



ALTERNATIVE PATHWAYS TO

**SECURING FOREIGN
EXCHANGE REVENUE**

FOR LAO PDR

Report purpose and intended audience:

This report is tailored for policymakers, private sector, financial institutions, civil society organizations, and research entities within Lao PDR, with an inclusive scope extended to those interested and investing in the Greater Mekong region.

The report focuses on the comparative advantages and disadvantages of planned hydropower development in Lao PDR and juxtaposes this analysis with the potential of lesser-developed sectors. To lay the groundwork for stakeholders to explore novel avenues of foreign revenue generation, the report expands on the interplay between investments in hydropower and their implications for fostering market development across other sectors.

This report is not intended to deliver detailed policy guidance but serves as a catalyst for a broader discourse and lays the groundwork for the holistic development of comprehensive policy guidelines.



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A special thanks to the lecturers at the Faculty of Environmental Science, National University of Laos for reviewing the report and sharing valuable contributions. We also thank WWF-Laos, Richard Lee (WWF) and Heron Holloway (WWF) for their support throughout the development of this report and Reuben Houfe for designing the report.

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INTRODUCTION

Lao People's Democratic Republic (PDR)'s rapid economic growth over the past twenty years has been driven by the exploitation of the country's natural resources, with significant investments in the development of hydropower dams, mines and transport sector infrastructure. Much of this investment was undertaken with external parties in public-private partnerships, and involved significant debt commitments on the part of the government.

As these commitments accumulated, government expenditure was increasingly dedicated to debt servicing, leaving the country in a fragile fiscal position with little margin to cope with unanticipated shocks. The combination of the Covid-19 pandemic and the war in Ukraine has disrupted economies across the globe, causing sharp declines in revenue as well as driving inflation in essential commodities, such as fuel. In Lao PDR, the timing of these shocks was particularly unfortunate, as they took place in the run-up to a period of sharply increased debt servicing when public finances were already under strain.

This document highlights possible avenues for capital-light public sector investment, which could result in alternative pathways to securing foreign exchange revenue over the short to medium term. Given current fiscal constraints faced by the government, now may be the right time for Lao PDR to shift away from its focus on capital-intensive hydropower development.

EXECUTIVE SUMMARY

LAO PDR HYDROPOWER STRATEGY

Lao PDR's "Battery of Southeast Asia" strategy aims to leverage its undeveloped hydropower potential. It seeks to promote energy for export to generate the revenue needed to meet national development objectives, such as reducing poverty. As of 2022, Lao PDR had 73 hydropower plants in operation, 43 under construction, and as many as 280 more proposed or at some stage of the planning process.

The government is targeting 12GW of hydropower generation capacity by 2025 and 20GW by 2030. Together with power from the 1.9GW Hongsa coal-fired plant, most of the energy generated by Lao PDR is exported. In 2021, 6.6GW out of a total of 10.3GW of generating capacity were devoted to exports, and the country aims to increase its power exports to 21GW by 2030.

73  PLANTS IN OPERATION

43  UNDER CONSTRUCTION

280  PROPOSED OR PLANNED

FISCAL IMPACTS


This heavy investment in electricity generation and other infrastructure, such as the Lao-China Railway, has required the government of Lao PDR to secure capital from external lenders at both concessional and market rates, with the country's debt to GDP ratio exceeding 100 per cent at the end of 2022.

As a result, Lao PDR's debt servicing is set to rise sharply, averaging about US\$1.3 billion annually from 2022-2026. This may be as much as 39 per cent of government revenue over the period. From a revenue standpoint, it does not appear feasible for hydropower export revenue alone to support debt service costs in the short to medium term. According to the World Bank, the Lao PDR Ministry of Finance (MOF) estimates that total revenues attributable to the power sector are below 10 per cent of government revenue, mainly due to government incentives (tax holidays, low royalty rates, etc.) for projects in their first 5-10 years of operation.

The sharp currency depreciation in 2021-2022, caused in part by concerns over the debt picture, has made foreign currency-denominated debt service more challenging. However, the easing of pandemic restrictions in 2022 and the subsequent reopening of the country to international tourism are expected to be welcome sources of foreign exchange, as is the new Lao-China Railway.

>100%  DEBT TO GDP RATIO (END-2022)

\$1.3B  AVERAGE DEBT SERVICE EXPENSE (2022-2026)

39%  OF GOVERNMENT REVENUE

ENVIRONMENTAL & SOCIAL IMPACTS

As is inevitable with any major strategy, implementation of Lao PDR's hydropower strategy has generated positive and negative impacts beyond the financial, in terms of society and the environment, and carries with it certain risks.

Positive impacts from the hydropower programme are largely social, and come from infrastructure development, the temporary jobs created during construction, the developmental benefits stemming from national electrification, and potential community income from recreation and tourism opportunities connected with dam reservoirs.

Negative impacts are both social and environmental. Social impacts include the relocation of affected communities, the disruption of livelihoods and food security resulting from the destruction of fisheries and the inundation of agricultural land. Environmental impacts include the blocking of fish migration, sediment flow and nutrient transfer, as well as changes to the river's natural hydrological flows, affecting all users of water resources and ecosystems.

The government of Lao PDR has issued a decree - effective from 4th March, 2023 - that mandates hydropower operators to inform the authorities whenever dam reservoirs reach maximum storage or when river levels downstream fall to a critical level in order to reduce the risk of flooding or water shortage.

RISKS

In pursuing its hydropower development strategy, Lao PDR faces a number of risks, both short-term and long-term.

- **Export demand** - As the primary customer, Thailand's level of demand is critical to Lao PDR's electricity export performance. Factors that may affect Thai demand include: changes to Thailand's national power reserve margin, which is currently well above global norms; changes to the Thai government's stance on mainstream Mekong dams; and the domestic expansion of rooftop and/or distributed solar generation. Environmental, Social and Governance (ESG) concerns may also affect demand from new regional interconnection customers, such as Singapore, particularly regarding the environmental and population impacts of new dams and the inclusion of coal generation in the export supply.
- **Climate change** - Climate change poses numerous risks to hydropower generation, including performance risks from reduced river flows and water supply, reservoir life risks from sediment accumulation, and safety risks from extreme flooding events as well as risks to environmental management and from changing patterns of water demand.
- **Water Supply** - In addition to supply risks caused by climate change, upstream Mekong dams in China also pose risks to the supply of water available for generation. Electricity production may also be affected by required environmental mitigation measures, and may itself affect agriculture and aquaculture in surrounding upstream and downstream areas.
- **Governance and Management** - The extensive suite of large hydropower projects in operation and under construction in Lao PDR requires a sophisticated governance system. In its absence, safety risks are exacerbated and economic considerations are more difficult to balance against environmental and social consequences.



POTENTIAL NON-HYDROPOWER REVENUE GENERATION OPPORTUNITIES

The current macroeconomic situation, particularly with respect to foreign exchange, underlines the importance of continuing to diversify revenue sources to fund national development and poverty alleviation. The government has highlighted the agriculture and tourism sectors as having high labour force participation rates and foreign exchange earning potential.

Revenue from these two sectors is likely to grow sharply in the immediate term as part of the emergence from pandemic restrictions, combined with the inauguration of the Lao-China Railway. However, fully capturing growth opportunities will require investment in enabling environments, capacity development and market analysis as well as in marketing and promotion. The fiscal situation over the short to medium term does not appear to allow for the kind of capital-heavy investment needed for infrastructure development in the power sector. In contrast, the investment requirements of the agriculture and tourism sectors are more policy-driven, with capital investment likely led by the private sector.

For these sectors, Seneca has developed three scenarios comprising estimates for potential export revenue generation through 2027. These scenarios include a baseline scenario broadly in line with recent government forecasts or targets; a lower growth scenario, including an outline of potential contributing factors; and a higher growth scenario that illustrates the revenue potential with improvements in the enabling environments of these two sectors. The higher growth scenario estimates cumulative revenue that is more than 20 per cent higher than the baseline scenario over the forecast period, totalling approximately US\$2,5 billion across both sectors.

A third sector - distributed electricity generation from renewable sources such as solar and biomass (rice husks) - offers an opportunity to reduce or eliminate public spending on electricity imports, which are currently necessary, mainly during the dry season, due to limitations of the domestic grid. At sufficient scale, distributed generation could in some cases also serve as a potential substitute for planned hydropower investments, particularly in the south of the country. This would require improving the transmission network and modifying the regulatory and tariff environment. Fully eliminating electricity imports would save US\$80-100 million annually. The potential export revenue in the case of full hydropower substitution by distributed generation is currently too speculative to quantify.

CONCLUSION AND RECOMMENDATIONS

Without significant debt relief, the fiscal situation for Lao PDR will be challenging through at least 2026 due to debt service obligations. Further capital-intensive investment in additional hydropower generation capacity risks prolonging this period of fiscal vulnerability as well as resulting in extra environmental and social costs. The new Lao-China Railway and the ending of pandemic restrictions provide an opportunity for Lao PDR to ease this fiscal pressure via a recovery in agricultural exports and the return of international tourists.

With appropriate policy support, the government can reduce barriers to development and drive private-sector led investment into accelerating the sustainable growth of these sectors. This has the potential to achieve significant improvements in the livelihoods of a majority of the Lao people, given the large share of the population working in agriculture and tourism.



Figure 1: Multi-Sector Summary

SECTOR	FINANCE POTENTIAL	SOCIAL ASPECT	ENVIRONMENTAL ASPECT
 <p>POWER</p>	<ul style="list-style-type: none"> • Limited fiscal capacity for further investment • Transmission arguably a more critical issue than generation in the immediate term • Inclusion of coal in the mix may harm Lao PDR's reputation as a source of green energy • Cumulative export revenue through 2027, if frozen at 2021 levels, would be US\$13 billion • Limited revenue attributable to Lao PDR over the short to medium term due to tax holidays and royalty incentives for investment • Risks to future export demand from external market evolution • Risks to future water supply from climate change and upstream actions • Improved governance systems required to balance economic considerations with social and environmental consequences 	<ul style="list-style-type: none"> • Limited source of permanent employment • Electrification has very positive community impact • Disruptions to lives, livelihoods and food security from relocation, impact on fisheries, and changing land availability due to flooding • Good source of connective infrastructure and community service development 	<ul style="list-style-type: none"> • Significant negative impact on fisheries • Significant negative impact on sediment flow and nutrient transfer • Negative impacts on water quality
 <p>AGRICULTURE</p>	<ul style="list-style-type: none"> • Baseline cumulative export revenue forecast for 2022-27 is US\$8,1 billion; growth scenario reaches US\$9,7 billion • Needs public sector support to facilitate private sector development of logistics industry • Needs capacity development with respect to standards and certifications 	<ul style="list-style-type: none"> • Sector represents over 60% of employment • Short-term growth may be concentrated on commercial farming operations • Over the longer term, smallholder producer incomes may benefit as they are connected to growth via the development of an enabling environment 	<ul style="list-style-type: none"> • Potential negative land impact from intensive cultivation • Opportunity to develop organic agriculture • Opportunity to pursue agroforestry-driven rehabilitation of degraded land • Potential slash and burn activities • Increased water extraction • Potential negative impact on water quality
 <p>NATURE BASED TOURISM</p>	<ul style="list-style-type: none"> • Baseline cumulative forecast tourism receipts for 2022-27 is US\$4,156 million; growth scenario reaches US\$5,056 million • Needs public sector involvement to facilitate private sector investment in services and facilities • Significant post-pandemic influx from China expected in the immediate term, via new rail line 	<ul style="list-style-type: none"> • Pre-pandemic, sector was linked to over 300,000 jobs, over 50% female • Potentially significant employment linkages to agricultural sector • Potential change to local culture and traditions if mass tourism is developed 	<ul style="list-style-type: none"> • Conservation benefits for tourism areas • Need to manage potential negative impact of high tourist volumes
 <p>DISTRIBUTED GENERATION (SOLAR, RICE HUSKS) IN TARGETED LOCATIONS</p>	<ul style="list-style-type: none"> • Potential to save up to US\$80-100 million annually by replacing imported electricity, primarily during the dry season and in certain border areas • Potential for distributed generation to supply electricity for export, replacing some planned hydropower supply; requires improvements to transmission 	<ul style="list-style-type: none"> • Electrification has very positive community impact 	<ul style="list-style-type: none"> • Environmental impact of disposal of solar panels if no clear plan is in place. • Distributed generation source is likely greener than what it replace

Source: Seneca







LAOS HYDROPOWER STRATEGY:

CURRENT SITUATION

As of 2022, Lao PDR had 73 hydropower plants in operation, 43 under construction, and as many as 280 more proposed or at some stage of the planning process. About 200 of the third category are small-scale dams below 15MW. Total capacity of the plants in operation is approximately 9.7GW, with about 3.2GW under construction (MITD, 2022). The government targets 12GW of hydropower generation capacity by 2025 and 20GW by 2030 (MEM & EDL, 2021).

Together with the 1.9GW Hongsa coal-fired power plant, most of the energy generated by Lao PDR is exported. In 2021, 6.6GW out of a total of 10.3GW of generating capacity were devoted to exports, and the country aims to increase power exports to 21GW by 2030. While the majority of this is destined for Thailand, Lao PDR aims to increase its electricity exports to other countries in the Greater Mekong Subregion (MEM & EDL, 2021).

Figure 2: Power Generation Capacities in Lao PDR in 2018 and 2030, and Share of Generation in 2030

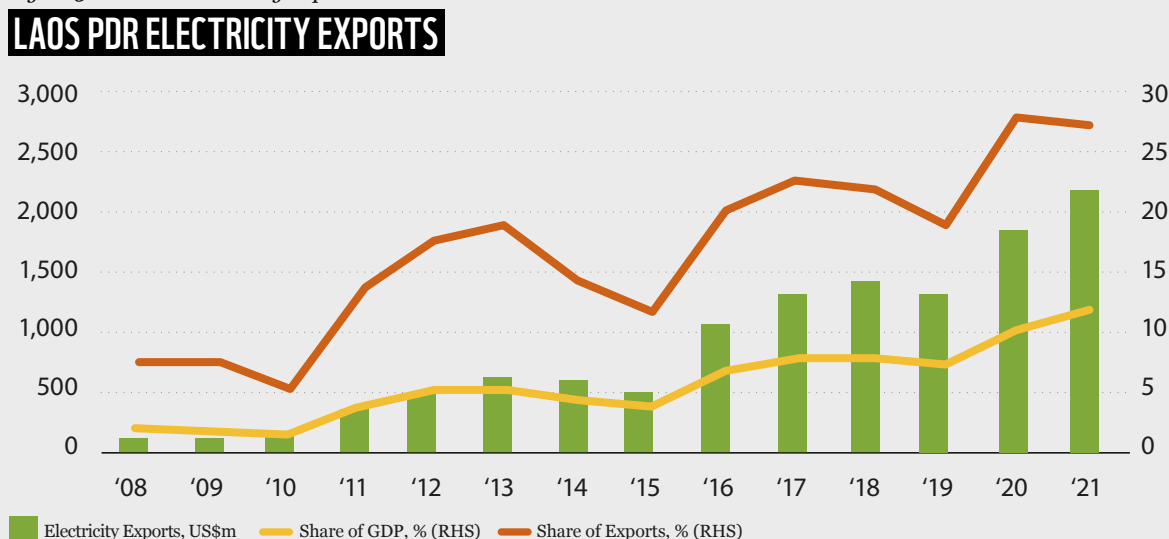
POWER GENERATION TECHNOLOGIES, BY FUEL	CAPACITY IN 2018 (MW)	CAPACITY IN 2030 (MW)	SHARE OF GENERATION IN 2030 (%)
 HYDRO	5,472	20,773	75.0
 COAL	1,878	3,878	14.0
 SOLAR PV	32	2,406	8.7
 BIOMASS	40	40	0.1
 WIND	0	600	2.2
 TOTAL	7,422	27,697	100.0

Source: UNESCAP

The policy context for this extensive development of the hydropower sector – frequently referred to as the “Battery of Southeast Asia” strategy – is to promote energy for export to generate revenue to meet national development objectives, such as reducing poverty, while also maintaining and expanding an affordable, reliable and sustainable energy supply (Phongoudome, 2015).

As generation capacity has come online, electricity exports have soared, approaching 30 per cent of the country’s total exports of goods and services, and 12 per cent of GDP.

Figure 3: Lao PDR Electricity Exports

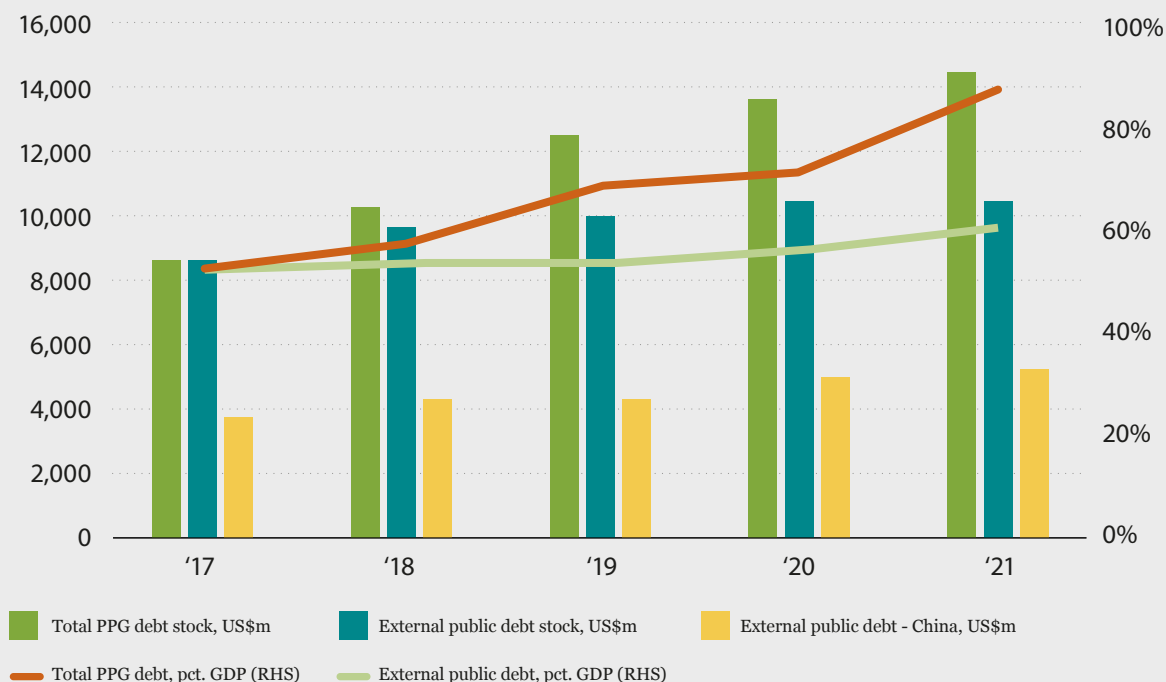


Source: World Bank, Bank of Lao PDR

This heavy investment in electricity generation and other infrastructure, such as the Lao-China Railway, has required the government of Lao PDR to secure capital from external lenders at both concessional and market rates. In recent years, much of this was secured from China in the context of its Belt and Road Initiative. The expanded borrowing has led to an increase in Lao PDR's debt position relative to GDP, exceeding 100 per cent by the end 2022.

Figure 4: Lao PDR Public and Publicly Guaranteed (PPG) Debt

LAO PDR PUBLIC & PUBLICLY GUARANTEED (PPG) DEBT



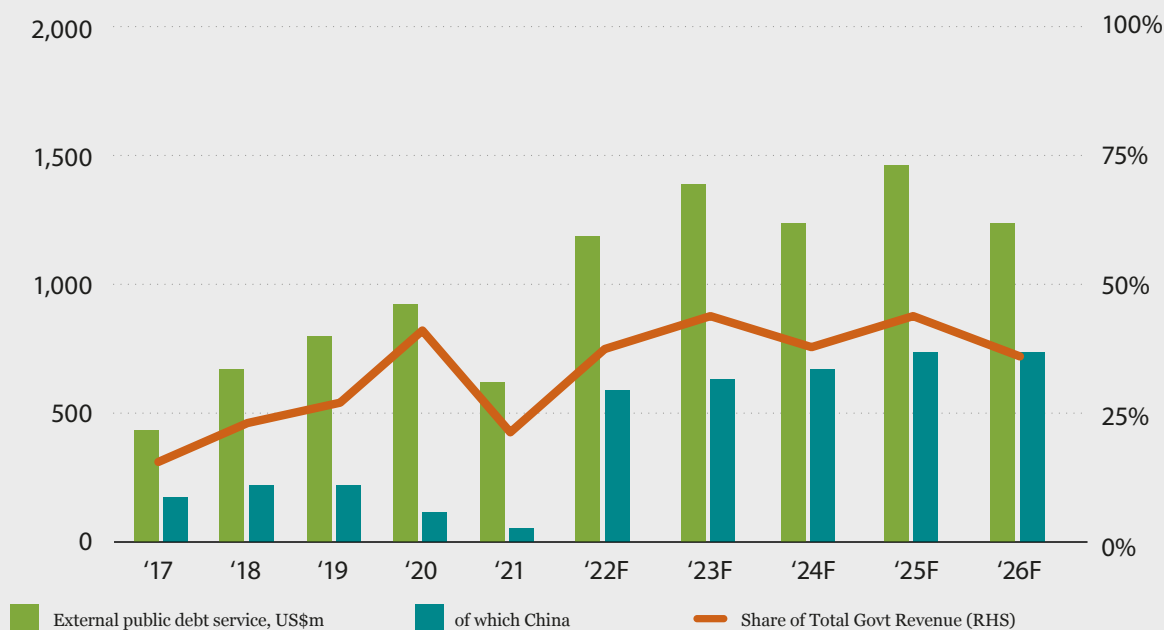
Source: Ministry of Finance, Lao PDR

Lao PDR's debt servicing is set to rise sharply, averaging about US\$1.3 billion annually from 2022-2026 (MOF, 2021). Seneca estimates that this represents an average 39 per cent of total government revenue for the period. According to the European Network on Debt and Development (Eurodad), for low- and middle-income countries where data is available, debt service on public external debt in 2018 averaged 12.6 per cent of government revenue (Fresnillo, 2020). Although the Ministry of Finance (MOF) expects its relevant SOEs to contribute an average of US\$450 million annually to service their portion of the debt, barring debt restructuring, the remaining ~US\$950 million in annual debt service represents 25 per cent of estimated government revenue over the period, significantly higher than the average for low- and middle-income countries in 2018.



Figure 5: Lao PDR External Public Debt Service Expense

LAO PDR EXTERNAL PUBLIC DEBT SERVICE EXPENSE



Note: External public debt service as a share of total government revenue assumes 3% annual growth in total government revenue from 2021. All other data/forecasts are from MOF.

Source: MOF data & forecasts, Seneca estimates

From a revenue standpoint, it does not appear feasible for hydropower export revenue alone to support debt service costs in the short to medium term. While it is difficult to compile a full picture of government revenue attributable to hydropower, the one specific relevant line item in the government’s accounts is hydropower royalties. These appear to be relatively low, averaging 3 per cent of electricity exports and comprising 2 per cent of total government revenue (BOLPDR, 2022). Likely additional sources of hydropower-related government revenue include profit tax from the generating companies and dividends from any minority stakes the government holds in these entities. The import and export of electricity were excluded from VAT at the beginning of 2022. Even assuming all profit tax and dividend revenue in the government’s fiscal accounts stems from the hydropower sector, those two revenue lines plus hydropower royalties represented 20 per cent of revenue in 2021, still short of what is needed to cover debt servicing.

According to the World Bank, MOF estimates that total revenues attributable to the power sector are below 10 per cent of government revenue, mainly due to government incentives (tax holidays, low royalty rates, etc.) for projects in their first 5-10 years of operation (World Bank, 2022a). As most large, operational generation projects began functioning relatively recently, government revenue from the sector may increase meaningfully once the incentive periods expire. However, it is unclear to what extent this will ease the strain on the budget over the near to medium term.

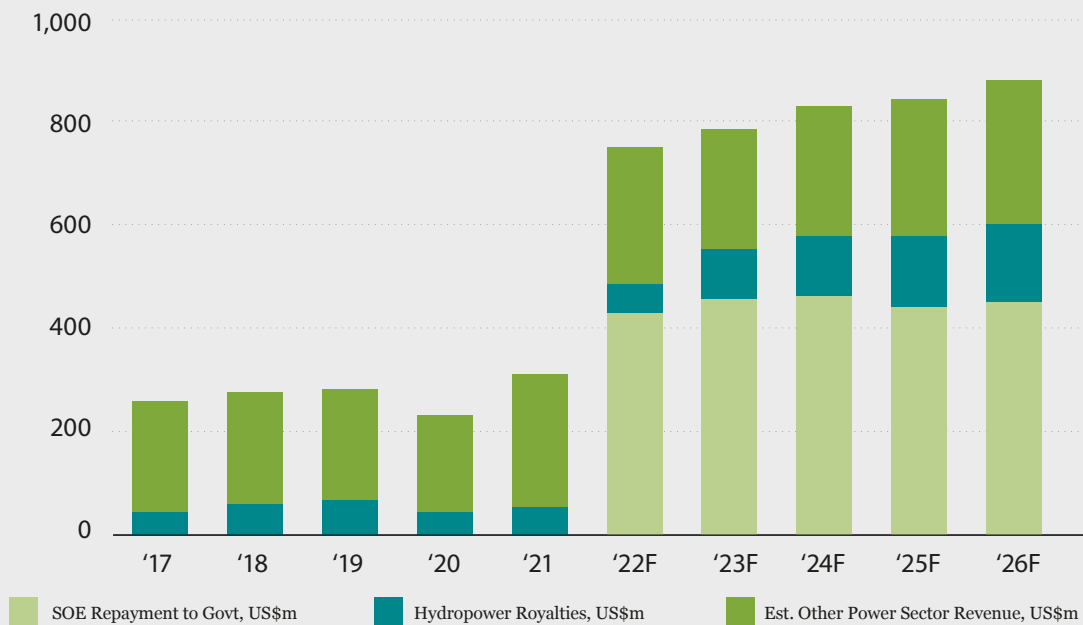




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~ Figure 6: Lao PDR Estimated Power Sector Revenue

LAO PDR ESTIMATED POWER SECTOR REVENUE



Note: Estimated other power sector revenue for 2022F-2026F consists of the dividend, depreciation and corporate profit tax revenue lines. Hydropower royalties plus other power sector revenue is assumed to total 10% of GoL revenue for 2022, growing to 12% by 2026. GoL revenue is assumed to grow 3% annually from 2021.

Source: MOF data & forecasts, Seneca estimates

The sharp currency depreciation in 2021-2022, caused in no small part by concern over the debt picture, has made foreign currency-denominated debt service more challenging. However, the easing of pandemic restrictions in 2022 and the subsequent reopening of the country to international tourism should generate a welcome additional source of foreign exchange.

In addition, the opening of the Lao-China Railway in December 2021 has expanded avenues for earning foreign exchange. While Lao PDR's portion of the US\$6 billion investment has added to its debt burden, the railway is expected to boost exports, with 1.6 million tonnes of cross-border freight carried in its first year of operation (Xinhua, 2022a). Following the lifting of most pandemic controls in China in late 2022, international tourist arrivals from China are also likely to grow. Given Lao PDR's minority stake in the Laos segment of the railway, it seems likely that indirect revenue – including increased profit tax, VAT and customs/border control-related fees from users of the railway as well as any dividends and tax receivable from the Laos-China Railway Company – will be needed to recover the cost of its investment, which is similar to the hydropower situation.

NON-FINANCIAL IMPACTS

As is inevitable with any major strategy, the implementation of Lao PDR's hydropower strategy has generated positive and negative impacts beyond its financial impacts, in terms of both society and the environment, and carries with it certain risks.

SOCIETAL IMPACTS

+ POSITIVE IMPACTS

- During the construction phase, hydropower projects create multi-year direct and indirect employment opportunities. Examples of these range from engineering and construction work to the provision of transportation and food/catering services.
- The addition of each new hydropower project contributes to the government's goal of 98 per cent nationwide electrification by 2025 and 100 per cent by 2030 (MEM & EDL, 2021), although some export-oriented electricity generators are not yet connected to the domestic transmission network. Addressing this is another government goal for the power sector. Electrification is an enabling condition allowing for long-term national development, with benefits ranging from improved health and productivity to more access to education and information.
- The supporting infrastructure needed to construct hydropower projects, such as new roads and local electricity transmission lines, continues to support and improve access to community services once the construction is complete. The government may also be required to invest in local services such as markets, schools and medical facilities in addition to any relocation compensation and environmental mitigation activities.
- Hydropower dams, particularly those with reservoirs, typically generate opportunities for businesses focusing on recreation and tourism, potentially generating income for local communities.

- NEGATIVE IMPACTS

- While the construction phase of a dam project may create fairly numerous job opportunities, there are significantly fewer permanent jobs generated by hydropower installations. This limits the number of indirect jobs supported by the facility once construction is complete.
- Particularly for dams with reservoir storage, projects may require the mass relocation of affected populations, with negative social consequences as people lose their homes and land.
- Local livelihoods near dam projects may be disrupted, as agricultural land may be flooded or fisheries disturbed or destroyed. This is particularly relevant for Lao PDR, as most farming and fishing is done at the subsistence level; food security is thus negatively affected.

ENVIRONMENTAL IMPACTS

The environmental impacts of large-scale hydropower installations have been widely disseminated in Lao PDR and do not bear examination in detail in this document. WWF's *Power Sector Vision 2050: Power Vision Overview for Laos* provides a high-level overview of some of these impacts. Building dams on rivers:

➔ NEGATIVE IMPACTS

- Impacts the river's natural hydrological flows affecting all users of water resources and ecosystems;
- Blocks fish migration with negative consequences not only for biodiversity but also for wild capture fisheries and the immense income they provide to local people and economies at large, as well as the critical role they play in food security;
- Blocks sediment and nutrient flows, which causes river bed incision and associated lowering of water tables, erosion of river banks, and subsidence of deltas as well as increasing coastal erosion and salt intrusion, leading to reductions in agricultural and aquaculture yields; and
- Impacts the livelihoods of all river users through changes in water quality. (WWF, 2016)



LAOS HYDROPOWER STRATEGY:

RISKS

In pursuing its hydropower development strategy, Lao PDR faces a number of risks, both short-term and long-term.

EXPORT DEMAND

As the primary customer, Thailand's demand situation is critical to Lao PDR's electricity export performance. Factors that may affect Thai demand include:

- **Changes to the national power reserve margin:** The Electricity Generating Authority of Thailand (EGAT) recently committed to reducing its reserve margin from 40 per cent to 15 per cent above projected peak demand, in line with global practice (Weatherby, et al., 2021). While this is unlikely to affect trade under the current electricity MOU between Thailand and Lao PDR, it could reduce the potential volume of future agreements.
- **Changes to the Thai government's stance on mainstream Mekong dams:** Rising public awareness and increased media coverage of hydropower issues in Thailand appear to have reversed the Thai government's previous willingness to purchase electricity from dams on the mainstream of the Mekong River. This has led to it delaying the signing of power purchase agreements for several mainstream dams, including in Luang Prabang and Phou Ngoy (Weatherby, et al., 2021).
- **Expansion of rooftop and/or distributed solar:** The Thai government is experimenting with a variety of mechanisms to promote residential, commercial and industrial adoption of rooftop and/or distributed solar power generation, and is targeting 10GW installed by 2037 (Weatherby, et al., 2021). How this aggregate capacity market evolves may have a significant bearing on any future electricity trade MOUs between Thailand and Lao PDR.

Beyond Thailand, ESG concerns may also affect demand from new regional interconnection customers, such as Singapore, particularly regarding the environmental and population impacts of new dams and the inclusion of coal generation in the export supply.

CLIMATE CHANGE

Per the Asian Development Bank's assessment of the Lao PDR energy sector, the International Centre for Environmental Management identified the following risks to hydropower generation posed by climate change:

- **Performance risks:** Risk of reduced power generation due to lower water volumes/levels in reservoirs because of intensifying droughts and daily, weekly, and seasonal changes in rainfall and evaporation rates.
- **Reservoir life risks:** The useful operating life of a hydropower plant can be shortened by increased accumulation of sediment, which reduces the amount of reservoir storage.
- **Safety risks:** Increasing risk and intensity of extreme flooding events can threaten dam integrity.
- **Environmental risks:** Increasing water temperatures can endanger the aquatic environment and biodiversity, thereby compromising the environmental compliance of hydropower projects.
- **Risks due to changing patterns of water demand:** Potential for warmer climatic conditions to increase evapotranspiration and reduce water quantities, which may increase competition for water in instances where it is also used for irrigation purposes and not solely electricity generation (ADB, 2019).

WATER SUPPLY

- **Electricity generation:** In addition to climate change, upstream Mekong dams in China also pose short- and long-term risks to water availability for generation.
- **Agri/aquaculture:** Volatile water supply/flow from upstream dam operations may result in changing conditions (land and water availability) for agriculture and aquaculture, potentially affecting yields and local incomes.

ENVIRONMENTAL MITIGATION COSTS

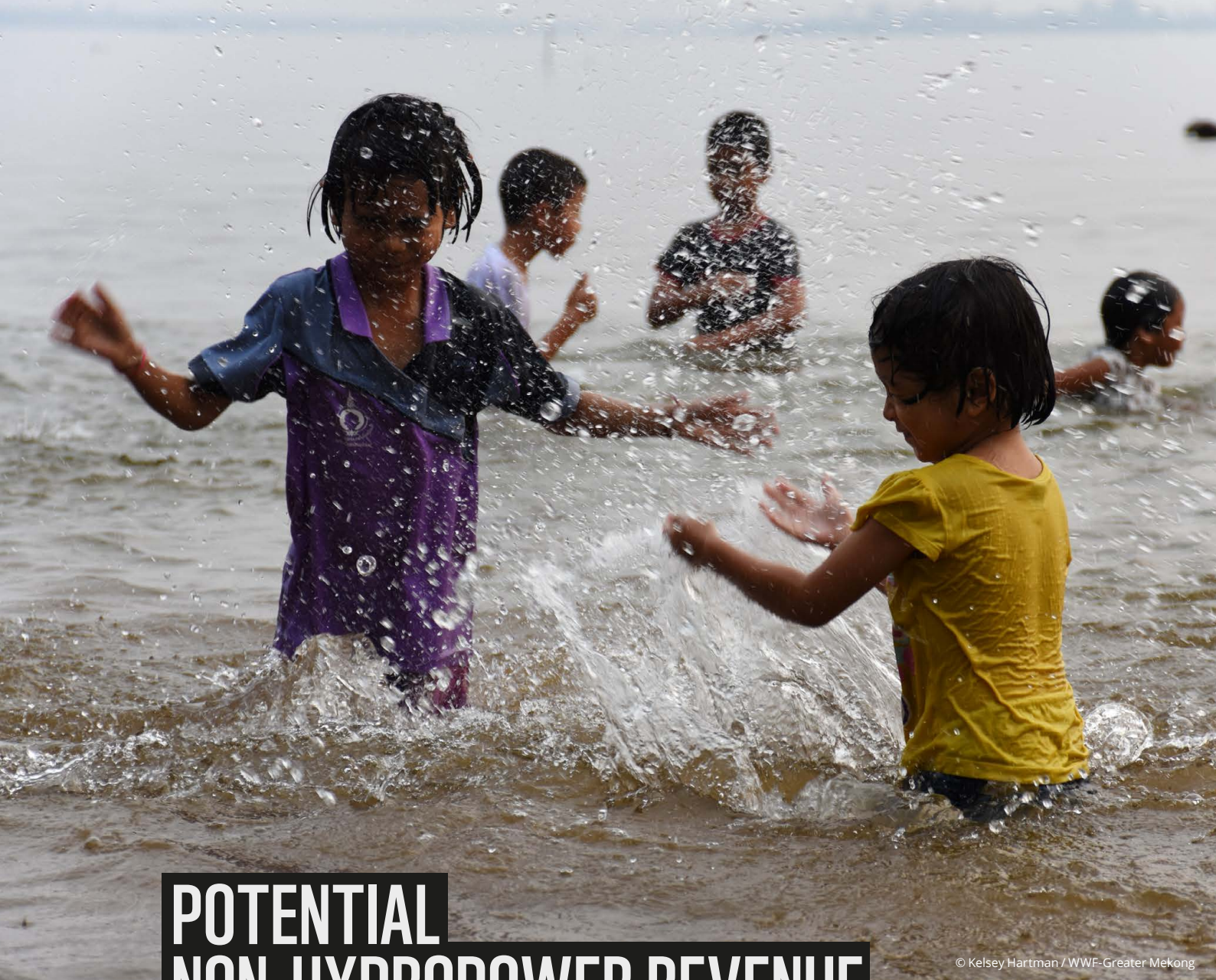
- **Required mitigation:** Environmental mitigation measures such as fish ladders and sediment flushing involve significant added cost, are of dubious effectiveness, and may result in lower generation and reduced revenues.

GOVERNANCE AND MANAGEMENT

The extensive suite of large hydropower projects in operation and under construction in Lao PDR requires a sophisticated governance system. In its absence, safety risks are exacerbated and economic considerations are more difficult to balance against environmental and social consequences. As highlighted by the World Bank in its recent Country Economic Memorandum for Lao PDR (World Bank, 2022a):

- Institutional fragmentation has contributed to sub-optimal sector planning.
- Unclear divisions of responsibility between the finance and planning ministries have resulted in a lack of prudent oversight and coordination of the highly ambitious investment strategy of national utility, Électricité du Laos (EDL).
- Many hydroelectric projects funded by the government or backed by public equity have been selected on the basis of unsolicited proposals, with no competitive process.
- While policies have been developed to mitigate the environmental impacts of hydropower, capacity for implementation remains weak.
- Safety incidents demonstrate the clear need to improve capacity to implement standards.





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POTENTIAL NON-HYDROPOWER REVENUE GENERATION OPPORTUNITIES

TO SUPPORT NATIONAL DEVELOPMENT AND POVERTY ALLEVIATION

The current macroeconomic situation, particularly with respect to foreign exchange, highlights the importance of continuing to diversify revenue sources to fund national development and poverty alleviation. The government recognises this in its 9th National Socio-Economic Development Plan 2021-2025 (NSEDPlan), which promotes the agriculture and tourism sectors as having both high labour force participation rates and foreign exchange earning potential (GoL, 2021). Revenue from these two sectors is likely to grow sharply in the immediate term as part of the emergence from pandemic restrictions, combined with the inauguration of the Lao-China Railway. However, fully capturing growth opportunities will require investment in enabling environments, capacity development and market analysis as well as in marketing and promotion. The fiscal situation over the short to medium term does not appear to allow for the kind of capital-heavy investment needed for infrastructure development in the power sector. In contrast, the investment requirements of the agriculture and tourism sectors are more policy-driven, with capital investment likely led by the private sector.

It should be noted that in order to maximise the revenue benefit to the nation from the development of these sectors, the government will need to strengthen the capacity of its tax administration institutions and improve the efficiency and transparency of tax collection.

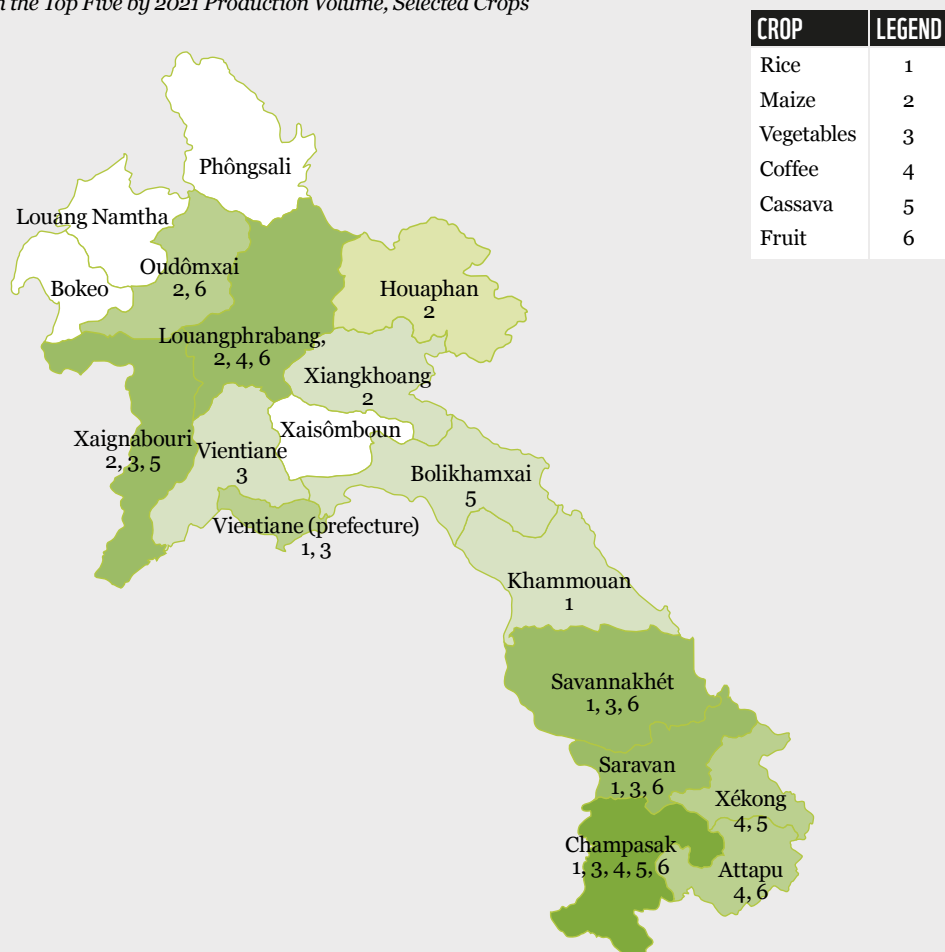
SECTOR 1

AGRICULTURE

There are three main opportunities to grow agricultural export revenues: increasing volumes to current markets, securing new markets for existing products, and increasing the quality and/or value added for a given product type to achieve a higher price. A fourth opportunity, identifying and developing new products for export, seems unlikely to make a meaningful contribution in the medium term.

In the immediate term, growth is most achievable by increasing the production of goods that are already being exported, including cassava, bananas, rubber, sugar and unroasted coffee. Since producers in Lao PDR are already familiar with the compliance regime for non-tariff barriers, such as Sanitary and Phytosanitary Standards (SPS) and Good Agricultural Practice (GAP), increased production can lead directly to increased sales. This familiarity may also enable producers to navigate the SPS process for new markets for these products. Nevertheless, it is essential for producers to investigate the demand, and prices, for these products in potential importing countries. It must also be noted that increasing the number of cassava and maize plantations could lead to a rise in slash and burn practices and more wildfires. Meanwhile, an increase in the number of banana plantations could lead to water and soil contamination and subsequent health problems. Measures would need to be taken to reduce these potential negative impacts. Increasing coffee cultivation, particularly shade grown coffee, could increase the income of the farmers as well lessen the environmental impact. However, coffee cannot be grown in all areas as the altitude affects the quality and type of coffee that can be grown.

Figure 7: Provinces in the Top Five by 2021 Production Volume, Selected Crops



Source: Lao Statistics Bureau, Seneca



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Given this dynamic, the opening of the Lao–China Railway presents a significant immediate-term opportunity for growth in exports of agricultural products to China and, potentially, to rail-linked international destinations beyond China, such as the EU, with which Lao PDR enjoys zero tariff access under its “Everything But Arms” regime. It may also improve export access to the Thai market from producers in the north of the country and along the rail corridor.

In the short to medium term, additional export revenue growth may come from exporting new agricultural products to existing partners, particularly China, Thailand and Viet Nam. However, compliance with non-tariff barriers can be burdensome and expensive, particularly for smallholder producers, and Lao PDR’s institutional framework and capacity for SPS is limited (World Bank, 2022c). As such, it may take some time for this form of growth to manifest.

Increasing existing product quality/value is another medium-term growth opportunity. A primary example of this is the potential to expand organic agriculture for export, as organic produce typically enjoys a significant price premium over conventional goods. In the Lao context, coffee is the primary organic export. However, there are opportunities for other crops. Tea from Phongsaly is already exported and volumes can increase further. Surveys can be undertaken in every province to gauge the potential for agricultural exports.

Although Lao PDR has a domestic organic certification, it is not recognized in regional or international markets. As a result, organic producers who wish to export their products need to secure (costly) 3rd-party certification of their compliance with relevant international standards (ADB, 2021).

Box 1: The Example of Coffee

Coffee production in Lao PDR is predominantly concentrated in the southern provinces of Champasack and Saravane, which produced 85% of the coffee harvested in the country in 2021.

One illustration of the opportunity presented by coffee, and the barriers that must be overcome to realise it, comes from a recent paper “The Export Potential of Laos Agri-Food to the EU Market” (Thippavong, Vanhnalat, Vidavong, & Bodhisane, 2022).

The authors found that Lao PDR developed a comparative advantage in foreign trade with respect to unroasted coffee over the decade to 2020. The country exported US\$89 million worth of coffee in 2020, of which almost US\$19 million (21% of exports) was sold to EU markets. This aggregate market was second only to Viet Nam (55% of exports) in size, and was ahead of Thailand (8%), Japan (5%) and the United States (4%).

Looking at the export potential of nine agricultural products to the EU, the authors noted that coffee held the most promise, with US\$43 million in annual untapped export potential, or 45 per cent of the total untapped value among the overall product group.

However, to realize this untapped potential, Lao firms seeking to export to the EU face various challenges. Recommendations to address these, taken from the authors’ survey of firms engaged in agri-food exports to the EU, include:

- An international standard coffee laboratory in Lao PDR. This would save Lao coffee exporters the cost of 3rd-party certification in Thailand and increase product competitiveness. Organic certification, in particular, is very costly and could use government support.
- A single-window export processing and facilitating mechanism for EU-exports, involving both the government and the private sector. This would improve information flow regarding trade-related regulations and processes required by importing countries, and could help facilitate product certification and certificate of origin issuance.
- Infrastructure development, particularly focused on upgrading the logistics sector to international standards, would help facilitate export growth.
- The government could do more to promote agri-food exports, via channels such as international trade fairs, Lao PDR embassies in Europe and externally-focused government websites.
- Improve access to finance for small entrepreneurs and farmers seeking to expand their markets into the EU.

While the obstacles mentioned here relate to exports to EU markets, they are broadly applicable to all export markets, with the difference being mainly one of degree. For example, exporting organic rice to the EU market requires nine documents, including organic certification, and compliance with 12 processes involving 13 stakeholders. In contrast, exporting the same product to Viet Nam requires six processes, six stakeholders and three documents.

Additional barriers highlighted by the World Bank include (World Bank, 2022c):

- Exporters face complex administrative requirements at border crossings, often leading to delays and extra costs.
- High logistical and transaction costs, with certificates required from numerous government departments.
- Absence of digitization of the SPS traceability system, necessitating paper documents for all steps.
- Significant capacity constraints within most aspects of the Lao PDR institutional framework of SPS certification and export processing, requiring several weeks to secure all required documentation for a given shipment.

Another quality or value-related growth opportunity for the medium term is identifying and marketing niche products, such as the many varieties of sticky rice that are uncommon outside of Lao PDR. In addition, longer term opportunities exist to combine agriculture with the rehabilitation of degraded lands through community agroforestry (WWF, 2021), which could result in products securing higher prices. Studies on the comparative advantage of the agricultural sector in each province are recommended to ensure value-related growth opportunities.

The potential shift to value-added agricultural products via processing represents one final medium-term opportunity for Lao PDR. This would allow for higher prices, enabling greater domestic value capture. At present, there is very minimal food processing in the country, typically with out-of-date equipment and lack of knowledge about modern processes, which is a result of limited vertical integration. This can result in significant losses in product quantity as well as value during harvesting and processing (World Bank, 2022c). This also impedes economies of scale, rendering the products vulnerable to potentially cheaper foreign imports.

Addressing these issues would require investments in both equipment and training. These investments could be made more effective by the parallel development of value-added logistics services, such as integrated door-to-door multimodal transport, inventory management, order management and cold chain services (World Bank, 2022c). It must be noted that many exporting companies currently have foreign investors and owners so most of the profits flow outside the country. To ensure that the benefits of this development are shared within Lao PDR and with its citizens, structures need to be established by the government that encourage domestic ownership of Lao exporting companies.

FINANCIAL POTENTIAL

The NSEDP aims for agricultural exports to grow to average US\$1,2 billion per year by 2025, an increase of US\$400 million compared to 2020. This goal may actually be achieved early as agricultural exports hit more than US\$1.1 billion in 2022. Using this target as a baseline forecast (Scenario 1), Seneca has developed two further scenarios, which quantify the revenue impact of changes in agricultural exports as a percentage of GDP, using the International Monetary Fund's GDP forecast for Lao PDR. The cumulative forecast revenue for the baseline scenario from 2022-2027 is US\$8,100 million.

- Scenario 2 is a hypothetical illustration of an agriculture sector where exports as a percentage of GDP are stagnant relative to their estimated performance in 2022, hovering at around 5.6%-5.8% over the period. Reasons for this could include limited public and private sector actions and investment to improve necessary logistics capabilities; delays in expanding capacity to support the completion of SPS requirements for new categories of products; loss of arable land and/or water supply due to hydropower expansion; and, limited action to develop the organic sector.

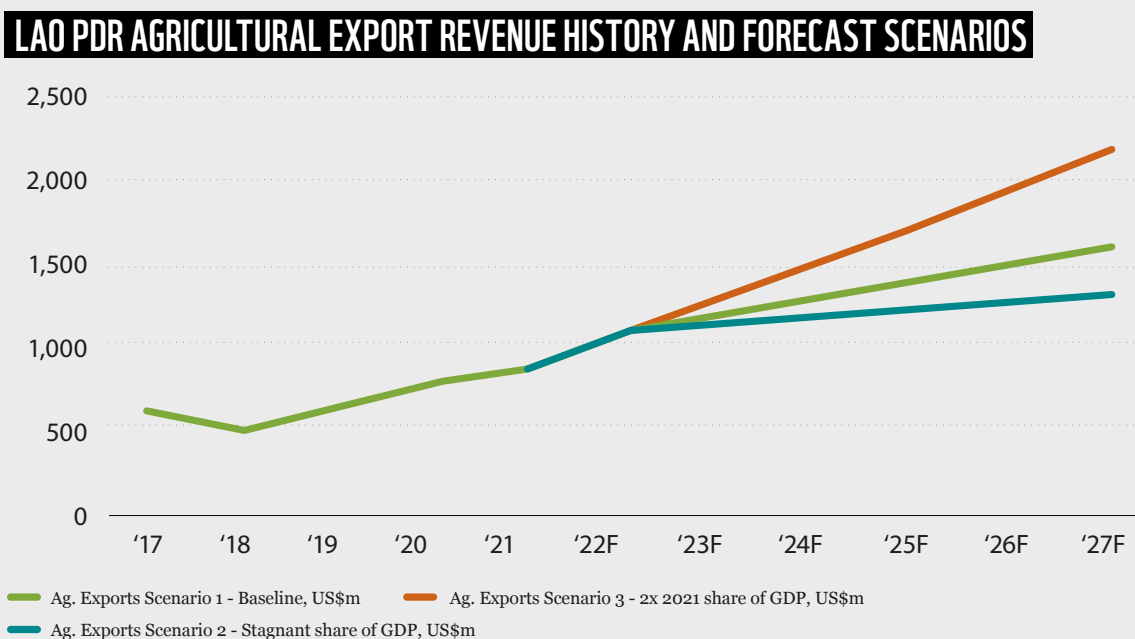
Agriculture export revenue as a percentage of GDP for Scenario 2 begins at par with that of the baseline in 2022 (5.7%) and stays at that level plus/minus 0.1% through 2027, resulting in a cumulative revenue for the period of US\$7,274 million - amounting to a shortfall vs the baseline of US\$826m.



- Scenario 3 illustrates the hypothetical potential for agricultural export revenue based on continued improvements in the enabling environment, particularly with respect to logistics capabilities and infrastructure, agricultural product marketing and promotion, and expanded institutional capacity for facilitating standards and certification compliance. Agricultural production and export growth could potentially be boosted further should land at risk of inundation by dam construction remain available for long-term use.

Agriculture export revenue as a percentage of GDP for Scenario 3 begins at par with that of the baseline in 2022 (5.7%) and increases by 0.25% annually through 2027, resulting in a cumulative revenue for the period of US\$9,753 million - amounting to a surplus vs the baseline of US\$1,653 million.

Figure 8: Lao PDR agricultural export revenue, historical and forecast to 2027



Source: IMF & Seneca estimates, Bank of Lao PDR, World Bank

ENVIRONMENTAL & SOCIAL ASPECTS

At the sector level, a sharp expansion of agriculture exports may involve an expansion of land under cultivation – especially for cash crops under intensive monoculture production, as is likely the case for some export-oriented contract farming operations. As this has the potential to contribute to environmental degradation, the government may need to intensify its efforts to ensure that the expansion is sustainable, in line with the aims of the Agricultural Development Strategy to 2025 and Vision to 2030. Over the longer term, blended finance projects such as the community agroforestry opportunity mentioned above, may contribute to the government’s stated aim to restore national forest cover.

From a social standpoint, agriculture remains the leading source of employment in Lao PDR, with over 60 per cent of the workforce engaged in the sector (World Bank, 2022b). Benefits from the expansion of agriculture exports are likely to be concentrated on commercial operations in the immediate term, as opposed to smallholder producers. Over time, however, any improvement to domestic logistics and transport infrastructure facilitated by the public sector may allow access to this growth opportunity to smallholders, potentially improving rural incomes and food security. Currently, many Lao labourers migrate to Thailand and other countries as wages are higher. Developing and expanding agri-processing domestically could provide new jobs in food processing facilities, increase wages and reverse this migration.



SECTOR 2

NATURE-BASED TOURISM

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Lao PDR's natural and cultural heritage holds significant potential for tourism development and green growth. Its rich endowment of landscapes, rivers, ecosystems and wildlife provide a wide variety of attractions for tourists, particularly those seeking nature-based experiences. The national government recognizes this potential and the sector's development is one of the major components of its green growth strategy. A key priority to boost the sector is upgrading, expanding and diversifying tourism products, services, markets and related infrastructure (MICT, 2021), particularly in ways that encourage a combination of longer average visits and higher average visitor expenditure.

Improving the management of Lao PDR's conservation landscapes is also a key priority. The World Bank noted that many admirable tourism projects in the country "ultimately underperform because the conservation issue has been insufficiently addressed." This has led to, among other examples, rivers promoted for kayaking no longer being navigable due to dams (World Bank, 2019). As Lao PDR's natural assets are degraded via unsustainable exploitation (e.g., hunting of wildlife, deforestation) or modification (e.g., mining, dam construction), the long-term growth and revenue potential of the tourism industry is put at risk.

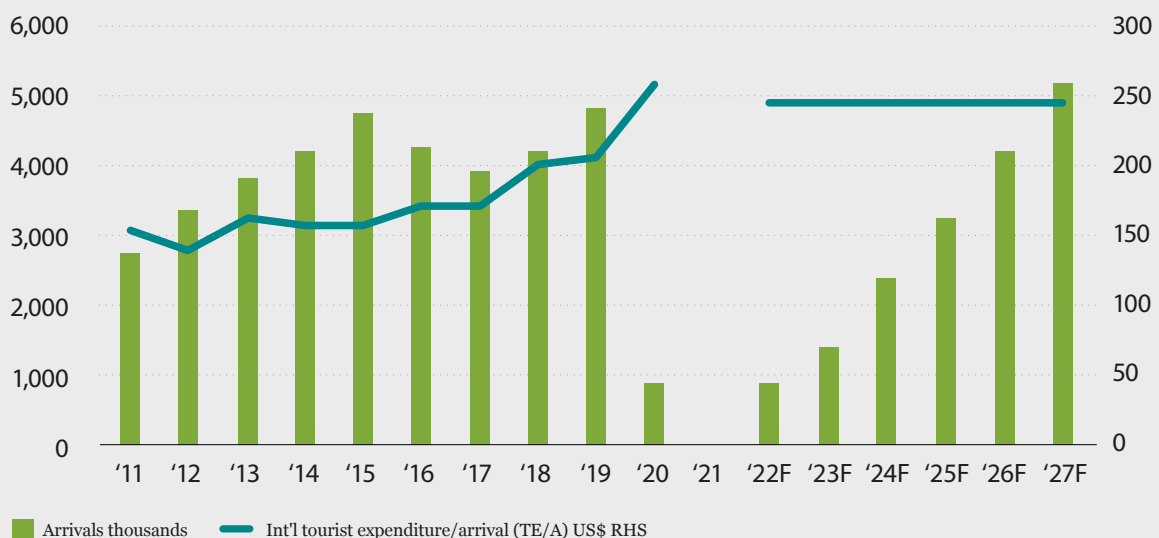
FINANCIAL POTENTIAL

Prior to the Covid-19 pandemic, travel and tourism exports (e.g., receipts from international arrivals) in 2019 comprised 5.2 per cent of Lao PDR's GDP, declining to 1.2 per cent in 2020 and essentially zero in 2021 when international arrivals were cut off. International visitors spent US\$974 million in Lao PDR in 2019, averaging over US\$200 per arrival (tourist expenditure/arrival, or TE/A).

Following the reopening of Lao PDR in May 2022, MICT expects arrivals to recover sharply through 2025, with compound annual growth of 53 per cent. Tourist numbers are forecast to reach 3.2 million in 2025, almost 75 per cent of the 5-year pre-pandemic average. The ministry estimates that international tourism receipts will recover to almost US\$780 million by 2025, or 80 per cent of the 2019 figure (MICT, 2022). This is based on a TE/A figure of US\$242 over the 2022-2025 period. Seneca has extended these forecasts by two years to create a baseline 5-year forecast of arrivals and receipts for the period 2022-2027, shown in the figures below.

Figure 9: Lao PDR international tourism arrivals and expenditure per arrival, historical and forecast to 2027

LAO PDR INTERNATIONAL TOURISM ARRIVALS AND EXPENDITURE / ARRIVAL



Source: MICT & Seneca estimates, World Bank.

Cumulative receipts for the baseline scenario over the forecast period total US\$4,156 million. Seneca also estimated two additional scenarios quantifying the revenue impact of TE/A figures that deviate from the baseline forecast. Changes in TE/A could result from a shift in the mix of arrivals – since regional visitors from Thailand and Viet Nam, who currently predominate, have lower expenditure profiles, primarily due to shorter visits.

- Scenario 2 is a hypothetical illustration of a tourism sector rendered less attractive to longer-staying international visitors, with a resulting downward trend in expenditure per arrival. This could happen for a variety of reasons, including continued degradation of nature-based tourist assets from exploitation or modification (e.g., from deforestation or a hydropower installation), stagnation of tourist infrastructure from lacklustre investment, or visit procedures (paperwork, fees, etc.) that are considered too burdensome.

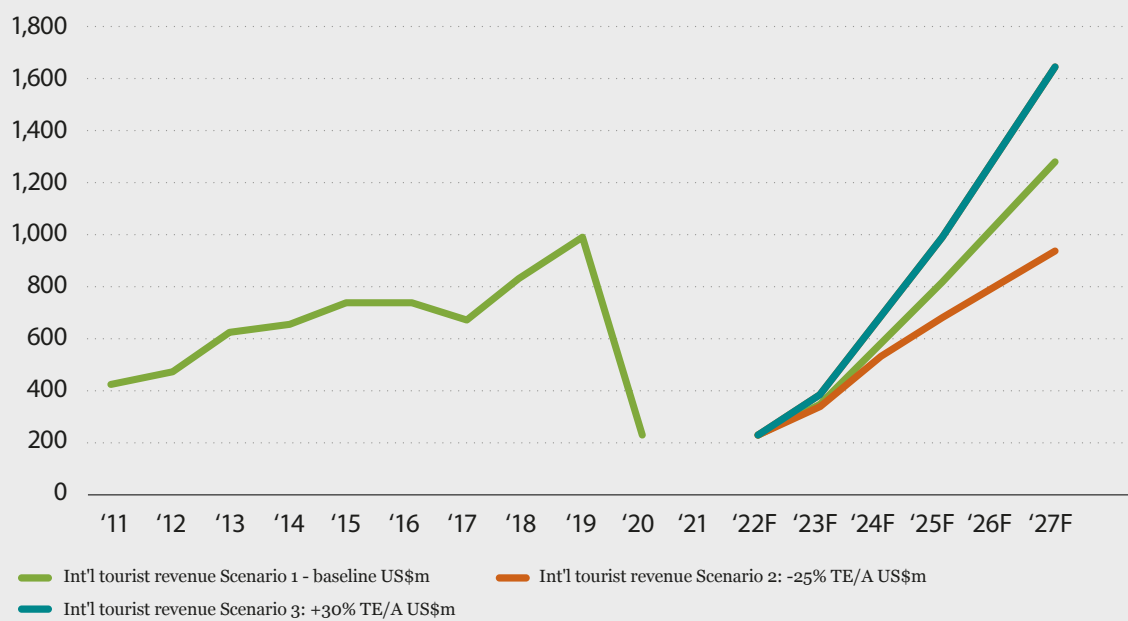
The TE/A for Scenario 2 begins at par with the baseline in 2022 and gradually drops to 75 per cent of the baseline by 2027, resulting in cumulative receipts over the period of US\$3,454 million - amounting to a cumulative revenue shortfall vs the baseline of US\$700 million.

- Scenario 3 illustrates the hypothetical potential for international tourism revenue based on continued positive development of the sector through conservation of Lao PDR's natural assets, and public and private sector investment in tourist attractions, infrastructure and marketing. In addition, it assumes that the combination of the new Laos-China Railway and the lifting of China's pandemic restrictions will shift the visitor mix so that TE/A rises faster in the immediate term.

The TE/A for Scenario 3 begins at par with the baseline in 2022, jumps to 10 per cent above baseline for 2023, and then gradually rises to 130 per cent of the baseline by 2027, resulting in cumulative receipts for the period of US\$5,056 million - amounting to a cumulative revenue surplus vs the baseline of US\$900 million.

Figure 10: Lao PDR international tourism receipts, historical and forecast to 2027

LAO PDR INTERNATIONAL TOURISM REVENUE HISTORY AND FORECAST SCENARIOS



Note TE/A = tourist expenditure per arrival.
Source: MICT & Seneca estimates, World Bank.



ENVIRONMENTAL & SOCIAL ASPECTS

Properly managed, private sector investment in nature-based tourism services and facilities can combine with public sector policies, regulations and incentives to support the conservation - and, potentially, restoration - of Lao PDR's natural environmental heritage in a self-reinforcing cycle, while also mitigating potential negative impacts from excessive visitors to a given location.

The tourism sector in Lao PDR in 2021 contributed approximately 28,000 direct jobs, a sharp decline from 42,000 in 2018 due to Covid-19. Women comprised about 57 per cent of the workforce, reaching close to 80 per cent for the handicrafts subsegment (MOES, 2021). More broadly, the travel and tourism sector contributed about 300,000 direct, indirect and induced jobs in 2019-2021, according to the World Travel & Tourism Council's research (WTTC, 2022)¹.

Figure 11: Tourism employment by subsector, 2018 and 2021

SECTOR	2018 ESTIMATED EMPLOYMENT	TEMPORARILY CLOSED	2021 CURRENTLY TRADING	ESTIMATED TOTAL EMPLOYMENT
Hotel	8,564	1,318	5,427	6,745
Resort	2,203	768	510	1,277
Guesthouse	2,821	1,279	4,752	6,031
Restaurant	4,526	1,402	6,738	8,140
Entertainment	3,594	2,057	1,434	3,491
Travel services	1,389	1,109	523	1,632
Attraction	4,728	3,726	4,487	8,214
Handicrafts	14,435	578	4,543	5,122
Total	42,260	12,237	28,413	40,650

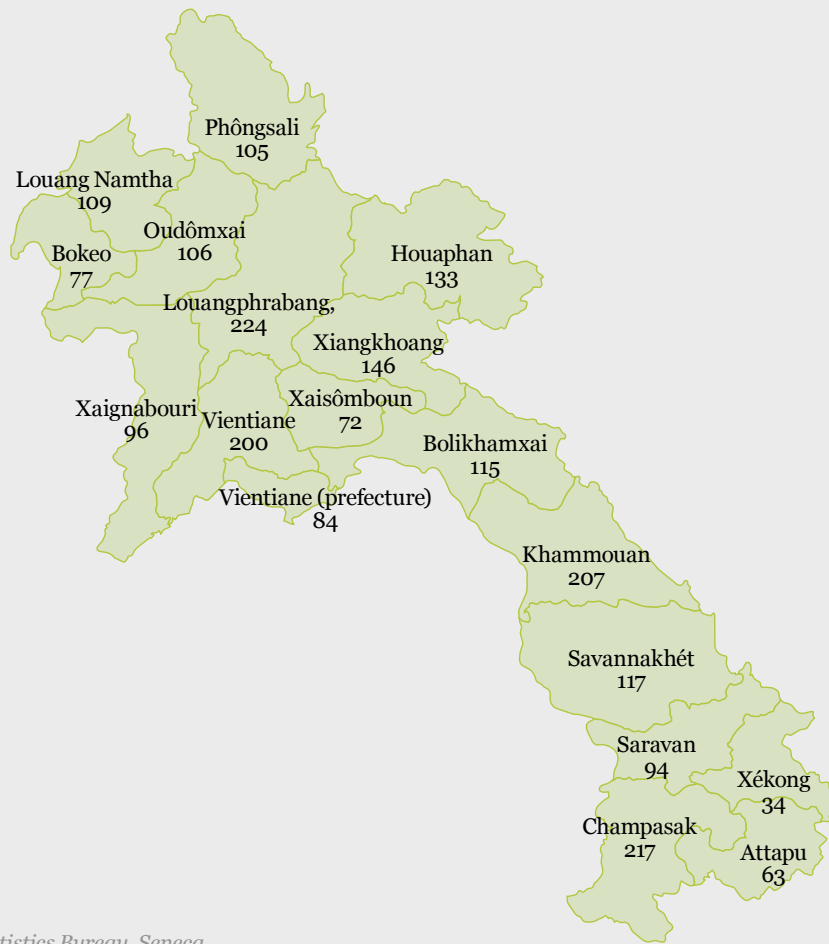
Source: MOES

As the sector recovers from Covid-19, direct jobs are expected to rise fairly quickly back to the 40,000 level, as locations that were temporarily shuttered by the pandemic reopen. This number is expected to increase further as the sector develops – MICT counted 2,199 tourist sites/attractions in the country in 2018 and 2021 with a further 587 under development (MICT, 2022). With an average of 19 jobs per site, the attractions under development could support an additional 11,000 direct jobs when complete.

Slash and burn agriculture and resultant fires lead to significant air pollution in the northern and central provinces during April and May. This leads to many tourists avoiding Laos as a destination or confining themselves to the southern parts of the country. The government has to work with all stakeholders and implement measures to prevent this in the future to prevent loss of income for the tourism industry.

¹ This includes direct, indirect and induced contributions such as jobs supported by investment spending (e.g., construction of tourist facilities), domestic supply chain purchases (e.g., spending on agriculture products, transport sector fuel, IT purchases) as well as jobs supported by the spending of those directly and indirectly employed by the travel and tourism sector. (WTTC, 2020)

Figure 12: Map of Number of Tourist Sites by Province, 2021



Source: Lao Statistics Bureau, Seneca





SECTOR 3

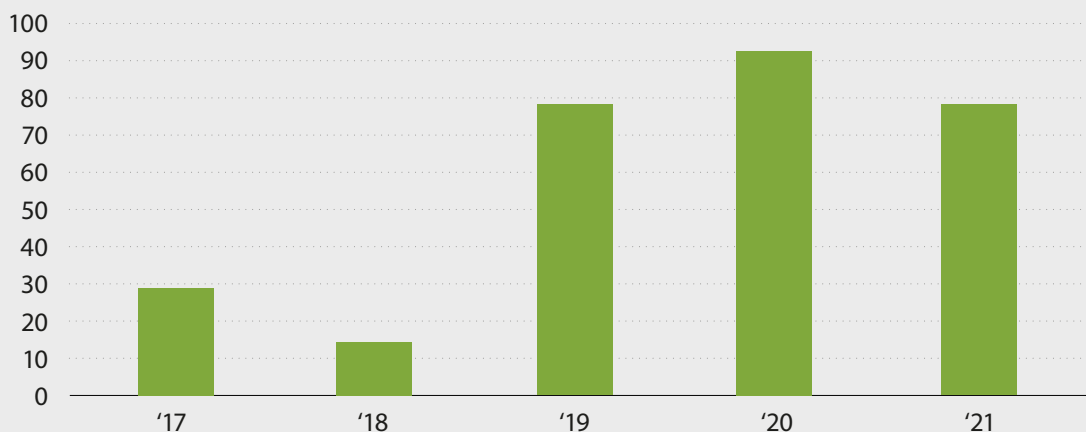
DISTRIBUTED ENERGY GENERATION

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One feature of Lao PDR’s hydropower sector is its seasonality. Due to limitations in transmission infrastructure, the country imports electricity from neighbouring countries to meet demand during the dry season, and also in some border areas that are not connected to the grid. This foreign-currency expenditure has averaged approximately US\$80 million since 2019, or about 3 per cent of government revenue (BOLPDR, 2022). This contributes to the financial strain faced by the national utility EDL, as it is unable to pass the costs of the imported power on to end-users (ADB, 2019).

Figure 13: Lao PDR Electricity Imports, 2017-2021

LAO PDR ELECTRICITY IMPORTS, US\$M



Source: Bank of Lao PDR

Distributed generation from clean energy sources at sub-utility scale could alleviate some of the need for imported power. These sources are more commonly employed in areas without grid access, such as the existing World Bank-supported Solar Home System programme, with around 17,000 systems in operation in almost 400 remote villages (ADB, 2019). The constrained power supply during the dry season in parts of Lao PDR suggests that for those locations, clean distributed generation as supplemental capacity may warrant further consideration.

Beyond solar, there are several options for using biomass to generate energy. In particular, agricultural waste such as rice husks can be used as a feedstock for a gasifier to produce synthetic gas, which in turn can be used to generate heat or electricity, or to produce refined, synthetic fuel (IRRI). This technology is well-established and has been used in countries across the global South, including Brazil, Cambodia India, Indonesia, and Senegal. Other potential by-products from this process include biochar and food-grade carbon dioxide (CO₂).

With a ready supply of rice husks from their primary crop, communities could help resolve their power supply issues via biomass generation. The USA’s National Renewable Energy Laboratory (NREL) estimated in 2018 that nationally, Lao PDR has the potential to generate 371 GWh/year from rice husk biomass (Lee, Grue, & Rosenlieb, 2018), a figure that could rise with increased rice production.

Other biomass resources include logging-related residues with potential estimated at 720 GWh/year, biogas from livestock (~3GWh/year) and sugarcane bagasse (431 GWh/year). Lao PDR already has two bagasse plants producing bioenergy and ethanol with a total capacity of 38 MW.

Figure 14: Summary of Biomass and Biogas Technical Potential for Lao PDR

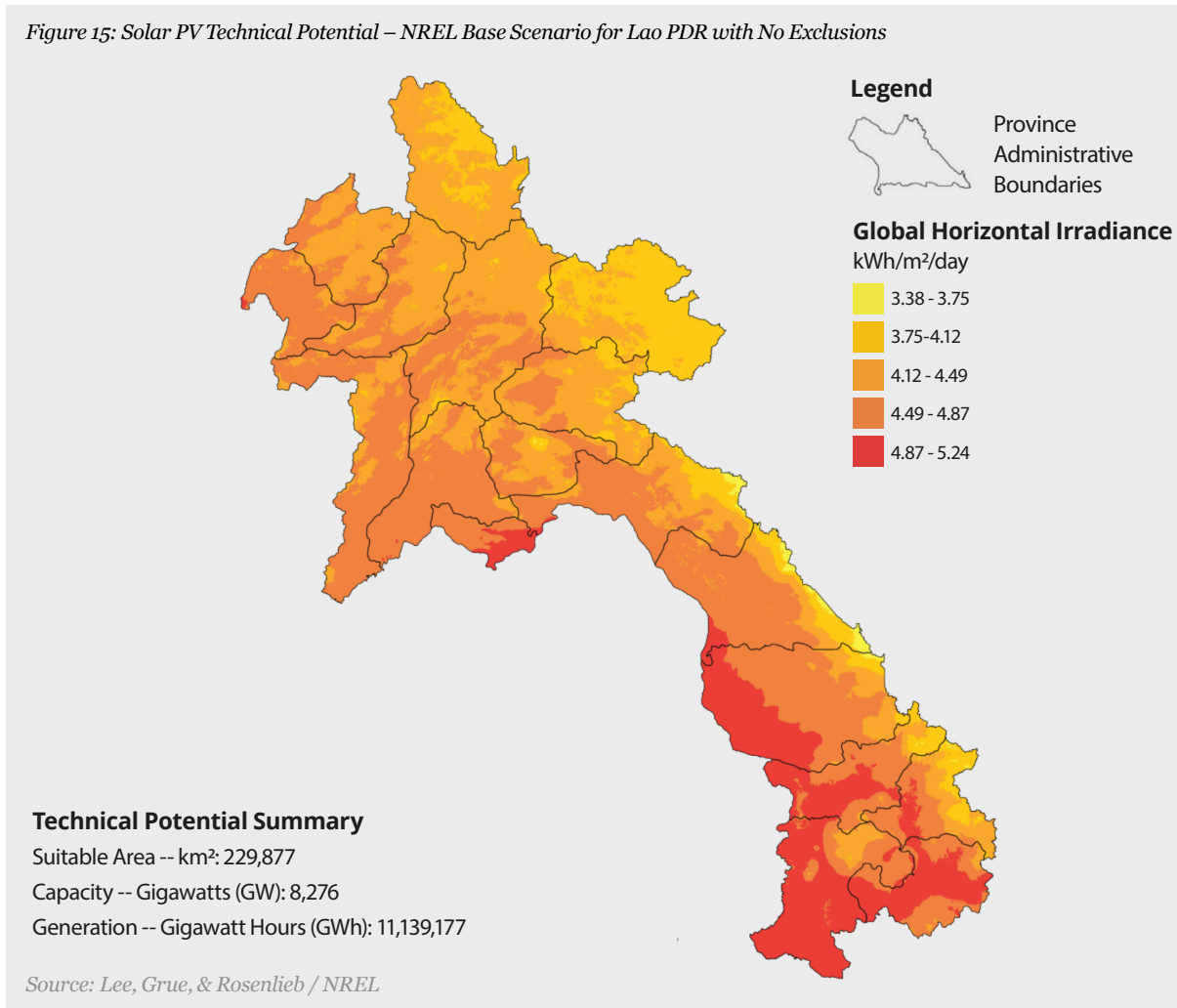
BIOMASS AND BIOGAS BASE-LAO PDR	TECHNICAL POTENTIAL
	GENERATION (GWH/YEAR)
Lao PDR (Total)	1,525
Resources — Multiple Scales	
Logging residue — Utility-scale	376
Primary mill residue — Utility-scale	254
Secondary mill residue — Nonutility-scale	90
Biogas — Nonutility-scale	3
Rice husk — Nonutility-scale	371
Sugar cane bagasse — Nonutility-scale	431

Source: MOES

If deployed at sufficient scale, this supplemental distributed capacity from solar and biomass could do more than just act as backup capacity. Combined with NREL’s estimate of solar technical potential of 731,417 GWh/year under maximally restrictive geographical assumptions² (Lee, Grue, & Rosenlieb, 2018), this aggregate capacity could be used to substitute for planned hydropower generation capacity. It could even potentially serve as a source of supply for the export market if aggregated into virtual power plant structures, assuming sufficient cross-border transmission capacity. An added benefit is that these technologies are modular and can be installed fairly rapidly, allowing for scaling in line with demand and as financial resources permit. However, the success of these projects will be dependent on effective capacity development and training provided to local communities together with continuous support, monitoring and evaluation led by the government.

² This NREL scenario begins with the total land area of Lao PDR, and excludes forested areas; areas with unexploded ordnance; protected areas, water bodies and wetland areas; areas with slopes greater than 5%; agriculture and forest areas; and urban areas, leaving over 14,000 km² as potential suitable area for solar.

Figure 15: Solar PV Technical Potential – NREL Base Scenario for Lao PDR with No Exclusions



A primary obstacle to the large-scale deployment of distributed generation capacity is the absence of a feed-in tariff scheme. Due to its financial constraints, EDL does not have the resources to embark on an investment programme for distributed generation. As such, any additional capacity would need to be driven by the private sector. Without a feed-in tariff that potentially incorporates long-term contracts with clear cost-based pricing and grid access, private sector investment - other than for self-consumption - seems unlikely to materialize.

Another key obstacle is the domestic electricity transmission grid. As mentioned above, grid limitations are a key factor driving imports of electricity. Until the necessary upgrades and interconnections are complete, investment in distributed generation - beyond what can be handled by the local grid (assuming a functional feed-in tariff) - may limit the possibility for this capacity to be utilized beyond a strictly local context.

FINANCIAL POTENTIAL

At the national level, the primary financial benefit of deploying distributed generation solutions to relevant communities would be the reduction or elimination of spending foreign exchange on electricity imports. As such, direct savings could reach US\$80-100 million annually. Savings in affected communities would depend on what substitutes they used – in the case of a diesel generator the savings could be substantial. However, for those communities where the power issue is seasonal, further study is required to assess the cost-effectiveness of this potential solution.

Although speculative, export revenues could be possible from distributed generation over the medium to long term. This would require appropriate amendments to the policy and regulatory framework for the power sector.

ENVIRONMENTAL AND SOCIAL ASPECTS

The environmental and social benefits and impacts of distributed clean power generation schemes will vary depending on what is being replaced. The primary value is the suite of benefits associated with electrification.





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CONCLUSION

Without significant debt relief, the fiscal situation for Lao PDR will be challenging through at least 2026 due to debt service obligations. Further capital-intensive investment in additional hydropower generation capacity risks prolonging this period of fiscal vulnerability, in addition to the environmental and social costs of such projects. The new Lao-China Railway and the ending of pandemic restrictions provide an opportunity for Lao PDR to ease this fiscal pressure via a recovery in agricultural exports and the return of international tourists.

With appropriate policy support, the government can help reduce barriers to development and drive private-sector led investment in accelerating the sustainable growth of these sectors. This has the potential to bring significant improvements to the livelihoods of a majority of the Lao people, given the large share of the population working in agriculture and tourism. Over the medium term, environmentally positive growth can be realised via the development of sub-sectors, such as organic agriculture. As demonstrated above, it appears feasible to develop export revenue opportunities across multiple sectors that not only provide positive environmental and social benefits, but also in aggregate support the fiscal position of the nation over the coming years.

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