



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

# **National Strategy on Climate Change toward 2030**

Vientiane, Lao PDR  
5 January 2023

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## Preface

This National Strategy on Climate Change toward 2030 has been updated from the National Strategy on Climate Change Solution which was adopted by the Government of Lao PDR in 2010. This improvement of the National Strategy on Climate Change responds to both domestic and international changes such as the updated version of the Environmental Protection Law (EPL), the Strategy on Natural Resources and Environmental Sector (SNRES) toward 2030, the 2030 Agenda for Sustainable Development Goals (SDGs), the National Green Growth Strategy (NGGS), Climate Change Decree (CCD), Law on Disaster Management (LDM), and the Paris Agreement. The main objective of this updated strategy is to continuously transform the climate change management strategy into action to reduce global warming and climate change consequences and impacts on socioeconomic development to improve people's quality of life, maintain personal properties, and improve infrastructure and environmental conditions.

The implementation of the National Strategy on Climate Change over the past 10 years has produced considerable positive impacts on various factors; for example, greenhouse gases emissions were reduced by 30% between 2000 and 2020; climate change impact has been projected from 1975 to 2099; maps of climate change risk and vulnerable areas have been completely developed for 148 districts throughout the country; and \$350 million has been mobilized for the implementation of climate change-associated projects in Lao PDR. Despite these outstanding achievements, there are still some obstacles and challenges to overcome in the implementation phase: climate change database needs to be systematically improved and managed, capacity of staff has to be continuously strengthened, the limitations of access to and transfer of technology need to be addressed; budgets have not been sufficiently allocated, and the monitoring and evaluation of the implementation of climate change adaptation and greenhouse gas mitigation plans have not yet been systematically and effectively conducted. All of these outstanding achievements and challenges are invaluable lessons and have become the basis for improving this strategy further for better implementation and fruitful outcomes.

This updated version of the Climate Change Strategy toward 2023 has been drafted in accordance with analysis of the results of the previous implementation of climate change-associated tasks; results of research studies on characteristics, overall situations, opportunities, challenges, barriers, modernization trends (at the international, regional, and national levels), globalization, and current and future collaboration at the international and regional levels; and outcomes and comments of all of relevant national and local sectors, as well as with development partners and international organizations.

This strategy defines the overall goals and anticipated targets, fundamental principles, priority programs, and projects to enhance and strengthen the implementation of climate change adaptation and resilience and greenhouse gas mitigation; promotes the mainstreaming of climate change in development for all relevant sectors; and creates environmental conditions conducive to climate change management.

This strategy document is considered to have important implications for policy and technical practices to develop solutions to climate change in Lao PDR, as well as to better enhance effective and efficient collaboration with regional and international organizations. Even though each program defined in this strategy has set a scope for projects and activities, it may be used as a reference with regard to defining and mainstreaming actions for both annual and 5-year plans for all ministries, agencies, and relevant sectors at both central and local levels and for further implementation in each area.

On behalf of the Ministry of Natural Resources and Environment, I would like to take this opportunity to express my appreciation to the steering committee, secretariat, national

and local agencies, development partners, and international organizations for their considerable and invaluable technical and financial support for the improvement of this strategy. I strongly encourage each of us to begin turning this strategy into action once it has been adopted.

Vientiane, Lao PDR, dated 5 January 2023  
Minister of Natural Resources and Environment  
(signed and sealed)

## Executive Summary

Climate change is one of the world's most pressing issues, causing adverse impacts on national socioeconomic development and well-being of people in many countries worldwide, including the Lao People's Democratic Republic (Lao PDR), where its citizens rely primarily on nature for their livelihoods. Since climate change threatens the country's socioeconomic development, the Government of the Lao PDR did not hesitate to take action during the early stages of the negotiation process for developing the United Nations Framework Convention on Climate Change (UNFCCC) in 1990, and eventually ratified the UNFCCC in 1995. To further its commitment to address climate change, the government ratified the Kyoto Protocol in 2003 and the Paris Agreement in 2016.

To operationalize climate change management, the first national strategy on climate change was developed in 2010. However, it was not effectively and efficiently implemented due to the following reasons: some of the priority plans defined in the strategy still remain incomplete and have yet to meet the needs of the climate change solutions (in particular, the contents of the strategy were not consistent with the post-2010 newly updated legal framework); programs, anticipated goals, and timeframes were not clearly specified in the strategy; monitoring, evaluation, and reporting systems were lacking; and access to funds and fund mobilization was limited.

Moreover, more severe climate change phenomena and unpredictable climate patterns (e.g., rapid increase in the earth's average surface temperature; fluctuations in precipitation; and increasing frequency of storms, floods, and droughts) have considerably affected regions and countries, which have led the government to improve on its strategy. At the global level, the United Nations has adopted the 2030 Agenda for Sustainable Development (also known as the Sustainable Development Goals [SDGs]) and ratified the Paris Agreement in an attempt to maintain Earth's average surface temperature increase to no more than 1.5 degree Celsius. Therefore, the Government of the Lao PDR finds it necessary to keep its strategy on climate change up to date to better address current climate trends as well as future climate change challenges.

The general goals of this updated strategy are to achieve the targets of Net Zero Emissions by 2050 (NZE 2050) and to better enable Lao PDR to adapt to climate change. The strategy consists of three main strategies and nine priority programs.

### **Following are the three strategies:**

1. Strategy 1: The enhancement of prevention, resilience, adaptation, risk reduction, and rehabilitation of climate change-associated impacts, including strengthening data and information systems; reporting; early warning system; risk reduction and rehabilitation of climate change-associated impacts and disasters; education and awareness raising; technology transfer; and resilience and adaptive capacity of infrastructures, manufacturing systems, business operations, ecosystems, and communities.
2. Strategy 2: The enhancement of prevention methods for the control and mitigation of greenhouse gases, including the promotion of energy efficiency (including renewable and alternative energy sources with environmentally friendly and low-carbon emission characteristics); the role of ecological systems in absorbing greenhouse gases and as cleaning mechanisms; standardization of waste management; improvement of urban planning, public works, and transportation; and enforcement of the existing legal framework and measures associated with climate change management.
3. Strategy 3: The mainstreaming of climate change management in sector plans and creation of an environment conducive to climate change management, including the enhancement and implementation of existing regulations, plans, financial

mechanisms, coordination, and collaboration at national and international levels; and monitoring and evaluation processes.

**The nine priority programs include the following:**

- 1) Develop and manage climate change database and information to track and report the status of adverse events and climate change-associated impacts.
- 2) Enhance the resilience and adaptive capacity to climate change impacts of various sectors such as infrastructure, manufacturing systems, business operations, services, ecosystems, and communities, as well as at-risk and affected sectors.
- 3) Strengthen the investigation, monitoring, and evaluation process, and the reporting on greenhouse gas emissions.
- 4) Strengthen different sectors' capacity for greenhouse gas control and mitigation.
- 5) Develop, utilize, and transfer technologies.
- 6) Promote education and awareness-raising, as well as encourage public involvement in climate change mitigation.
- 7) Strengthen climate finance.
- 8) Mainstream climate change awareness and creation of environments conducive to climate change management.
- 9) Strengthen institutions and develop human resources for climate change management.

## Terminology

- 1) **Climate Change** refers to a rapid increase in the earth's average surface temperatures which is greater than normal ranges in the long term, caused by direct and indirect human activities or natural phenomena, resulting in changes in atmospheric components.
- 2) **Climate Change Management** means a set of policies, strategies, human resource development, educational curriculum development, scientific research, awareness raising, data and information sharing and dissemination, finance, materials and equipment, facilities, as well as local wisdom and indigenous knowledge that is used to effectively and efficiently manage the effects of climate change.
- 3) **Adaptation** refers to any adjustment process made by humans, animal and plant species, ecosystems, infrastructure, and urban developments to enable resilience to climate change and minimize climate impacts by introducing proper measures to reduce potential vulnerability, risk, and consequent damages.
- 4) **Vulnerability** means sensitivity and inability to deal with the impacts of climate change-associated impacts.
- 5) **Resilience** means the ability to respond to impacts and restore affected communities and/or the larger society (including infrastructure and ecosystems) to a normal status.
- 6) **Greenhouse Gases (GHGs)** refer to any gases including carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride that trap heat in the atmosphere, increasing Earth's surface temperature. This results in the "greenhouse effect," causing global warming and climate change.
- 7) **GHG Emissions** mean the release of the seven GHGs mentioned above into the atmosphere. GHG emissions are caused by natural phenomena and/or human activities (such as burning of fossil fuels, forest and land use changes, and waste generation and disposal).
- 8) **Mitigation** means the process of reducing GHG emissions and enhancing carbon sinks.
- 9) **Absorption of GHGs** means the process of absorbing GHGs from the atmosphere.
- 10) **Financial Mechanism** means the mobilization of financing to support climate change mitigation and adaptation plans. The UNFCCC has established a financial mechanism to allocate funds to the least developed and developing countries or parties to assist them in implementing the Convention's objectives.
- 11) **Impacts** mean the adverse effects of disasters and climate change on natural systems and society.
- 12) **Droughts** refer to the natural phenomena that exist when precipitation is significantly below long-term average recorded levels, causing serious hydrological imbalances that lead to adverse impacts on land and production systems.
- 13) **Floods** refer to the overflowing of the normal confines of streams, rivers, and other water bodies, or the accumulation of water over areas



# Chapter I: General Situation and Evaluation of the Implementation of the Climate Change Strategy 2010

## 1.1 Overview

Climate change is one of the most pressing challenges facing our global community, including the Lao People's Democratic Republic (Lao PDR). It has been observed that, in Lao PDR, climate change has resulted in increasing variable temperatures and fluctuations in precipitation, severe storms and torrential rains, and the frequent occurrence of severe and prolonged floods and droughts. These climatic events have brought adverse impacts on several sectors, particularly in agriculture, forest and land use, water resources, energy, industries, public works and transportation, urban planning and development, and public health. These are demonstrated by the following storms from the past decade, which are some of the most severe storms to ever occur in the Lao PDR. In 2009, damage from Typhoon Ketsana was estimated at \$94.2 million and affected approximately 180,000 people from 30,000 households. In 2011, Typhoon Nokten caused severe damage in 12 provinces, which brought approximate economic losses of \$200 million and 41 fatalities. In 2018, Son-Tinh and Bebinca storms caused severe floods; disrupted production activities, services, transport, infrastructure and other sectors; and led to economic losses of approximately \$371.1 million—equivalent to 2.1% of the country's gross domestic product (GDP). It is projected that climate change will cause more frequent and severe floods and droughts, increasing the likelihood of catastrophes in the future. These incidents indicate that Lao PDR is extremely susceptible and vulnerable to climate change-associated impacts. In 2018, Lao PDR was ranked the 22nd most vulnerable country in the world to climate change.

The Lao PDR has recognized the importance of taking urgent action on climate change solutions at the national level, as well as contributing to global action on climate change. Its government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995, the Kyoto Protocol in 2003, and the Paris Agreement in 2016. Moreover, Lao PDR adopted the Strategy on Climate Change of the Lao PDR in 2010, followed by the Lao PDR's Climate Change Action Plan, over the period 2013–2020. The Lao PDR communicated its first Nationally Determined Contribution (NDC) in 2015 and submitted a second version to the UNFCCC Secretariat in 2021. In September 2019, the government approved the Decree on Climate Change.

This strategy has been improved based on the implementation outcomes of the recent strategy which was approved by the government in 2010. It is considered as an important document for policy implementation and the development of solutions to combat climate change in Lao PDR, as well as a template for effective and efficient collaboration at the regional and international levels. This strategy defines overall goals on climate change toward 2050, and strategies and programs toward 2030. The strategies specifically include actions on risk prevention and reduction, resilience, adaptation, recovery and rehabilitation from climate change-associated impacts, as well as mitigation of greenhouse gas (GHG) emissions, which are the main cause of climate change. In addition, this strategy significantly contributes to national socioeconomic development in the direction of green growth and sustainable development; institutional coordination and enhancement of cooperation; multi-stakeholder engagement; and ownership of climate change management at the national, regional, and international levels.

## 1.2 Climate Change Status, Impacts, and Responses at International and Regional Levels

### 1.2.1 Climate Change Status and Impacts at International and Regional Levels

Global climate systems are changing at a significant rate. From the pre-industrial era (i.e., the 1850s) to 2017, the Earth's average surface temperature increased by 1 degree Celsius (°C). The key factor contributing to this trend is human-induced emissions of GHGs into the atmosphere due to extraction and consumption of fossil fuels and other natural resources, changes in land use patterns, forest degradation and destruction, increased industrial production, application of chemicals in agriculture, and waste generation and disposal. The Paris Agreement, adopted under the UNFCCC in 2015, is an important legal basis for developing solutions to climate change at the global level. The agreement has set an ambitious target and measures to hold the increase in the global average temperature to well below 2°C above pre-industrial levels. This is to help safeguard communities from climate change impacts. In 2018, The results of the study by the Intergovernmental Panel on Climate Change revealed that there is a high potential that the global average temperature will reach 1.5°C above pre-industrial levels sometime between 2023 and 2052 if current global GHG emissions persist without effective and efficient measures applied on a global scale. It is believed that the significant increase in the global average temperature will bring adverse impacts on global climate patterns and the world's communities in the following areas:

1) **Extreme heatwaves.** If global average temperatures increase by 2°C, 1.7 billion or more people will experience severe heatwaves, while 420 million additional people will suffer from extreme heatwaves. These heatwaves are a significant factor contributing to disease outbreaks, morbidity, and overall mortality.

2) **Droughts and floods.** Climate change will cause approximately 350 million people to live with droughts at the global average temperature increase of 1.5°C. If the temperature increase reaches 2°C, it is projected that 410.7 million people will suffer from unexpected droughts and floods. If the global average temperature increase can be limited to 1.5°C, less than 50% of global population will suffer from water stress, compared to those under a 2°C increase scenario. Furthermore, over 70% of the global population will experience fluvial flooding under a warming (i.e., 2°C increase) scenario.

3) **Decreased food production and natural habitats.** With an increase in global average temperature of 1.5°C, 6% of insects, 4% of vertebrates, and 8% of plant species will lose more than half of their natural habitats. In a case where the global average temperature increase reaches 2°C, those species will lose their habitats at double the rate. Yields of rice, wheat, barley, and a range of livestock throughout the world will be reduced by approximately 7%–10%.

Climate change status in and responses by the Association of Southeast Asian Nations (ASEAN) Member States (AMS) are varied by locations, geographies, socioeconomies, living conditions, vulnerability to natural catastrophes, and adaptive capacities. In general, AMS are at-risk of sea level rise, as the majority of their populations and socioeconomic infrastructure are situated in coastal areas. At the same time, climate change has been impacting agriculture, particularly food production. Recently, it was observed that the number of extreme events has been increasing: heavy torrential rains, increasing numbers of hot days, more severe floods, changing typhoon patterns, and variations in droughts. It is also observed that the available data of losses and damages are insufficient in some AMS, most relevantly with regard to flooding and rising sea levels. Like other AMS counties, Lao PDR experienced average temperature increases at a rate of 0.05°C per year over the last 40 years, and it is projected that the average temperature will increase

by between 1.4°C and 4.3°C in 2100, which will result in more severe and prolonged floods and droughts.

The GHG emission rates of the Mekong riparian countries in comparison with their GDP tend to have decreased dramatically since 1990, particularly for Cambodia, Lao PDR, and Myanmar. However, the total GHG emissions in the Mekong riparian countries still continue to rise by about 1.3% to 3.6% per annum due to population growth and economic development. It has been observed that average annual basin-wide temperatures and precipitation have increased over historical record levels. However, it is very difficult to prove whether or not more frequent occurrences of torrential rains, storms, floods, and droughts have been directly caused by climate change or other factors, due to the variation in water levels in the basin in each year. It is projected that the average temperature for the Mekong River Basin could increase by up to 3.3°C by 2060 in comparison to rising global average temperature trends.

## **1.2.2 Climate Change Response at International and Regional Levels**

Climate change response at the international level is in accordance with the implementation of the UNFCCC and Paris Agreement. By 2020, parties to the Paris Agreement were to have updated and submitted their nationally determined contributions (NDCs), and to have developed their long-term low greenhouse gas emission development strategies (LT-LEDSs) to the UNFCCC.

Under the Paris Agreement, particularly the requirements for raising climate ambition, all parties are requested to submit their updated NDCs in 2020 and 2025 and collect global data for a stocktake in 2023 to assess progress on the agreed temperature goals. Furthermore, the Paris Agreement's Enhanced Transparency Framework imposes reporting requirements on the government.

Members of the International Civil Aviation Organization (ICAO) and the Kigali Amendment to the Montreal Protocol for the prevention of ozone layer depletion have undertaken an important step toward addressing global warming. In 2013, the ICAO adopted a global framework for market-based measures to achieve carbon neutrality within the aviation sector. In addition, the Kigali Amendment has set its goals to phase out hydrofluorocarbons, —which are most commonly used as refrigerants—over the 2036–2047 period.

The Sustainable Development Goals (SDGs) were conceived as a “blueprint to achieve a better and more sustainable future for all.” SDG 13 promotes climate action and sets targets to strengthen resilience and the adaptive capacity of countries to climate-related disasters. It also calls to mitigate greenhouse gases and integrate climate change measures into policies, planning, and implementation of the UNFCCC.

ASEAN has affirmed its support for the goals of the UNFCCC. On 2 November 2019, ASEAN declared a Joint Statement on Climate Change to the 25th Session of the Conference of The Parties to the UNFCCC. At present, AMS are implementing key measures on climate change adaptation and disaster risk reduction. Many of them have undertaken risk and vulnerability assessments, capacity development, institutional strengthening, and policy and legislative development associated with climate change. Also, AMS have been multiplying their efforts with regard to climate change adaptation for the years ahead. Furthermore, AMS have set up prior countermeasures on readiness, enhanced transparency framework (ETF), and knowledge and experience exchanges of mitigation actions among themselves, especially capacity development on GHG emissions projections and reduction to achieve the regional net-zero emission goal in the future.

Generally, climate change has negatively affected natural resource and socioeconomic development in the Lower Mekong Basin (LMB) in the past and at present, and it will continue to do so in the future. The Mekong Climate Change Adaptation Strategy and Action Plan (MASAP) 2017 provides policy and vulnerability-based adaptation measures for minimizing impacts and enhancing resilience to climate change in the LMB. The long-term strategy in the Mekong Basin recognizes the importance of responses to unexpected extreme climate-related impacts, which could potentially result in agricultural yield reduction due to water scarcity and more severe flooding. Therefore, LMB countries should develop their long-term strategies and measures for water irrigation, storage, and flood control schemes as appropriate.

### 1.3 Overview of Lao PDR

#### 1.3.1 Geography and Climate

Lao PDR is situated in the middle of Southeast Asia's mainland—one of the world's most culturally and naturally diverse regions—which is also experiencing rapid economic growth. The Lao PDR is a landlocked country, sharing borders with the People's Republic of China to the north, the Socialist Republic of Viet Nam to the east, the Kingdom of Cambodia to the south, and the Republic of the Union of Myanmar and the Kingdom of Thailand to the west. It has a total area of 236,800 square kilometers, of which approximately 70% is the mountainous area surrounding the Annamite Mountain Range. The plain regions are mainly located in the Mekong River Basin, covering approximately 35% of the country's territory. It has a tropical climate influenced by monsoons from the southwest, which bring high precipitation and humidity. Lao PDR's weather is marked by two main seasons; the rainy season is from May to September while the dry season is from October to April. The average annual rainfall is 1,900 millimeters, of which 80% is recorded in the rainy season. The average temperatures are between 31°C and 27°C.

#### 1.3.2 Natural Resources and Environment

**Land resources.** According to the national land use master plan, land is divided into eight categories: (i) agricultural land, (ii) forestland, (iii) water and wetland, (iv) industrial land, (v) land for communication, (vi) cultural land, (vii) defense and security land, and (viii) construction land. Lao PDR has set a land survey target in 2023 for the reservation and protection of designated protected forest areas covering approximately 16.5 million hectares (ha) (or equivalent to 70% of the total country's land area). These are protected forest areas (20%), buffer forest areas (35%), production forests, planting forest areas (13%), and industrial tree plantations (2%). The remaining 30% of land area is allocated to development including agricultural land and settlements (19%), construction (11%), and other land uses (11%). As mentioned above, most of the country's land area is mountainous, and approximately 5.24% of this area is susceptible to landslides and soil erosion. There is a limited amount of arable land, which covers only about 3.8 million ha (or 16% of the total area of the country). Moreover, Lao PDR also has peatlands, which are important as carbon storage sources. Based on a primary study in 2022, approximately 1,449 ha of peatland areas are in three provinces (Champasack, Vientiane, and Xaysomboun) and in the capital Vientiane. Further surveying is still needed to determine the extent of peatlands nationwide.

**Forest resources.** Data from 1970 shows that forest cover in Lao PDR was 70% of its total area. However, forest areas have been gradually decreasing as a result of clearing, logging, and forest fires. The rate of forest loss was projected at about 1.1% per year for the period of 2005 to 2015. According to the Forestry Strategy toward 2035, the country's forestlands were at 58% in 2015 and 62% in 2019. The Government of Lao PDR has been multiplying its efforts to reach 70% of forest coverage that will include potential forest lands (26.7%), croplands (10.5%), other croplands for cultivation (1.7%), surface water and

swamps (1.7%), other land uses (1.1%), and infrastructure land areas (0.4%). Forests are immensely important for the Lao people. Statistics from 2005 showed about 80% of the population rely on forest resources for their livelihood.

**Water resources.** The total amount of annual surface water resources in the country is estimated to be 377.3 cubic kilometers (km<sup>3</sup>), equivalent to 55,000 cubic meters per person per year on average. About 95% of the national territory is situated in the Mekong River Basin which contributes 35% of its surface water flow to the Mekong River. Water withdrawal within Lao PDR is approximately 4,260 million km<sup>3</sup> per year, accounting for 1.3% of its total freshwater resources. Total water withdrawal and consumption by industrial sector is at 4%, municipalities at 3.1%, and agriculture at 93%.

**Mineral resources.** The results of the economic and technical feasibility study and mining–processing phases showed that Lao PDR has available cumulative mined resources as follows: 389,183,275 tons of gold and silver; 156,269,912 tons of copper; 608,075 tons of nickel; 21,153 tons of cobalt; 482,960 tons of antimony; 23,061,700 tons of lead; 2,087,953 tons of tin and zinc; 100,907,894 tons of iron; 319,631,237 tons of rare earth minerals; 1,364,985,807 tons of limestone; 11,080,986 tons of gypsum; 407,131,300 tons of bauxite; 12,320,015,470 tons of potassium chloride; 4,677,099,875 tons of coal; 92,876,690 tons of baryte; 852,081 tons of quartz; 1,115,905 tons of pagodite; 1,153,230,814 tons of limestone, and 8,417,500 tons of clayey soil. Significant mineral resources that are currently being mined are gold, copper, rare earth minerals, lead, live, zinc, antimony, iron, bauxite, coal, gypsum, potassium chloride, limestone, pakodai, and gravel and sand for construction and industrial use. Over the last decade, the promotion of mining has progressed in many ways, particularly with the commencement of activities in mine extraction, mine processing, and transformation for supplying domestic and international markets. These are considered as significant and potential income-generating sources for the country in the long term.

**Energy.** National hydropower development potential is between 23,000–26,000 megawatts (MW). According to the modified data on electricity generation sources in 2022, there were 93 operating power plants with an average installed capacity of over 1 MW, making the sector’s total installed capacity at 11,661.12 MW, generating 58,700.61 gigawatt-hours (GWh) per year. These include 81 hydropower plants with a total capacity of 9,615.14 MW and total power generation of 45,703.25 GWh/year. The energy sector’s power generation mix also includes coal, thermal, and renewable power sources.

Up to 2021, the nationwide electrification ratio reached the following: (i) 100% of all 148 districts; (ii) 93.3% of all 8,450 villages; and (iii) 95% of total households. These are important indicators contributing to the Lao PDR’s sustainable development and poverty eradication goals. According to reports on the 8th Five-Year Energy and Mine Development Plan (2016–2020) and the 9th Five-Year Energy and Mine Development Plan (2021–2025), the electrical grid had a total combined length of 63,563 circuit-kilometers (cct-km) throughout the country. These included high-voltage gridlines of 500 kilovolts (kV) at 626 cct-km; 230 kV gridlines at 2,637 k-cct;; 115 kV at 7,213 cct-km; medium-voltage gridlines of 22 kV at 34,626 cct-km; and low-voltage gridlines of 0.4 kV at 20,441 cct-km. There were 74 power stations throughout the country, including 11 230/115/22 kV stations, 62 115/22 kV stations, and 1 T-Off 230 kV station.

Despite the hydropower potential, climate change threatens the stability of the country’s dam storage and power generation. For instance, a drought situation in 2019 affected power production, reduced energy security, and minimized energy exports. Aside from this, the price of electricity keeps varying and is expected to reach a ceiling by 2030, resulting in a possible 77% drop in power generation by 2040.

Apart from hydropower, Lao PDR has a significant potential to generate energy from renewable energy technologies including biomass, solar, biogas, geothermal, and wind, with total capacity potential of 2,068 MW of power and total heat energy potential of 889 kilotons of oil equivalent (ktoe). Biomass has total capacity potential of 938 MW and generation potential of 227 ktoe of electricity. Solar power has total power capacity potential of 7,677 MW. Biogas has total potential power capacity of 313 MW and total heat generation 444 ktoe of heat. Solar power, thermal power, and wind farms have an electricity production potential of about 216 MW, 59 MW, and 40 MW, respectively. In 2015, the total energy production in Lao PDR was 4,765 ktoe, of which 3,122 ktoe were domestically consumed and the remainder was exported. Approximately 46% of energy was produced from biomass, especially fuelwood and charcoal. Fossil oils, coal, and electricity shared 29%, 13%, and 12%, respectively. Since 2015, Lao PDR has generated 14% of its electricity from lignite coal power plants, resulting in an increase in national carbon emissions. Electricity generation from coal will potentially reach 22% of the total energy mix by 2040 which—under a business-as-usual scenario—will result in carbon dioxide emissions that are 4 times higher compared with the emission level in 2015, unless proper mitigation actions, e.g., shifting to renewable energy, are implemented. By 2025, energy demand is expected to be 4,930 ktoe, and Lao PDR has aimed to increase the share of renewables in its energy mix to 30% by 2025.

**Biodiversity.** Lao PDR is one of the countries that is richest in biodiversity. There are approximately 166 species of reptiles and amphibians, 700 species of birds, 90 species of bats, and 500 species of mammals. There are also approximately 500 fish species in Mekong River and its tributaries. In addition, it is estimated that there are about 8,000–11,000 species of flowering plants in the country. Biodiversity is fundamental to human well-being for the Lao people; around 67% of the Lao population live in rural areas and largely depend on forest resources for livelihood, with about 40% of poorer families' incomes derived from the gathering and sale of nontimber forest products. The trends in global average temperature increase will adversely affect the inherent adaptability of these flora and fauna, and hamper rural people's access to such natural resources in the future. Therefore, proper and early-stage measures are required to prevent climate change-led biodiversity loss.

### 1.3.3 Society and Economy

Lao PDR has had a constant and substantial average economic growth of around 6% over the last decade (2012–2021) primarily due to mining, hydropower, timber, and timber product exports. In 2018, GDP growth was 6.3%, equaling KN152,414 billion or \$18.13 billion, with per capita GDP at \$2,585. The agriculture sector grew at an annual average of 1.3% and comprised 15.7% of GDP, while the industry sector grew at an average of 7.8% and made up 31.4% of GDP, and service sector average growth was at 6.9% and amounted to 41.60% of GDP. Duties and taxes grew at an average of 6.2% and comprised 11.3% of GDP.

Despite its recent economic growth, the country's economy remains highly vulnerable given its heavy dependence on natural resources. Lao PDR still has a weak manufacturing foundation, its production of goods is undiversified, and its infrastructure is insufficient and fragile. These are the key factors that hinder the country's ability to shift out of its Least Developed Country (LDC) status, a goal that underpins its 8th National Socio-Economic Development Plan (NSED), 2016–2020. According to the United Nations' standards for graduating from LDC status, a given country is assessed using three criteria: income per capita, human assets, and economic vulnerability. Assessment is undertaken every 3 years or as necessary, based on the world's socioeconomic situation over the previous 3-year period. In Lao PDR, almost a quarter of its population still lives below the UN poverty line, and the country's economy is ranked the third smallest in Southeast Asia. In

2020, even though Lao PDR's economic growth was reduced to 3.3% due to climate change threats and the coronavirus disease pandemic situation, it was still considered to be one of the countries having the highest economic growth in Southeast Asia.

Climate change also threatens Lao PDR's capacity to achieve consistent economic growth and sustainable development. Floods and droughts from 2018 to 2019 caused economic losses of \$750 million and caused significant disruption in the agriculture, power generation, and transportation sectors. Nevertheless, Lao PDR will continue to work toward LDC graduation by 2026 and ensure that such an effort is sustained.

The population of Lao PDR is 7,012,995 people, most of whom are in the younger age range (the median age of the population is 24.4 years). Around 65% of Lao people live in rural areas and 70% of the total population are in agriculture, which accounts for 17.7% of GDP. Almost 70% of those who work in the sector are women. Given their dependence on land resources for subsistence and livelihood, the devastating effects of climate change on farmers and fisherfolk are self-evident.

The 9th Five-Year NSEDP, 2020–2025 aims to shift Lao PDR out of LDC status to become an upper-middle-income country. It also intends to achieve the SDGs, including the zero poverty and climate change resilience goals, while ensuring a socioeconomic development process in the direction of green growth and sustainability.

## **1.4 Assessment of a Recent Strategy Implementation on Climate Change, Impacts, and Responses in Lao PDR**

### **1.4.1 Climate Change and Socioeconomic Impacts**

Climate change means that the global average temperature increase is greater than the normal ranges in the long term, caused by direct and indirect human actions or natural phenomena, resulting in changes in atmospheric components.

In 2018, Lao PDR's average temperature was 30.38°C. In the northern region, the average temperature was 28.41°C, while the average temperatures in other regions was 31.38°C. However, Lao PDR's temperatures have been increasing over the past 30 years (1976–2005), as measured in 10-year intervals. The annual average temperature tends to be consistently increasing at a rate of 0.022°C per year; the minimum average temperature change recorded was by 0.017°C per year, while the maximum average temperature change was by 0.023°C per year.

The average annual rainfall ranged from 1,896 millimeters (mm) to 2,085 mm over the same 30-year period, and has increased by approximately 1.46 mm per year over a 3-decade period, with occasional variations. The average annual rainfall was +/-7% over normal rates, though in some years rainfall intensity fluctuated by approximately 20%. The RCP 4.5 scenario shows an increase in the average temperatures between 2021–2050, with the highest average temperature expected to increase by 1.03°C–1.29°C and the lowest average temperature will also increase by 1.09°C–1.36°C compared with the preindustrial temperature average. Between 2070–2099, the highest average temperature may rise by 2.05°C–2.56°C compared with preindustrial temperature level, while the lowest average temperature rise is projected at between 2.04°C–2.47°C. Rainfall will also be substantially different during the wet and dry seasons. Based on the RCP 4.5 and RCP 8.5 scenarios, precipitation is estimated to increase from February to April. By using the RCP 8.5 scenario, it is projected that annual rainfall changes will range from -37% to -19%. From May to September, rainfall will increase and reach 49% in July. On the other hand, using the RCP 4.5 scenario projects a decrease in rainfall by less than 10% between June and September and an increase from 3% to 46% between July to December.

Lao PDR has historically produced limited GHG emissions (approximately 50,000 GgCO<sub>2</sub>eq in 2000, with projections at 82,000 GgCO<sub>2</sub>eq in 2020 and 104,000 GgCO<sub>2</sub>eq in 2030), but remains highly vulnerable to climate change. Floods cause adverse socioeconomic impacts, particularly for agriculture and food security, via waterlogged crops, reduced production, impaired irrigation systems, and damaged farm-to-market roads and bridges. In 2017, Lao PDR lost approximately 30,000 ha (or about 130,000 tons) of rice due to flooding, drought, and locust outbreaks. Disasters in 2018 from two tropical storms and the collapse of the Xe Pien–Xe Nam Noy Dam caused severe loss of lives and property, and caused environment and health problems. The disaster destroyed more than 100,000 ha of rice fields (or approximately 12% of the nation’s total rice plantation areas), leading to a 20% drop in rice production (compared to 2017 outputs) that negatively affected approximately 750,000 people through low supply and high prices of rice, a staple food crop. Moreover, the disasters also resulted in outbreaks such as diarrhea, dengue, and other seasonal diseases, further compounding the poverty situation in affected areas. Total losses and damages were at KN3,167 billion (\$371 million), equivalent to 2.1% of GDP. Fortunately, Lao PDR had recently been able to mobilize \$350 million worth of climate finance to undertake mitigation and adaptation activities in the country, to minimize further climate change-related incidents.

#### **1.4.2 Recent Implementation of Strategy and Activities on Climate Change**

Lao PDR has improved its capacity to respond to climate change in line with the objectives of the UNFCCC, decisions made by the Conferences of Parties, and policies and socioeconomic development plans at the national and local national levels. The key actions undertaken include improving response readiness, developing and updating policies, restructuring of organizations, expanding networks and cooperation, developing human resources, promoting education and awareness, conducting research, establishing data and information systems, and improving financial mechanisms. These actions are specified below.

##### **1) Policies and Legislation**

The Decree on Climate Change (2019) is an important law necessary for mitigating emissions and building climate resilience and adaptive capacity in Lao PDR. The decree mandates that the Ministry of Environment and Natural Resources (MONRE) is to play an important role in leading and coordinating with relevant ministries and parties to act against climate change. This decree focuses on (i) developing a climate change data and information management system to support national coordination on climate planning and action, (ii) conducting vulnerability assessments and mapping processes to support adaptation actions at the national level, and (iii) creating a framework for enhancing carbon sinks and preparing a national strategy to lower GHG emissions.

##### **2) Strategic Plans, and Programs**

Recently, Lao PDR developed a series of strategic plans and programs for climate change mitigation and adaptation. These include the National Adaptation Program of Action to Climate Change (NAPA) in 2009; the Climate Change Strategy in 2010; the Climate Change Action Plan, 2013–2020, the Nationally Determined Contributions (NDCs) in 2015 and 2020, and the Technology Action Plan for Climate Change Mitigation and Adaptation in Agriculture, Forestry, and Water Resources Sectors in 2018.

The NAPA has defined objectives for climate change adaptation as well as identified priority tasks for the agriculture, forestry, water resource, and health sectors. This action plan also includes many priorities such as early warning systems, enhancement of resilience of plant and animal species to climate change, and the promotion of the sustainable use of water resources.



The government has also been mainstreaming climate change in the national and sector strategies and action plans, such as in the 8th Five-Year NSEDP, the national green growth strategy, the public health strategy, and the agriculture and forestry strategy.

### **3) Greenhouse Gases Inventory and Mitigation**

Lao PDR submitted its first and second national communications on climate change to the UNFCCC in 2000 and 2013, and its first biennial update report in 2020. Over the period 1990–2000, Lao PDR shifted from being a net carbon sink to becoming a net carbon emitter. In 1990, the country's net carbon sink was at 104,570 GgCO<sub>2</sub>eq, whereas its net carbon emissions were at 41,764 GgCO<sub>2</sub>eq in 2000, followed by net carbon emissions of 24,099 GgCO<sub>2</sub>eq in 2014. The land use, land use change, and forestry sector contributed over 70% to total emissions, with the rest coming from the energy, waste, and industrial sectors.

In an attempt to reduce emissions and increase carbon sinks in Lao PDR, over 10 mitigation projects have been implemented since 2009. Most of these were carried out in forestry sector (particularly through the Clean Development Mechanism, the reducing emissions from deforestation and forest degradation [REDD+], the Joint Crediting Mechanism), and the implementation of the National Appropriate Mitigation Action in the energy and transport sectors.

### **4) Enhancement of Climate Resilience and Adaptation**

The Lao PDR is one of the countries with high vulnerability to climate change. Therefore, enhancement of resilience and adaptation has become a national priority to prevent, limit, and reduce risks and impacts of climate change, as well as recover from climate change-associated consequences.

Since 2009, the Lao PDR has implemented more than 30 projects related to climate change resilience and adaptation in different sectors. These projects have been implemented as part of the climate change adaptation program done in parallel with NAPA implementation. In 2021, the country finalized climate change vulnerability maps for 148 districts throughout the country and also initiated the development of the national adaptation plan. Various sectors have also been increasing their efforts to enhance their adaptive capacity and resilience.

**Agriculture and forestry sectors.** Research and development programs are conducted on crop varieties (including rice and vegetables) that are resilient to floods and drought. In addition, climate-smart agriculture techniques have been piloted such as greenhouse cultivation, water harvesting techniques for water management, improvement of agro-climate information services, enhancement of agri-business value chain, and the promotion of crop diversification. The country has also made improvements on the resilience of agricultural infrastructure.

**Water resources sector.** The law on water and water resources was revised and adopted, along with the approval of the law on meteorology and hydrology, followed by the development and adoption of a series of legal frameworks such as the decree on river basins and reservoirs; a ministerial decision on groundwater management; and guidelines for water resources management, administration, and utilization. Water resources profiling and assessments relevant to climate change were also undertaken in the Nam Ou, Nam Ngeum, and Nam Theun–Nam Kading basins. Climate risk and vulnerability assessments were conducted on two important wetland sites (Beung Khiad Ngong and Xe Champhone) together with resilience-building of vulnerable communities in and around the

wetland sites. The Mekong Climate Change Adaption Strategy and Action Plan (MASAP) was also implemented to ensure the sustainable development of the Mekong River Basin.

**Public works, transport, and urban development sectors.** The Strategy on Housing and Urban Development toward 2030 has been implemented to achieve the 2035 Vision while mainstreaming climate resilience. Guidelines on environmentally sustainable cities and highway renovation have also been created that consider climate change as a key influence in proper planning, design, construction, and operation and maintenance procedures. Currently, a series of investment projects are being carried out that aim to reduce air pollution and GHGs. They include the Lao PDR–People’s Republic of China railways, the sustainable public bus rapid transit system in Vientiane’s urban areas, and the policy implications regarding the use of electric vehicles (EVs). Legal frameworks, technical criteria, and EVs’ tag design have been developed that are consistent with the government’s policy on promoting environmentally friendly transportation. Construction and maintenance of waterway infrastructure is also being done in compliance with specific standards, particularly with regard to urban riverbank protection and flood control systems, which must be resilient to climate-induced disasters such as storms, floods, and earthquakes, and applying ecosystem-based adaptation for urban resilience.

**Public health sector.** Key achievements in this sector include the development and endorsement of the Strategy on Climate Change and Health Adaptation; 2018–2025 and Action Plan, 2018–2020); training of trainers programs in seven provinces on climate change and its health impacts; and the development and dissemination of information, education, and communication outreach activities related to climate change and its public health impacts. Also, a cooperation project on climate change and air quality monitoring has been carried out under the UNICEF cooperation program. The aim is to strengthen the coordination mechanism in the natural resources and environment sector and the environment and climate change subsector; assess at-risk and vulnerable groups, particularly women, children, the disabled and elders; assess environmental impacts on at-risk and vulnerable groups by integrating climate change adaptation measures; and establish air quality monitoring stations. In addition, rural water supply and sanitation projects were designed to support climate change adaptation in the public health sector, while providing rural communities with clean water supply systems and sanitation.

**Energy sector.** A climate change vulnerability assessment for the energy sector has been developed with an action plan on climate resilience, a manual on dam safety, and an action plan on emergency preparedness, all of which will strengthen sector climate resilience and adaptation. In addition, effective reservoir management and multipurpose hydropower schemes are being promoted to benefit surrounding communities and other sectors by improving flood and drought mitigation measures.

**Education sector.** the National Strategy on Education and Awareness on the Environment and Climate Change, 2018–2025 and Vision toward 2030 were approved in 2018. The environmental science faculty of the National University of Laos has included climate change and other related subjects in its teaching and learning curriculum. Furthermore, there are public information dissemination campaigns on climate change conducted through different channels and social media to raise public awareness and enhance public participation in climate change action.

### 1.4.3 Barriers and Challenges

The Lao PDR faces several barriers and challenges to fulfilling its climate change adaptation and mitigation programs: limited information and knowledge on climate

change impacts on various sectors, ineffective mainstreaming of climate change into development plans, weak coordination across relevant sectors, limited and uncertain allocation of financial resources, lack of capable human resources, limited accessibility to appropriate technologies, and the lack of an effective monitoring and evaluation system for measuring implementation progress. These are heightened by inadequate public knowledge, understanding, and awareness on climate change. For example, many people are still following their traditional lifestyles and behaviors such as burning garbage in open areas, and abiding by production practices without regard to studies on seasonal climate data and information.

The country also has to conduct a critical benefit and loss assessment to balance the trade-offs between economic growth and sustainable development, in which Lao PDR's aspiration to graduate from LDC status by 2026 should be anchored. The desire remains to shift to industrialization and modernization, and to do so while addressing climate change and boosting resilience continues to be the challenge.

## **1.5 Updating the Strategy on Climate Change**

The rationale and need for updating this strategy are based on the following internal and external factors:

Since Lao PDR adopted its 2010 Climate Change Strategy, situations and circumstances have considerably changed. The country has approved a series of laws and legal frameworks such as the updated Environment Protection Law in 2012, the Strategy on Natural Resources and Environment toward 2030 in 2015, ratification of the SDGs and the Paris Agreement in 2016, the National Green Growth Strategy in 2018, the REDD+ Strategy in March 2021, the Decree on Climate Change in 2019. These plans and policies are oriented toward having the country graduate from LDC to developing country status by 2024 and low-middle-income country status by 2030, while the ambitious net-zero emission goal by 2050. In the meantime, other relevant laws have also been adopted, such as the Law on Meteorology and Hydrology in 2017, the Law on Water and Water Resources in 2017 and the Strategy towards 2030 in 2019, Forest Law in 2019, Land Law in 2019, the Master Plan on Land Use in 2018, and Law on Disaster Management in 2019.

The results of the review on the first strategy on climate change endorsed in 2010 showed the following gaps and constraints in the strategy: (i) the lack of a timeframe for the vision, goals, and programs; (ii) the lack of a monitoring, evaluation, and reporting system, which created challenges for assessing progress and results; (iii) the inclusion of only seven climate change sectors; (iv) unclear mechanisms for climate financing, including financial access and resource mobilization; and (v) ineffective and inefficient implementation. Many project activities were not executed due to a lack of access to financial mechanisms. Unsuitable activities were also included in the strategy, which resulted in difficulties in implementation, e.g., reduction of methane (CH<sub>4</sub>) caused by fermentation in paddy fields and livestock ranges, and application of CH<sub>4</sub> from coal mines. In addition, the strategy does not support post-2010 policies and legislation such as the policy and strategic plan for sustainable development, green growth, and the decree on climate change.

The climate change situation at the global level and in the Lao PDR have dramatically changed. It is more complex than before, thus making timely and accurate forecasts of its changes and impacts more difficult. For instance, temperature and precipitation are rapidly changing, vulnerable areas have expanded, and GHG emissions have increased. Disasters like storms, floods, droughts, and other extreme phenomena frequently occur and are more severe than before. Simultaneously, the Paris Agreement 2015 obliges parties to upgrade their

strategies, NDCs, and other measures to limit global warming, strengthen climate resilience, and build adaptive capacity to respond to these uncertainties.

The year 2030 marks a critical milestone globally. The global community including Lao PDR will re-assess and update their localized SDGs. The Paris Agreement will be evaluated with regard to the first 10 years of its implementation progress and key achievements to see whether or not the world is on track to meet the accord's average temperature goal.

Based on the internal and external rationales and factors mentioned above, the Government of Lao PDR recognizes the need to update its climate change strategy to fit with the current situation, policies, directions, and socioeconomic development framework, together with mainstreaming the existing mechanisms in the regional and international frameworks to move in the direction of green growth and sustainable development.

## Chapter II: Strategies and Programs toward 2023

### 2.1 General Goals and Targets

The Lao PDR has set a target to reduce GHG emissions in order to become a net-zero emission country by 2050, and to better enable the country to mitigate, be resilient, and adaptable to climate change; as well as reduce risks, respond to, and recover from climate change impacts at a sufficient level. By doing this, the government intends to secure lives, protect health and property, and improve environmental conditions and infrastructure, together with promoting the mainstreaming of existing mechanisms outlined in the regional and international frameworks, and contributing to green growth and sustainable development. The 2030 targets of the Lao PDR aim to strengthen all aspects of its capacity, including policies, institutions, human and financial resources, coordination, collaboration, research, data and information exchange, education, awareness, and improvement of its response capacity to climate change in all sectors.

The country's 2030 targets are as follows:

- 1) Mainstream climate change management in policies, strategies, programs, and projects of the relevant sectors such as natural resources and environment, planning and investment, energy and mines, public works and transport, industry and commerce, agriculture and forestry, public health, education, labor, and social welfare. The strategy also includes mainstreaming climate change management and measures in the socioeconomic development plans of vulnerable localities to ensure the effectiveness and efficiency of climate change actions. Development and investment projects must undertake an initial environmental examination and/or social and environmental impact assessment together with the development of a climate change risk and impact assessment and management plan.
- 2) Enhance adaptive capacity and resilience of districts, rural areas, communities, infrastructure, production and service systems, and ecosystems, to reduce their vulnerability to climate change-induced disasters.
- 3) Reduce GHG by 60% by 2030, compared to business-as-usual level.
- 4) Reduce economic or GDP loss and damage by less than 0.2% and the impacts of climate-induced disasters on population by less than 120,000 people; become a low-emission country by reducing emissions to less than 1.2 tons/capita/year; increase national forest cover up to 70% of the country's total area; and achieve a renewable energy share of 30% in total national energy consumption by 2025.

### 2.2 Fundamental Principles

This strategy has been updated based on the following fundamental principles:

- 1) **Needs, relevance, and coverage.** Ensure the relevance and support for national socioeconomic progress in the direction of green growth and sustainable development, consistent with the national status and relevant to regional and international situations on climate change.
- 2) **Climate change mainstreaming.** Ensure the mainstreaming of climate change as a core element in all policies, strategies, programs, and development and investment projects.
- 3) **Enabling environment.** Improve and develop policies, financial, and technical readiness to promote and leverage climate change management.
- 4) **Cooperation, coordination, and partnership.** Expand and strengthen coordination and cooperation arrangements, partnership, and networking with public

organizations, the private sector, communities, development partners, and other local/overseas-based international organizations in an effective and efficient manner.

5) **Institutional strengthening and capacity building.** Strengthen institutions and build capacity for climate change initiatives in the public sector, educational and research institutions, the private sector, and communities.

6) **Strategic solutions, participation, and mutual benefits.** Enhance development and implementation of climate actions and solutions that are strategic, participatory, cost-effective and efficient, and market-oriented; and maximize these benefits to various regions, sectors, and communities.

7) **Effective financial instruments.** Promote and enhance capacity to access external financial resources and support, and budgetary allocation, as well as develop effective financial tools and mechanisms for climate change implementation.

8) **Public education, awareness, and participation.** Promote and strengthen public education, awareness, responsibility, participation, and involvement in climate action.

9) **Alignment with environmental protection, biodiversity conservation, and sustainable development.** Prioritize prevention and response to mitigate climate change impacts; ensure the application of appropriate methods and technologies, transparency, and ethics; uphold the “polluter pays” principle; sanction offenders; and reward the outstanding performers.

10) **Responsibility and ownership.** The Ministry of Natural Resources and Environment (MONRE) plays an important role in overall coordination while relevant sectors take their ownership in the collaboration and effective implementation of the above principles, in accordance with their roles and responsibilities.

### **2.3 Strategies, Priority Programs, and Projects toward 2023**

The Lao PDR shall be implementing three main strategies from now through 2030, cited as follows:

#### **2.3.1 Strategy on Enhancement of Prevention, Resilience, and Adaptation to Climate Change Impacts**

1) Development and management of data and information, climate change reporting system, and end-to-end early warning systems, including climate change monitoring, communication, response planning, as well as post-climate change-induced and disaster recovery.

2) Development, deployment, and transfer of modern and proper technologies for early warning, prevention, risk and impact reduction, and enhancement of resilience and adaptive capacity to climate change.

3) Institutional strengthening and human resource development, including building the knowledge and capacity needed to ensure the development and implementation of policies, plans, and actions for climate change adaptation and resilience.

4) Promotion and enhancement of climate change education and awareness in order to increase knowledge, consciousness, safety preparedness, and reduction of risky behavior that will lead to climate change-associated phenomena and disasters.

5) Creation of an enabling environment, promotion and enforcement of measures for prevention, risk reduction, and rehabilitation from climate change impacts.

6) Enhancement of resilience and adaptive capacity of infrastructure, production systems, business services, ecosystems, and communities, as well as various sectors that are at risk of consequence and impacts of climate change.

### 2.3.2 Strategy on Enhancement of Greenhouse Gases Mitigation Measures

- 1) Enhancement of capacity for GHG inventory and management planning.
- 2) Promotion of energy use in an effective and efficient manner.
- 3) Expanded development and use of renewable and alternative energy sources.
- 4) Expanded development and use of environmentally friendly energy and low- carbon emission technologies, clean development mechanisms, and GHG capture and storage technologies (in various sectors as necessary).
- 5) Protection and enhancement of ecosystems that serve as carbon sinks, especially forests, wetlands, peatlands, and carbonated soils.
- 6) Promotion of production processing, business, services, and waste management and disposal in accordance with the national and international standards of environmental management and GHG mitigation.
- 7) Promotion of low-emission urban development and renovation, public works infrastructure, transportation, and the use of EVs or other types of fossil fuel-free vehicles.
- 8) Promotion and expansion of low-emission waste management, including the reduce-reuse-recycle (3Rs) waste management model and waste-to-energy transition.
- 9) Strengthening and promotion of mitigation policies and measures for the reduction of GHG emissions and the increase of carbon sinks.

### 2.3.3 Strategy on Mainstreaming and Creating an Enabling Environment for Climate Change Management

- 1) Mainstreaming of climate change goals and actions in all sectors.
- 2) Development and implementation of regulations, programs, and financial mechanisms for climate change management.
- 3) Enhancement and expansion of national and international coordination and cooperation.
- 4) Development and implementation of climate change readiness plans and projects.
- 5) Improvement and enhancement of climate change monitoring and evaluation system.

## 2.4 Priority Programs and Projects toward 20230

The Lao PDR’s updated climate change strategy consists of nine priority programs as defined in the table below. Project activities have been summarized in the annex of this strategy.

**Priority Programs and Projects toward 2030**

No.	Programs	Purposes
1	Development and management of data and information systems, reporting situations, events, and impacts of climate change	Program 1: Dissemination and Implementation of Strategy items 2.3.1. and 2.3.2. The main purpose of this program is to provide appropriate and sufficient data and information for effective, efficient, and timely decision-making and planning for climate change management.
2	Enhancement of	Program 2: Dissemination and Implementation of

	resilience and adaptation capacity to climate change for at-risk and affected infrastructure, production systems, business, services, ecosystem, community and sectors	Strategy item 2.3.1. The overall purpose of the program is to enhance climate change resilience, improve adaptation capacity and reduce risk and impacts on ecosystems, the environment, society, and the economy.
<b>3</b>	Strengthening of GHG inventory, monitoring and evaluation, and reporting	Program 3: Dissemination and Implementation of Strategy item 2.3.2. The main objective is to improve the capacity of public, private, and business sectors to increase comprehensive, reliable, and transparent levels of GHG emissions and absorption calibration, which is an important basis for mitigation planning.
<b>4</b>	Strengthening of GHG emission measure and mitigation in all sectors	Program 4: Dissemination and Implementation of Strategy item 2.3.2. The main purpose is to support the emission reduction targets and green growth, promote knowledge, appropriate, green and environmentally friendly technologies (as defined in Program 5).
<b>5</b>	Development, deployment, and transfer of technology	Program 5: Dissemination and implementation of Strategy item 2.3.1 regarding the enhancement of prevention, resilience and adaptation to climate change impacts; and Strategy item 2.3.2 regarding enhancement of greenhouse gases mitigation measure.
<b>6</b>	Promotion of climate change education and awareness	Programs 6 to 9: dissemination and implementation of Strategy item 2.3.3, which supports Strategy items 2.3.1 and 2.3.2. Following are its main purposes: <ul style="list-style-type: none"> <li>- Improve accessibility to data and information, knowledge, awareness societal involvement, cooperation, and community in climate change management;</li> <li>- Create the environment, policies, conditions, and readiness for climate change management;</li> <li>- Strengthen institutions and administration systems, as well as ensure the sufficient human resources for climate change management.</li> </ul>
<b>7</b>	Enhancement of climate finance	
<b>8</b>	Mainstreaming climate change and creating a capable environment for climate change management	
<b>9</b>	Institutional strengthening and human resource capacity building for climate change management	



## **Chapter III: Measures for Implementation, Monitoring, Evaluation and Reporting**

### **3.1 Implementation**

The Ministry of Natural Resources and Environment (MONRE), especially the Department of Climate Change (DCC), serves as the national focal point for implementing this strategy in collaboration with relevant agencies. Its key tasks are as follows:

1) Disseminate and communicate this strategy to overall stakeholders and target groups.

2) Develop and elaborate programs, projects, and work plans including the financial mechanism for implementing this strategy. Development of programs and projects is to be designed by considering their alignment with and impacts on the economy, society, the environment, gender equality, and vulnerable groups.

3) Promote, support, and work in partnership with all ministries and sectors at all levels in order to prepare their climate action plans or to mainstream climate change into their strategies and action plans, including the provision of institutional and personnel arrangements for plan implementation and coordination with other relevant organizations.

The budget for strategy implementation is from the Climate Change Fund as part of the Environmental Protection Fund. Additional financing will be mobilized from other funding sources, including international sources such as the Green Climate Fund, the Adaptation Fund, the Least Developed Country Fund, the Global Environment Facility, bilateral and multilateral cooperation programs, and international development partners as defined in the Decree on Climate Change.

### **3.2 Monitoring and Evaluation**

#### **3.2.1 Measurement, Reporting, and Verification System**

It is essential for Lao PDR to monitor, assess, and report on the progress and results of the implementation of its national strategy, especially those program activities that contribute to attaining the annual climate change management targets. The measurement, reporting, and verification (MRV) system was created in 2022 in accordance with the UNFCCC and Paris Agreement (details are provided in the Annex). The MRV requirements are needed for the following tasks:

- Implementation of the NDCs, the national communications, and biennial reports including the GHG inventory, progress, and impacts of mitigation, adaptation, and resilience enhancement actions;
- mainstreaming and reporting on the progress and accomplishments of the climate action goals as defined in the 9th NSEDP, the national SDGs, the National Green Growth Strategy., the National Strategy on Disaster Risk Reduction, 2021–2030, and sector strategies at the national and subnational levels;
- access to and mobilization of financial resources, including those for technology transfer and capacity building for climate change management.

#### **3.2.2 Review of National Strategies and Programs on Climate Change**

##### **1) Annual and Mid-Term Reviews**

MONRE is responsible for reviewing and preparing the annual progress reports, starting in December 2022. The midterm review will be conducted in 2025.

## **2) Final Review**

A final review of the implementation of this strategy will be undertaken by 2029, to provide fundamental information needed for further improvement. During the review process, MONRE will work closely with the Ministry of Planning and Investment, national and subnational sector agencies, development partners, and international organizations. During the review process, the following tasks will also be taken into consideration:

- the MRV framework and results of sector climate action plan implementation;
- national, regional, and international cooperation; and
- substantive issues for the development of the next climate change-associated strategies.

## Annexes

The priority programs and projects toward 2030 have been defined as follows:

### **Program 1: Development, management of data and information, reporting, and early warning systems for climate change**

Scope of projects or key actions	2021-2024	2025-2030
Development of systems for management of climate change data	√	√
Monitoring, assessment, and development of climate vulnerability and disaster risk mapping (e.g., flood, drought, heatwave, etc.)	√	√
Development of early warning system (EWS), including hazard monitoring, assessment, communication, reporting, early warning, and emergency response to climate change.	√	√
Development of State of Climate Change Report	√	√

### **Program 2: Enhancement of resilience, adaptability to climate change of at-risk infrastructure, production systems, business, services, ecosystem, communities, and sectors**

Scope of projects or key actions	2021-2024	2025-2030
<b>1. Agriculture Sector</b>		
Review and assessment of climate change vulnerability, risk, impacts, and adaptation plan (including alternatives) for agriculture and food security, such as <ul style="list-style-type: none"> <li>- key production systems and value chains for food security, commerce, and employment, and</li> <li>- other at-risk and affected production systems and value chains</li> </ul>	√	√
Development and implementation of adaptation plans for the agriculture sector at both central and local levels	√	√
Enhancement and expansion of early warning system (EWS) development: <ul style="list-style-type: none"> <li>- Expansion of agro-meteorology systems to regional and local levels, and key production systems and value chains to all at-risk provinces.</li> <li>- Research and development of monitoring and early warning plans for weeds, pests, insects, and animal diseases.</li> <li>- Implementation of monitoring plans of EWS and agro-met services for weeds, pests, insects, and animal diseases.</li> </ul>	√	√
Expansion of technological and technical development and transfer for climate change adaptation and resilience for various impacts of the agriculture sector: <ul style="list-style-type: none"> <li>- Review, identification/inventory, and improvement of technology transfer program for climate change adaptation and resilience in the agriculture sector.</li> </ul>	√	√

Scope of projects or key actions	2021-2024	2025-2030
- Implementation of technology transfer programs for agriculture sector, especially advanced technologies for climate resilience, climate-oriented agriculture, multiplied agriculture systems and varieties, and ecosystem-based environmental conservation.		
Broadening of research and development, as well as the promotion of climate-resilient agriculture systems, livestock, and varieties (focusing on nutrient-oriented agriculture production and food security, agribusiness, climate change-adaptable species, and conservation of appropriate varieties).	√	√
Development and expansion of climate-resilient and disaster infrastructure and facilities for agriculture production, processing, and stock.	√	√
<u>Organizational strengthening</u> (including farmers' organizations for capable resilience and adaptation, emergency responses and rehabilitation in the agriculture sector)	√	√
Study and promotion of agriculture production, agribusiness value chain, and alternatives to better farmers' livelihoods and provide them more support for climate change resilience.	√	
Enhancement of policies, laws, decrees, other legal frameworks related to agriculture production and promotion via mainstreaming of climate change adaptation within the sector.	√	√
<b>2. Water and Water Resources Sectors</b>		
Broaden vulnerability assessments of water and water resource sectors such as wetlands, peatlands, aquatic biodiversity, ecosystem, habitat, water quantity and quality, water supply and sanitation at national level, especially affected and at-risk major river basins and sub-basins.	√	√
Development and implementation of climate change adaptation and resilience enhancement plans in water and water resources sectors via the management and protection of river basins, watersheds, water storage, swamps, reservoirs, wetlands, peatlands, aquatic biodiversity, ecosystem service, water quality, to ensure water security for all sectors and communities.	√	√
Development, improvement, and expansion of forecasting, monitoring, and early warning systems for water-induced hazards in collaboration with hydrology and meteorology, energy, agriculture, and other sectors.	√	√
Enforcement of legislative compliance and undertaking of measures to settle illegal and destructive activities to infrastructure, facilities, and ecosystems, with regard to adaptation and conflict settlement in water and water resources utilization.	√	√
<b>3. Forestry and Land Uses Sectors</b>		
Strengthening of education, development, and implementation of adaptation plans in the forestry and land use sectors.	√	

Scope of projects or key actions	2021-2024	2025-2030
Monitoring and assessment of climate change and hazard vulnerability, risk and impacts on forestry resources, including ecosystems and biodiversity.		
Expansion, development, and utilization of technologies in the forestry and land use sectors, especially forestry ecosystems, forest lands, geographic features, sustainable forestry, and nontimber forest product management. Conservation, rehabilitation, and increase of forest cover and ecosystem services. Management of forestry business, agroforestry systems, administrative techniques, and local knowledge.	√	√
Institutional strengthening for local administrations and the private sector to incorporate climate change adaptation and resilience enhancement activities.	√	√
<b>4. Public Works and Transport Sectors</b>		
Study and assessment of climate change impacts on public works and transport infrastructure. Institutional strengthening and capacity building for the development and management of more adaptive and resilient infrastructure.	√	√
Development and implementation of regulations, standards, and plans on climate change adaptation and infrastructure investments.	√	
Expansion of research and transfer of technologies and techniques on climate change adaptive capacity and resilience enhancement.	√	√
Enhanced development of multimodal transportation systems, infrastructure, and urbanization designs that are resilient to climate change and disasters.	√	√
<b>5. Energy and Mines Sectors</b>		
Assessment and development of climate change and disaster risk mapping for energy and mines sectors, especially for investment projects and activities related to hydropower, solar energy, wind power, and mineral extraction and processing.	√	
Development, implementation, monitoring, and reporting of regulations, standards, and adaptation plans for the energy and mines sectors.	√	√
Institutional strengthening and human resource capacity building in energy and mines development and management for climate change resiliency and adaptation.	√	√
<b>6. Information, Culture, and Tourism Sectors</b>		
Assessment and development of climate change and disaster risk mapping and adaptation plans for the culture and tourism sectors, especially on conservation-oriented tourism, including culture tourism, historical site tourism, and ecotourism.	√	
Development, implementation, monitoring, and reporting on the climate change adaptation plans for the information, culture, and tourism sectors.	√	√

Scope of projects or key actions	2021-2024	2025-2030
<b>7. Rural Development and Settlement Sectors</b>		
Assessment of risks and impacts from climate change and disasters in rural development and settlement, including education, planning, and resettlement of relatively high-risk and seriously affected communities to a better location in an appropriate and sustainable manner.	√	
Strengthening, development, implementation, monitoring, and reporting of climate change adaptation and resilience enhancement plans in the rural development and settlement sectors.	√	√
<b>8. Public Health Sector</b>		
Assessment of risks and impacts from climate change and disasters in the public health sector.	√	
Development, implementation, monitoring, and reporting of systems and programs for the surveillance and solutions to disease outbreaks that are likely related to climate change, such as malaria, diarrhea, pandemics, and other illnesses.	√	√
Development and consolidation of clean water supply system, hygiene, nutrition, and public health services.	√	√
Strengthening of capacity in the development and implementation of climate change adaptation plans in the public health sector.	√	√
<b>9. Education Sector</b>		
Assessment of risks and impacts from climate change and disasters, and capacity needs for the implementation of climate actions in the education sector.	√	
Development, implementation, monitoring, and reporting with regard to education sector-based climate change adaptation plans.	√	√
<b>10. Crosscutting Sectors</b>		
Assessment of risks and impacts from climate change and disasters to vulnerable groups, especially women, children, disabled people, ethnic minorities, elderly, and other groups.	√	
Development, implementation, monitoring and reporting of climate change adaptation plans for vulnerable communities, especially women, children, disabled people, ethnic minorities, elderly, and other groups.	√	√

### Program 3: Development of Capacity for GHG Inventory and MRV

Scope of projects or key actions	2021-2024	2025-2030
Development of data and information systems for GHG inventory at the national and city levels in key sectors such as agriculture, forestry and land use, industry, waste, energy, and transport.	√	√

Scope of projects or key actions	2021-2024	2025-2030
Promotion of research and development of emissions factors in key sectors such as land use, forestry, energy, agriculture, industry, transport, urban planning and housing, and waste management.	√	√
Capacity building and promotion of implementation of measures on GHG inventory, monitoring, reporting, and verification (MRV) at city level.	√	√
Development of MRV system for GHG emission at the national level. Promotion of the MRV implementation at sector and project levels.	√	√

**Program 4: Strengthening of GHG emission measurement and mitigation in all sectors**

Scope of projects or key actions	2021-2024	2025-2030
<b>Area 1: Capacity development, promotion of energy and resource conservation, efficiency, and savings</b>		
Promotion of the development and expansion of energy-efficient cooking stoves.	√	√
Promotion of energy-saving building design and household appliances.	√	√
Improvement and development of infrastructure such as road and bridge networks, freight and passenger transportation, and logistics systems to reduce traffic congestion.	√	√
Promotion and expansion of electric vehicle (EV) development.	√	√
Expansion of smart city development in secondary towns and other locations.	√	√
Promotion and enhancement of resource efficiency in wood and nontimber forest product processing and uses.	√	√
Promotion and enhancement of energy and resource efficiency via the application of digital technology in the telecommunication sector.	√	√
Strengthening of the electrical leak monitoring and control system.	√	√
Strengthening of the sulphur hexafluoride (SF <sub>6</sub> ) leak monitoring and control system.		√
Raising awareness, development, and application of environmentally friendly green labels, and providing incentives and rewards for the implementation of energy and resource efficiency policies.	√	√
Study, improvement, and implementation of pilot activities for energy resource pricing mechanisms such as electricity, fuels, water, forest resource, and mine pricing mechanisms.	√	√
<b>Area 2: Study, pilot, and creation of models to promote clean, environmentally friendly and low-emission technologies</b>		
Promotion of research and planning for the expansion of clean, environmentally friendly, and low-emission technologies.	√	

Scope of projects or key actions	2021-2024	2025-2030
Implementation of plans for the expansion of clean, environmentally friendly, and low-emission technologies in energy, public works and transport, industry, agriculture and forestry, and waste management sectors.	√	√
<b>Area 3: Pilot and creation of renewable and alternative energy development and utilization</b>		
Promotion and expansion of solar, wind, biofuel, and biomass energy development and utilization.	√	√
Promotion and implementation of waste-to-energy pilot project.		√
<b>Area 4: Promotion of development and deployment of GHG capture and storage technologies in key sectors</b>		
Study, research, registration, and detailing of appropriate GHG capture and storage technologies.	√	
Promotion of GHG capture and storage technologies in the power generation, coal, and cement industries.		√
<b>Area 5: Protection and enhancement of carbon sequestration for ecosystems, especially forests, wetlands, and green areas</b>		
Combatting deforestation and forest degradation.	√	√
Enhancement of forest restoration and rehabilitation activities.	√	√
Promotion of sustainable management of production and community forests.	√	√
Promotion and enhancement of sustainable reforestation activities.	√	√
Promotion and enhancement of sustainable nontimber forest product management.	√	√
Prevention and reduction of wetland, carbon soil, and peatland destruction, in conjunction with local livelihood improvement.	√	√
Promotion of effective and sustainable forest product utilization.	√	√
Promotion of city green area protection and enhancement.	√	√
<b>Area 6: Promotion and enhancement of the standardized management of products, processing, and disposal</b>		
Enhancement of research on and enforcement of international environmental standards on coal thermal power plants, aviation, cement processing and iron melting industries, and city waste disposal landfills, as well as cities and development zones where those development projects are located.	√	√
Promotion of education and research for development of guidelines on urban infrastructure climate resilience such as guidelines for planning, maintenance, and construction of drainage canals and landfills.	√	√



Scope of projects or key actions	2021-2024	2025-2030
Promotion and research for the modification of the city resilience index.	√	√
Development of the multi-access database for housing and urban planning sectors.	√	√
Promotion and enforcement of international environmental standards in major power generation plants and cement processing factories.		√
<b>Area 7: Enhancement of low emission waste management, including the promotion of Reduce-Reuse-Recycle (3Rs) and waste-to-energy practices</b>		
Development and improvement of solid waste management and services, including waste treatment facilities in cities and secondary and tertiary towns.	√	√
Development and improvement of wastewater management, services, and treatment, including wastewater treatment facilities in cities and secondary and tertiary towns.	√	√
Project for environmental improvement in Luang Prabang City.	√	√

#### **Program 5: Development, Utilization, and Transfer of Technologies**

Scope of projects or key actions	2021-2024	2025-2030
Assessment of needs and development of programs for climate change adaption and mitigation technologies	√	
Coordination and collaboration with development partners and the private sector in the implementation of climate technology programs, including experimentation, promotion, and dissemination of technologies on climate adaptation, resilience, and mitigation.	√	√
Promotion, support, and development of local wisdom for climate change adaptation and mitigation.	√	

#### **Program 6: Promotion of Public Education, Awareness, and Participation in Climate Change**

Scope of projects or key actions	2021-2024	2025-2030
Assessment of capacity needs for the implementation of climate change management in the education sector.	√	√
Review and improvement of public education curriculum, training programs, and participation in climate change mitigation in both formal and nonformal education at all levels.	√	√
Development and implementation of capacity building programs for teachers in teaching climate change curriculum.	√	√

Scope of projects or key actions	2021-2024	2025-2030
Standardization of public curriculum, guidelines, theories, and methodologies for disclosure, awareness, and participation.	√	√
Training on climate change management, especially with regard to scientific knowledge on climate change, adaptation, technology, and effective application.	√	√
Organization of public campaigns, in collaboration with relevant sectors, to disseminate climate change data and information, create opportunities for knowledge sharing, develop pilot projects, endorse model communities and products, and other events.	√	√

#### **Program 7: Enhancement of Climate Finance**

Scope of projects and key actions	2021-2024	2025-2030
Study and development of regulations or notices, mechanisms, and guidelines for climate finance implementation.	√	
Assessment of financial sources and needs for climate change management.	√	
Development and implementation of strategies and mechanisms for financial access, mobilization, and resources for climate change management.	√	√
Development and implementation of financial monitoring and reporting system.	√	√

#### **Program 8: Mainstreaming, enabling environment and promotion of readiness**

Scope of projects or key actions	2021-2024	2025-2030
Mainstreaming of climate change awareness in national, subnational, and sector policies, strategies, and programs.	√	
Consultation and development of climate change mainstreaming programs.	√	
Implementation and monitoring of climate change mainstreaming programs.	√	√
Creation and conduct of consultation platforms and bilateral and multilateral forums on climate change management.	√	

#### **Program 9: Capacity Enhancement on Climate Change Management**

Scope of projects or key actions	2021-2024	2025-2030
Development and consolidation of policies and plans.	√	
<u>Development and implementation of institutional strengthening and</u>	√	√

Scope of projects or key actions	2021-2024	2025-2030
administration plans at both the national and provincial levels to assess gaps and needs regarding the implementation of legislation, regulations, NDCs, conventions, and other relevant international agreements.		
Assessment of capacity needs and implementation of human resource development programs for GHG inventory, mitigation planning, modelling and projection, risk and vulnerability assessment, adaptation planning, climate financing, monitoring and evaluation, monitoring, reporting and verification, and others.	√	√
Consolidation of cooperation and coordination on climate change management.	√	√
Promotion of research and development related to climate change.	√	√

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