Low-carbon Development in the Green Growth Framework of Lao PDR

URBAN LEDS II | Lao People's Democratic Republic Urban Low Emission Development Strategies









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URBAN LEDS

ABOUT THE URBAN-LEDS II PROJECT

The Urban LEDS project is an initiative funded by the European Commission under its Global Climate Change Alliance Plus initiative and UN-Habitat and ICLEI-Local Governments for Sustainability (ICLEI) are jointly implementing the project. This initiative addresses integrated low emission and resilient development in more than 60 cities in 8 countries: Brazil, India, Indonesia and South Africa (from Phase I) and countries added in Phase II: Bangladesh, Colombia, Lao PDR and Rwanda. In addition to these countries, 16 European cities act as source cities and support peer-to-peer exchange and cooperation.

The overall objective is to "contribute to the reduction of greenhouse gas emissions by the promotion of Urban Low Emission Development Strategies (Urban LEDS) in cities / towns in emerging economies (Brazil, Colombia, India, Indonesia and South Africa), and Least Developed Countries (Bangladesh, Lao PDR and Rwanda)." One of the four specific objectives is to "enhance vertical and horizontal integration of climate action in support of National and Local Strategies and Policies." This initiative is being implemented in the wake of the Paris Agreement signing at COP21 in 2015. There has been a growing awareness of the need for a coordinated effort from all levels of government to reduce greenhouse gas (GHG) emissions, as noted in the Paris Agreement.

In Lao PDR, the country is facing rapid urbanisation in an environment of weak urban planning, with no operational comprehensive urban strategy, poor coordination at the local level, and a growing vulnerability to climate change. As there is a critical need to mainstream climate action into urban development before settlements progress in a haphazard, the Urban LEDS project is therefore particularly relevant in enhancing vertical and horizontal integration in support of climate action.

This report is an output from the Urban LEDS II project in Lao PDR. It aims at reviewing the role of the green growth agenda in urban, low-carbon development contributing to reducing GHG emissions in Lao PDR.

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Abbreviations and Acronyms

AFOLU	Agriculture, Forestry and Other Land Use
AIPA	ASEAN Inter-Parliamentary Assembly
ASEAN	The Association of Southeast Asian Nations
CIRIS	City Inventory Reporting and Information System
DHUP	Department of Housing and Urban Planning
EST	Environmentally Sustainable Transport
EV	Electric vehicle
GDP	Gross domestic product
GHG	Greenhouse gas
GHGI	Greenhouse gas inventory
GMS	Greater Mekong Subregion
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Process and Product Use
Lao PDR	Lao People's Democratic Republic
MPI	Ministry of Planning and Investment
MPWT	Ministry of Public Works and Transport
MSW	Municipal solid waste
NGGPC	National Green Growth Promotion Centre
NGGS	National Green Growth Strategy
NIER	National Institute for Economic Research
NSCGG	National Steering Committee for Green Growth
NSEDP	National Socio-Economic Development Plan
SDGs	Sustainable Development Goals
SMEs	Small and medium enterprises

UN-Habitat Lao PDR

Introduction

In a context of widespread environmental degradation, biodiversity loss and climate disruption, as well as rising inequality on a scale from small groups to globally, green growth has been promoted as a new paradigm with which to engage in economic development. The paradigm, which was adopted in Southeast Asia, with the unanimous agreement of the ASEAN Inter-Parliamentary Assembly (AIPA) on 17 September 2014, that each ASEAN member country would develop a green growth strategy and establish a green growth promotion centre as a means of coordinating the promotion of green growth activities.¹ Accordingly, Lao PDR established institutions and processes which culminated in the endorsement of a national green growth strategy in 2019 and the establishment of a National Green Growth Promotion Centre.

Separate from the green growth agenda, and in a bid to reduce greenhouse gas (GHG) emissions, institutional and policy frameworks have been established under the paradigm of climate change mitigation. In many countries, including Lao PDR, climate change mitigation falls under the mandate of the environmental sector. However, the green growth paradigm includes similar aims to reduce GHG emissions. The green growth paradigm has been widely adopted as a means of ensuring sustainable, inclusive development in a way that protects the environment, including the atmospheric balance which affects the climate. The green growth paradigm ushered in significant changes in Lao PDR's development aspirations. Its development trajectory had previously been one of relatively high gross domestic product (GDP) growth sustained by rampant exploitation of natural resources with an emphasis on major activities in sectors such as hydropower, mining and forestry. However, this type of development had adverse environmental and social effects including the depletion and degradation of natural resources, and increasing social disparity. Being narrowly concentrated on mainly climate and resource-dependent sectors, the economy was also vulnerable to external shocks such as natural disasters and global economic downturns. In addition, once Lao PDR had committed to the Paris Agreement, there was a need to consider greenhouse gas (GHG) emissions in its development approach. The adoption of a green growth paradigm sought to resolve these issues.

This review considers the role of the green growth agenda in urban, low-carbon development contributing to reducing GHG emissions in Lao PDR. It first describes planning for green growth, including the National Green Growth Strategy (NGGS) and the green growth institutional framework, and considers the place of low-emissions development in the NGGS. It then looks at urbanisation in Lao PDR and relates low-emissions development to urban areas. The second part of the review identifies opportunities and challenges for urban, low-emissions development.

¹ Government of Lao PDR, 'National Green Growth Strategy of the Lao PDR till 2030', December 2018, <u>https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-</u> <u>database//national green growth strategy of%20the Lao PDR till 2030 government of Lao.pdf</u>

Part I: Green growth planning in Lao PDR



1. Mainstreaming green growth into development planning

Green growth has been mainstreamed into the highest levels of Lao PDR's development planning since the 8th National Socio-Economic Development Plan (NSEDP) was adopted along with a Vision to 2030 and a Ten-year Socio-economic Development Strategy (2016–2025). The concept of green growth is evident in these documents. The opening of the Vision to 2030 clearly shows the national aspirations with the intention that by 2030, it will be possible to state that, "Lao PDR is ranked as a developing country with upper-middle income and with innovative, green and sustainable economic growth"². The Ten-Year strategy comprises seven parts, of which two highlight green growth. These are:

- 1. Strategy on quality, inclusive, stable, sustainable and green economic growth; and,
- 2. Strategy on sustainable and green environment with effective and efficient use of the natural resources.

The 8th NSEDP included 15 green growth indicators in multiple sectors, however, none was related to GHG emissions. At the time of the 9th NSEDP, the National Green Growth Strategy had already been endorsed, and so green growth was mainstreamed through the plan. This can be seen in the first of three parts of the overall directions which is to, "continue to make comprehensive preparations to lead the country out of the Least Developed Country status, ensuring employment and improved living standards of the people with inclusive, equal and fair access to benefits, ensuring political stability, building a peaceful, united, democratic, just, civilised and orderly society, achieving socio-economic development by ensuring a balance between economic, social and environmental development, and effectively implementing the National Green Growth Strategy and the Sustainable Development Goals 2030."³

Figure 1. Summary of green growth in development planning



Green growth is to be further mainstreamed into sector and local planning. The national green growth planning framework is summarised in **Error! Reference source not found.**. The green growth strategy is, therefore, a supplementary strategy with the purpose of strengthening sustainable development policies, strategies and mechanisms to achieve socio-economic development goals as identified in the major planning documents shown in **Error! Reference**

² Ministry of Planning and Investment, '8th Five-Year National Socio-Economic Development Plan (2016-2020)', 2016, https://laopdr.un.org/en/13284-8th-national-socio-economic-development-plan-2016-2020.

³ Government of Lao PDR, '9th Five-Year National Socio-Economic Development Plan (2021-2025)' (Vientiane Capital, 2021), https://data.laos.opendevelopmentmekong.net/lo/dataset/594f94b8-1b77-4225-b779-

 $[\]label{eq:sc16512bf073/resource/34208f7e-ba9e-4a50-90e3-3632581658be/download/_eng_9th_nsedp_final_print_12.1.22.pdf.$

source not found. As such it is to be mainstreamed into planning in all sectors and at all levels of government.

2. Structure and focus of National Green Growth Strategy

Key foci of the NGGS are:

- 1. Building awareness and creating consensus on green growth as required for national socio-economic development in each period
- 2. Mainstreaming green growth into national, sector and local strategies and socio-economic development plans
- 3. Encouraging and promoting sectors and local level governments to implement policies, plans, programmes, projects and activities that are related to green growth by using various promotion methods, including providing technical advice, information, and recommendations on policy; sharing lessons and best international experiences; technology transfer; capacity building; and fund mobilisation.

In order to clarify the concept of green growth, the NGGS gives the following definition:

National Green growth of the Lao PDR means the economic growth, poverty reduction and raising of living standards of the people in a comprehensive, inclusive and equitable manner by raising the efficiency, effectiveness and sustainability of the utilization of limited natural resources to ensure optimal benefits, decreasing the pollution, wastes and greenhouse gas emissions as well as minimizing the risks and vulnerability of the economy to natural disasters and global economic uncertainties.

From the inclusion of GHG emissions in the definition of green growth, it can be concluded that low emissions development is a key part of the green growth agenda. The definition is dynamic in line with changing circumstances and development needs in each planning period.

The green growth agenda is aligned with the three pillars of sustainability, as shown in **Error! Reference source not found.**, in which it is again stated explicitly that greenhouse gas emissions are an integral part. Each pillar has either two or three dimensions, with the three environmental dimensions being:

- 1. efficiency of the use of limited natural resources of the country to ensure optimal benefits,
- 2. clean and environmentally friendly economic growth, and
- 3. decrease of risks and vulnerability to natural disasters.

Four fundamental characteristics are described as:

- comprehensive, inclusive and fair
- efficient, effective and sustainable
- clean (reducing the release of pollution, wastes and greenhouse gas emissions)
- economic growth, poverty reduction and raising of living standards of the people which are resilient or have low level of risks and vulnerability to climate change, natural disasters and global economic uncertainties.

Since the characteristic of being clean includes GHG emission reduction, and a dimension of the environmental pillar is "clean and environmentally friendly economic growth", the reduction of GHG emissions is a key component of the environmental pillar.

Figure 2. Pillars of green growth in Lao PDR, Adapted from NGGS



CROSS- CUTTING FOCUS AREAS	FOCUS SECTORS						
Investment Environment and Management	Natural			Public	_		
Rural Development and Poverty Reduction	Resources and Environment	Agriculture and Forestry	Industry and Commerce	Works and Transport	Energy and Mines	Information, Culture and Tourism	n, Science d and Technology
	SUPPORTING SECTORS						
Gender Role: Protection and Promotion of the Advancement of Women Adaptation to Climate Change and Management of Natural Disasters	Finance	Ва	anking	Education an Sports	d La Soc	bour and ial Welfare	Health

Table 1. Focus areas, focus sectors and supporting sectors in the NGGS.

Having defined green growth in Lao PDR, and clarified its relationship with sustainability, having also clarified the relationship of the NGGS with other documents and strategies, the NGGS sets out focus areas and sectors, as shown in Table 1. While the focus areas relating to the investment environment and to gender are cross-cutting, the other two focus areas are notable for low-emissions development. The first one, rural development and poverty reduction, aims to close the gap in socio-economic development which exists between rural and urban areas. One longstanding policy to achieve this is to group several small villages into one large village, and to build a number of large villages into one small, green, liveable town. Through this policy, rural development is connected to urban development as settlements are redefined and become increasingly urban. The last focus area is adaptation to climate change and management of natural disasters. Included in this focus area is, "encouraging the economic growth that causes low greenhouse gas emissions to contribute to the mitigation of the climate change through promoting the use of advanced techniques and technologies which are efficient, effective, producing less wastes, energy-saving and using clean and environmentally friendly energy", highlighting once again that low emissions development is to be mainstreamed into every sector.

3. Green Growth institutional framework

A multisectoral national steering committee was established to oversee green growth in Lao PDR. Chaired by the Deputy Prime Minister, the Minister of Finance, with the Minister of Planning and Investment as Vice-Chair, committee members include the President of the National Institute for Economic Research and the ministers of a number of relevant line ministries. The committee is assisted by a secretariat comprising vice-ministers of relevant ministries and the Vice-President of the National Institute for Economic Research. A support committee to the Green Growth Secretariat comprises director generals and deputy director generals of the departments of planning of several relevant line ministries and agencies.

The NGGS also established a National Green Growth Promotion Centre (NGGPC) by transferring civil servants with interest and expertise in the work. The main role of the NGGPC is to coordinate, encourage and promote green growth in each sector and at local level. It does this through a coordinating point in the Department of Planning and Investment of provinces and relevant ministries and agencies. Through coordination with the NGGPC, these coordination points will have the responsibility, among other activities, to mainstream green growth into sectoral and local strategies, plans, programmes, projects and activities.



Figure 3. Green Growth coordinating mechanism. Source: NGGS, p. 61

4. Monitoring and Evaluation

The NGGPC is responsible for monitoring and reporting on the implementation of green growth in socio-economic development. Progress is measured against indicators of the dimensions of each pillar of green growth. For the environmental pillar, there are two indicators in the cleanliness and environmental friendliness dimension which directly measure GHG emissions. These are:

- **3.2.4.** Proportion of greenhouse gas emissions to GDP (tonne/GDP-million)
- **3.2.8.** Average greenhouse gas emissions per person (tonne/person/year)

In addition, there are indicators which relate to the causes of GHG emissions or sequestration of GHG. These are:

- **3.2.3.** Percentage of garbage or wastes which are reused or disposed through proper methods and sites (%)
- **3.2.4.** Rate of forest cover
- 3.2.5. Proportion of use of clean energy (hydroelectricity, solar energy and wind energy)(%)

5. Low emissions development in the Green Growth Strategy

As shown in Section 2, GHG emission reduction figures prominently in the definition of green growth in Lao PDR and in the cross-cutting areas, and there are relevant indicators to measure progress. However, this emphasis is not translated into all of the relevant sectors.

Natural Resources and Environment Sector

This is the first of the seven key sectors identified in the NGGS. As the sector responsible for climate change mitigation and greenhouse gas emissions, it is central to low emissions development. In spite of this, there is no mention of GHG emissions in the priorities for the sector, nor is there any reference to the climate change strategy or action plan. The closest links are enhancement of the sector's role in coordinating with other sectors to complete the survey, allocation and participatory formulation of the national land management and use plan, and improving pollution control, including air pollution.

Agriculture and Forestry

A key focus in the forestry sector is the development of forests, in line with the goal of achieving 70% forest cover by 2020. The role of forests in carbon sequestration is one of a number of important features which the NGGS notes about forests.

Industry and Commerce

The Industry and Commerce sector does not specifically mention GHG emissions or low carbon development but it does focus on environmental friendliness and cleanliness. In manufacturing, the NGGS applies in a context of mainly small and medium-sized manufacturing businesses which use inefficient techniques and technology, and have a low level of environmental friendliness in terms of energy saving, waste management and clean energy. Priorities which contribute to low carbon development are building environmentally friendly infrastructure for the disposal or destruction of waste, improving standards relating to pollution, and improved support for green and sustainable operation of SMEs in the form of, for example, facilitating access to funding sources; and access to clean, advanced, efficient and effective technology. Relating to trade, priorities include the promotion of green and environmentally friendly products in domestic and

international markets, the issue of certificates, trade exhibitions for green and environmentally friendly products, and more facilities for investment in the production and movement of goods in a green and environmentally-friendly manner.

Public Works and Transport

Urban development and inland transportation are priorities. The focus in urban development is the development of "beautiful towns with artistic and cultural value, green and most liveable"⁴ as well as the provision of infrastructure to cater for increasing populations, and increased resilience to climate change. Although there is no specific mention of climate change, there are points of focus promoting cleanliness and environmental friendliness. These are:

- The promotion of construction materials which are efficient and environmentally friendly
- Increasing the effectiveness and efficiency of waste management systems
- Promoting domestic and foreign investment in waste-related business activities
- Improving infrastructure (treatment systems) and the environmental protection and management system in urban areas to reduce waste from factories, hotels, guest-houses, restaurants and people's homes

Priorities in the transport sector are directly or indirectly related to low emissions development and the reduction of GHG emissions is specifically referred to as an aim of two of the priority actions. Actions include:

- Improving urban transportation infrastructure to create favourable conditions for pedestrians and non-motorised vehicles (bicycles), and provision of public transportation (buses)
- Raising awareness and creating values to promote walking, non-motorised vehicles (bicycles) and public transportation by expanding service networks, improving service quality and setting reasonable charges
- Promoting the production, import and use of transport vehicles which use clean energy or energy which is available in the country, such as: electric vehicles that use hydro or solar energy

Energy and Mines

It is noted that the techniques and technology in use in Lao PDR and in many countries in the Greater Mekong Subregion (GMS) are mostly old and are not energy-efficient. There is a recognition of the role that unclean energy plays in GHG emissions leading to climate change. Relevant priority actions include:

- Promoting public and private sector investment in hydroelectricity, solar energy and wind energy with a focus on improving laws, regulations and coordinating mechanisms to attract investors.
- Enhancing cooperation at regional and international levels in conducting studies and building technical capacity with a focus on international cooperation in security work, and the resolution of emergency problems related to alternative energy such as nuclear energy and hydrogen energy
- Increasing the efficiency of clean energy use by promoting and facilitating the production and use of materials, production equipment, transport vehicles, techniques and technology

⁴ Government of Lao PDR, 'National Green Growth Strategy of the Lao PDR till 2030'. p. 42-3.

which are energy-saving while restricting the import of materials, production equipment, transport vehicles, techniques and technology which are energy- wasting

• Reducing the use of unclean energy, such as: biomass energy (charcoal, firewood, etc.)

Information, Culture and Tourism

The tourism sector has potential for green growth as it rebuilds after the Covid-19 pandemic. Priority actions include:

- Coordinating with business units, particularly tourism/travel companies, transportation services, accommodation places, restaurants, and other tourism services to use energy economically and to use clean and environmentally-friendly products.
- Developing and implementing standards for green tourism cities, green tourism sites and green tourism service places (tourism/travel companies, hotels, resorts, guesthouses, restaurants and entertainment places). This consists of developing standards, conducting assessments, issuing certificates and promoting green tourism service places.

Science and Technology

There is a priority on strengthening the research network in Lao PDR for the purposes of implementing the NGGS. This includes capacity building, implementing financial mechanisms to fund research, and mainstreaming the results of research and lessons learned from international organizations and foreign countries into the formulation and implementation of national, sector and local green growth strategies.

6. Urbanisation in Lao PDR

Lao PDR has been shown to have the most rapid rate of urbanisation in Southeast Asia,⁵ with the 2015 census showing approximately 33% of the population living in urban areas, mainly in Vientiane Capital.⁶ Almost half of the national population is concentrated in five high density areas, with 50% of the urban population residing in Vientiane.⁷ Settlements in Lao PDR can be ranked from cities with a population of over 100,000, large provincial towns, small provincial towns and district capitals, then rural towns. Many smaller settlements are becoming more urban in nature due to a range of factors including rural-urban migration and government policies. Urban planning is not strong, particularly at local levels, and the populations of many small towns do not have access to basic services. Infrastructure such as waste management is often lacking. Most provincial and district towns have urban development plans prepared in the 1990s or 2000s, however, there is limited evidence that the plans have been implemented.⁸

⁸ Bosoni, N., Epprecht, M., & Hayward, D., 'Urbanization Processes in the Lao PDR: Processes, Challenges and Opportunities.', 2018, https://www.shareweb.ch/site/Poverty-Wellbeing/equality-equity-inclusion/Documents/Lao_Urbanization_Study_CDE_final.pdf.

⁵ UN-Habitat, 'World Cities Report 2016: Urbanization and Development - Emerging Futures' (Nairobi, 2016), https://unhabitat.org/sites/default/files/download-manager-files/WCR-2016-WEB.pdf.

⁶ Lao Statistics Bureau, 'Results of Population and Housing Census, 2015' (Vientiane Capital, 2015),

https://lao.unfpa.org/en/publications/results-population-and-housing-census-2015-english-version.

⁷ UN-Habitat, 'Urbanization: A Rapidly Emerging Development Issue for Lao PDR', Position paper (Vientiane, 2020),

https://www.fukuoka.unhabitat.org/docs/publications/pdf/habitat_newsletter/1_Urbanization_Rapidly_Emerging_Develo pment_Issue_for_Lao_PDR_paper_APA.pdf.

6.1. Green growth in urban areas in the National Green Growth Strategy

Of the seven key sectors identified in the NGGS, Public Works and Transport is the most directly related to urban development as the Ministry of Public Works and Transport (MPWT) houses the Department of Housing and Urban Planning (DHUP). Although the need for low emissions development is not mentioned with regard to urban development, there are two priorities which are linked to low emissions development. These are the improvement of waste management systems and infrastructure, and the promotion of environmentally friendly construction materials. The need to reduce GHG emissions is more explicit in the transport sector, with moves to promote alternatives to motorised transport and fossil fuels.

Two other sectors which are relevant to low emissions development in urban areas are the energy and industry sectors. In the energy sector there has been an emphasis on hydroelectricity, and there is nearly 100% access to electricity in urban areas,⁹ mostly from hydropower sources. Despite this, there is still widespread use of biomass fuels. The development of clean, renewable sources of energy is a key focus.

As the sites of much of the industrial development, urban areas are also linked to the industry sector. Priorities on waste management and improving access to clean, efficient technology are relevant to urban areas.

⁹ https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?locations=LA





Photo by UN-Habitat Lao PDR/Juan Torres

The second part of the review employs the following methodology to identify opportunities and gaps for urban, low-emissions development:

- 1. Identify major sources of urban GHG emissions from current, available data;
- Identify policy documents related to the key GHG emission sources, and investigate links between low-emissions development in the green growth strategy, and the same in the identified policy documents;
- 3. Highlight the opportunities and gaps in policy frameworks for urban, low-emissions development, as revealed in linkages between policies.

1. Major sources of GHG emissions in Lao PDR urban areas

The calculation of GHG emissions is at a relatively early stage in Lao PDR. The most recent national GHG inventory (GHGI) was carried out with a base year of 2014 using the 2006 Intergovernmental Panel on Climate Change (IPCC) guidelines. Since there is a dearth of country-specific data, default emission factors were used. The inventory covered the Energy, Industrial Process and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU) and Waste sectors. It calculated emissions of CO₂, CH₄ and N₂O. The inventory showed total net emissions of 24,099.98 GgCO₂eq,¹⁰ comprising 18,793.41 GgCO₂eq from the AFOLU sector, 3,729.42 GgCO₂eq from energy, 1,151.89 GgCO₂eq from IPPU and 425.26 GgCO₂eq from Waste.¹¹ These results are shown in **Error! Reference source not found.Error! Reference source not found.** At the national level then, the key net emitting sector was the AFOLU sector, suggesting that urban areas were not responsible for most of the emissions in Lao PDR.

To gain an understanding of emissions at the city level, GHGIs were completed in the cities of Pakse and Kaysone Phomvihane, with a base year of 2019. The 2006 IPCC guidelines were used, along with city level tools, namely the City Inventory Reporting and Information System (CIRIS) and the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC). Emissions from the stationary energy, transportation, waste, and AFOLU sectors were estimated. Three of these sectors were included in the national GHGI, however, there was inadequate data and minimal activity in the IPPU sector and so it wasn't included in the city inventories. A sector in the city GHGIs which wasn't in the national one is transportation. Results from the city GHGIs are shown in **Error! Reference source not found.**.

Although the sectors in the two cities have different proportions of emissions by sector, it is clear that stationary energy is the highest emitter in both cities, followed by waste. In Kaysone Phomvihane there were higher numbers of livestock within the city boundary than those within the Pakse boundary, and this is one reason for higher emissions from the AFOLU sector than from the

¹⁰ GgCO₂eq refers to Gigagrams of CO₂ equivalent emissions.

¹¹ Ministry of Natural Resources and Environment; Department of Climate Change, 'The First Biennial Update Report of the Lao PDR', 2020, https://unfccc.int/sites/default/files/resource/The%20First%20Biennial%20Update%20Report-BUR_Lao%20PDR.pdf.

transportation sector in Kaysone Phomvihane. Emissions from the transportation sector were $9,380 \text{ tCO}_2\text{e}^{12}$ in Pakse and $9,373 \text{ tCO}_2\text{e}$ in Kaysone Phomvihane.









2019 Emissions by sector in two cities

¹² tCO2e refers to tonnes (t) of carbon dioxide (CO2) equivalent (e)

When comparing results from the national GHGI with those of the two cities, the AFOLU sector was responsible for a far larger proportion of the emissions in the national GHGI. This is logical, since there is a higher percentage of land which is used for AFOLU purposes outside city boundaries than in urban areas. The second highest sector in the national inventory, energy, corresponds to the highest emitting sector in the city inventories. Waste had a higher percentage of emissions in the cities than it did nationally. Again, this is logical, since urban areas have greater economic activity and denser populations, and therefore, produce more waste.

It cannot be assumed that every city in Lao PDR has the same emissions by sector as Pakse and Kaysone Phomvihane. For example, some cities have a higher amount of industrial activity than others so it would be expected that they would have more IPPU emissions. The city GHGI report also noted limitations in data and technical capacity. Specifically, "several data are missing, inconsistent and lacks update."¹³ However, since there is not widespread data available for urban emissions in Lao PDR, this review will take the 2014 national and 2019 city GHGI data into account and consider that the highest emitting sectors in urban areas are 1. Stationary energy, 2. Waste, and 3. Transportation.

Stationary energy

The main sources of stationary energy emissions in Pakse and Kaysone Phomvihane were from the residential sector, with fuel wood and charcoal consumption accounting for over half of the emissions. The second biggest source was emissions from electricity supply to and loss from the grid.

Transportation

It was estimated that approximately 90% of emissions were from fuel consumption for road transport and approximately 10% were from aviation.

Waste

The GHGI included emissions from municipal solid waste (MSW) which was disposed of in a landfill, dumped in other locations or burned in the open, and wastewater discharged within the city boundaries. Estimations of emissions from the different activities in the waste sector are shown in Table 2, where it can be seen that the highest volume of emissions was from landfills, followed by wastewater, and solid waste which was either dumped in locations other than a landfill or burned in the open.

Type of waste	Percentage of total emissions from waste				
	Pakse	Kaysone Phomvihane			
Landfill	80	76			
Unmanaged solid waste	5	9			
Open burning of waste	6	0			
Wastewater	9	16			

Table 2. Focus areas, focus sectors and supporting sectors in the NGGS.

A review of the available GHGIs at the national and city levels suggests that high emitting activities in cities in Lao PDR are fuel wood and charcoal consumption, electricity supply to and loss from

¹³ Mone Nouansyvong, 'Pakse and Kaysone Phomvihane City GHG Inventory 2019', 2020.

the grid, solid waste disposal in landfills and wastewater. While transport emissions did not figure as prominently in the GHGIs, it is worth noting that road vehicles are increasing at a high rate, from 1 million in 2010 to 1.85 million in 2016,¹⁴ while in Vientiane Capital, private registered vehicles have increased in number by more than 10% per annum since 2009¹⁵. Fuel consumption by road vehicles is only one example of an emitting activity that is on a trajectory to increase in the future, and this needs to be taken into account.

2. Policy related to key GHG emission sources

9th National Socioeconomic Development Plan

The NGGS has been mainstreamed into the 9th NSEDP. Output 2 (Green growth and climate change actions) of Outcome 4 (Environmental Protection and Natural Disaster Risk Reduction) includes priority activities, of which key relevant points, aligning with the NGGS, are summarised below:

- Promotion of a circular economy that applies concepts of reduction, reuse, rejection and recycling industrial development: by-products or waste from one factory to be inputs for another to increase efficiency, and to reduce waste
- Small and medium enterprises (SMEs): Encouraging tourism supporting businesses to efficiently use natural resources and energy and reduce waste
- Urban planning: Urban building construction in municipal areas that promotes green, liveable cities with climate resilient infrastructure; improving treatment facilities; and urban environmental protection and management systems to reduce waste from industrial and hospitality businesses and people's houses
- Waste: Improving the efficiency and effectiveness of solid waste and other waste management by raising awareness on littering, segregating waste for recycling and reuse, reducing the use of single-use materials, promoting the use of biodegradable products; building and improving well-functioning landfills; and promoting local and foreign investments in waste recycling
- Transport sector: Promotion of vehicles using clean energy or energy which is available in the country, such as electric vehicles that use hydro energy and solar energy; promotion of biofuel plants from palm oil, kerosene and cassava; and projects demonstrating methane production for transportation and industry to reduce fossil fuel imports
- Energy sector: Encouraging green infrastructure development and improving energy; selectively promoting public, private and foreign direct investments in electricity generation from hydro-power, solar and wind energies through monetary incentives such as tax incentives. Developing regulations and manuals for energy saving and conservation for industrial plants, office buildings and electrical equipment and energy appliances; promoting energy management systems in buildings and industrial plants.

¹⁴ Global Green Growth Institute, 'Lao PDR(LA04) Business Case for Electric Vehicle Dissemination in Vientiane, Lao PDR', Project Reference Profile, 2021, https://gggi.org/project/project-reference-profiles-lao-pdrla04-business-case-for-electric-vehicle-dissemination-in-vientiane-lao-pdr/.

¹⁵ Global Green Growth Institute, 'Accelerating Climate Ambition and Building Back Better', Annual Report 2020, 2021, https://report.gggi.org/2020/assets/PDFs/21008_GGGI_AnnualReport2020_PRINTversion_v09_RC.pdf.

Climate Change

With its aim of mitigating and adapting to climate change, the <u>Strategy on Climate Change of the</u> <u>Lao PDR</u> shares with the NGGS the aim of reducing GHG emissions. Like the NGGS, the Strategy on Climate Change is to be mainstreamed into strategies, plans and projects. Specific options in relevant sectors include:

- Accelerating the development of renewable energy sources
- Introducing energy-efficient lighting, appliances and buildings
- Promoting the use of alternate energy powered motor vehicles
- Applying the 3Rs to waste (reduce, reuse and recycle)
- Attaining full coverage of major urban centres with solid waste collection
- Building recycling facilities
- Composting organic contents to manufacture organic fertilizers
- Effectively managing sewage sludge from domestic septic tanks and slurry from waste treatment plants
- Constructing landfill facilities that can capture methane
- Promoting environmental, sustainable urban development, integrating the issues of waste management and low carbon transportation

Urban Development

An urban development strategy was drafted in 2017, to which amendments are still being made. A 2021 draft of the urban development strategy (2021-2030) has a ten-year vision to "build cities and urban settlements that are unique, green, modern, liveable, climate-resilient and sustainable, and that promote socio-economic development and national connectivity."¹⁶ The strategy includes emphases on urban development plans, infrastructure, capacity building and development of the legal system.

The 2021 draft does not focus on GHG emissions, and it contains only two specific mentions of greenhouse gases. The first is in a paragraph which explains the NGGS, and the second is in a description of an infrastructure and urban environment project which includes the promotion of sustainable transport systems with low emissions. A section on the environmental context deals with solid waste and the use of fossil fuels but it does not link these to GHG emissions and climate change.

Further on, the draft notes that there are environmental opportunities in the form of appropriate solid-waste management and waste-water management, the introduction of sustainable energy options, and climate-smart transport systems. The draft includes five priority programmes each comprising a number of projects. While three of the projects have aspects that deal with the environment in general, Project 7 focuses on solid waste management, waste water and drainage as well as a specific component to, "promote use of transport systems in urban areas that have low emissions and are sustainable."¹⁷ This is the only aspirational statement that is directly related to low-emissions development.

¹⁶ Ministry of Public Works and Transport and Department of Housing and Urban Planning, 'Urban Development and Housing Strategy (2021-2030): Building Unique, Green, Modern, Liveable, Climate-Resilient, Sustainable Cities and Urban Settlements Promoting Socio-Economic Development and National Connectivity (Draft)', 9 December 2021.

¹⁷ Ministry of Public Works and Transport and Department of Housing and Urban Planning, 'Urban Development and Housing Strategy (2021-2030): Building Unique, Green, Modern, Liveable, Climate-Resilient, Sustainable Cities and Urban Settlements Promoting Socio-Economic Development and National Connectivity (Draft)'.p. 9.

Stationary Energy

There is no overall energy strategy for Lao PDR. A <u>Law on Electricity</u>, which was amended in 2011, and a 2011 <u>Strategy on Renewable Energy</u> are key policy documents. The Strategy on Renewable Energy has a target of renewable energy sources providing 30% of the total energy consumed in 2025. There is a focus on developing biofuels, small power, and other renewable energies such as solar, biomass, biogas and wind.

Waste

Although the 9th NSEDP promotes a circular economy, there are not yet policies or regulations, either at the national or subnational level, in support of waste-to-resource approaches.¹⁸ The Ministry of Public Works and Transport (MPWT) is currently exploring sustainable solid waste management practices.

Transport

The Department of Transport of MPWT has been following a strategy of environmentally sustainable transport (EST). At a local level, much of the activity has focussed on Vientiane Capital.

3. Opportunities and challenges

Green growth has been mainstreamed into the 9th NSEDP through the integration of the NGGS. While reducing emissions is articulated in the key parts of the NGGS, it is not prominent in sectoral priorities, which focus more on visually obvious aspects of "green" environments such as greenery, lack of pollution and lack of waste. There are, however, opportunities to promote low-carbon development through the cross-cutting and sectoral strategies which guide planning. Since the NGGS relies on sectoral budgets for implementation, alignment with sectoral budgeting increases the financial viability of actions. Opportunities are described below.

Developing urban plans for all urban areas, including small and emerging towns, district capitals and larger towns and cities. This is particularly important for towns that are rapidly growing and are still taking shape such as those along the economic corridors. It is imperative that planning is forward-thinking and includes integrated climate action.

Building capacity across sectors in government and private sector stakeholders. Climate change is still a relatively misunderstood concept in many areas in Lao PDR. There is a need for capacity building to accompany interventions in all sectors and to include education and awareness on climate change and the need for reducing GHG emissions.

Promoting small-scale renewable energy sources. This aligns with the government's target of having 30% of total energy coming from renewable sources by 2025. It is also significant in that stationary energy was the highest emitting sector in the 2019 city GHGIs in Lao PDR, with the major share of emissions coming from the consumption of charcoal and fuelwood.

As income increases, many people are turning from burning biomass for fuel, to alternative energy sources. At this point, there is the potential to create demand for clean energy sources, with the option of enterprise development to meet demand. There are already numerous examples of pilot

¹⁸ Korean Ministry of Economy and Finance, 'Sustainable Solid Waste Management in Laos', 2021, https://www.ksp.go.kr/english/pageView/info-eng/774.

solar energy projects in towns throughout Lao PDR. Demonstrations for such purposes as street lighting are an entry point.

Promoting waste management systems that capture GHGs. Waste management is a key priority in larger towns and cities as well as emerging towns. There is an opportunity to employ technical solutions that reduce GHG emissions from waste. This is significant when considering that waste is the second highest source of emissions in towns, according to the 2019 GHGIs.

Reducing GHG emissions from road transport. Road transport is a source of increasing GHG emissions as the number of vehicles increases. While electric vehicles (EV)s are an oft quoted solution to vehicle emissions, they come at a high cost in terms of infrastructure such as charging points, and may not be feasible for all urban areas in the foreseeable future. Other options include implementing town plans that are designed to reduce the need for travel, and developing the infrastructure to regulate fuel quality and vehicle emissions from petrol driven vehicles.

While there are many opportunities presented in planning, there are challenges to implementation of many of the plans.

A key issue is lack of finance to develop in a low-carbon manner. The private sector is one source of funds which has the potential to be more engaged in low-carbon development.

Green growth is fairly well known in relevant circles in Lao PDR, with the understanding of economic growth in a manner that is conducive to social and environmental well-being. However, there is not a widespread realisation that emissions reduction is an aspect of green growth. This low level of understanding results in low levels of promotion of low-carbon development. It is, therefore, essential that awareness is built of the role of low-carbon development in emissions reduction, and of its contribution to green growth.

Conclusions

Low emissions development occupies a central place in the broad framework for green growth in Lao PDR. Since the NGGS is required to be mainstreamed into sector and local planning, this implies that low emissions development is required to be mainstreamed. However, when looking at specific priorities in the seven key sectors, GHG emissions are less prominent. In some cases, there is a focus on "clean" development which, according to the NGGS definitions, includes low emissions development. Overall, however, there is not an emphasis on low emissions development in sectoral priorities, even for the natural resources and environment sector, which is responsible for climate change mitigation oversight. Of the seven key sectors in the NGGS, Public Works and Transport, Energy and Mines, and Industry and Commerce have the highest relevance to urban areas. In urban development, low emissions development is not a major, explicit goal in the 2017 Urban Development Strategy draft, with only one specific achievement target linked to reducing GHG emissions. The lack of focus on low emissions in sectors suggests a disconnect between the aspirations of the NGGS and implementation in sectors. This presents a challenge to taking up opportunities for low-emissions development in urban areas, such as integrating climate action into urban plans, building capacity in climate action in government and private sector stakeholders, promoting small-scale renewable energy sources, promoting waste management systems that capture GHGs, and reducing GHG emissions from road transport. It is important that low emissions development is represented in targets for all relevant sectors in order to achieve green growth objectives.

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