



Chapter 14

Ways to Finance Energy Supply Security in Lao PDR and Implications for ASEAN

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1. Introduction

Lao People's Democratic Republic (Lao PDR) – known as the 'Battery of South-East Asia', thanks to the development of numerous hydropower projects – is in dire need of energy security, specifically regarding diversification of energy sources. The country's reliance on hydropower is currently raising questions about the sustainability of its long-term energy plans (Blake and Barney, 2021). The rapid acceleration of development in hydropower has led to the inevitable decline of fisheries and tourism and has raised concerns about dam safety (Nhiavue et al., 2022). Issues include sediment reduction, poor soil fertilisation, and nearby active earthquake faults, which could significantly affect the safety of nearby households and result in the loss of, for example, UNESCO World Heritage status for the historic capital, Luang Prabang.

Although Lao PDR is admired for its electricity generation from its highly developed hydropower system, it is still saddled by its reliance on fossil fuels for various industries, including transport and agriculture. Moreover, despite the significant export of electricity, there is a risk of over-reliance on very few customers, making energy security and sustainability in the energy sector crucial (Käkönen and Kaisti, 2012). Proposing financial solutions represents a significant step in bringing investment towards energy security and sustainability in Lao PDR (Nhiavue et al., 2022).

Accordingly, Lao PDR must consider introducing more green finance instruments – such as green credit guarantee schemes (GCGSs), green bonds, and government subsidies – to attract investments. Such a strategy would encourage an environmentally sustainable energy sector and attract environmentally and socially conscious investors. Secondly, issuing bonds in domestic currency rather than foreign currencies should be emphasised, because issuing bonds in domestic currency enhances financial stability by mitigating currency exchange rate risks and boosting consumer confidence in investors, leading to the development of a self-sufficient financial ecosystem. Additionally, strategies must be proposed to encourage the accumulation and circulation of domestic savings for green projects rather than relying on external borrowing, which generates outstanding national debt in the long term. Finally, it is crucial to recognise the importance of institutional investments – such as pension funds, insurance companies, and credit unions – in long-term financing. This fosters a collaborative approach towards sustainable development between the public and private sectors.

This chapter aims to propose solutions and policy directions for elevating energy supply security in Lao PDR and consider its wider implications for the Association for Southeast Asian Nations (ASEAN). These solutions will promote sustainable energy resources and include financial instruments that leverage the energy transition, such as GCGSs to reduce risk, tax refunds to raise rates of return, and funds or investments to facilitate access to financing sustainable practices.

2. Current Energy Landscape and Challenges in Lao PDR

Compared to neighbouring nations, Lao PDR does not have ample fossil fuel resources; hence, it relies on imports for most of its fossil fuel energy. However, the nations' hydropower development has led the energy sector to become a key driver of economic growth (Wu et al., 2018). Over 95% of electricity is generated from hydropower in Lao PDR. The abundance of water resources allows it to be a favourable energy source, specifically around the Mekong River, known as the 'Mother of Water'. Indeed, the nation aims to become the 'Battery of South-East Asia' by exporting electricity to various neighbouring countries (Oum, 2019). Several projects, such as the Xayaburi and Nam Theun 2 hydropower projects, facilitate this ambition to cover energy needs domestically as well as those of neighbouring nations while simultaneously reducing fossil fuel dependency. However, financial, environmental, and social challenges surround this objective (Wong et al., 2023).

First, the river's capacity to support life is being undermined, as more than 160 dams operate throughout the Mekong River Basin, including 13 on the river's mainstream, with hundreds more either planned or currently under construction. Inevitably, this impacts water quality and causes a decline in fisheries. Chen, Khalili, and Pumaneratkul (2019) highlighted locals' perspective of the socio-economic impacts produced by the dams in the Lower Mekong River Basin. Although they mentioned that the impact on citizens living in the Lower Mekong River Basin area vary, they highlighted that fishers who manage caged floating fish farms along the riverbank are significantly more vulnerable to changes in water levels caused by discharges from dams in the Upper Mekong River Basin. However, at the same time, such fishing methods allow them to overlook the reduced sediment in the riverbed. Fishers using traditional fishing methods are more sensitive to the changes in the sediment and fish amounts, with many claiming that they have observed a decline in both since the dams have been constructed.

Lower fishing yields lead to health concerns for the population. According to Yoshida, Taghizadeh-Hesary, and Nakahigashi (2020), the population of Lao PDR would lose up to 30% of its annual protein intake ultimately due to the impacts of hydropower dams. Statistically, approximately 2.1 million people in Lao PDR would suffer direct and indirect livelihood losses due to hydropower development. Soukhaphon, Baird, and Hogan (2021) also found that toxic blue-green algae have been found in reservoirs and dams, which leads to illnesses and deaths amongst the human and animal populations. Additionally, children who spend time at the river to bathe and to swim are more susceptible to diseases, indicating potential health risks associated with water quality.

The uncertainty of the water quality has led many indigenous communities to relocate to areas deeper in forested or agricultural areas (Soukhaphon, Baird, Hogan, 2021). This leads to another challenge of energy access – in rural areas, many lack access to electricity due to poor grid infrastructure, as building power plants, transmission lines, and distribution networks in rugged terrain is costly and logistically difficult. Furthermore, service disruptions often occur as dense forests complicate maintenance and repairs (Suhardiman and Mayvong, 2015).

Several of Lao PDR's rural provinces have experienced low levels of economic development due to limited economic activity and lack of private investment. Power generation there has benefited disproportionately from investments; transmission and distribution projects account for just 1% of the pipeline's total value of power projects (Kamal Chowdhury et al., 2020). With adequate investment and infrastructure development, however, these provinces could cease the regional disparities in energy access and economic growth (Saleh and Liquin, 2023).

3. Role of Green Finance and Investment in Sustainable Energy Development

Green finance can be defined as any structured financial activity, product, or service designed to produce better environmental results. It consists of various loans, debt structures, and investments that are recycled to promote the growth of green initiatives, lessen the climate effect of more conventional enterprises, or a mix of the two (Chien, 2022a). Furthermore, green finance refers to using financial products, services, and investment strategies to support projects and initiatives with positive environmental benefits (Chien, 2022b). Hence, the relationship between green finance and sustainable energy development goes hand-in-hand with achieving national environmental and economic objectives.

Green bonds are a financial instrument, which comprise debt securities issued by governments, municipalities, or corporations that raise and collect funds for sustainable projects. The funds and proceeds from these bonds are designated for specific green initiatives, including the construction of renewable energy infrastructure or improvement of water conservation measures (Shibli et al., 2021). Green finance also involves incorporating sustainability principles into banking services, including offering loans and credit to green businesses.

Moreover, implementing policies and incentives through the government to accelerate green finance practices is a crucial green finance aspect. This includes tax incentives, subsidies, and regulations that force financial institutions to disclose their exposure to climate-related risks (Bai et al., 2022). Public credit guarantee schemes are also widely utilised political instruments that support firms in accessing finance while limiting the fiscal burden (World Bank, 2020). This instrument is typically effective when there is sufficient liquidity in the financial system, but it only flows to specific sectors or segments due to a high level of credit risk. Public credit guarantee schemes can help mitigate this credit risk and, therefore, facilitate the flow of bank finance.

By promoting renewable energy projects, green finance can contribute to economic growth and stability, which align with the nation's energy goals. In Lao PDR, given that the country relies on exports, investments in these projects offer significant benefits to enhance energy access, economic development, and environmental stability. Not only do green investments yield financial returns but they can also improve the livelihoods of the populations affected by the damaged water quality and economic instability.

To promote green finance in Lao PDR, policymakers can incentivise green bonds and implement financial incentives for renewable energy projects. In addition, strengthening regulatory frameworks and enhancing the transparency in green investments can attract private capital and accelerate the transition.

Case studies of successful green finance initiatives in Lao PDR provide insight into good practices and lessons learned. For instance, Lao Environmental Protection Fund (EPF) represents a green finance initiative that combines endowments and sinking funds for direct financial assistance for biodiversity conservation, pollution control, water resources management, and sustainable land resources management (UNDP, 2015). It is a government fund created to mobilise domestic and foreign funds to contribute to the management of natural resources and to protect the environment effectively and sustainably.

Although the EPF's achievement of international standards in financial integrity and social environment safeguards are successful aspects of the project, several challenges must be noted, such as limitations on quantitative data on government spending, allocation of resources in environmental protection, and reliance on external sources for capital spending (UNDP, 2015). Lessons highlighted are the importance of sustainable revenue sources, adherence to international standards, and continuous support for local beneficiaries, offering valuable insights for policymakers looking to establish comparable green finance mechanisms for sustainable development.

Although the EPF demonstrates the feasibility and positive impact of utilising green finance for sustainable energy development, challenges in implementing green finance initiatives, such as regulatory guidance and resource constraints, still impede market development in Lao PDR. Financial barriers, technological challenges, and limited local capacity have been highlighted as three central challenges to green energy investments (UNDP, 2015). Through a deeper understanding of green finance instruments as well as the strengths and weaknesses of Lao PDR, the implementation and integration of green finance to leverage investment will be clear for advancing development and energy supply security. Implementing country-specific policies and initiatives to utilise green finance is essential. By leveraging green finance instruments, addressing regulatory challenges, and fostering stakeholder collaboration, Lao PDR can unlock the potential of sustainable energy investments and advance its green growth agenda.

4. Policy Direction for Financing Energy Supply Security

The International Energy Agency defines energy security as the continuous supply of energy sources at a reasonable price.¹ In the long term, energy security involves making timely investments to deliver energy in accordance with environmental regulations and economic trends. In the short term, however, it focusses on the capacity of energy systems to respond to abrupt shifts in the supply–demand balance.

Enhancing energy security for Lao PDR – a landlocked nation primarily dependent on hydropower – requires an adjustment in strategy towards diversification, the use of renewable energy, and investments in clean energy technology. This strategy must aim to address these challenges and to reduce risks associated with energy investments' financial, technical, and regulatory aspects.

First, there is a need to promote and to implement green finance instruments, such as green bonds, GCGs, and green investment funds, to stimulate new investments in renewable energy projects in Lao PDR (Xia, Liu, Yang, 2023). These initiatives align with the world's sustainability agenda and represent a responsible and sustainable investment commitment. To control regulatory risks, the country also requires a robust and transparent regulatory framework (Sulaksana, 2023). It also necessitates coherent regulations, including those focussed on the simplification of permits, policy coordination amongst administrations, an atmosphere that provides confidence to investors, and support for sustainable energy investment (Sholoiko, 2023). Lastly, it is essential to design training programmes that focus on developing skills in project management, renewable energy systems, and financial risk assessment to enable local actors to manage energy projects, leading to self-sufficiency and sustainability in the energy sector.

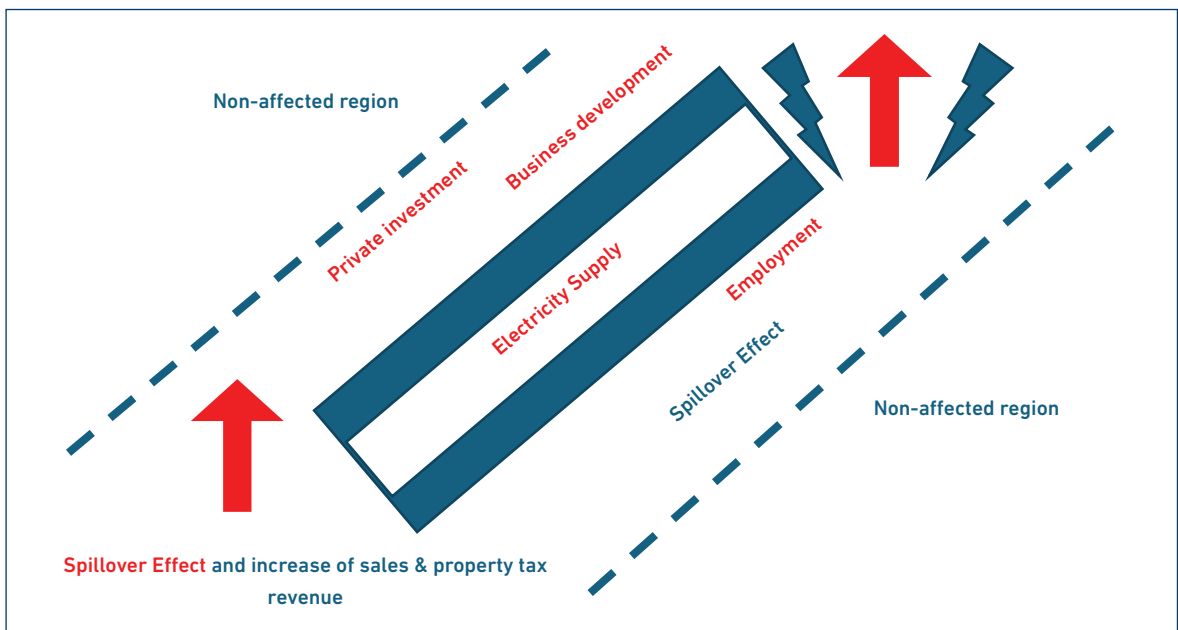
¹ IEA, Energy Security, <https://www.iea.org/topics/energy-security>

5. Key Recommendations

5.1. Utilise the Spillover Effect

To increase the investment incentives for funding sustainable energy development, the government should utilise the spillover effects created by energy supplies and refund the tax revenues to the investors of the energy projects. This is suggested as the government often regulates electricity tariffs, and private financial institutions struggle to finance these infrastructure projects (Figure 14.1).

Figure 14.1. Spillover Effects of Electricity Supply



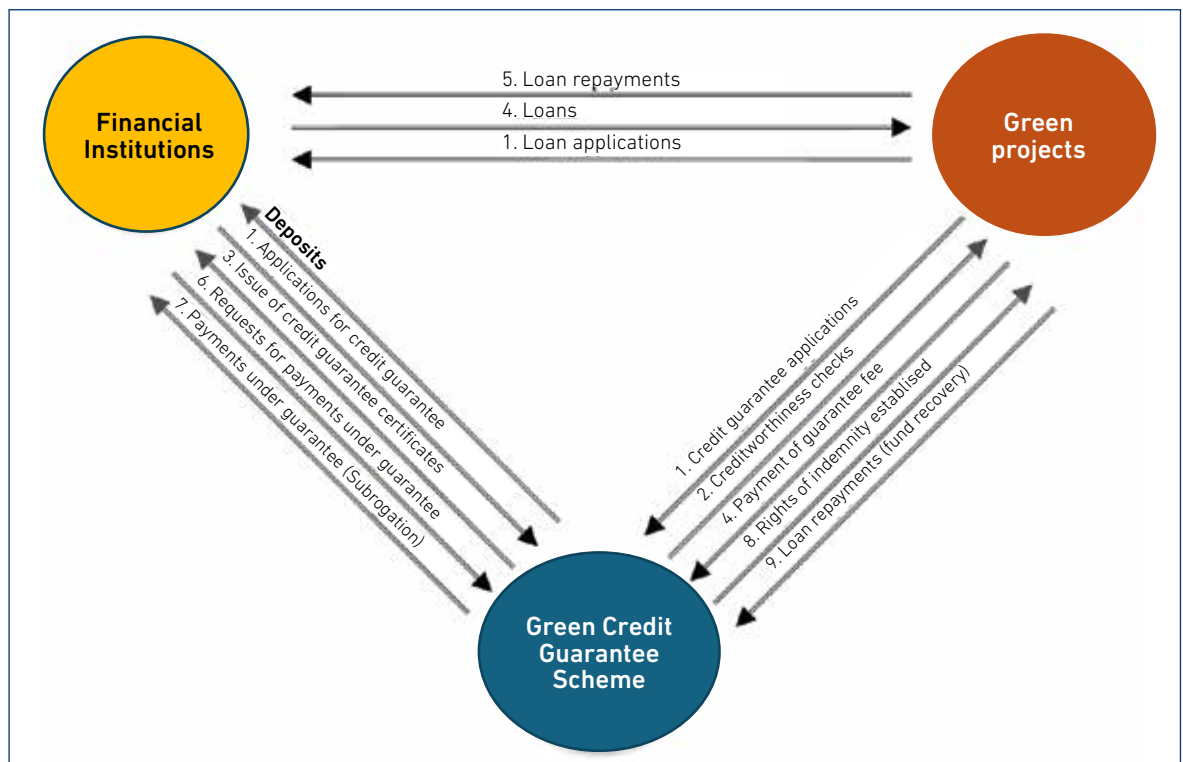
Source: Yoshino, Taghizadeh-Hesary, Nakahigashi (2019).

There are three significant reasons why utilising spillover effects will benefit Lao PDR. First, private investors will be given further incentives to invest in sustainable energy initiatives by being able to leverage tax revenues and business development. Hence, this would lead to higher rates of return on investments and projects that are more attractive to private investors. Second, utilising the effect will aid in mitigating risks associated with sustainable energy investments. By providing sources of additional revenue through increased sales and property tax revenue, there would be less risk posed to private investors, making investment more attractive. Third, the spillover effects will contribute to energy development in the region by creating jobs, increasing employment opportunities, and stimulating the business economy (Yoshino, Taghizadeh-Hesary, Nakahigashi, 2019). Not only will this benefit the energy sector of Lao PDR, but it will also positively impact the overall economic stability in the long term.

5.2. Establish a Green Credit Guarantee Scheme

The establishment of a tailored GCGS will reduce the risk in investment and information asymmetry associated with sustainable energy projects. A GCGS is crucial in improving the creditworthiness of low-carbon projects, which often lack physical collateral and tend to have weak credit standings (Taghizadeh-Hesary, Phoumin, Rasoulinezhad, 2022). A GCGS serves as a safeguard by covering a portion of the risk imposed and smoothing access to private financial institutions' financing, increasing investor confidence in unlocking private capital for sustainable energy projects (Figure 14.2).

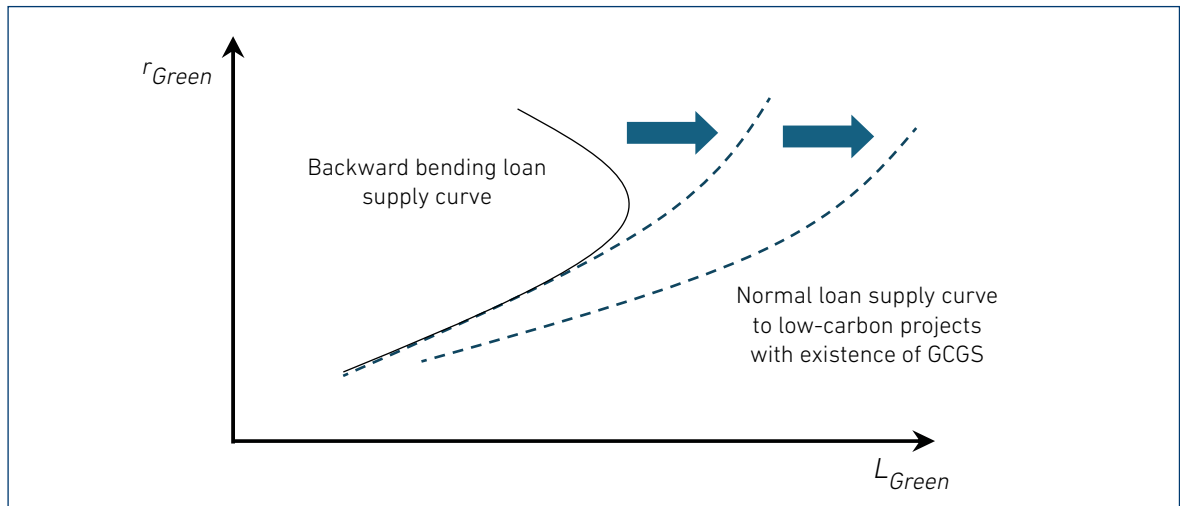
Figure 14.2. Green Credit Guarantee System Flow of Operations



Source: Taghizadeh-Hesary, Phoumin, Rasoulinezhad (2022).

A GCGS for low-carbon projects will reduce information asymmetry and the expected default losses because the credit guarantee corporation – the government – guarantees a portion of loan default. Therefore, banks want to lend money to these projects (Figure 14.3).

Figure 14.3. Green Credit Guarantee Scheme and Loan Supply to Low-Carbon Projects



GCGS = green credit guarantee scheme, L_{Green} = amount of loan to green projects, r_{Green} = lending interest rate to green projects.

Source: Taghizadeh-Hesary, Phoumin, Rasoulinezhad (2022).

To achieve financial sustainability for a GCGS, several key points need consideration:

- (i) **Sufficient capital.** A GCGS must possess adequate capital to guarantee projects for the energy transition. This ensures that the GCGS can support a wide range of projects, providing the necessary financial backing to foster growth and development in the energy sector.
- (ii) **Independent assessment body.** The assessment body should operate independently from the GCGS to ensure impartial evaluation of projects. This independence is crucial for maintaining objectivity and fairness in the selection process.
- (iii) **Assessment.** The role of the assessment process is pivotal in selecting projects with higher creditworthiness and a greater likelihood of success. Accurate and thorough assessments help mitigate risks and ensure that only viable projects receive support.
- (iv) **Variable guarantee fees.** The GCGS should vary guarantee fees based on the soundness and creditworthiness of projects. Projects demonstrating higher soundness and lower risk should be charged lower fees, incentivising quality and reliability in project proposals.
- (v) **Local offices.** A GCGS needs to establish local offices nationwide or in major cities. This local presence allows the GCGS to have direct access to information and to monitor the progress of projects. It also facilitates better communication and support for regional initiatives, ensuring projects are on track.

By addressing these points, a GCGS can build a robust framework for financial sustainability, supporting the successful transition to sustainable energy solutions.

5.3. Maximise Non-Debt Financing

Relying on external debt for energy generation puts Lao PDR at risk of being vulnerable to global financial market changes and fluctuations in currency exchange rates. Additionally, the accumulation of foreign debt may create economic and political risks for the country.

Lao PDR could develop its sustainable energy sector without heavy external borrowing by maximising non-debt financing modalities, such as foreign direct investment and remittances and relying more on domestic savings. Notably, foreign direct investment often implies technology transfer, managerial expertise, and direct and indirect access to foreign markets; thus, it boosts the competitiveness of renewable energy. Remittances represent a stable source of income and, if channelled into sustainable energy projects, may substantially reduce the country's external debt. Additionally, the circulation of domestic finance and savings into investments will align with economic stability objectives by retaining capital within the country and stimulating economic activity.

As previously mentioned, effective instruments – such as green bonds and GCGs – should be emphasised in ensuring an adequate level of finance and funding for development without the need to compromise the financial stability of Lao PDR. By expanding the green bond market, Lao PDR gains access to a new source of funding that supports its sustainability goals and is attractive to socially conscious investors. At the same time, GCGs address the reluctance of private financial institutions to lend the necessary funds due to perceived risks by acting as an insurance policy against default on the loans covering renewable energy projects.

An integrated approach would grant access to financial resources for renewable energy projects and increase the nation's economic resilience. In particular, using various financial instruments from multiple sources reduces the dependence on volatile external debt markets and ensures adequate investment. By maximising the use of non-debt financing sources (e.g. foreign direct investment and remittances) as well as tapping into financial instruments (e.g. green bonds and GCGs), Lao PDR would minimise the contribution of overseas finance to risks, decrease the impact of external debt, and secure the inflow of funds for energy projects.

5.4. Attract Institutional Investors

Institutional investors – such as insurance companies and pension funds – hold large pools of capital, which desire long-term investments with stable returns. Given that the investment requirements for renewable projects need to be long-term, have relatively stable cash flow, and adhere to sustainability goals, institutional investors appear well-suited to play a substantial role in financing them. Investing institutional capital in the renewable energy sector represents a strategic option for Lao PDR to mobilise a considerable amount of capital during its energy transition (Kaminker and Stewart, 2012).

Collaboration amongst the government, financial institutions, and institutional investors is critical to realising the potential of institutional capital in financing renewable energy projects. Partnerships may come in different forms, such as joint ventures, co-investment arrangements, or specialised investment funds, which could be used to leverage the expertise and resources provided by institutional investors. Through this, project viability, mitigation of risks, and acceleration of deployment of renewable energy infrastructure could be possible.

Furthermore, designing investment vehicles that cater to institutional investors' preferences and risk profiles is indispensable to attract participation. Typically, institutional investors prioritise stable returns, long investment horizons, and low levels of risk. Investment vehicles such as renewable energy funds, infrastructure bonds, or asset-backed securities may be appealing to institutional investors by offering them exposure to renewable energy projects while addressing risk–return preferences. Incorporating and involving institutional investors are critical to securing long-term financial support for large-scale infrastructure projects. Institutional investors can contribute to the financial sustainability of renewable energy ventures by providing stable, patient capital. Their involvement can attract additional private capital, catalysing further investment and fostering a vibrant renewable energy market ecosystem in Lao PDR.

5.5. Note Implications for ASEAN

Implications for ASEAN of policy recommendations issued in Lao PDR include the spillover effect of tax refunds to private investors, a GCGS, non-debt financing opportunity maximisation, and institutional investors. In addition, ASEAN would benefit from having a regional GCGS that can make the energy transition more accessible and favour regional economic integrity.

Although most recommended policies concern Lao PDR specifically, spillover effects can be implemented in other ASEAN Member States. Spillover effects from tax refunds can be utilised to close financial gaps in energy sectors to attract investors to build financial blocks for infrastructure. Therefore, ASEAN Member States expecting similar issues to Lao PDR can apply this policy to commit to sustainable expansion. Moreover, the recommended establishment of a GCGS facilitates mitigating risk for green investments and enhances access to finance for sustainable energy projects. The scheme can present a blueprint across ASEAN for promoting green finance instruments as a tool for regional collaboration and supporting sustainable energy development. Furthermore, broader participation of institutional investors within the ASEAN region will promote stable and long-term sustainable energy initiatives in the region. The expertise, significant capital, and long-term investment horizons can contribute to the region's energy transition and foster energy supply security while simultaneously building a culture of sustainable energy practices.

Overall, the policies tailored to Lao PDR focus on expanding the energy sector through green finance mechanisms and strategic partnerships to bring in investment. Through showcasing the successful use of risk-mitigating financial instruments, incentivising green investments, and diversifying financial sources, Lao PDR can lead as an example and collaborate with neighbouring nations to advance regional energy security and financial stability.

5.6. Build Capacity

Below are a few key capacity-building recommendations involving the technologies, capacity, and experience in sustainable energy development for Lao PDR.

- (i) **Technical training programmes.** Implementing a specialised training programme that is focussed on hydropower technologies as well as on solar and wind would be beneficial in improving the technical capacity of local professionals. These programmes can include skills development initiatives or hands-on workshops to improve expertise in renewable energy systems. These are recommended due to the need to enhance the domestic workforce's expertise in renewable energy systems. Hence, these will drive innovation while reducing reliance on external expertise, facilitating the growth of skilled and qualified workers in the energy sector.
- (ii) **Financial literacy workshops.** A financial literacy workshop for stakeholders concerning investment opportunities, risk management, and financial modelling specific to sustainable energy projects will allow policymakers and decision-makers to gain financial knowledge, make informed investment decisions, assess project viability, and manage financial resources effectively. Improved financial literacy and decision-making are essential to attract investments, ensure sustainable funding, and promote energy security and economic development.
- (iii) **Regulatory compliance training.** It is recommended that training sessions be offered on regulatory compliance and legal frameworks relevant to sustainable energy development. By educating stakeholders on regulatory requirements, laws, and standards and sharing industry best practices, they can navigate complex regulatory rules effectively. Enhanced knowledge will reduce legal risks, enrich information disclosure, and heighten project sustainability.

6. Conclusion

The energy landscape of Lao PDR encompasses both significant opportunities and challenges. Although hydropower has catalysed growth significantly, it also ushered in environmental and social – as well as energy supply security – issues. The risks suggest diversifying energy sources and financial solutions to sustainable energy development. Investment can be attracted through collaboration with institutional investors, a GCGS, and other non-debt financing mechanisms. Moreover, building capacity through technical training or workshops will allow stakeholders to increase engagement with and knowledge of sustainable energy initiatives. Tackling technical and regulatory aspects simultaneously, Lao PDR will unlock the full potential of renewable energy resources to create a sustainable future, both environmentally and financially.

Ultimately, securing the energy supply demands a strategy that caters to diverse stakeholder needs, encourages innovation, and prioritises environmental and social sustainability. By focussing on investments, Lao PDR has the potential to become a key player in the advancement of sustainable energy. This will help enhance energy security in the country and the region and support the worldwide shift towards a more sustainable future.

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