



# THE FIRST BIENNIAL UPDATE REPORT OF THE LAO PDR

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## LAO PEOPLE'S DEMOCRATIC REPUBLIC

PEACE INDEPENDENCE DEMOCRACY UNITY AND PROSPERITY

### THE FIRST BIENNIAL UPDATE REPORT

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## FORWORD

Climate has been changing, which has become the global concern. Its effects touch all segments of society worldwide. Without appropriate and timely actions, it would be worsening and jeopardizing the future prosperity of the global communities. Lao PDR is vulnerable to climate change, and in order to address the problem and support the United Nations Framework Convention on Climate Change (UNFCCC), Lao PDR ratified the UNFCCC including implementation of the Conference of the Parties (COPs)' decisions since 1995. Lao PDR, in accordance with the convention and COPs' decisions, carried out the National Communication on Climate Change on a regular basis, among others. Currently, the government adopted and is implementing the Paris Agreement, Sustainable Development Goals (SDGs), Decree and Strategy on Climate Change, the updated Intended Nationally Determined Contributions to Climate Change (NDC), the National Green Growth Strategy and Reducing Emissions from Deforestation and Forest Degradation (REDD+). In addition, there is integration of climate actions and disaster risk management in the National Socioeconomic Development Plan and sectoral development plans, including agriculture, public health, public and transport sector.

This first Biennial Update Report (BUR) of Lao PDR was developed in accordance with the decision of the COP 17 and guidelines and through consultations at national and local level. The BUR includes updated information about national circumstance, greenhouse inventory, mitigation measures and its effects, monitoring, reporting, and verification (MRV), constraints, gaps, and support needs for more effective and sustainable implementation of climate change actions. Particularly, the implementation of climate change mitigation priorities that co-benefit with adaption, green growth, sustainable socioeconomic and sectoral development.

This BUR would not be completed without leadership and ownership of Ministry of Natural Resources and Environment, including department of climate change and contributions of relevant ministries and organisations such as ministry of Agriculture and Forestry, Energy and Mines, Industry and Commerce, Public Work and Transport, and National University of Lao PDR, including a technical working group. Immortally, it would not be possible without **cooperation, technical and financial support from the UNFCCC**, Global Environment Facility (GEF) and United Nations Environment Programmes (UNEP).

BUR process has strengthened our intuitional and staff capacity and helped fulfilment of a commitment under the UNFCCC. Under supervision of MONRE's leadership, I am very pleased and honoured to present this document. I would also like to thank all relevant organisations for supports and contributions.

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## LIST OF ACRONYMS, ABBREVIATIONS

ADB	Asian Development Bank
BUR	Biennial Update Report
CLIPAD	Climate Protection through Avoided Deforestation
COP	Conference of the Parties
DCC	Department of Climate Change
EIA	Environmental Impact Assessment
EPF	Environmental Protection Fund
FAO	Food and Agriculture Organization (of the United Nations)
FCPF	Forest Carbon Partnership Facility
FIM	Forest Information Management
FIP	Forest Investment Programme
FIPD	Forest inventory and Planning Division
GCF	Green Climate Fund
GEF	Global Environment Facility
GDP	Gross Domestic Product
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
GOL	Government of Lao PDR
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
kfW	Kreditanstalt für Wiederaufbau (German Development Bank)
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines
MOF	Ministry of Finance
MONRE	Ministry of Natural Resource and Environment
MPI	Ministry of Planning and Investment
MRV	Measuring/Monitoring, Reporting and Verification
NC	National Communication on Climate Change
NFI	National Forest Inventory
NFMS	National Forest Monitoring System
NGOs	Non-Government Organizations
ODA	Official Development Assistance
OECD	The Organization for Economic Co-operation and Development
PAREED	Participatory Land and Forest Management Project
PLUP	Participatory Land-use Planning
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Reducing Emissions from Deforestation and forest Degradation plus the conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks
REL	Reference Emissions Level
R-PP	Readiness Preparation Proposal
SESA	Strategic Environmental and Social Assessment
SFM	Sustainable Forest Management

SIDA	Swedish International Development Agency
SNC	The Second National Communication on Climate Change
SNV	Netherland Development Organisation
SUFORD	Sustainable Forestry and Rural Development
TNC	The Third National Communication on Climate Change
TWGs	Technical Working Groups
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WCS	World Conservation Society
WREA	Water Resources and Environmental Administration
WRI	World Resource Institute
WWF	Worldwide Fund for Nature

## EXECUTIVE SUMMARY

In accordance with the COP16 agreed in Cancun in December 2010, Lao PDR as a non-Annex I party to UNFCCC prepared its first Biennial Update Report (BUR) in cooperation with United Nations Environment Programme (UNEP) and support by the Global environment Facility (GEF). This BUR provides information on (i) national circumstances, (ii) greenhouse gas (GHG) inventory, (iii) mitigation actions, (iv) monitoring, reporting and verification (MRV), and (v) constraints, gaps and support needs for especially implementation of mitigation actions. In addition, it includes Annex, the reference emission level and information about activities and plans on Reducing Emissions from Deforestation and Forest Degradation (REDD+) for result-based payment.

Geographically, Lao PDR is situated in the heart of Southeast Asia and a landlock country. Around 80% of the land area (236,800 km<sup>2</sup>) is mountainous. Lao PDR is in the humid zone, influenced by monsoon wind from the south west, which causes a lot of rain and moist. The average rainfall is about 1,900 millimetres per year, and the average temperature is around 31°C. Socioeconomically, Lao PDR is a small population and economic country. Natural resources, however, remains abundant and crucial for protection of environment including climate change mitigation and adaption, and pursue sustainable development. As of 2018, total population of Lao PDR was about 7 million, and the Gross Domestic Product (GDP) per capital was US\$ 2,585. Gross National Product (GNP) was around US\$ 17.32 billion, and service accounted for 41.61%, which was the highest contribution in the economy. Industry, Agriculture and Taxes shared 31.53%, 15.71% and 11.15%, respectively. As for natural resources, approximately 90% of land area is in Mekong River Basin and its tributaries, which are abundant in freshwater biodiversity and hydropower. The potential of large-scale hydropower is about 23,000 megawatts (MW), and so far, only 5% of the potential has been exploited. Apart from this, there are renewable energies including small scale hydropower, solar, biomass, etc which could produce electricity of around 725 MW. Forest cover remains high (58% of the country) despite of decrease from years to years. Mineral resources such as gold, diamond, coal, oil, metal, copper, salt, lead, zinc, gypsum, and others are partly exploited while some are intact.

Total emissions are also small in comparison with other country in the regions. The net emission was 24,099.98 GgCO<sub>2</sub>eq in 2014. AFOLU was the highest carbon sources and sink. The net emission of the AFOLU sector was 18,793.41 GgCO<sub>2</sub>eq, accounting for about 78% of the total emissions. Second largest source of emissions was Energy Sector, 3,729.42 GgCO<sub>2</sub>eq (15%). The rest, IPPU and Waste shared 5% and 2% of the total emissions, respectively.

To address the emissions, Lao PDR, in partner with development partners and stakeholders, has made efforts and progress to identify and implement measures for mitigation. In past 10 years. Lao PDR developed and implemented the National Strategy on Climate Change (NCCS) (2010), Climate Change Action Plan (2013), the First Intended Nationally Determined Contributions to Climate Change (INDC) (2015), Climate Change Technology Action Plan (2017) and Decree on Climate Change (2019). In addition, climate change mitigation actions were integrated in the national and sectoral policies and plans, such as the 8th National Socioeconomic Development Plan (NSEDP) 2016-2020, Strategy on Renewable Energy,

Forestry, and Green Growth Strategy, among others. At the programme and project level, NAMAs on renewable energy, transport development, and REDD+ have been studied and piloted. However, the majority of implementation and progress were in the forest sectors or REDD+, energy and transport sector, and largely dependent on external support and investment. Despite the progress, Lao PDR has faced number of constraints and barriers, especially financial and technical barriers including environmentally friendly and climate change mitigation technology issues. In future, Lao PDR still need financial and technical support to implement the following mitigation programmes.

1. Renewable development strategy and NAMAs;
2. Policies on energy conservation and efficiency;
3. Forestry and REDD strategy including upscaling REDD+ programmes and result base payment;
4. Sustainable and low carbon transportation strategy and NAMAs;
5. Policy on clean and green industry strategy including environment management system;
6. The national strategy on climate change and NDCs;
7. the national green growth strategy;
8. National communication on climate change and BUR;
9. Technology transfer including technology needs assessment and action plan;
10. Natural resources and environment strategy; and
11. Mitigation action indented in the 9<sup>th</sup> national socioeconomic development plan.

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## CHAPTER 1: NATIONAL CIRCUMSTANCES AND INSITUTIONAL ARRANGEMENTS

### 1.1 GEOGRAPHICAL AND PHYSICAL CONTEXT

Lao PDR situated in the Annamite Mount Range in the South East Asia, sharing the border with China to the north; Vietnam to the East; Cambodia and Thailand to the South and Southwest; and Myanmar to the north west (Figure 1). Lao PDR has total land area of 236,800 squares kilometres. Around 80% of total land area is mountainous and one third is slope steeper more than 30 degree. The rest, 20% is flat land, which is mainly along the Mekong River. The elevation ranges from 200 to 2,880 meters above sea level.

Lao PDR is in the humid climate zone, influenced by monsoon wind from the south west, which causes a lot of rain and moist. There are mainly two seasons. The raining season is from May to September with the average rainfall of about 1,900 millimetres per year (80% of an annual rainfall falls in this season). The dry season starts from October to April and is influenced by cold wind from the north east, which causes the temperature low between November and January. Average temperature is about 20° C in the north, and 25-27° C in the rest of the area<sup>1</sup>.



Figure 1 Map of the Lao PDR

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<sup>1</sup> Ministry of Planning and Investment, Lao Statistics Bureau.2015. *Statistical Yearbook 2015*. Vientiane.

## 1.2 NATURAL RESOURCES

Lao PDR is a natural resources rich and good environment country in the region, and social economic development largely depends on the natural resource.

### Land

Land use is classified into 6 main categories: forest, cropland, grassland, settlement, other land, and wetland including water. Settlement especially includes industrial, transportation, cultural, national defence and security and infrastructure land. However, based on the national land use master plan, land is divided into 2 categories: the land for natural resources conservation area (70%) and the land for economy development and settlement (30%) (Table 1).

**Table 1 Strategic Land Use in Lao PDR**

No	Land Use Objectives	Total area	
		(Thousand ha)	(%)
<b>I</b>	<b>Land for conservation including for increasing forest cover to 70% of the national total land area</b>	<b>16,576.5</b>	<b>70</b>
1	Conservation forest	4,718	20
2	Protection forest	8,247	23
3	Production forest	3,110	13
4	Industrial tree plantation	501.5	2
<b>II</b>	<b>Land for development</b>	<b>7,102.5</b>	<b>30</b>
<b>1</b>	<b>Agriculture</b>	<b>4,502.5</b>	<b>19</b>
1.1	Paddy field	2,000	8.4
1.2	Perennial and cash crops	1,000	4.2
1.3	Fruit tree plantation	802.5	3.4
1.4	Pasture	700	3
<b>2</b>	<b>Construction and others</b>	<b>2,600</b>	<b>11</b>
2.1	Transportation	180	0.8
2.2	Construction	370	1.8
2.3	Others	2,050	8.6
	<b>Total</b>	<b>23,680</b>	<b>100</b>

**Source:** Ministry of Natural Resources and Environment, Department of Land. 2018. National Land Use Master Plan. Vientiane.

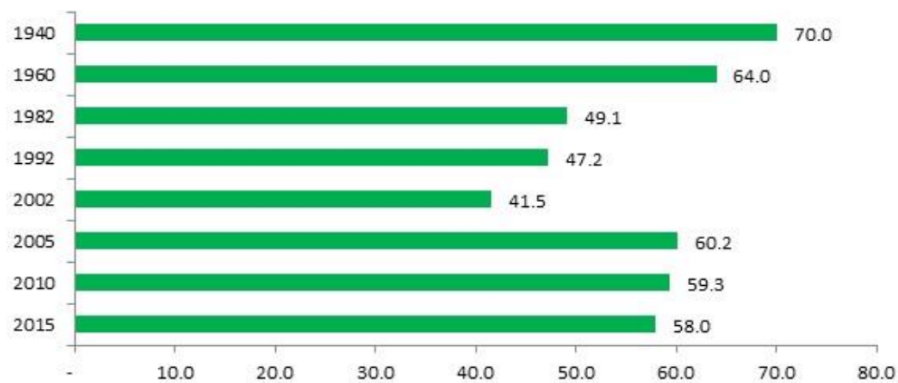
### Water Resources

Lao PDR has abundance of freshwater resources including river networks. Average rainfall is approximately 1,900 millimetres per year. Of which 80% occurs in the raining season and 20% in the dry season. Surface water is about 332,5 kilo cubic meters or on average, 55,000 cubic

meters per capita per year. About 90% of the country land area is in Mekong River Basin. Water consumption in the country is 4,260 million cubic meters per year, accounting for 1.3% of the country total freshwater resources. Water use in industrial sector accounts for 4%; household use 3.1% and agriculture 93%. Hydropower potential development is around 23,000 megawatts but only 5% has been s exploited.

### Forest Resources

Lao PDR used to have very high forest cover in the region. However, it decreased from time to time over past five decades. Forest cover assessment using the combination of sample plot and satellite-based estimation showed that the forest cover went down from 70% in 1940 to 41.5% in 2020. In 2015, wall to wall mapping and ground truth was conducted from 2005 to 2015, and the result showed that, forest cover was 60.2% or equivalent to 14.3 million hectares, 59.3% (14 million hectares) and 58% (equivalent to 13.7 million hectares) in 2005, 2010 and 2015, respectively (Figure 2). The main drivers of deforestation are commercial logging, household use, shifting cultivation, agriculture extension, mining, hydropower, infrastructure development and expansion of settlement area.



**Figure 2 Forest cover (%) in Lao PDR 1940-2015**

In the year 2015, 3.1 million hectares were area of production forest. Of which, forest covered 2.2 million hectares or (70.8% of the total area of the production forest). 7.9 million hectares were protection forest, which 4.8 million hectares (59.8%) of them were forest. Conservation forest was 4.8 million hectares, including 3.5 million hectares (73.4%) of forest. In addition,

there were forest areas that were outside the 3 forest categories. This uncategorized area was 7.8 million hectares, and 3.2 million hectares (42.5%) were forested.

**Table 2 Forest areas in 2015**

Forest category	Area (million ha)	Forest cover (million ha)	Forest cover (% ha)
Production forest	3.1	2.2	70.8
Protection forest	7.9	4.8	59.8
Conservation forest	4.8	3.5	73.4
Uncategorized forest	7.8	3.2	42.5

### Mineral Resources

Apart from the existing operations (Table 3), there are more than 500 intact mineral deposits. Those minerals include gold, coal, oil, metal, copper, salt, lead, zinc, gypsum, and others, which are the main important income sources of the country.

**Table 3 Minerals explored in Lao PDR from 2009 to 2013<sup>2</sup>**

Minerals	Unit	2009	2010	2011	2012	2013
Gold	Kg	5,033	5,061	3,984	6,415	6,838
Silver	Kg	14,726	15,788	16,738	19,181	29,715
Copper	Ton	67,561	64,241	78,859	86,295	90,03
Copper(concentrate)	Ton	54,019	67,806	59,897	63,285	64,885
Baryte	Ton	12,46	17,5	2,5	21,9	22
Cement	Ton	1,000,000	1,200,000	1,300,000	1,500,000	1,500,000
Lignite Coal	Ton	466,082	501,622	511,7	578,068	580
Gypsum	Ton	761,331	553,396	686,15	578,534	580
Anthracite Coal	Ton	167,447	211,721	166,609	133,583	135
Limestone	Ton	1,488,070	3,106,724	997,591	1,014,000	1,000,000
Tin	Ton	598	925	674	762	800
Lead	Ton	2	2,27	2,921	4,51	4,5
Zinc	Ton	4	5	5,32	5,25	5,5
Iron	Ton	42	50,9	42,7	48,4	50

<sup>2</sup> Ministry of Energy and Mines. 2013. *Mineral statistic magazine 2013*. Vientiane

From 2011 to 2015, the mining industries generated a total revenue of 66,746.83 billion LAK with average growth rate of 6.97% per year. Compared to the revenue for the period of 2006 and 2010, it increased 184.18% (Ministry of Energy and Mining, 2015). The contribution to GDP of the mining sector was 6.6% for the year 2010 and increased to 7% and 8% in 2011 and 2012, respectively (National Bank of Laos, 2013). The volume of mineral produced in Lao PDR from 2009 to 2013, in general, increased. The production of silver increased about 55%, from 19,181 kilograms in 2009 to 29,715 kilograms in 2013. Exception for cement, which its production decreased. The production between 2011 and 2013, especially decreased 3 times compared to those produced in 2010.

### 1.3 STATE OF ENVIRONMENT

Overall, Lao PDR still has good environment. However, the fast development and population growth including moving of rural people to cities led to increase impacts on environment, especially air, water, land, chemical pollution, nuisance (haze, odour, noise, and colour, etc), heat and garbage, while infrastructure, parks and green area are lacking. Solid waste generation rate in the cities increased from 0.65 kg/capita/day in the year 2000 to 0.79 kg/capita/day at the present. Solid waste generation rate in the rural area is 0.31kg/capita/day. In the meantime, sustainable urban development and management including buildings and settlements have not fully promoted and enforced. Deployment of energy saving and efficiency technologies in buildings, public transportation system, renewable energy use, solid waste and wastewater treatment system, environmental management plans, green area and park are limited.

To address the problems, in 2017, the government adopted a regulation on national environmental standards, which set quantitative indicators and parameters of chemical, air, soil and water pollution and nuisance. In addition, it defines pollution management principles and methods, which is a technical tool and reference for pollution control in relevant sectors.

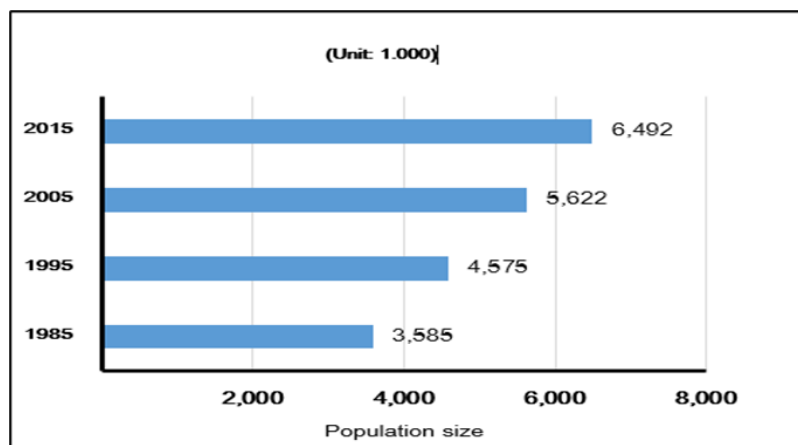
In general, environmental protection works implemented at central and local levels base on the environmental protection law 2012, national environmental strategy to the year 2020,

national strategy on education and awareness rising to the year 2020 and the 5-years plan of the natural resources and environment sector. In addition, one of the most important actions was mainstreaming of environmental protection in all sectors and aspects that suitable with the current situation of social economy in the country.

Nevertheless, the environmental protection has been strengthened, there still are some issues that need to address such as coordination with related sectors, technical and funding for the implementation of environmental protection, data collection, development of plan and regulations defined in the environmental protection law.

### 1.4 CURRENT STATE OF THE NATIONAL SOCIOECONOMY

Population of Lao PDR was increasing at a high rate. The total population increased from 5.6 million people in 2005 to 6.49 million people in 2015, with the increment ratio of 1.45% per year. The population density was 27 people per square kilometre, which was very low compare to the other countries in South East Asia (Figure 4). The ratio of the increment could be divided into the age group, and different growth rate could be observed. Especially, the population in the age of 5 – 14 decreased I decreased by about 3.7%, while the population at the age for employment increased by 10.6% and the elderly increased 10.1%. The increase of teenager population would positively contribute to the growth of the country population.



**Source:** Ministry of Planning and Investment, Lao Statistics Bureau.2015. Population and Housing *Census* 1985-2015. Vientiane.

**Figure 3 Population growth 1985-2015**

According to the past population age structure, the ratio of new-born had a big increase, which led to the increase of other age groups. For the reason, the overall population rapidly increased. The increase of young population would bring more benefits, "Population benefits". The ratio of the employed population would increase, in the meantime, the ratio of the unemployed population would decrease. The ratio of the unemployed population would reduce from 0.62% in 2015 to 0.51% in the year 2023 and would continue to decline to 0.43% in 2045. However, it might increase after 2050. The change of population, especially increase of the aged population were expected but it would not be a problem for Lao PDR since proportion of the population was only 3.8%, and considerably low compare to those in other countries in the region. However, it would rapidly increase after 2020. In 2050, the ratio of the aged population group in Lao PDR might be still lower than the present level.

### **Economy Development**

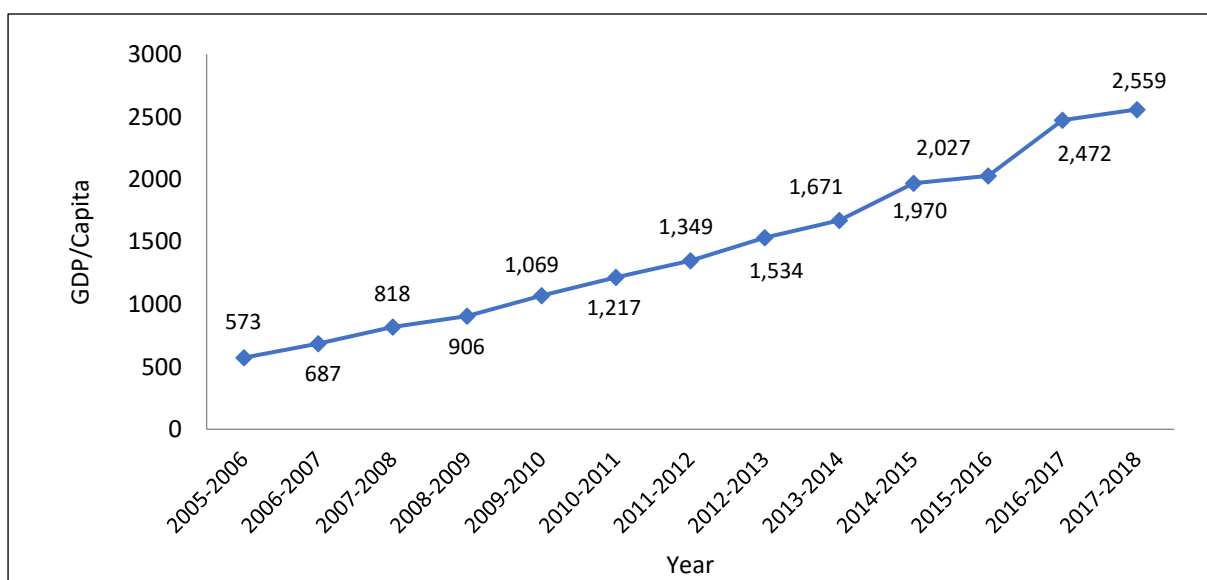
From the year 2010 to 2018 the economy of Lao PDR had been continuously and steadily growing at 7.5% per year, on average. The largest proportion of the growth were Service and Industrial sectors (Table 4). Total gross domestic product (GDP) per capital continuously increased, as a result of the implementation of social economic development plan, from US\$ 1,217 in the year 2010 - 2011 to US\$ 1,970 in the year 2014 - 2015 and then US\$ 2,558 in the year 2017 – 2018 (Figure 5). In the year 2011, Lao PDR had the gross national income (GNI) of US\$ 1,010 per capita, and increased to US\$ 1,232 per capita in the year 2015, and then US\$ 2,209 in the year 2018. The continuous growth of the economy was due to the government mechanism, the suitable macroeconomic management measures, peacefulness, courteous society, political and economic stability, increased international and regional integration of the country. The growth of the economy had resulted in reduction of poverty rate from 27.6% in 2008 to 23.2% in 2012-2013.



**Table 4 GDP growth rate from 2011 to 2018**

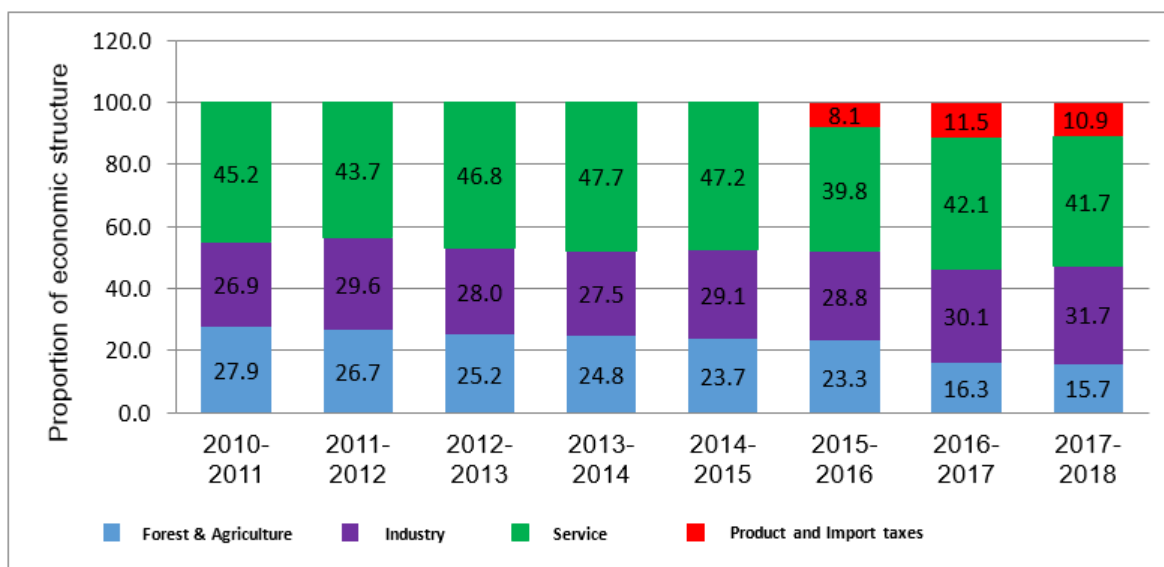
	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
GDP growth	8.1	8.3	8.0	7.8	7.5	6.9	6.8	6.5
Agriculture and Forest	2.9	2.8	3.1	3.0	3.0	3.0	2.8	2.5
Industry	15.8	14.4	7.4	8.5	8.9	9.0	9.5	7.7
Service	7.8	8.1	9.7	9.3	9.1	8.5	6.2	7.6
Product and import taxes	-	-	-	-	-	3.8	6.9	3.7

**Source:** Ministry of Planning and Investment. 2012.,2020. Socio-economic Development Annual Report 2010-2011; 2018-2019



**Source:** Ministry of Planning and Investment. 2012.,2020. Socio-economic Development Annual Report 2010-2011; 2018-2019

**Figure 4 Average GDP growth per person per year, 2005-2016 and 2018-2019**



**Source:** Ministry of Planning and Investment. 2012.,2020. Socio-economic Development Annual Report 2010-2011; 2018-2019

**Figure 5 Proportion of economic structure**

The economic structure has changed following the change of the industrialization and modernization. The agriculture and forestry sector’s share in economy reduced from 27.9% in 2010 – 2011 to 23.7% in 2014 – 2015 and then 15.7% in the year 2017 – 2018. In contrast, the industrial sector increased from 26.9% in 2010 – 2011 to 29.1% and 31.7% in 2014 – 2015 and 2017 – 2018, respectively. The service sector had the biggest share in economy. Its share to GDP increased from 45.2% in 2010 – 2011 to 47.7% in 2013 – 2014 and then 47.2% in 2014 – 2015. However, the structure seems to change from 2016 – 2017 onward after the product and import tax combined (Figure 5).

Agriculture sector is one of the important sectors for socio-economic development, especially food security. The introduction of the new policy to lift agriculture sector from production for self-consumption to market-oriented and commercialization development resulted in significant improvement and development of agriculture infrastructure, for instance, irrigation system, reservoir and water pumping stations, technical capacity, , research, demonstration and technical service centres or stations. . These have led to increase agricultural production, and self-sufficiency, exportation and food security since the year

2000<sup>3</sup>. Furthermore, agriculture and wood industries, especially commercial and cash crops: corn, job's tears, sugarcane, beans, coffee, rubber, cottons, vegetables, and fruits have been expanded and capable of export to both local and international markets. Animal husbandry and fishery have grown as well following improvement and development of animal husbandry techniques, new equipment and production factors, technical training on animal husbandry techniques, storage of fodder, grass cultivation, animal vaccination. As a result, this sub-sector grew at the ratio of 5% per year.

Forestry sector is another important sector that contributes to socio-economic development of Lao PDR, especially livelihood improvement of rural people. The majority of rural people depend on forest resources, including non-timber forest product (NTFPs) for household consumption and generation of revenue. In the rural area, the revenue generated from NTFP was about US\$ 320 per household, and total revenue from NTFP for the whole country was about US\$ 183.7 million per year<sup>4</sup>.

Energy sector strongly backed up socio-economic development and transition from agriculture to industrial-based development and modernization in past decade. Energy sector is one of the many sectors that drive the social economic to grow. Nowadays, Lao PDR has total of 45 electricity related projects with the total install capacity of 6.437 MW and production capacity up to 34,357 million GWh per year. Of which, the medium to large power projects (equal to or more than 15 MW) are totally 29 projects, which have installed capacity of 6.365 MW and can produce the electricity up to 33,957 GWh per year. Small power project, which can produce electricity more than 15 MW are, in total, 14 projects, which have installed capacity of 72 MW and can produce electricity up to 400 GWh per year<sup>5</sup>.

Mining sector is another important sector that contributed to the social economic development, especially export earnings. In the year 2011, the mining sector contributed to 10.3% of the GDP. In the year 2011 – 2015, the production from the sector had an average

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<sup>3</sup> Ministry of Agriculture and Forestry. 2015. ***Agriculture Strategic Development Plan 2025 and The Vision 2030.***

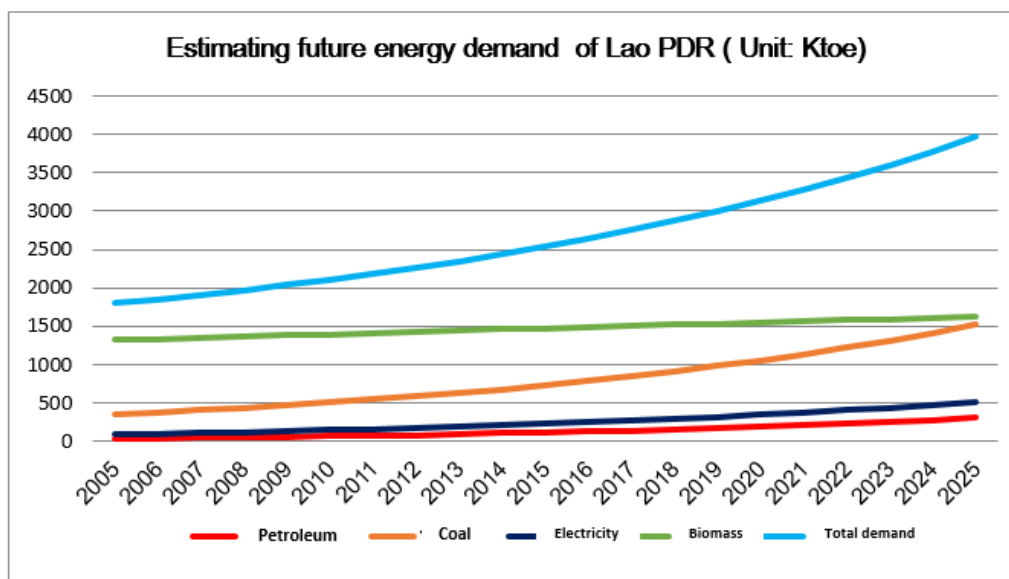
<sup>4</sup> Government of Lao PDR. 2005. ***Forestry Strategy to the year 2020.*** Vientiane.

<sup>5</sup> Ministry of Planning and Investment. 2015. ***The National Socio-Economic Development Report for the year 2011 – 2015.*** Vientiane.

growth of 9.97% per year (generated total revenue of 66,746.83 billion kip). In comparison to the year 2006 – 2010, it increased 184.14%<sup>6</sup>

Along with socioeconomic development, demand of energy for the whole country was estimated to increase about 3.6% per year, from 1.8 million tons (MTOE) in the 2005 to 3.9 million tons in the year 2025. However, the energy demand would be different among sectors. The energy demand in household sector was expected to decrease from 77.8% in 2005 to 48.5% in 2025, while the demand for industrial sector might increase from 6.1% in the year 2005 to 16.9% in the year 2025. The energy production from hydroelectricity might also increase about 11% in the year 2005 – 2025 and the need of electricity within the country might increase about 8.3% per year until 2025 (Figure 6)

**Figure 6 Estimated future energy demand in Lao PDR**



Source: Ministry of Energy and Mines. 2018. *Lao PDR Energy Statistics 2018*. Economic Research Institute for ASEAN and East Asia.

<sup>6</sup> Ministry of Energy and Mines. 2018. *Lao PDR Energy Statistics 2018*. Economic Research Institute for ASEAN and East Asia.

## **Social Development**

In the 5-years period 2011 – 2015, the government paid more attention on village and village cluster development in accordance with a strategic plan called 4 Directions, 4 Objectives, and 3 Builds (Building province to become strategic unit, district to be an effective integrated planning unit, and village to become development unit). The main focus was on the development of economic related basic infrastructure such as road to connect between districts and villages. Nowadays, 84.51% of the villages through the country are connected or accessible by road. At the same time, the government had improved and expanded the education, healthcare, and water system for rural area.

Educational sector plays an important role in the development of human resources, and for the reason, the government allocated 17% of the government budget for the sector to develop the educational infrastructure and improve the educational system at all levels, expecting to improve Lao PDR educational system both quantity and quality. As a result, the villages that have the secondary school increased from 80% in 2011 to 99.63% (Result of the poverty and development analysis, 2015), the proportion of the children at the age between 3 – 5 years old enrolled in kindergarten increased from 22.1% in the year 2009 – 2010 to 43.20% in the year 2014 – 2015, the proportion of the children at the age of 5 prepare entering the primary school increased from 52.9% in 2012 – 2013 to 66% in the year 2014 – 2015, the proportion of the students who entered the primary school increased from 92.7% in 2009 – 2010 to 98.6% in 2014 – 2015, the proportion of the educated people at the age of 15 and above increased from 81.7% in 2009 – 2010 to 93.6% in the year 2014 – 2015, the proportion of the students entering the secondary and high school reached 78% and 45.7% in the year 2014 and 2015, respectively.

As for the healthcare sector, the healthcare system had been expanded widely throughout the country including the rural area. The villages that have meet healthcare criteria increased from 24.5% in the year 2011 to 64.84% of the total number of villages in 2014. Currently, the country has totally 985 healthcare offices or centres through the country. Of which, the offices that are capable of delivering the baby are 859; 17 district hospitals are capable of providing basic healthcare needs, and 5 central hospitals and 3 specialized hospitals are capable of

providing advance healthcare service. The proportion of population accessible to clean water reached 84.71% in 2014 (target was 80%) and toilet reached 67.92% in 2014 (target was 60%). In summary, the government has achieved several rural development and poverty eradication goals over 5-year periods. According to the poverty analysis in 2014, 1,736 villages (23.09% of the villages in the country) and 76,604 households are remaining poor. Nevertheless, the result of the fifth Lao expenditure and consumption survey (LECS V) showed that the ratio of poverty decreased from 27.6% in 2007 – 2008 (LECS IV) to 23.2% in 2012 – 2013 and then 20% in 2015.

### **Climate Change**

Impacts of climate change on livelihood, food security, water supply and health of the Lao people are evident. The impacts of floods and drought are likely to continue to occur and could be more frequent and stronger in the future. In the past two decades Lao PDR have faced major floods 27 times with the average 1 time every one and a half year. Base on the statistics in the year 1966 – 1999, floods and drought impacted heavily on Lao PDR's socioeconomics, which costed about US\$ 104,897,400 by floods and US\$ 597,700,000 by drought. Some years (1972, 1979, 1986 and 1997 – 1999), the cost from floods and drought were US\$ 77,654,927. River flood usually occurred in the central and southern part of Laos, while flash flood usually took place in the northern and east in the year 1995, 1996, 2000, 2002, 2005, 2008 and 2009 (Typhoon Ketsana) In the year 2010 a flash flood occurred in northern of Lao PDR impacted both life and properties at a damage cost total of LAK 40 billion. These showed that Lao PDR is vulnerable to climate change and related disasters, especially 80% of the people who depend on agriculture, animal husbandry and NTFPs.

In order to contribute to solve climate change and reduce risks and impacts from natural disaster, the government of Lao PDR ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995, created and implemented policies, strategies and plans.

In 2017, Lao PDR introduced disaster management law, which defines principles and methods in disaster management, risk assessment, early warning system, disaster control, impact assessment, emergency response, the right to access to the disaster emergency fund and the right of impacted people. Furthermore, in 2019, the government also introduced a Decree on

Climate Change, which defines the principles, regulations, and measures for managing and monitoring climate change and its impacts in order to ensure security of livelihood, health, property, environment, biodiversity, infrastructure, enhance cooperation with regional and international communities, and to contribute to national socio-economic development in a sustainable and green growth manner.

In the year 2013 the government introduced policy No. 220/PM on the establishment of the national disaster management and protection committee, whose members are representative from relevant ministries and chaired by deputy prime minister. The role of the committee is to manage, protect, counter, and solve the negative impacts of the natural and human-made disasters.

Ministry of Natural Resources and Environment approved and introduced the Lao PDR Climate change action plan in 2013. The action plan was created based on the climate change strategy of Lao PDR endorsed by the government of Lao in 2010. and the Second National Communication on climate change of Lao PDR submitted in 2013. National climate change action plan included actions and measures to reduce emissions and climate change adaption in agriculture, land use and forestry, water resources, energy, industry, transportation, rural development and health sector for the 2013 – 2020 period. Furthermore, the action plan defined the government sectors at central, provincial, private, and other relevant organisations to engage in the implementation of the action plan as well as reducing emissions and improving climate change adaptation capacity.

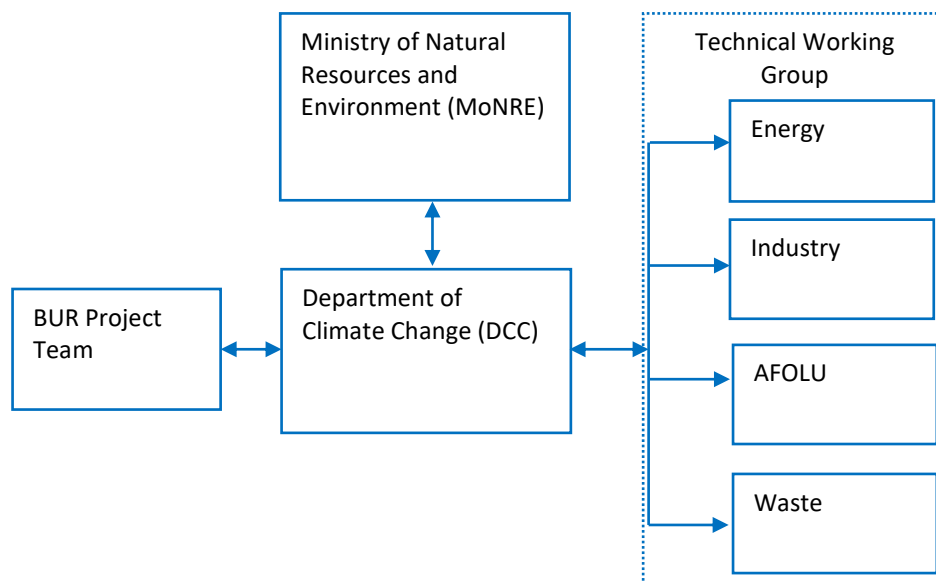
In order to implement COP 20 decisions agreed in the city of Lima, Peru, which called for climate change actions, Lao PDR have completed the first intended nationally contributions on climate change (INDC) at the end of 2015. This plan is in line with the sustainable development plan of the government. It was also a foundation to request for assistance from green climate fund and for mainstreaming the climate action into sectoral plan and implementation. The INDC reaffirmed the plan to fight against emissions together with prevention of impacts from climate change. In particular, it promoted increasing forest cover to 70% in the year 2020, production electricity from renewable energy and renewable energy shared 30% of the total energy consumptions by 2030, the use of eco-friendly technology in

industrial sector and infrastructure development which is in line with the sustainable development of green economy. As for the climate change adaption, it defined adaption measures in the important economic sectors and natural resources, which are likely to be impacted by climate change, aimed to increase public awareness and participation on the prevention of natural disasters and climate change.

Furthermore, Lao PDR approved and introduced the clean development and ecosystem-based adaptation guidelines, technology needs assessment and technology action plan for reducing emissions and adaptation to climate change, assessment of technology barriers and enabling environment for the implementation of climate change mitigation and adaption in the agriculture, forestry and water resources sector.

### 1.5 INSTITUTIONAL ARRANGEMENTS

BUR was prepared based on the overall institutional arrangement structure shown in the Figure 7 below.



**Figure 7 Institutional Arrangement for BUR**

The process was overseen by Ministry of Natural Resources and Environment (MoNRE). Under MoNRE, Department of Climate Change (DCC) managed not only quality, relevance, and



compliance of BUR, but also ensured delivery of the BUR and communication with MONRE leadership. DCC was implementing the BUR project including consultants and coordinating with the technical working groups (TWGs) on the reporting including data collection, assessment and reporting, validation as well as quality assurance and quality control (QA/QC). In addition, DCC also liaised with UNEP to ensure compliance of the BUR to the UNFCCC and IPCC's guidelines.

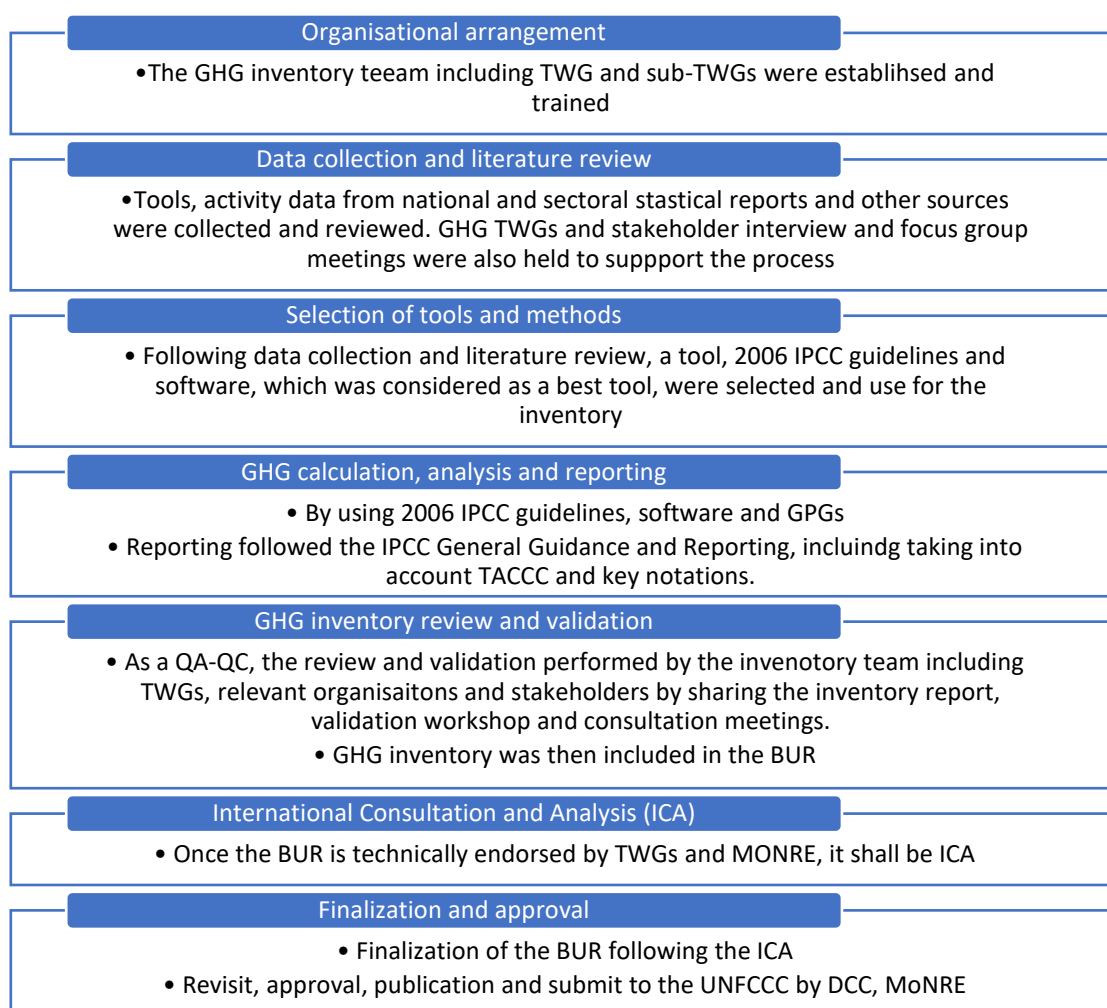
The TWGs were promoted by MONRE, and the members from relevant sectors and stakeholders were nominated by their respective authorities to coordinate the BUR activities, especially GHG inventory, mitigation and assessment of constraints and support needs. Their tasks, apart from data provision, included review of the report including results.

## **CHAPTER 2: NATIONAL GREENHOUSE GAS INVENTORIES**

### **2.1 GENERAL OVERVIEW AND RESULTS**

The GHG inventory was conducted in accordance with Article 4.1(a) and Article 12 of the United Nations Framework Convention on Climate Change (UNFCCC), which requires inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. 2006 IPCC Guidelines and software for National Greenhouse Gas Inventories was used for the inventory. The base year was 2014, which is in line with the COP's decision. This inventory covered emissions and removals for four sectors, namely Energy, Industrial Process and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU) and Waste. The GHG emissions estimated were only CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O since data on halocarbon products and use were inadequate, while the emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>) were possibly small. GHG emissions and removal expressed in CO<sub>2</sub> equivalents (CO<sub>2e</sub>), and Global Warming Potential (GWP) in the IPCC Second Assessment Report (2RA) were used for the conversion of the unit, which are in line with the previous GHG inventories.

GHG inventory process included data collection and assessment, selection of tools and methods, calculation and reporting, review and validation, and endorsement (Figure 8). It was managed by Department of Climate Change, the Ministry of Natural Resources and Environment, and facilitated and supported national consultant and GHG Technical Working Groups (TWG). The tool employed for the inventory was 2006 IPCC guidelines and software, and Good Practice Guidance (GPG). Tier 1 method and default emission factors (EFs) were used for estimation of GHGs since the country-specific data, especially EFs were not available. However, Transparency, Accuracy, Consistency, Completeness, and Comparability (TACCC) were taken into account in the inventory. Notation Key including Not estimated (NE), Included elsewhere (IE), Confidential information (C), Not applicable (NA) and Not occurring (NO), where appropriated, were used in the reporting. In addition, key category and uncertainty analysis were also conducted following the calculation of the GHGs.



### Figure 8 GHG inventory and reporting process

The result showed that the net emissions was 24,099.98 GgCO<sub>2eq</sub> in the inventory year, 2014. AFOLU, especially forest remaining forest, crop land remaining cropland and lands converted to forest had a capacity to remove emissions equivalent to about 13,000 Gg. AFOLU sector had net emissions of 18,793.41 GgCO<sub>2eq</sub>, which was the largest sources of emissions, accounting for about 78% of the total emissions. Second largest source of emissions was Energy Sector, which emitted 3,729.42 GgCO<sub>2eq</sub> (15%). The rest, IPPU and Waste shared 5% and 2% of the national emissions, respectively (Figure 9 and Table 5).

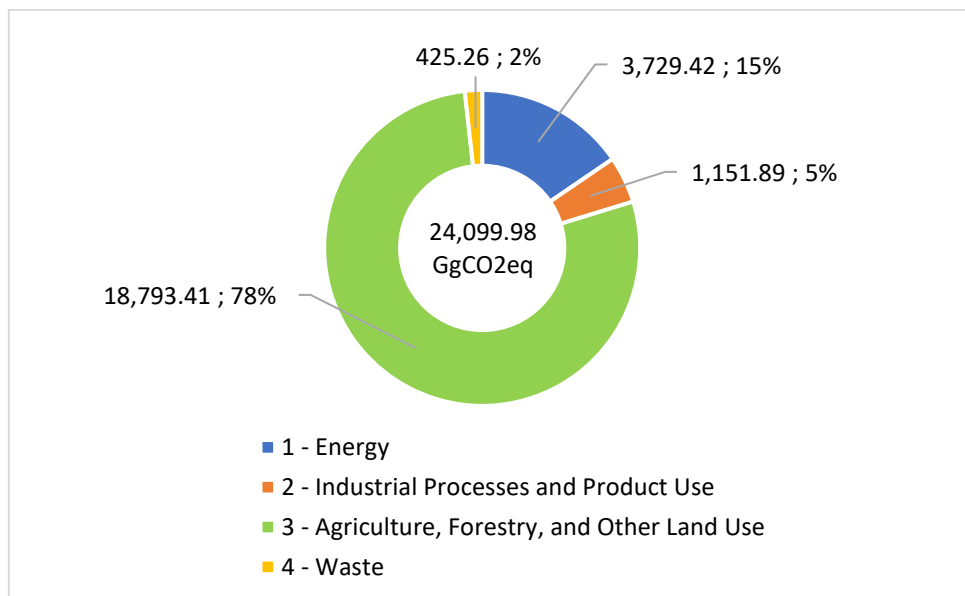


Figure 9 Total Emissions in 2014 in Lao PDR

**Table 5 Total GHG emissions in 2014 in Lao PDR**

Categories	Emissions (Gg)			Emissions CO2 Equivalents (Gg)				Emissions (Gg)					Emissions (Gg)
	Net CO2 (1)(2)	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (3)	Other halogenated gases without CO2 equivalent conversion factors (4)	NOx	CO	NMVOCS	SO2	CO2e
<b>Total National Emissions and Removals</b>	<b>15,441.035</b>	<b>300.562</b>	<b>7.571</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>24,099.98</b>
<b>1 - Energy</b>	<b>3,343.418</b>	<b>5.958</b>	<b>0.842</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,729.42</b>
<b>1.A - Fuel Combustion Activities</b>	<b>3,343.418</b>	<b>5.843</b>	<b>0.842</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,727.00</b>
1.A.1 - Energy Industries	0	5.381	0.718						0	0	0	0	335.44
1.A.2 - Manufacturing Industries and Construction	27.042	0.001	0.000						0	0	0	0	27.16
1.A.3 - Transport	2,281.649	0.270	0.113						0	0	0	0	2,322.40
1.A.4 - Other Sectors	1,034.726	0.190	0.011						0	0	0	0	1,042.01
<b>1.B - Fugitive emissions from fuels</b>	<b>0</b>	<b>0.115</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.41</b>
1.B.1 - Solid Fuels	0	0.115	0						0	0	0	0	2.41
<b>2 - Industrial Processes and Product Use</b>	<b>1,151.890</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,151.89</b>
<b>2.A - Mineral Industry</b>	<b>1,090.245</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,090.24</b>
2.A.1 - Cement production	1,087.294								0	0	0	0	1,087.29
2.A.2 - Lime production	2.951								0	0	0	0	2.95
<b>2.B - Chemical Industry</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>2.C - Metal Industry</b>	<b>61.646</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>61.65</b>
2.C.1 - Iron and Steel Production	61.646	0							0	0	0	0	61.65
<b>2.D - Non-Energy Products from Fuels and Solvent Use</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>2.E - Electronics Industry</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>2.F - Product Uses as Substitutes for Ozone Depleting Substances</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>2.G - Other Product Manufacture and Use</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>3 - Agriculture, Forestry, and Other Land Use</b>	<b>10,943.431</b>	<b>280.544</b>	<b>6.318</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18,793.41</b>
<b>3.A - Livestock</b>	<b>0</b>	<b>179.826</b>	<b>0.615</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,966.89</b>
3.A.1 - Enteric Fermentation		152.914							0	0	0	0	3,211.19
3.A.2 - Manure Management		26.912	0.615						0	0	0	0	755.69
<b>3.B - Land</b>	<b>9,093.245</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9,093.25</b>
3.B.1 - Forest land	(12,661.984)								0	0	0	0	- 12,661.98
3.B.2 - Cropland	19,314.621								0	0	0	0	19,314.62
3.B.3 - Grassland	8.148								0	0	0	0	8.15
3.B.4 - Wetlands	0		0						0	0	0	0	-
3.B.5 - Settlements	91.672								0	0	0	0	91.67
3.B.6 - Other Land	2,340.789								0	0	0	0	2,340.79
<b>3.C - Aggregate sources and non-CO2 emissions sources on land</b>	<b>25.883</b>	<b>100.718</b>	<b>5.703</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,908.98</b>
3.C.1 - Emissions from biomass burning		46.057	0						0	0	0	0	967.19
3.C.2 - Liming	1.731								0	0	0	0	1.73
3.C.3 - Urea application	24.152								0	0	0	0	24.15
3.C.4 - Direct N2O Emissions from managed soils			4.215						0	0	0	0	1,306.59
3.C.5 - Indirect N2O Emissions from managed soils			1.355						0	0	0	0	420.05
3.C.6 - Indirect N2O Emissions from manure management			0.133						0	0	0	0	41.37
3.C.7 - Rice cultivations		54.662							0	0	0	0	1,147.90
3.C.8 - Other (please specify)		0	0						0	0	0	0	-
<b>3.D - Other</b>	<b>1,824.303</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,824.30</b>
3.D.1 - Harvested Wood Products	1,824.303								0	0	0	0	1,824.30
3.D.2 - Other (please specify)	0	0	0						0	0	0	0	-
<b>4 - Waste</b>	<b>2.296</b>	<b>14.060</b>	<b>0.412</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>425.26</b>
<b>4.A - Solid Waste Disposal</b>	<b>0</b>	<b>2.624</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>55.10</b>
<b>4.B - Biological Treatment of Solid Waste</b>	<b>0</b>	<b>0.005</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.10</b>
<b>4.C - Incineration and Open Burning of Waste</b>	<b>2.296</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.30</b>
<b>4.D - Wastewater Treatment and Discharge</b>	<b>0</b>	<b>11.431</b>	<b>0.412</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>367.76</b>
<b>4.E - Other (please specify)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>5 - Other</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>5.A - Indirect N2O emissions from the atmospheric deposition of nitrogen in NOx and NH3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>5.B - Other (please specify)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>
<b>Memo Items (5)</b>													<b>-</b>
<b>International Bunkers</b>	<b>53.068</b>	<b>0.000</b>	<b>0.001</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>53.54</b>
1.A.3.a.i - International Aviation (International Bunkers)	53.068	0.000	0.001						0	0	0	0	53.54
<b>1.A.5.c - Multilateral Operations</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-</b>

There were totally 45 emissions sources and removals in 2014. Of which, there 12 key sources which accounted for about 95% of the total emissions and removals, and the majority were in AFOLU sector (Table 6 and 7). Based on trend analysis, the majority of emissions were on the rising trend, while removals from forest land remaining forest land, emissions from land converted to other lands, and animal manure management decreased in comparison with the previous inventories (Table 7).

**Table 6 Key Sources Analysis Approach 1 Level Assessment**

IPCC Category	Greenhouse gas	2014 Ex,t (Gg CO2 Eq)	Ex,t  (Gg CO2 Eq)	Lx,t	Cumulative Total of Column F
Land Converted to Cropland	CARBON DIOXIDE (CO2)	20,057.515	20,057.515	0.394	0.394
Forest land Remaining Forest land	CARBON DIOXIDE (CO2)	(12,472.765)	12,472.765	0.245	0.639
Enteric Fermentation	METHANE (CH4)	3,211.194	3,211.194	0.063	0.702
Land Converted to Other land	CARBON DIOXIDE (CO2)	2,340.789	2,340.789	0.046	0.748
Road Transportation	CARBON DIOXIDE (CO2)	2,228.582	2,228.582	0.044	0.792
Harvested Wood Products	CARBON DIOXIDE (CO2)	1,824.303	1,824.303	0.036	0.828
Direct N2O Emissions from managed soils	NITROUS OXIDE (N2O)	1,306.586	1,306.586	0.026	0.853
Rice cultivations	METHANE (CH4)	1,147.895	1,147.895	0.023	0.876
Cement production	CARBON DIOXIDE (CO2)	1,087.294	1,087.294	0.021	0.897
Other Sectors - Liquid Fuels	CARBON DIOXIDE (CO2)	1,034.726	1,034.726	0.020	0.918
Emissions from biomass burning	METHANE (CH4)	967.191	967.191	0.019	0.937
Cropland Remaining Cropland	CARBON DIOXIDE (CO2)	(742.894)	742.894	0.015	0.951

**Table 7 Key Sources Analysis Approach 1 Level Trend Assessment**

IPCC Category code	IPCC Category	Greenhouse gas	2010 Year Estimate Ex0 (Gg CO2 Eq)	2014 Year Estimate Ext (Gg CO2 Eq)	Trend Assessment (Txt)	% Contribution to Trend	Cumulative Total of Column G
3.B.1.a	Forest land Remaining Forest land	CARBON DIOXIDE (CO2)	(45,833.410)	(12,472.765)	0.845	0.630	0.630
3.B.6.b	Land Converted to Other land	CARBON DIOXIDE (CO2)	2,809.763	2,340.789	0.089	0.067	0.697
3.A.1	Enteric Fermentation	METHANE (CH4)	3,003.258	3,211.194	0.085	0.063	0.760
3.C.7	Rice cultivations	METHANE (CH4)	1,850.946	1,147.895	0.065	0.048	0.809
3.D.1	Harvested Wood Products	CARBON DIOXIDE (CO2)	1,674.175	1,824.303	0.047	0.035	0.844
1.A.3.b	Road Transportation	CARBON DIOXIDE (CO2)	1,518.850	2,228.582	0.034	0.025	0.869
3.C.4	Direct N2O Emissions from managed soils	NITROUS OXIDE (N2O)	1,002.116	1,306.586	0.025	0.019	0.887
2.A.1	Cement production	CARBON DIOXIDE (CO2)	839.800	1,087.294	0.021	0.016	0.903
3.A.2	Manure Management	METHANE (CH4)	638.416	565.144	0.020	0.015	0.918
3.B.2.b	Land Converted to Cropland	CARBON DIOXIDE (CO2)	6,364.476	20,057.515	0.018	0.013	0.931
1.A.4	Other Sectors - Liquid Fuels	CO2	7.897	1,034.726	0.015	0.011	0.942
3.B.2.a	Cropland Remaining Cropland	CARBON DIOXIDE (CO2)	(162.154)	(742.894)	0.013	0.010	0.952

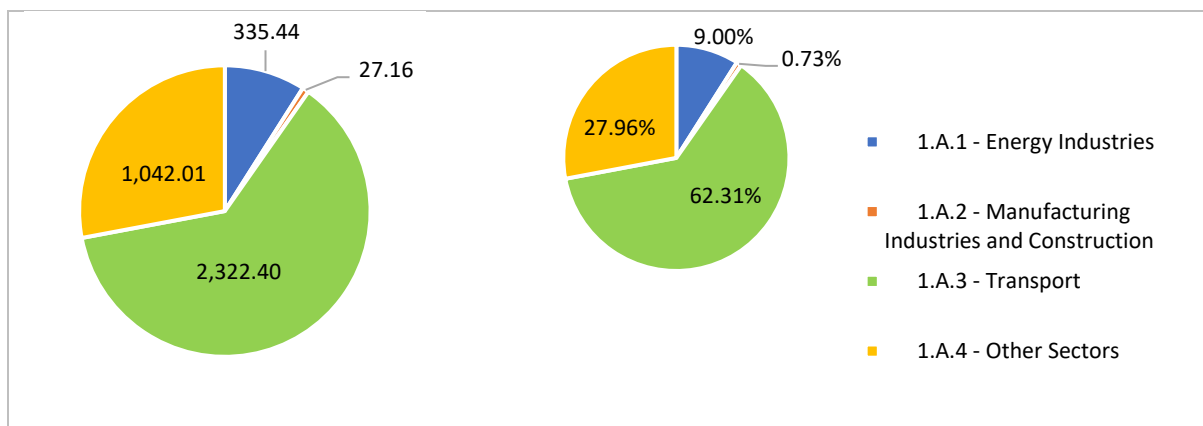
Uncertainty analysis conducted following the estimation and illustrated that there could be variation in total and sectoral emissions or by gases. The combined inventory uncertainty was about 37.93%. Improvement of inventory quality requires improvement of activity data and development of country specific EFs.

## 2.2 GREENHOUSE GAS EMISSIONS BY SECTOR

### 2.2.1 ENERGY SECTOR

GHG inventory of the Energy Sector covered estimation of emissions from 1) Fuel Combustion (1A) and 2) Fugitive Emissions from Fuels (1B). The emissions of Carbon Dioxide in Transportation and Storage (1C) was included elsewhere or not estimated since data was inadequate, and it was not a key source of emissions.

In 2014, total emissions from energy sector were 3,729.42 Gg, accounting for about 17.08 % of the national total emissions. Of which, 99.94 % (3,727 Gg CO<sub>2eq</sub>) were emissions from fuel combustion. Particularly, fuel combustion in transportation, manufacturing and construction, energy industry and other sectors, which shared 62.31% (2,322.40 Gg CO<sub>2eq</sub>), 27.96 % (1,042.01 Gg CO<sub>2eq</sub>), 9% (335.44 Gg CO<sub>2eq</sub>) and 0.73% (27.16 Gg CO<sub>2eq</sub>), respectively. Fugitive emissions was only from coal mining, 2.41 Gg CO<sub>2eq</sub>, which was only 0.06% of the total emissions from the energy sector (Figure 10).



**Figure 10 Emissions from Energy Sector**

## 2.2.2 INDUSTRIAL PROCESS AND PRODUCT USE

2006 IPCC guideline and software includes eight industries (2A to 2H) for GHG inventory in the industrial process and product use sector. In Laos, particularly in 2014, there were only two industries that were relevant to the GHG emissions. The mineral industry including cement and lime, and metal industry, particularly iron rod production processes. Industrial products that potentially emit HFCs, PFCs and SF6 such as freezers, fridge, and electronic appliance, etc. were imported and used in Laos, but its quantity was possibly small. Importantly, it lacked data about the products and uses. So, this report covered only emissions from cement, lime, iron production processes.

Cement, lime, iron rod production in 2014 were 2,220,100 tones, 3,934 tonnes and 42,223 tonnes, respectively, and their production resulted emissions of 1,151.89 Gg CO<sub>2</sub> in total in the inventory year. Cement industry emitted 1087.29 Gg CO<sub>2</sub>e, which accounted for 94.93% of the total emissions. The rest were emissions from lime and iron production, which were 2.95 Gg CO<sub>2</sub> (0.26%) and 61.65 Gg CO<sub>2</sub> (5.25%), respectively (Table 8).

**Table 8 Emissions from IPPU sector**

Categories	(Gg)			CO2 Equivalents(Gg)				(Gg)				
	CO2	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (1)	Other halogenated gases without CO2 equivalent conversion factors (2)	NOx	CO	NMVOCs	SO2
<b>2 - Industrial Processes and Product Use</b>	<b>1,151.890</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>2.A - Mineral Industry</b>	1,090.245	0	0	0	0	0	0	0	0	0	0	0
2.A.1 - Cement production	1,087.294								NE	NE	NE	NE
2.A.2 - Lime production	2.951								NE	NE	NE	NE
2.A.3 - Glass Production	NO								NO	NO	NO	NO
<b>2.B - Chemical Industry</b>	NE/NO	0	NE/NO	0	0	0	0	0	NE/NO	NE/NO	NE/NO	NE/NO
<b>2.C - Metal Industry</b>	61.646	0	0	0	0	0	0	0	0	0	0	0
2.C.1 - Iron and Steel Production	61.646	NO							NE	NE	NE	NE
<b>2.D - Non-Energy Products from Fuels and Solvent Use</b>	IE/NO	0	0	0	0	0	0	0	IE/NO	IE/NO	IE/NO	IE/NO
<b>2.E - Electronics Industry</b>	-	0	0	NO	NO	NO	0	0	NO	NO	NO	NO
<b>2.F - Product Uses as Substitutes for Ozone Depleting Substances</b>	-	0	0	NE/NO	NE/NO	0	0	0	NE/NO	NE/NO	NE/NO	NE/NO
<b>2.G - Other Product Manufacture and Use</b>	-	0	0	0	NE/NO	NE/NO	0	0	NE/NO	NE/NO	NE/NO	NE/NO
<b>2.H - Other</b>	-	0	0	NE	0	0	0	0	NE/NO	NE/NO	NE/NO	NE/NO

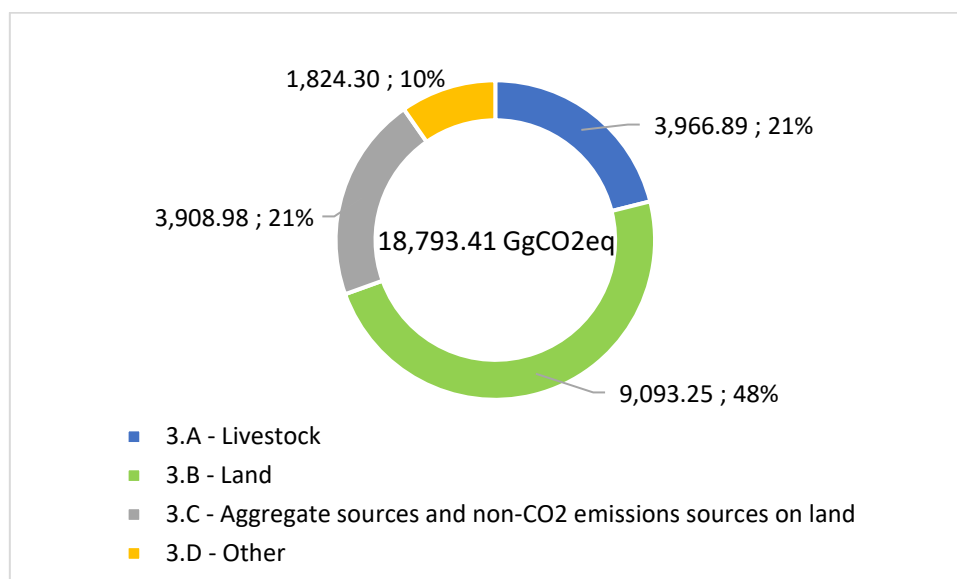
The emissions from IPPU increased sharply compared to the previous inventories. The emissions increased about 24 times in comparison with the total emission in the year 2000, which was only 48 Gg CO<sub>2e</sub>. However, it was understood that there were some variations

associated with the methods and emission factors. The previous inventory employed the revised 1990 IPCC guidelines and UNFCCC software, while 2014 inventory used 2006 IPCC guidelines for national GHG inventory, which their emission factors and assumptions were slightly different.

### 2.3.4 AGRICULTURE, FORESTRY AND OTHER LAND USE

This GHG inventory of the Agriculture, Forestry and Other Land Use (AFOLU) sector covered 4 main categories or sources of emissions: 1) emissions from livestock (3A), 2) emissions and removals associated with land use and land use change (3B), 3) aggregate sources and non-CO<sub>2</sub> emission from land (3C), and 4) other (3D).

The net emissions of the AFOLU sector was 18,793.41 GgCO<sub>2eq</sub> in the inventory year, 2014. Of which, the largest source of emissions was land and land use change. Its net emissions were 9,093.48 GgCO<sub>2eq</sub> or about 48% of the total emissions in the sector. Emissions from livestock and aggregate sources and non-CO<sub>2</sub> emissions sources on land were about the same, sharing about 21% the sector's emissions. Lastly, emissions from other, especially harvested wood product shared about 10% of the emissions. (Figure 11).



**Figure 11 Net emissions from AFOLU sector in 2014**

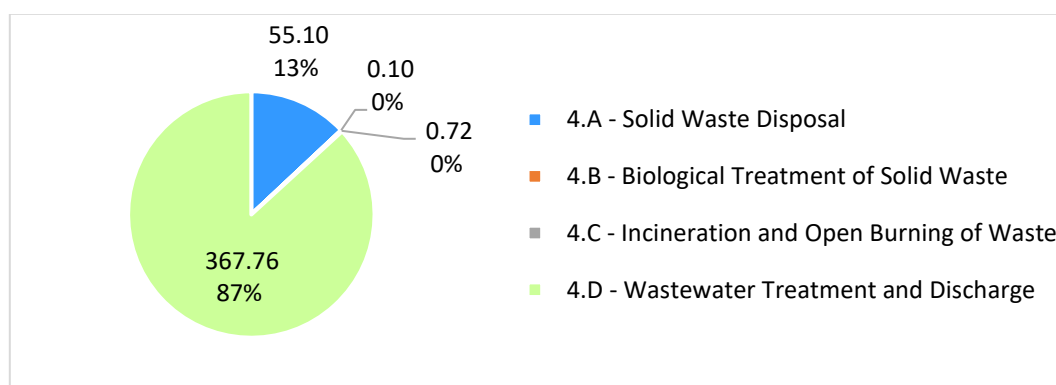


### 2.3.5 WASTE SECTOR

GHG inventory in waste sector covered four main sources of emissions: solid waste disposal (4A), biological treatment of solid waste (4B), incineration and open burning of solid waste (4C), wastewater treatment and discharge (4D). Other source (4E) was not estimated since there was no other source of emissions.

Solid waste production in Laos has been increased overtime. In 2003, solid waste was about 1.268 million tonnes, and then it went up to about 1.647 million tonnes in 2014. Solid waste disposal at site, however, was relatively low. It ranged from about 16% to 31% only, between 2003 and 2014. The rest were dumped, burned, and disposed elsewhere. The recycling of solid waste was possibly less than 10%. Biological treatment of solid waste, especially compost was small scale and unorganised. Incineration of solid waste was also small scale, too and there was only a clinical incinerator in the country. Open burning of solid waste still occurred elsewhere. However, it was estimated that only about 0.1% of the unmanaged solid waste was burned in the inventory year, 2014.

Waste sector released about 423.68 GgCO<sub>2</sub>e in total. Most of the emissions were from wastewater treatment and discharge, which contributed to almost 87% of the total emissions. Solid waste disposal, based on First Order Decay method, could generate 55.10 GgCO<sub>2</sub>e in the inventory year. The rest were from solid waste incineration and open burning, and biological treatment, which generated 0.72 GgCO<sub>2</sub>e (0.19%) and 0.10 GgCO<sub>2</sub>e (0.03%), respectively (Figure 12).



**Figure 12 Emissions from Waste Sector**

## CHAPTER 3: MITIGATION ACTIONS AND EFFECTS

### 3.1 GHG EMISSION MITIGATION ACTIONS

Lao PDR, in partner with development partners, has made efforts and progresses on identification and implementation of measures for mitigating climate change, especially in past 10 years. Key mitigation actions were identified and implemented under the National Strategy on Climate Change (NCCS) (2010), Climate Change Action Plan (2013), the First Intended Nationally Determined Contributions to Climate Change (INDC) (2015), Climate Change Technology Action Plan (2017). Currently, mitigation planning and mitigation is supported and guided by Decree on Climate Change, which has been in place since September 2019. In addition, climate change mitigation actions were integrated in the national and sectoral policies and plans, such as the 8th National Socioeconomic Development Plan (NSEDP) 2016-2020, Strategy on Renewable Energy, Forestry, and the National Green Growth Strategy. At the programme and project level, NAMAs on renewable energy, transport development, and REDD+ have been studied and piloted. However, Lao PDR has not completely set the national or sector’s mitigation target. The Table 9 below summarised the existing key mitigation actions and goals set those policies and strategies, and by sector. Its implementation progress and achievements were presented and discussed in section 3.2.

**Table 9 Key climate mitigation measures and goals**

Mitigation Measures by Sectors	Main Targets/ Objective	CO2 Reduction Potential
<b>Forestry Sector</b>		
1. Maintains the existing forest and carbon including preventing deforestation and forest degradation as well as avoid conversion of forest to other land use and illegal logging	<ul style="list-style-type: none"> <li>Forest cover increased to 70% of land area or 16.58 million hectares by 2020<sup>7</sup></li> <li>50% of the protection and conservation forest are well-prevented and managed by 2030</li> </ul>	60,000- 69,000 ktCO <sub>2</sub> <sup>9</sup>

<sup>7</sup> Note. Data from Data from The Government of Lao PDR. 2005. Forestry Strategy to the year 2020; Ministry of Planning and Investment. 2016. the 8th NSEDP 2016-2020. The Government of Lao PDR. 2009. Strategy on Climate Change. The Government of Lao PDR. 2016. Intended Nationally Determined Contribution (INDC).

<sup>9</sup> Note. Data from the technical report on mitigation for SNC and INDC.

Mitigation Measures by Sectors	Main Targets/ Objective	CO2 Reduction Potential
	<ul style="list-style-type: none"> <li>Slash and burnt agricultural reduced by 15% by 2030<sup>8</sup></li> </ul>	
2. Expands forest and carbon sink by afforestation, reforestation, enhanced regeneration, agroforestry urban and green landscape	<ul style="list-style-type: none"> <li>500,000 ha of plantation established by 2020<sup>10</sup></li> <li>Establish a park per community (population&gt;100,000) by 2030<sup>11</sup>.</li> </ul>	
3. Promotes and maintains sustainable forest and non-timber forest product (NTFP) management including harvesting and efficiency	No specific or qualitative target or calculation of emissions reduction potentials	
4. Increased efficiency of forest resources including wood and non-timber forest products processing and utilization		
<b>Agriculture Sector</b>		
1. Promote conservation and integrated agriculture	No specific or qualitative target or calculation of emissions reduction potentials	
2. Promote precise farming		
3. Promote restoration of degrade farmlands and soils, and enhance soil conservation		
4. Improve livestock feed and feeding		
5. Enhance animal manure management and biogas development		
<b>Energy Sector</b>		
1. Increase access to electricity	Electricity is available to 90% of household in rural area by 2020 <sup>12</sup>	63 ktCO2e/pa by 2020
2. Promote renewable energy	Build large (>15 MW) hydropower plants to provide clean electricity to neighbouring countries. <sup>13</sup>	16,284 ktCO2e per annum (2020-30)
	<ul style="list-style-type: none"> <li>Renewable energy shares 30% of energy consumption by 2025<sup>14</sup>.</li> <li>10% of the fuel use in transport sector replaced by biofuel by 2025</li> <li>58 MW from biomass</li> <li>51 MW from biogas</li> <li>48 MW from solar power</li> <li>73 MW from wind power</li> <li>36 MW from municipal solid waste</li> </ul>	1,468,000 ktCO2e by 2025

<sup>8</sup> Note. Data from Vision to 2030 and 10-year strategy (2016-2025) of the Natural Resources and Environment Sector (2015).

<sup>10</sup> Footnote 7.

<sup>11</sup> Note. Data from Ministry of Agriculture and Forestry. 2015. Vision to 2030 and 10-year Strategy (2016-2025) of the Natural Resources and Environment Sector.

<sup>12</sup> Note. Data from INDC (2015)

<sup>13</sup> Note. By 2020, 5,500 MW of hydropower planned. After 2020, additional 20,000 MW planned.

<sup>14</sup> Note. Data from The Government of Lao PDR. 2011. Renewable Energy Development Strategy in Lao PDR.

Mitigation Measures by Sectors	Main Targets/ Objective	CO2 Reduction Potential
	<ul style="list-style-type: none"> <li>400 MW from small-scale hydropower</li> </ul>	
3. Promote energy conservation and efficiency in all sectors	<ul style="list-style-type: none"> <li>Energy saving by 10% by 2030</li> <li>Increased energy use efficiency by 10% by 2025<sup>15</sup></li> </ul>	No calculation of emissions reduction potentials
4. Promote environmentally friendly and low carbon technologies	No specific or qualitative target and or calculation of emissions reduction potentials	
<b>Transport Sector</b>		
1. Promote low-emission transportation	<ul style="list-style-type: none"> <li>15% of the emissions in transport sector reduced by 2030<sup>16</sup></li> </ul>	
2. Reduce number of KM travelled by all vehicles	No specific or qualitative target	33 ktCO <sub>2</sub> e/pa
3. Increase use of public transport	No specific or qualitative target	158 ktCO <sub>2</sub> e/pa
<b>Industry Sector</b>		
1. Promote deployment of ISO14001	No specific or qualitative target and or calculation of emissions reduction potentials	
2. Promote clean and green industries		
<b>Waste Management Sector</b>		
1. Promote 3Rs practices	No specific or qualitative target and calculation of emissions reduction potentials	
2. Promote waste-to-energy		
<b>Natural resources and environment sector</b>		
1. Enhanced solid waste management including promoting 3Rs practices	<ul style="list-style-type: none"> <li>15% of chemical and hazardous solid waste reduced by 2030, and 15% of solid waste reduced in 18 towns of the provinces</li> <li>18 landfills through the country are improved and standardized.</li> <li>Ozone depletion substance reduced by 97.5% by 2030<sup>17</sup></li> </ul>	No calculation of emissions reduction potentials
2. Promote deployment of environmental management system (EMS) in all sectors	<ul style="list-style-type: none"> <li>Promote deployment of ISO1400</li> </ul>	
3. Promote sustainable and low emission transportation	<ul style="list-style-type: none"> <li>15% of the emissions in transport sector reduced by 2030</li> </ul>	
4. Enhance climate change mitigation	<ul style="list-style-type: none"> <li>Emissions reduce from 0.15 (2015) to less than 0.6 by 2025 and &lt;1.2 t/cap/yr. by 2030<sup>18</sup>.</li> </ul>	
5. Enhance conservation of wetland	No specific or qualitative target and calculation of emissions reduction potentials	

<sup>15</sup> Note. Data from Ministry of Energy and Mines. 2015. Policy on Energy Efficiency of Lao PDR. Vientiane.

<sup>16</sup> Footnote 8.

<sup>17</sup> Footnote 8.

<sup>18</sup> Note. Data from Green Growth Secretariat.2019. National Green Growth Strategy of the Lao PDR till 2030. Vientiane.

### 3.2 PROGRESS, EFFECTS AND THE ROADMAP OF NAMAs

Main progress and achievements of the key mitigation action implementation were summarised in Table 10. The majority of implementation progress and achievements were in readiness or pilot phase, and effects of several actions have not been evaluated or not assessable. Constraints and gaps on migration were discussed in the Chapter 5.

**Table 10 Main progress on the implementation of climate mitigation measures**

Activity	Main Progress and or Achievements
<b>Forestry Sector</b>	<ul style="list-style-type: none"> <li>• As of 2018, forest cover was only 58% of the total land areas, (82.85% compared to the target by 2020).</li> <li>• Illegal forest logging and encroachment observably decreased resulting law enforcement enhancement, particularly implementation of the Decree No 15/PM on forest inspection. In addition, progress has been made on the Forest Law Enforcement, Governance and Trade (FLEGT), especially Voluntary Partnership Agreements (VPAs) on verified legal timber and Timber Legality Assurance System (TLAS)</li> <li>• 7 REDD+ projects and 16 Readiness Initiatives<sup>19</sup> have been implemented through the country since 2010.</li> <li>• 446,000 ha of plantation established by 2015<sup>20</sup>.</li> <li>• 463,618.06 ha of degraded forest restored<sup>21</sup>.</li> </ul>
<b>Energy Sector</b>	<ul style="list-style-type: none"> <li>• 9 solar powerplants (32 MW) from 2015-17 (66.67% compared to the target).</li> <li>• 39.7 MW from biomass (68.44% compared to the target). 2 biomass power plants (25 MW) developed from 2013-2017, and 60 MW plant is under construction<sup>22</sup>.</li> <li>• 74.77 MW small scale of hydropower plants developed from 2011-2017 (22.5 MW from 2015-2017)</li> <li>• 92% of households nationwide have access to electricity in 2017.</li> <li>• As of 2020, total 46 large scale hydropower plants attained 6,129 MW (161,170 million kwh).</li> </ul>

<sup>19</sup> Note. Data from <https://theredddesk.org/countries/laos> accessed on April 9<sup>th</sup>, 2019.

<sup>20</sup> Note. Data from Smith et. al.2017. Tree Plantations in Lao PDR: Policy Framework and Review. Project Working Paper 1. From <http://www.laofab.org/document/download/3866>

<sup>21</sup> Note. Data from Ministry of Planning and Investment. 2019. The 2<sup>nd</sup> Draft the 9<sup>th</sup> national socioeconomic development plan 2020-2025. Vientiane Capital. May 2020.

<sup>22</sup> Note. Data from ASEAN Centre for Energy. 2017. Renewable Energy Development in Lao PDR. From <http://usaidcleanpowerasia.aseanenergy.org/resource/renewable-energy-development-in-lao-pdr/>.

Activity	Main Progress and or Achievements
	<ul style="list-style-type: none"> <li>• Renewable energy including large hydropower shared 86.14 % of electricity consumption by 2015.</li> <li>• 2,500-hectare jatropha plantation and for biodiesel established, and a biodiesel factory (2,000 litters per/day) operated in Xayabuli Province</li> <li>• Pre-feasibility studies of 2 wind power projects conducted. One (64 MW) is in Savannakhet and another one (50 MW) in Champasak Province.</li> </ul>
<b>Transport sector</b>	<ul style="list-style-type: none"> <li>• 42 public buses are operated under NAMAs, but its effects regarding GHG reduction have not been assessed. The Planned Road network and BRT under NAMAs have not been implemented.</li> <li>• Low Emission EV project initiated in Luangprabang since 2012.</li> </ul>

## CHAPTER 4: INFORMATION ON DOMESTIC MRV

Lao PDR has not had a harmonised or inclusive MRV system and a standard procedure. However, Lao PDR has planned to carry out MRV of GHGs, mitigation actions and effects, and supports received. For now, and near future, MRV of the three areas shall focus on national level, sectoral, programmes or project and facility level, and base on the existing domestic processes, arrangements, and systems, and sectoral approaches. At national and sectoral level, MRV of GHGs emissions and removals shall be performed under the national GHG inventory for National Communication (NC) on Climate Change and BUR, which shall be conducted on a regular basis, by MONRE, in accordance with the UNFCCC convention, COP's decision and IPCC guidelines. At sectoral level, MRV shall also performed in accordance with its specific sectoral approach or mechanism and requirements. For example, MRV of REDD-plus shall be in line with its mechanism, and the main responsible body shall be the Ministry of Agriculture and Forestry (MAF). MRV of aviation sector shall be carried out in accordance with ICAO's resolution A39-3 and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), and responsible mainly by the Ministry of Public Work and Transport (MPWT). At programme or project and facility level, sectoral or project; market specific MRV such as REDD+, CDM or JCM, etc. shall be employed.

MRV of mitigation actions and effects focussed on MRV of the implementation and GHGs and sustainable development effects of the national strategy and action plan on climate change, NDC, NAMAs, REDD and Renewable Energy Development and the National Green Growth Strategy. At sectoral level, relevant ministries or sectors shall carry out MRV of mitigation actions and effects in their sectors and share with MONRE. At national level, it shall be MONRE to coordinate with relevant sectors and compile all mitigation actions and effects in line with, for instance, NC, BUR or NDC reporting timeframe.

MRV of domestic or international supports, the Ministry of Planning and Investment (MPI) and the Ministry of Finance (MOF), who have a centralized support received or official development assistance (ODA) database system, shall be the key organisations, among others. However, at national level, MONRE shall be responsible for coordination and reporting support received in the BUR.

Organisationally, in general, MONRE oversees MRV of GHGs, mitigation actions and effects, and supports received at national level. In addition, national assembly and state inspection also play a role on external or third-party review of especially mitigation actions and support received. External consultants could be hired for verification when needed.

## **CHAPTER 5: CONSTRAINTS, GAPS, NEEDS AND SUPPORT RECEIVED**

In accordance with Decision2/cp.17, this chapter elaborated information on constraints and gaps, and financial and technical support received and needs. The constraints, gaps and needs were summarised in the section 5.1, and supported received is in Section 5.2.

### **5.1 CLIMATE CHANGE MITIGATION CONSTRAINTS**

The constraints, gaps, and needs for especially were summarized in the Table 11 below. They were identified by literature review, stakeholder interview and consultations, especially validation workshop and stakeholder consultation meetings.

**Table 11 Key constraints, gaps and needs on climate change mitigation**

Categories	Key constraints and gaps
<b>Economic and financial</b>	High cost and inadequate financial resources to invest in mitigation technologies or actions, especially clean, renewable energy, and low emission technologies
	Lack of financial incentives for mitigation
<b>Market</b>	Variable carbon credit and market including low price.  (Several CDM and NAMAs have been studied and planned, but very few implemented and achieved).
<b>Policy, legal and regulatory</b>	Unclear and or incomplete legal and regulatory framework, especially policies to promote development, deployment, and diffusion or transfer of renewable energy, environmentally friendly and low carbon technologies, and practices. Financially, policies on incentives, feed-in tariff, subsidies, etc. are unclear.
	Ineffective law enforcement
<b>Network</b>	Inexistent specific expert group/network and ineffective network expansion
<b>Institutional and organisational capacity and human skills</b>	Ineffective organisational arrangement including organizational planning and reporting system and procedure
	Lack of coordination amongst stakeholders
	Limited technical capacity and skills
<b>Information and awareness</b>	Insufficient information on technical, financial and economic, social-culture, environmental aspects and effects of mitigation technologies
<b>Other</b>	Insufficient models and best practices
	Lack of M&E and feedback system, data and information system

## 5.2 FINANCIAL AND TECHNICAL SUPPORT RECEIVED AND NEEDS

About US\$ 1.5 billion is needed to implement mitigation actions, especially under the national strategy on climate change in Lao PDR<sup>23</sup>. Just over US\$ 223 million in ODA flows supported

<sup>23</sup> ODI, *Age of Choice Study*. 2016. p. 21. From <https://www.odi.org/publications/10392-age-choice-development-finance-lao-pdr>



climate change projects in Lao PDR in 2013-14, with a third (33%) on climate change mitigation directly and about 20% on both mitigation and adaptation<sup>24</sup>. The majority of the support are in the forestry sector, and some of the key projects were summarised in Table 12.

In general, there are gaps on financial and technical support in comparison with the needs. In future, Lao PDR still needs more financial and technical supports to implement priority mitigation programmes outlined in Table 13.

**Table 12 Financial and Technical Support Received in Forestry Sector**

No	Mitigation projects	Status
1	Sustainable Forestry and Rural Development Project (SUFORD) (2009-2012)	Completed
2	Climate Protection through Avoided Deforestation (CliPAD) (2009-2018)	Completed
3	Sub-national REDD projects in Lao PDR by the Wildlife Conservation Society <ul style="list-style-type: none"> <li>- Nam Et Phou Loey National Protected Area (NEPL NPA)</li> <li>- the Nam Kading National Protected Area (NK NPA).</li> </ul>	Completed
4	Participatory Land and Forest Management Project (PA REDD) 2009-2014	Completed
5	Forest Programme for Forest Information Management 2010-2013	Completed
6	Winrock International Asia Regional Biodiversity Conservation Program's REDD+ Activities in Lao PDR 2010	Completed
7	Grassroots Capacity Building for REDD in Asia Pacific with RECOFTC 2009-2013	Completed
8	SNV-Lao PDR Assessment of Implementing a REDD project in Nam Xam National Protected Area, Huaphanh 2010-2011	Completed
9	Pre-planning for REDD+ Pilots in Xe Pian NPA and Xe Sap NPA by the World Wild Fund for Nature (WWF) 2010	Completed
10	Sustainable Forest and Land Management in the Dry Dipterocarp Forest Ecosystems of Southern Lao PDR (2016-2022) <sup>25</sup>	On going
11	Implementation of the Lao PDR Emission Reductions Programme through improved governance and sustainable forest landscape management (2020-2024, 2020-2029) <sup>26</sup>	On going

<sup>24</sup> OEDC. 2017. *Investment Policy Review: Investment Framework for Green Growth in Lao PDR*.

<sup>25</sup> [https://www.la.undp.org/content/lao\\_pdr/en/home/projects/Sustainable-Forest-and-Land-Management-in-the-Dry-Dipterocarp-Forest-Ecosystems-of-Southern-Lao-PDR1.html](https://www.la.undp.org/content/lao_pdr/en/home/projects/Sustainable-Forest-and-Land-Management-in-the-Dry-Dipterocarp-Forest-Ecosystems-of-Southern-Lao-PDR1.html)

<sup>26</sup> <https://www.greenclimate.fund/document/implementation-lao-pdr-emission-reductions-programme-through-improved-governance-and>

**Table 13 Financial and Technical Support Needs for Mitigation**

No	Mitigation actions or programmes
1	Implement renewables development strategy and NAMAs
2	Implement policies on energy conservation and efficiency
3	Implement Forestry and REDD strategy including upscaling REDD+ programmes and result base payment (more details are in annex)
4	Implement sustainable and low carbon transportation strategy and NAMAs
5	Implement sustainable and low carbon and or smart city strategy and plan
6	Implement clean and green industry strategy including environmental management system (ISO 14000)
7	Implement national strategy on climate change
8	Implement the national green growth strategy
9	Prepare and implement NC and BUR
10	Prepare and implement technology transfer including technology needs assessment and action plan
11	Natural resources and environment strategy and
12	Mitigation action indented in the 9 <sup>th</sup> national socioeconomic development plan.

## **ANNEX 1: THE TECHNICAL ANNEX OF THE BUR ON THE REDD-PLUS ACTIVITIES**

(Reported in septate document)