



LAO PDR



COUNTRY OVERVIEW

Lao PDR is a landlocked country in Southeast Asia blessed with various natural resources with a total land area of 236,800 square kilometres with rugged mountains, comprising 18 provinces, and bordering the Mekong River, which forms most of its western frontier with Thailand. As one of the countries in Southeast Asia with the most neighbouring states Laos also shares a border with Viet Nam to the east, Cambodia to the south as well as Myanmar and the People's Republic of China (PRC) to the north.

Laos PDR is classified as a "lower middle-income country", but has shown consistent, robust growth since the introduction of the New Economic Mechanism (NEM) in 1986, which introduced market incentives and began decentralizing government economic enterprises. The country has seen growth rates of just over 7% from 2010 until the start of the COVID-19 pandemic,¹ fuelled by investments into the country's hydropower systems and allowing the growth of industry.

¹ International Monetary Fund (IMF). IMF DataMapper. Real GDP Growth. <http://www.imf.org/external/datamapper/> (accessed 17 December 2017)



SECTOR OVERVIEW

Typical areas of the clean technology (cleantech) are transportation (sustainable mobility), circular economy, agriculture and sustainable water management, energy efficiency as well as environmentally friendly energy and energy storage including power generation with renewable energies and environmentally friendly use of fossil fuels.

Renewable energy

Lao PDR does not have a lot of available fossil fuel resources and is therefore dependent on imports of petrol. While the country does have around 700 million tons of coal deposits in the northwest, the greatest asset is without doubt, its vast capacity of **hydroelectric power**, due to its ready access to large rivers, high rainfall levels and the mountainous landscape, which ensures high levels of runoff water.

Total exploitable hydro potential is estimated to be 23,000 MW², and 8,019 MW of hydropower capacity has been commissioned by the end of 2019, an increase of around 30% from the previous year. Mostly due to the opening of the 1,285 MW plant in the Lao province of Xayaburi. Hydropower is very important for the Lao PDR government's development plans and plays an important part in the ability for the transition into a middle-income country by 2024. It also makes a significant contribution to the overall economy, providing revenue from taxes, royalties, and dividends from the state owned company Électricité du Laos (EDL) and from many private investors, as well as foreign capital and investments, as more than 50% of the electricity produced in Laos is exported, mainly to the PRC.

The country plans to develop its hydropower potential for exports as well as to provide electricity throughout the entire country. The Laos Power Development Plan expects an installed capacity to reach over 14GW by 2025. While hydropower investments are usually controlled by larger companies, SMEs can benefit from these projects by providing equipment and technologies for mini grids, grid extensions, off-grid rural electrification and services related to the construction of hydropower plants.

Although Laos lacks conventional energy resources (e.g. oil or natural gas) there are abundant renewable energy resources, such as biomass, solar energy and small or mini hydropower. The Renewable Energy Development Strategy for 2011–2025 aims to bring the medium and small hydropower share to 30% of the total energy demand by 2025 and there may be good opportunities for SMEs in these sectors.

² https://www.un.org/esa/sustdev/sdissues/energy/op/hydro_phonekeoLaoPDR.pdf

With between 1800–2000 sunlight hours each year Lao PDR has a good potential for **solar energy**. Around 20,000 households are supplied with electricity through solar home systems. Larger photovoltaic (PV) systems (capacity up to 40–100 kWp) have also been piloted in cooperation projects between the Lao Ministry of Energy and Mines (MEM) and the Japanese New Energy and Industrial Technology Development Organization (NEDO). However, due to the very mountainous and heavily forested terrain there are natural limits to developing large-scale solar arrays giving opportunities to smaller and decentralised units including the use of solar energy for water heating for households and for drying agricultural products in rural and remote areas with considerable potential for further expansion.

The Lao government encourages the development of grid-connected solar PV systems and solar PV hybrid systems integrated with small hydropower to sustain electricity supply during the dry season. As flat land suitable for large scale solar PV farms is scarce the country has taken a novel step and announced in 2021 its plan for the world's largest floating hybrid solar PV plant on the reservoir of Nam Theun 2 power plant, which is expected to be completed by 2024. The joint French–Laotian project will have an installed capacity of 240-megawatt peak (MWp).

Related to the forest and agricultural sector in Lao PDR there are significant **biomass resources** from waste products including energy crops and organic wastes, rice straw and husks, sawdust, and corn cobs. There are 4 operational biomass power plants in the country with an installed capacity of around 100 MW, which represents only around 10% of the realistic capacity. Biomass is used mostly as a source of heating in households with more than 80% of the population relying on it for cooking as well as for small-scale industrial production of alcohol and tobacco. There are plans to increase the number of bioenergy plants across the country, which can offer opportunities to SMEs.

While there is a very small production of **biofuel** from palm oil and jatropha the relatively easy access to large quantities of hydropower offers Laos opportunities for a transition to carbon neutral transport via electric vehicles. This will increase the demand in charging technologies, batteries, and small vehicles.

According to international data sources, there is also some wind potential in the central provinces of Lao PDR, especially on high mountains along the Lao–Vietnam border in Savannakhet and Khammouane provinces, where at a height of 50 m and above, wind speeds reach 5.8 m/s. The theoretical potential for wind energy in Lao PDR is estimated to be more than 182,000 MW.

Recycling and circular economy

Like its neighbours in ASEAN, Lao PDR has seen rapid economic growth, which has significantly increased the rate of urbanisation and the creation of waste. Figures from UNDP suggest that less than half of the waste is collected although statistics are unreliable, disposal and recycling methods are inadequate. The Laotian government has increasingly emphasised that the country should move towards a more circular green economy, outlined in its development plans.

The waste that is collected is sent usually to a municipal landfill sites. Uncollected waste is usually disposed via incineration, burying or simply dumped on vacant ground. As in many other cities in ASEAN, there are many informal workers in the waste management and recycling value chain, who collect and sort waste for resale. This is done both for large hotels and companies, which might make an exclusive deal with a team of pickers, as well as with unseparated, urban waste.

At present, Lao PDR has a number of restrictions which challenge the development of the recycling sector and does not have a clear definition of waste as a potential resource. However, there are potential opportunities in Lao PDR, where SMEs can benefit.

As waste can be a valuable resource, the ability to separate waste ideally at source into streams, which can be converted into products and value added shows an increasing interest in Lao PDR in several areas including **recovery and recycling of recyclable materials**. There are several projects across the country in urban and rural areas to sensitise people to the need to segregate waste including recyclables, and the introduction of separation services for large users and household areas. As this is a fundamental for an improved waste management the number of projects and opportunities are expected to increase in the coming years.

Another potential growth area is the **conversion of waste into compost** gaining a valuable commodity for agriculture and substituting for the consumption of chemical fertilisers. This is an interesting strategic opportunity as the country is heavily dependent on agriculture, yet fertiliser consumption per hectare of arable land, is considerably behind neighbouring countries, resulting in lower yields and incomes.³ In Lao PDR the fertiliser consumption is 22 kg per hectare of arable land, compared with 152 kg/ha in Thailand and 397 kg/ha in Viet Nam. While there are legal issues in Lao PDR relating to the use of compost from urban waste in commercial agricultural crops, composting can not only bind nutrients in soil, but can be used in private gardens, public areas and as top-dressing. This would also contribute to reducing the country's dependence on imported chemical fertilisers and enable Lao PDR to continue its national development priority of clean agriculture and organic farming.

Recovery of waste as animal feed is a common practice in Southeast Asia but not widely utilised in Lao PDR in any scale. This could give opportunities for SMEs to provide certification and standardisation services, as well as technical equipment for heat treatment and sterilisation.

Finally, tying in with the overall renewable energy themes, Lao PDR has good opportunities for **waste-to-energy conversion through anaerobic digestion**. Among the opportunities for converting solid waste into energy, anaerobic digestion could be the most suitable for the country. This is a biological treatment method where the organic fraction of waste is decomposed by using anaerobic bacteria into biogas, which can be used as a heating fuel or to generate electricity. This can be a supplement to hydropower during the summer seasons also in rural areas. As many Laotians use traditional biomass for cooking it offers even more potential as a heating fuel.

³ Trading Economics 2017



REGULATION

Lao PDR legislation includes the Electricity Law from 1997, which has been continually updated and revised, most recently in 2018. The law provides the legal framework for the industry, supports the strategic development of electricity development by promoting both cross-border power exports as well as for the domestic sector to encourage socio-economic growth.

As hydropower forms the largest part of Lao PDR's energy, the country has a National Policy on Sustainable Hydropower Development. The policy came into effect in 2015 and requires full analysis of technical, engineering, environmental and social considerations on all hydro projects larger than 15 MW. Importantly, it mirrors the National Socio-Economic Development Plan's aim to move the country to a middle-income status, which requires not only economic growth, but also a number of social targets. These include 95% household electrification, effective utilisation of all available energysources and improving grid connections across ASEAN through improved transmission infrastructure and harmonisation of technical standards.

Apart from State Owned Enterprises (SOE), Lao PDR has been successful in encouraging private investment and foreign direct investment into power generation. By the end of 2017, 88% of the total installed power capacity in the country was from Independent Power Producers (IPP). Lao PDR has a reasonably well-developed framework for IPP, which must enter into a formal agreement with the Laotian government, which varies depending on the aim of the project. Export-oriented projects are usually based on a contract of up to 30 years, operating on a build-operate-transfer (BOT) agreement, while domestic production is usually on a build-own-operate model.

Applications to run an IPP are submitted directly to the Ministry of Planning and Investment (MPI), which will liaise with the Ministry of Mines and Energy (MEM) regarding feasibility studies. Projects between 5-100 MW must be approved by the government after consultation with relevant stakeholders while larger projects must be approved by the National Assembly. Export-oriented IPP usually need to show a contract with a neighbouring country's electricity board before approval, although increasingly, the contracts are made directly with Électricité du Laos (EDL), which gives greater flexibility in supply and allows electricity sales to be combined from a variety of sources.

There are many incentives to promote IPP under the Law on Investment Promotion, including attractive return-on-investment levels set by the government, no import duties on production machinery, equipment, raw materials, nor on chemical materials necessary for biofuels production within a seven-year period. Furthermore, the government offers profit tax exemptions, subsidies for different types of energy and generous rules on repatriation of profits, amongst others. The government has continued to provide financial support by investing into IPP projects, which has reduced the risk of investment and encouraged private ownership. Nearly three quarters of all installed capacity will be from foreign investment by 2030, with China and Thailand accounting for the majority of it according to figures from the Asian Development Bank (ADB).



MARKET ENTRY

While foreign ownership is permitted, it is usually better to work with a Laotian partner and to consult with legal experts regarding local practices and conditions.

The [Lao National Chamber of Commerce and Industry](#) (LNCCI) provides a range of services and may be able to help with information on suitable contacts and potential partners. Membership is also open to non-Laotian businesses. There are many [foreign chambers](#) in Lao PDR as well, including from ASEAN countries.

Lao PDR government is a leading procurer of goods and services, but procurement procedures are often not transparent. The national budget is heavily reliant on overseas development aid, which often includes requirements for purchases from the donor market making public procurement more complicated.

Government procurement contracts are sometimes advertised in the local English language newspapers like the [Vientiane Times](#) and [Lao News Agency](#). This may include infrastructure and energy projects financed by donors such as the ADB, World Bank and various international aid agencies. However, government purchases are usually not advertised openly, and many projects have been started by direct submission to the Lao government outside procurement. In recent years the Lao government has published more tenders and contracts and appears to target more open and competitive bidding.

Many Laotian businesses are regular visitors to other ASEAN trade fairs, particularly Bangkok. Relevant cleantech trade fairs can include [Future Energy Asia](#), and [ASEAN Sustainable Energy Week](#).



RECOMMENDATIONS AND TRENDS

Heavily dependent on natural resources for its major industries of farming, hydropower, mining and wood products Laos is highly vulnerable to climate change. Since the early 1990s the Lao PDR government has increasingly brought in legislation to address environmental issues, including the 1999 Environmental Protection Law, which was followed by separate legislation protecting forestry, wildlife and aquatic life, land, agriculture, water, and water resources.

Several multinational development banks and agencies have strongly supported the development of cleantech initiatives in the country encouraging investments into areas of concern, including energy provision, water supply and treatment, and increasingly waste disposal. While a lot of Laotian projects in the hydropower sector are often for larger companies there are several potential investment areas in Lao PDR for SMEs:

- Products and services to improve waste collection and sorting, diverting waste from landfills.
- Improved biomass heating / cooking systems with higher efficiency to reduce air pollution, deforestation, and other environmental impacts.
- Composting systems for households, rural and urban environments and business models for fertilisers.
- Developing business models to increase recycling rates and particularly the re-use of plastics in industry from sorted municipal waste.
- Off-grid renewable energy systems, including small-scale micro-hydro plants, solar installations and small biomass plants to provide energy to rural areas, and as a supplement to hydropower during seasons of low rainfall.

Overall Lao PDR offers a surprisingly attractive market for cleantech suitable for many SMEs which is likely to continue growing in the future.



CLEANTECH SECTOR BRIEF