

Energy Security White Paper: Policy Directions for Inclusive and Sustainable Development for Lao PDR and the Implications for ASEAN

Edited by

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Energy Security White Paper:

Policy Directions for Inclusive and Sustainable Development for The People's Democratic Republic of Lao and the Implications for the Association of Southeast Asian Nations

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Sepon Mine Vilabouly district, Savannakhet Province, Southern Lao

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Hongsa Coal Fired Power Plant

Ban Han, Hongsa, Sainyabuli, Lao

Foreword

Saleumxay Kommasith
Deputy Prime Minister and Minister of Foreign Affairs
Lao People's Democratic Republic

Over the past decades, rapid economic development has transformed Southeast Asia, preparing the region to join the international production network. This transformation has enabled vibrant exports of manufacturing products, textiles, and other high-valued-added goods, including energy, from the Association of Southeast Asia Nations (ASEAN) to the global market. This success is largely due to global investments attracted by the region's favourable labour force, growing connectivity, innovation, and regional political stability driven by ASEAN's vision.

This achievement reflects the collective efforts of ten Southeast Asian countries to promote mutual trust and cooperation, broadening collaboration with nations worldwide for regional prosperity. However, the ASEAN region, like others, faces numerous challenges, including maintaining economic growth, addressing climate change, managing natural disasters, and tackling both traditional and non-traditional security issues. Lao PDR, in particular, must broaden its macroeconomic structure and policies to address current economic issues – such as inflation, currency depreciation, and employment – and future challenges related to green growth for sustainable development.

In 2024, Lao PDR has set the theme for its ASEAN Chairmanship as 'ASEAN: Enhancing Connectivity and Resilience.' Under this theme, energy security remains a key priority for ASEAN, supporting inclusive and sustainable economic growth in the region.

ASEAN countries are parties to the Paris Agreement, committing to reducing global greenhouse gas emissions (GHGs) as outlined in each country's Nationally Determined Contributions (NDCs). To achieve the carbon neutrality target by mid-century, countries must pursue alternative fuel pathways, shifting from fossil fuel-based energy systems to cleaner energy systems. Multiple decarbonisation pathways are essential. Amongst the policies and measures encouraging investment in a sustainable energy system and energy security, energy efficiency and conservation are considered low-hanging fruits for curbing energy consumption and reducing CO₂ emissions.

Many ASEAN countries are rich in natural resources and renewable energy, including solar, wind, biomass, geothermal, and hydropower. With the right policies, the region can accelerate the deployment of these renewable resources to green its energy system. Lao PDR, in particular, can play a significant role in contributing renewable electricity to help decarbonise the ASEAN grid through power connectivity and trade. The gradual adoption of hydrogen and ammonia as fuel presents untapped potential for clean energy, converting surplus renewable energy from hydropower, solar, wind, and biomass into clean fuel molecules like hydrogen and ammonia. These could be used in transportation, power generation, and industries, benefiting countries that can produce green hydrogen and ammonia. Lao PDR stands to gain significantly from this, given its abundant renewable resources.

Despite exporting electricity to neighbouring countries, Lao PDR has a high dependency on imported finished petroleum products such as gasoline, diesel, liquefied petroleum gas (LPG), and kerosene for domestic consumption in transportation, commercial, and residential sectors. This dependency makes Lao PDR's energy supply security vulnerable, necessitating an appropriate energy security strategy to mitigate potential risks.

This White Paper provides key policy directions for all involved sectors, emphasising the importance of cooperation, collaboration, and investment in creating a resilient, inclusive, and sustainable energy system. Sustainable finance, through investments in clean technologies, renewables, energy efficiency, ecotowns, smart grids, electric vehicles, and battery energy storage, can drive sustainable development and decarbonisation in the region.

While policies are advancing to support clean and renewable energy development, unnecessary energy subsidies must be scrutinised. These subsidies place an economic burden on many countries, particularly developing economies in ASEAN, deter investment in energy infrastructure and efficient technologies, and undermine renewable energy initiatives. Although some ASEAN countries have acted to remove these subsidies, governments must do so cautiously, as removing subsidies can be politically sensitive. Inefficient subsidies can lead to increased energy demand, fiscal pressure, harmful emissions, and hinder sustainable green growth. However, targeted subsidies are essential to support the energy poor.

Financing clean technologies and renewables is a critical issue in Lao PDR and ASEAN. Innovative financing mechanisms, including blended finance, can help make renewable projects and clean energy development technologies bankable. New sources of capital mobilisation through green bonds, sustainable bonds, social bonds, and climate transition bonds can accelerate the deployment of clean and renewable technologies in the region.

ASEAN must enhance cooperation under its three community pillars: promoting infrastructure connectivity, narrowing the development gap, promoting greater economic integration and people-to-people exchanges, and strengthening relations with external partners. This approach will maintain ASEAN's relevance and centrality in the evolving regional architecture. Regional and international cooperation can facilitate technological transfers and lower the cost of clean and renewable energy deployment in ASEAN. Under Lao PDR's ASEAN Chairmanship, the country aims to expand ASEAN's external relations, strengthen ASEAN's centrality and unity, and construct a regional architecture for stability, peace, and development.

Promoting carbon neutrality and ensuring national and regional energy are critical for inclusive and sustainable development. This energy policy white paper calls for cooperation from all stakeholders in policy design and implementation at all levels. Lao PDR is ready to support the development of policies and measures suggested in the White Paper and to collaborate bilaterally, regionally, and internationally to achieve carbon neutrality by 2050.



Saleumxay Kommasith

Deputy Prime Minister and Minister of Foreign Affairs
Lao People's Democratic Republic

Preface

Chansaveng Boungnong
Deputy Minister, Ministry of Energy and Mines
Lao People's Democratic Republic

I am very delighted to see the comprehensive development of the Energy Policy White Paper on 'Energy Security Policy Directions for Inclusive and Sustainable Development for Lao PDR and the Implications for ASEAN.' This White Paper has been developed through careful processes, including two extensive stakeholder consultations to gather views and feedback from line ministries, involved agencies, embassies, and experts on key issues around energy security, inclusive growth, and sustainability of the energy system.

The White Paper reflects the commitment of both parties, 'The Ministry of Energy and Mines (MEM), Lao PDR, and the Economic Research Institute for ASEAN and East Asia,' as outlined in the signed 3-year Memorandum of Understanding (MoU). Under this MoU, ERIA provides technical support to MEM during Lao PDR ASEAN Chairmanship and follows up on the Energy Security White Paper. I am also very pleased that ERIA plays critical role in supporting ASEAN countries in the energy transition. As you may be aware, Lao PDR, as well as the rest of ASEAN, are facing tremendous challenges regarding the future energy landscape and how the energy transition will embrace a new architecture, including sound policies and technologies to ensure energy access with affordability, energy security, and energy sustainability. Pathways towards carbon neutrality could be diverse amongst countries. Availability, accessibility, and affordability of energy supply are the most fundamental requirements for Lao PDR with respect to the energy security and sustainable development.

Lao PDR's high potential renewable energy resources, such as hydro, solar, wind, and biomass, could be utilised at optimum levels to accelerate the share of renewables in the energy mix. These renewable resources could allow Lao PDR to build a green and resilient economy. Lao PDR is in a good position not only to achieve the decarbonisation of its own energy system, but also to help green the ASEAN Grid through power exchange and the future power market of ASEAN.

In the context of energy security, Lao PDR could be more resilient if all end-use sectors move towards electricity usage. The adoption of electric vehicles (EV) could be a good strategy, as it would reduce the import of petroleum products such as gasoline, diesel, LPG, and kerosene. Accelerating the use of electricity in all sectors will bring about new opportunities for developing clean fuels such as ammonia and hydrogen, which could be used for industries and heavy-duty transport modes for both inland and waterway transportation. Furthermore, green ammonia will provide a new opportunity for producing green agricultural fertilisers domestically, reducing the need to import fertilisers and petroleum products.

Although Lao PDR is expected to have a high share of renewables, some petroleum products will continue to play roles in the energy mix. Therefore, it is crucial for Lao PDR to leverage energy cooperation through existing ASEAN mechanisms such as the ASEAN Petroleum Security Agreement (APSA) to ensure mutual assistance during times of distress when energy supplies are disrupted by extreme weather conditions or terrorist attacks. Nonetheless, Lao PDR must also have systems in place to respond to supply disruptions, requiring reserve capacity and the ability to act in emergencies.

The next steps involve accelerating energy cooperation to ensure that Lao PDR is equipped with the human resources needed to handle required technologies for the transition and future challenges. This includes gaining knowledge of smart grids, the Internet of Things, possibly Artificial Intelligent (AI) and automation in the power sector, as well as understanding EVs and recycling if transportation shifts towards electricity and hydrogen fuel. Closing knowledge gaps in technology know-how for energy transitions and future technologies is paramount.

The Ministry of Energy and Mines, Lao PDR (MEM), seeks cooperation at all levels within the government, line ministries, agencies, and involved stakeholders to participate in the process of building strategic policies to safeguard Lao PDR's energy security while ensuring inclusiveness and sustainable development. I extend my sincere appreciation to ERIA and the experts led by Dr Han Phoumin, my senior staff such as Permanent Secretary Mr Khamso Kouphokham, Director General of the Research Institute for Energy and Mines Dr Anousak Phongsavath, and all DGs and key staff for their strong collaboration and hard work in shaping this important policy direction on energy security for inclusiveness and sustainable development for Lao PDR, with significant implications for ASEAN.



Chansaveng Boungnong

Deputy Minister, Ministry of Energy and Mines
Lao People's Democratic Republic

Preface

Tetsuya Watanabe

President of Economic Research Institute for ASEAN and East Asia (ERIA)

Since the 2020s, the world has navigated complex socio-political challenges, including the Covid-19 pandemic, the prolonged Russia–Ukraine war, Middle East tensions, and the ongoing economic conflict between the United States and China. Amongst the numerous issues arising from these black swan events, high energy costs have the potential to divert countries from long-term decarbonisation efforts. These events have also served as a wake-up call for countries to secure their energy sources while maintaining commitments to achieve carbon neutrality by 2050.

The Economic Research Institute for ASEAN and East Asia (ERIA) has actively supported the Association of Southeast Asia Nations (ASEAN) by crafting a regional decarbonisation roadmap and providing perspectives on energy transition technologies. These efforts help countries embark on the right paths for a smooth energy transition. Moving towards a green and clean energy system will depend on clean technologies, fuels, and the deployment of renewable energy resources. In this regard, energy policy and planning must facilitate and accommodate investments in clean technologies and renewables, providing new opportunities for investment and adding value to the economy.

Technically, ASEAN is rich in solar photovoltaic (solar PV) resources, though only a few countries, such as Viet Nam, Indonesia, and the Philippines, have significant offshore wind resources. The Mekong subregion countries (Thailand, Myanmar, Lao PDR, Cambodia, and Viet Nam) are abundant in hydropower resources. High penetration of hydropower, solar PV, wind, and biomass power generation in ASEAN could be facilitated by future power connectivity and trade within the entire region. If the ASEAN electricity market gradually evolves into a multilateral electricity market, hydropower resources from the Mekong subregion could play a significant role as baseload power, complementing the high penetration of solar and wind energy. In the absence of thermal power plants, large capacity electrical discharge ‘battery energy storage’ will be needed to back up power shortages during periods of low sunshine and wind. Battery energy storage, hydrogen fuel, and ammonia could be considered as they can be produced from excess electricity generated by hydropower, solar PV, wind, and biomass.

To support Lao PDR’s ASEAN Chairmanship, ERIA and the Ministry of Energy and Mines, Lao PDR, signed a Memorandum of Understanding (MoU) to conduct a study and develop a Strategic White Paper on ‘Energy Security for Inclusiveness and Sustainable Development for Lao PDR and the Implications for ASEAN.’ This study is significant for ASEAN countries as it examines energy security while providing a direction for inclusive growth and sustainable development. The study aligns energy security objectives with countries’ long-term climate commitments as reflected in their Nationally Determined Contributions (NDCs) and carbon neutrality goals by mid-century.

ERIA's experts, together with experts from the Ministry of Energy and Mines, approached this task diligently, including a scoping analysis of key energy issues and stakeholder involvement. Key energy issues were identified by analysing the entire energy system of Lao PDR in relation to neighbouring countries. These issues related to energy security include fossil fuel import dependency, energy efficiency, power grid connectivity, power systems, transportation (including the introduction of electric vehicles), carbon credits and mechanisms, carbon markets, regional and international cooperation for innovative technological transfer, financing sustainable energy infrastructure, and closing knowledge gaps. Experts used Strength, Weakness, Opportunity, and Threat (SWOT) analysis to understand the detailed aspects of opportunities and challenges, such as establishing energy security mechanisms, scaling up renewable penetration into the energy system, introducing electric vehicles and hydrogen fuel, and developing the carbon market.

This Energy White Paper provides broad policy directions with options best suited to various energy systems. Importantly, the White Paper is based on evidence-based research findings conducted by energy experts with input from a wide range of stakeholders. I am very pleased with the entire process of developing the 'White Paper on Energy Security Policy Directions for Inclusive and Sustainable Development for Lao PDR and the Implications for ASEAN.'

I hope this White Paper will open up new opportunities for developing detailed policies to support investment in clean technologies and the uptake of renewable resources. Fast-tracking energy finance for the energy transition is critical to ensure countries can secure enough funds for their energy transformation while maintaining energy security. I also want to thank all experts, especially Dr Han Phoumin, the Senior Energy Economist who led the team of experts in this important task. I also thank Mr Khamso Kouphokham, the Permanent Secretary; Dr Anousak Phongsavath, Director General of Research Institute for Energy and Mines; and all other key stakeholders involved in developing the White Paper. Additionally, I thank the Mekong River Commission Secretariat (MRCS) for deploying their experts to contribute to the analysis of sustainable hydropower development in the Mekong subregion.



Tetsuya Watanabe

President of ERIA

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The Energy Security White Paper was developed by a working group consisting of teams from Lao PDR and the Economic Research Institute for ASEAN and East Asia (ERIA). Laotian team included experts from the Ministry of Energy and Mines (MEM), while the ERIA team brought together specialists in energy economics and policy, power systems, sustainable transport, energy efficiency and conservation, green financing, and capacity-building training. Extensive consultations were conducted with various local experts in Lao PDR's energy sector, whose feedback greatly informed the international experts on the policy directions necessary to achieve energy security in the country.

This White Paper was led by Dr Han Phoumin, Senior Energy Economist at ERIA, and co-led by Dr Anousak Phongsavath, Director General of the Research Institute of Energy and Mines (RIEM), MEM, Lao PDR.

This White Paper would not have been possible without the contributions and support of all the authors: Dr Alloysius Joko Purwanto (ERIA), Mr Kei Sudo (ERIA), Mr Jeremy Gross (ERIA), Ryan Wiratama Bhaskara (ERIA), Citra Endah Nur Setyawati (ERIA), Dr Nuki Agya Utama (ERIA), Dr Weerawat Chantanakome (Ministry of Energy, Thailand), Prof. Farhad Taghizadeh-Hesary (Tokai University, Japan), Dr Ruengsak Thitirajakul (Petroleum Institute of Thailand), Prof. Phouphet Kyophilavong (National University of Laos), Ir. Leong Siew Meng (Green Technology Solutions Pte, Malaysia), Ir. Ong Ching Loon (Cofreth (M) Sdn Bhd, Malaysia), Ir. Lam Kim Seong (Prudenergy Consulting Sdn Bhd, Malaysia), Dr Anoulak Kittikhoun (Mekong River Commission Secretariat (MRCS)), Mr Sophearin Chea (MRCS), Mr Sopheak Meas (MRCS), Ms Ly Thim (MRCS), Mr Peeti Ngamprapasom (MRCS), and Dr Hoyyen Chan (Invite Green Consultancy).

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List of Abbreviations

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CCS	carbon capture and storage
CCUS	carbon capture, utilisation, and storage
CN2050	Carbon Neutral Scenario 2050
CO₂	carbon dioxide
EDL	Électricité du Laos (Electricity of Lao PDR)
EE	energy efficiency
EEC	Energy efficiency and conservation
EGAT	Electricity Generating Authority of Thailand
EnMS	Energy management system
EPC	energy performance contract
ESCO	Energy Services Companies
EV	electric vehicle
FDI	Foreign direct investment
GCGS	green credit guarantee scheme
GDP	gross domestic product
GHG	greenhouse gas
IPP	Independent Power Producers
JCM	Joint Credit Mechanism
kWH	kilowatt hour
Lao PDR	The People's Republic of Lao
LCR	Lao–China Railway
LPG	liquefied petroleum gas

IPP	Independent Power Producers
MEM	Government of Lao PDR, Ministry of Energy and Mines
MEPS	minimum energy performance standard
MONRE	Ministry of Natural Resources and Environment
MRC	Mekong River Commission
Mtoe	millions tonnes of oil equivalent
MRV	Measuring, reporting, and verification
NDC	Nationally Determined Contribution
PNPCA	Procedures for Notification, Prior Consultation, and Agreement
R&D	research and development
SEZ	special economic zone?
TTO	technology transfer offices
TWH	terawatt-hour
VCM	voluntary carbon market