for Development and Cooperation
Status	Under implementation

#	Project	Budget (USD)	Agencies
A.EN2	Dam Safety Technical Assistance to EDL and EDL-GEN	600,000	NZ-REF, MEM
A.EN3	Renewable Energy Strategy Implementation - Wind Power Technical Assistance	500,000	NZ-REF, MEM

3.8.3. Gaps, Barriers and Needs

Given the qualitative nature of the NDC targets, a qualitative assessment of gaps, barriers and needs follows. Overall, the energy sector is making some progress towards achieving both long- and short-term targets, though significant efforts remain to be made.

Short-Term Target: In terms of the short-term target, a dedicated sector strategy or action plan for resilient energy sector is needed.

Long-Term Target: In terms of the first long-term target, on improved dam safety, projects A.EN1 and A.EN2 are both contributing to improvements. For the second long-term target, A.EN2 is contributing but further activities are needed to broaden and strengthen technical capacity. For the third long-term target, [no] projects are currently active in this target area, and this therefore requires attention.

This is summarized in table 29 below.

***Table 28*: Achievement status of adaptation targets**

Sector	Target Type	Target	Contributing Projects	Achievement Status
Energy	Short-Term	Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework	A.EN1	Needs attention
	Long-Term	Build resilience to climate change in hydropower sector through improved dam safety regulations and guidelines	A.EN1, A.EN2	On track
	Long-Term	Strengthen technical capacity to use new and innovative technologies to enhance climate resilience and sound management in energy sector	A.EN1, A.EN3	Needs attention
	Long-Term	Promote multipurpose use of reservoirs to enhance resilience of surrounding communities and maximize benefits for other sectors		Needs attention

3.8.4. Energy Sector Adaptation Actions

Given the above assessment of progress towards targets, the following table presents the five key priority actions for the sector. These actions have been explored, reviewed and validated through both technical and multi-stakeholder consultations involving government, non-government and private sector partners.

***Table 29*: Action plan for energy sector adaptation**

NDC Target	Priority Actions	Lead Agency	Supporting Agencies	Budget (million USD)
Mainstream climate change adaptation in sectoral strategy and action plan including through results-based management framework	**Develop energy sector climate resilience plan** Integrate climate change adaptation into a resilient energy sector strategy or plan, outlining key priorities for enhancing the resilience of the sector across major energy types and energy infrastructure.	MEM	NZREF	0.5
Build resilience to climate	**Undertake national dam safety assessment and develop regulation**	MEM	MONRE	0.3

change in hydropower sector through improved dam safety regulations and guidelines	Based on activities undertaken to date, assess dams for safety and identify residual safety priorities. These may be structured into dam emergency action plans, supported with warning systems and increased capacity of responsible agencies			
Strengthen technical capacity to use new and innovative technologies to enhance climate resilience and sound management in energy sector	**Deliver training program on energy sector resilience** Prepare and roll out a training program to energy sector officials and private sector on new technologies, as well as management practices, for energy sector resilience.	MEM		0.5
Promote multipurpose use of reservoirs to enhance resilience of surrounding communities and maximize benefits for other sectors	**Develop and deliver integrated reservoir management programs** Support communities, government partners and private sector to build integrated reservoir management plans, with strong ecosystem services and payment component.	MEM	MONRE	3
	Set up financing facility for integrated reservoir management Design and capitalize a dedicated revolving facility to support development of ecosystem-based services payments around reservoirs.	MEM	MONRE	10

4. Institutional Arrangements and MRV

4.1. Institutional Arrangements

Ensuring the successful and timely delivery of Lao PDR's NDC targets, and the priority implication actions outlined in this Implementation Plan, is critical. In particular, this requires focused effort on the various targets of the NDC which are classified as 'needing attention' in this report. Additionally, given the multi-sectoral and multi-ministerial nature of the NDC and its targets, coordination across organizations and institutions on the implementation status is important, and institutional arrangements for implementation must reflect this. Figure 5 below describes the existing institutional arrangement for NDC implementation. Importantly, the implementation arrangement of this NDC Implementation Plan adopts the implementation arrangement of the NDC. Where possible, for the purpose of institutional efficiency and clarity, the Government of Lao PDR prefers to utilize existing implementation structures with updated responsible entities, rather than creating new ones. The line ministries will be responsible for collecting related data in their sector and provide these to MONRE for consolidation.

The existing implementation arrangement has been set up at the national level to oversee climate change priorities as well as the implementation of the NDC. The arrangement features relevant government agencies, as well as development partners.

The Prime Minister Office (PMO) provides supervision and overall management and monitoring of NDC implementation progress, as well as decision makings on behalf of the Government of Lao PDR, including policies, strategic plans, regulations. The National Committee on Environment was established by the PMO in 2009 as an ad hoc committee to monitor activities related to climate change, and broader environmental issues within Lao PDR. The Committee also supports the PMO on reviewing relevant draft policies, strategic plans, and regulations prior to the adoption by the PMO. MONRE has been assigned by the PMO to take direct responsibility and coordination with relevant ministries, development partners and local authorities, through this Committee.

The Department of Climate Change (DCC) within MONRE acts as coordination focal point on the implementation of NDC, including developing and maintaining data and information in coordination with relevant ministries, Lao Front for National Development (LFD) who is a national champion on ethnic group related affairs, Lao Women's Union (LWU) as well as Provincial Department of Natural Resources and Environment, and the District Office of Natural Resources and Environment. These subnational entities are responsible for managing, implementing and reporting on climate change within their respective localities. In addition, MONRE has also established a Technical Working Group on Climate Change which consists of representatives from line ministries, international development partners, as well as from the private sector to support with the provision of technical advisory and recommendations on topics linked to climate change.

***Figure 5*: Institutional arrangement for NDC implementation**

The roles and responsibilities of these entities are described further in Table 31 below.

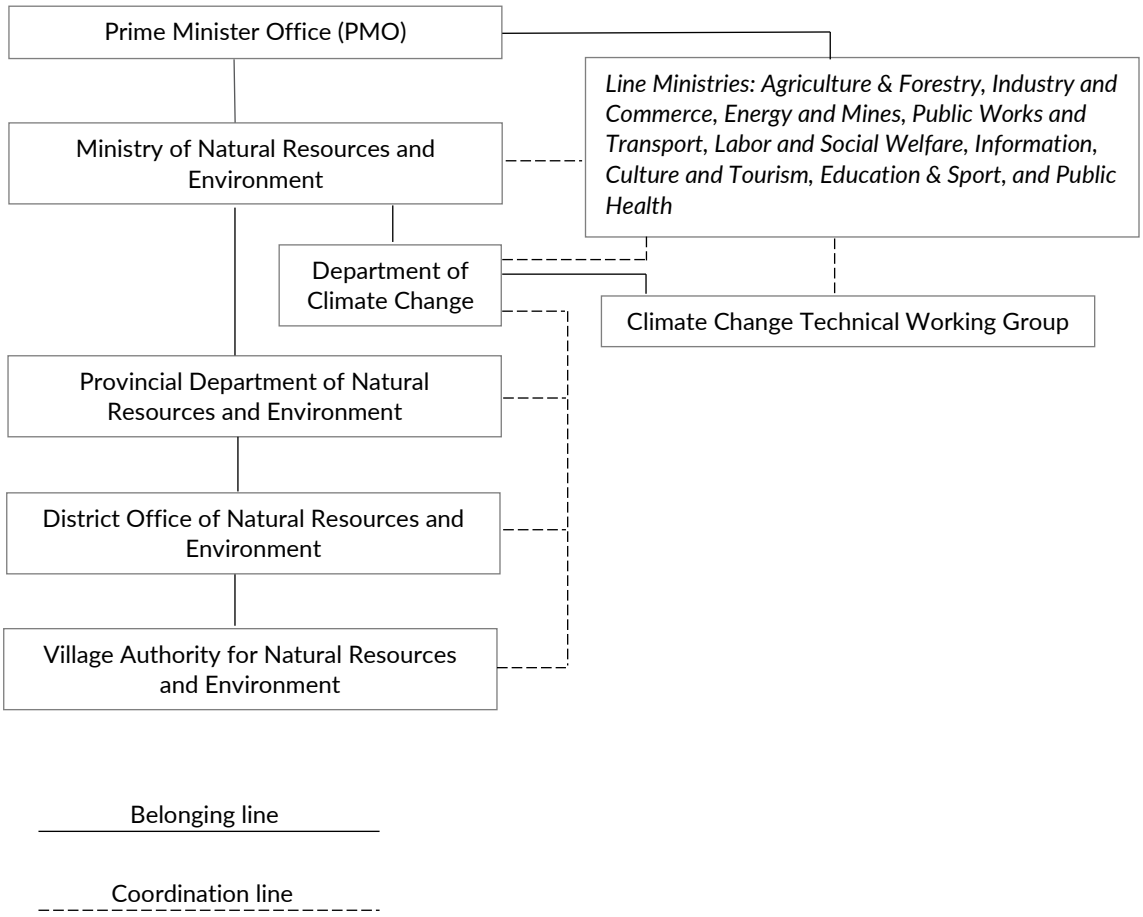


***Table 30*: Roles and responsibilities of participating institutions**

Entity	Mandate	Role in NDC Implementation
Prime Minister Office (PMO)	• Centrally and uniformly screens and provides no objections for all development projects financing from the private and ODA including climate change projects before accepted by GOL (Ministry of Planning and Investment and line ministries) throughout the country. • Review and approve a Prime Minister's Decree which assign MONRE the authority on behalf of the Lao government of direct responsibility on climate change and coordination with line ministries, organizations, and local authorities accordingly.	• Oversee the implementation of the NDC in close coordination with MONRE, National Committee on Environment and line ministries. • Consider and adopt sectoral policies, strategic plans, regulations which contribute to the achievement of NDC targets.

Ministry of Natural Resources and Environment (MONRE)	• Develop policies, strategic plans, laws and regulations related to climate change and submit to Government of Lao PDR for approval. • Develop and maintain data and information systems on climate change in a reliable, accurate and timely manner.	• Act as focal ministry to provide oversight and advisory support to stakeholders including TWGCC on the NDC implementation, including maintenance of data and information. • Develop policies, guidelines and regulations to support relevant Ministries in setting sectoral priorities in line with NDC implementation. • Disseminate the NDC targets and priority actions to relevant sectors in central and local levels.
Department of Climate Change (DCC)	• Coordinate NDC activities on behalf of MONRE with other relevant ministries and local authorities.	• Coordinate NDC activities including MRV. • Act as Secretariat of the TWGCC. • Take minutes of the TWGCC, endorsed NDC reports. • Lead the dissemination of NDC targets and priority action information to relevant sectors in central and local levels. • Lead in tracking progress of the NDC implementation plan and inform and advise the TWGCC, MONRE, and NCE.
Ministry of Planning and Investment	• Review and approve all proposed projects submitted by line ministries including climate change and green finance related projects to ensure alignment with government's overall 5 years 9th National Socio-Economic Development Plan (NSEDP) and priorities; • Monitor the progress of project implementation with the responsible line ministries at the central and local levels.	• Maintain the investment related information system and provide a list of climate change related projects financed by private, public and ODA that are approved, pending to be approved and closed in all sectors.
Line Ministries	• Mainstream climate change into sectoral activities.	• Mainstream priorities for NDC implementation into

	• Conduct studies, research and promoting the use of environmentally friendly technologies that mitigate GHG emissions and/or increase resilience to climate change. • Coordinate and provide data and information on climate change from their sectors to the MONRE.	its sectoral strategic and development plans. • Identify and execute sectoral climate actions that support the NDC Implementation. • Provide sectoral data and information on the progress of NDC Implementation to MONRE. • Support MER of the NDC sector-related activities.
Lao Women's Union (LWU)	• Representing Lao women in their development, protection of their rights and benefits including children's, promoting gender equality and involvement of women in the national development.	• Ensure engagement of women in the project design and implementation, evaluation. • Provide perspectives on how the proposed projects may impact different gender of various ethnic groups.
Lao Front for National Development	• Responsible for conducting studies and researches as well as making records on each ethnic group profile; • Developing and monitoring policies related to all 52 ethnic groups in Lao PDR.	• Participating in the project design, implementation and monitoring/reporting to ensure the inclusion of vulnerable and minority ethnic groups who may be impacted by the proposed project. • Support the ethnic language translation or communication with the elders according to the participating ethnic groups' unique cultures.
Provincial Department of Natural Resources and Environment	• Implement and disseminate strategic plans, decrees and regulations related to climate change. • Monitor and inspect the implementation of climate change activities, and report to MONRE. • Direct the District Office for implementation of climate change activities.	• Disseminate the importance of NDC and its implementation plan at the provincial and district level. • Support the monitoring and reporting to MONRE on activities related to NDC implementation.
District Office of Natural Resources and Environment	• Implement and disseminate strategic plans, decrees and regulations related to climate	• Disseminate and advise village authorities for awareness raising on NDC Implementation.

	change at the village and district levels. • Advise and coordinate with village authorities for implementation and assessment of climate change activities. • Report to the Provincial Department and district governors on the climate change activities.	• Participate in activities related to climate change and NDC Implementation. • Monitoring and reporting to Provincial department on activities related to climate change and progress of NDC implementation.
Village Authority for Natural Resources and Environment	• Implement and disseminate strategic plans, decrees and regulations related to climate change at the village level • Monitor and inspect the implementation of climate change activities. • Coordinate and report to district office on the implementation of climate change activities.	• Monitor and inspect climate change activities in its own areas at village level. • Implement community level activities that contribute to NDC Implementation. • Coordinate with district office for updates and reporting. • Beneficiaries of community level activities.
Climate Change Technical Working Group	• Support MONRE through the Department of Climate Change on reviewing and providing technical inputs to policies, strategic plans and regulations related to climate change. • Coordinate with relevant sectors at central and local levels on the execution and dissemination of related policies and regulations. • Identify and propose effective actions to the government on climate mitigation and adaptation.	• Provide technical review of sectoral polices, development projects and activities related to climate change and ensure the alignment with contribution to NDC implementation and report to PMO for consideration. • Invite and assign ad-hoc technical focal points to review particular reports for reporting to CCTWG. • Provide technical inputs and advice to DCC on the progress and results of NDC Implementation. • Coordinate with line Ministries and development partners for information and knowledge sharing. • Propose priority actions for the achievement of NDC Implementation. • Submit recommendations of approval or on NDC reports and updates.

4.2. Monitoring, Reporting and Verification

Monitoring and reporting on progress made in the implementation of the priority actions of the NDC Implementation Plan will be undertaken via the institutional arrangements outlined above.

Lao PDR shall monitor, assess and report the progress and results of NDC Implementation in line with national strategic plans and climate priorities. The national Monitoring, Reporting and Verification (MRV) system was established in 2022, but the system has not yet been implemented. According to the latest Lao National Climate Change Strategy approved in February 2023, the MRV shall focus and in line with below government's strategic priorities:

- NDCs, Biennial Update Reports, National Communications to UNFCCC, National Inventory, as well as impacts and results from the execution of mitigation and adaptation actions and climate resilience enhancement.
- Assess the progress of climate priorities implementation which integrated into the 9th NSEDP, SDGs, National Green Growth Strategy, National Strategy on Disaster Risk Management 2021-2030, sectoral strategic plans at the central and local levels.
- Identification of needs and financial support, technologies transfer and capacity building for NDC implementation.

***Table 31*: Monitoring, Reporting and Verification (MRV) Framework**

Monitoring and Reporting	Frequency	Lead Entity
Biennial Update Reports (BUR)	Every 2 years	MONRE
National Communication to UNFCCC	Every year	MONRE
National Inventory	Every year	MONRE

It is also noted that since 2018, the Ministry of Planning and Investment (MPI) has officially launched the ODA Management Information System (ODA-MIS.Gov.LA) to centralize aid management and to ensure the most effective use of information. Climate change related projects and funding sources including the expected GHG emission reductions have been recorded by MPI in system but not all projects are registered. In addition, there has been a request by the Bank of Lao PDR for the International Finance Corporation (IFC) support in developing the regulation on green finance that includes the requirement to classify green financing (taxonomy) for reporting, information disclosure and green bond development. Therefore, there are opportunities for all government agencies to work together and coordinate to further improve national MRV on climate change.

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Annexes