



VIETNAM



COUNTRY OVERVIEW

According to the World Bank and the Asian Development Bank, Viet Nam ranks among the top five countries which risk the most negative consequences of climate change and pursuing “green growth” is therefore vital for the country. Already in 2011, the Vietnamese government launched the “National Green Growth Strategy (2011–2020)” and since then, Viet Nam has pursued a dedicated sustainable development policy, which includes climate and renewable energy. The country was one of the first nations to draw up an action plan to implement the Paris Climate Agreement. In 2020, Viet Nam launched the “National Energy Development Strategy of Vietnam to 2030, with a vision to 2045”, prioritising sustainable energy development and eliminating subsidies, monopolies, ambiguity and unfair competition in the energy sector. This built on the 2015 “Renewable Energy Development Strategy up to 2030, with a vision to 2050” strategy, which set out the priorities for both short and long term renewable developments, from a wider socio-economic perspective. In early 2021, the Ministry of Industry and Trade of Viet Nam (MOIT) released the draft proposal for the national power development plan (PDP8) for the period 2021–2030, with a long-term vision towards 2045. The plan sets an ambitious goal of 53% of total energy generated from renewable sources, and 3% from energy from storage devices (source: Pinsent Masons).



SECTOR OVERVIEW

Within renewable energy, Viet Nam has seen wind and solar grow from essentially 0 to 10% of its supply in only five years, since 2015. The draft PDP8 further expands wind and solar capacity and increases their share of the country's generation mix. The draft PDP8 also puts emphasis on enhancing grid infrastructure as a way to ensure stable operation with a higher share of renewables. The country relies significantly on hydroelectric generation and is home to a number of large rivers, including the Mekong. However, hydro's reliability is affected by periodic droughts and water shortages. The plan also prioritises investments in the development of power plants utilising urban waste, solid waste and biomass in parallel with environmental protection and circular economy development (source: Vietnam's National Energy Development Strategy to 2030 and Outlook to 2045 / US Energy Information Administration).

In 2017, **solar energy** was mostly absent in Viet Nam's energy strategy, yet by 2021, it has a key role in Viet Nam's cleantech development. The market is open to floating, ground mounted as well as rooftop solar panels. By the end of 2019, Viet Nam had overtaken Malaysia and Thailand and reached the largest installed capacity of solar panels in Southeast Asia, being firmly in the top 10 in the world. By the end of 2019, photovoltaic projects increased to 5GW, far beyond the 1GW 2020 target. Viet Nam offered generous incentives to households and businesses to install rooftop solar in 2020. As a result, by the end of 2020, 9.3GW of extra generating capacity had been created – equal to six coal-fired plants. By 2021, the country had more than 101,000 rooftop installations on homes, offices and factories, resulting in a 25-fold increase in its solar generation capacity in just one year. China is a prominent player in the installed solar panels market, covering all aspects from investment and engineering to procurement and construction. However, many other foreign companies are major players on the market, such as German ASEAN Power, B.Grimm Power Public, Trina Solar, Schletter Group, JA Solar, Sunseap International, Nippon Sheet Glass, Ecoprogetti, Tata Power, Shapoorji Pallonji Infrastructure Capital, Gulf Energy Development, InfraCo Asia

Development, and ACWA Power. Geographically, most solar power plants are concentrated in the southern region, where they can overwhelm the national grid, which struggles to store and transmit the large amounts of energy it receives. Meanwhile, some solar plants have had their operation date delayed because of incomplete transmission lines. In addition to developing power transmission capabilities to allow northern regions to source solar power, the government has also suggested to apply the research of a smart grid system and use Industry 4.0 technology to optimise transmission systems.

(Source: WE Forum / Vietnam Briefing)

Although not yet as popular as solar, Viet Nam's onshore and offshore **wind power** resources are as impressive, and thanks to the falling installation costs, a lot of headway has been made in this area. While both onshore and offshore wind generation have considerable potential in the future, it is offshore wind generation that stands out, having the potential to supply 12% of Viet Nam's electricity by 2035. Viet Nam is expected to have about 1,200 large offshore wind turbines, installed in both large conventional fixed offshore wind farms as well as floating wind farms. In addition, there will be about 40 smaller nearshore wind farms using smaller turbines. Viet Nam has the technical potential to generate 160GW of wind energy within 100km from shore, amounting to about two and a half times the total current installed power capacity. However, just like with solar, central and southern provinces are holding most of the wind resources and underdeveloped power grid and lacking transmission capability are an impediment to increasing wind energy capacity. The market is dominated by domestic and foreign companies from China, Thailand, Singapore, Germany, Russia, South-Korea, and Japan. Major stakeholders and investors include GE Renewable Energy, Mainstream Renewable Power, Phu Cuong Group, Blue Circle, Superblock, Siemens Gamesa, Doosan Heavy, Egeres Enerji, and Tan Hoan Cau Corp.

(Source: International Financial Corporation).

Both wind and solar energy raise questions about how to transmit power to the north more efficiently and how to build a system to cope with the volume of energy that can be generated from cleantech. **Grid improvement** is therefore a major issue and one of the biggest impediments to increasing the utilisation of renewable energy sources in Viet Nam and the government is fully aware of this. Due to the limits of the grid, the state-owned company Electricity Vietnam (EVN) has at times also stopped receiving electricity from renewable sources without compensation, placing mounting risks on the bankability of renewable projects. One of the focus areas of PDP8 is a mechanism encouraging the development of flexible power sources including battery storage for flexible operations. Both battery storage and smart grids are considered as potential solutions for integrating renewable energy into the power system.

Hydropower is the original renewable energy source in Viet Nam and one that is generating a large amount of current capacity. The PDP8 actually reduces the share of hydro from 18% in 2030, to 9% in 2045, further cementing the priority given to solar and wind energy. Hydropower is largely concentrated in the north of the country. By 2019, large hydropower projects had been almost fully exploited and construction of new international environmental and social best practice compliant projects with low investment costs had begun.

In September 2021, Viet Nam launched the world's second largest **waste-to-energy** plant in Hanoi, which can handle 4,000 tons of dry solid waste a day, 67% of daily output. The plant is based on a Viet Nam based investment firm and delivered by a Chinese contractor. Viet Nam is moving fast on this front, having only set up its first waste-to-energy plant in 2017, with Japanese funding and technology. Similar projects have been built by Chinese companies, using funding from the Asian Development Bank. Future projects are focusing on increasing the number and capacity of waste-to-energy plants in Hanoi, Ho Chi Minh City, and the Mekong Delta. Some of the major investors include Hitachi Zosen Corporation, Watrec Ltd, and Trisun Green Energy Corporation. These projects are crucial, because although the National Waste Management Strategy aims to build a circular economy focusing on complete waste collection by 2025. In 2020,

roughly 85% of all waste was buried without treatment in landfill sites, 80% of which were unhygienic and polluted the environment. Although Hanoi has one of the highest recycling rates in Asia, with about 20% of the municipal waste recycled, across the country, **recycling and waste sorting** is lagging behind. This task is largely performed by individual waste-pickers, or at most informal family businesses and small companies, without the use of appropriate technologies. When it comes to **wastewater** treatment, Viet Nam is on the low end of the scale with approximately 10% of wastewater being treated. And although the will is there, with almost 50 wastewater treatment plants across the country, challenges with collecting and treating wastewater keep treatment levels low. Efficient drainage in cities is made difficult by a large number of households not being connected to the drainage system, which makes creating an efficient drainage and treatment system challenging. There are challenges in accessing reliable electricity supply to run wastewater treatment. Therefore, finding alternative energy sources and ways to collect, treat and reuse wastewater are major issues.

As an agricultural country, Viet Nam has plenty of **biomass** to use for energy. Agricultural wastes are most abundant in the Mekong Delta region with the Red River Delta being the second largest source. Main biomass resources are rice husk from paddy milling stations, bagasse from sugar factories, coffee husk from coffee processing plants in the Central Highlands and wood chip from wood processing industries. Vietnam has set a target of having a combined capacity of 2,000MW biomass power by 2030. However, biomass is generally treated as a non-commercial energy source, and collected and used locally by households. Approximately 40 bagasse-based biomass power plants have been developed, utilising bagasse from sugar mills, but until 2020, they were still unable to connect with the national grid due to low power prices. Strong competition for the in-take material has also been a challenge for more commercial biomass plants that would sell to the grid, as most of the energy from biomass is used directly by factories.



REGULATION

In order to satisfy the increasing public demand for clean air and environmental protection and to reduce the country's share of imported energy, Viet Nam is pursuing a strong policy favouring renewables.

The Vietnamese government offers attractive **Feed-in-Tariffs (FiT)** for both solar and wind energy projects, which have been the key driver for renewable energy generation. The first FiT for solar projects were launched in 2017 and proved highly attractive, generating numerous new installations. However, high uptake meant that the weak transmission system could not cope, and many solar plants were left operating below capacity. In 2020 and 2021, FiT were cut between 10% - 38%, depending on type of solar installation. In September 2021, the Vietnamese government introduced a new mechanism, a self-consumption rate, for rooftop solar. This is based on the ratio between the consumption of on-site and the total installed production capacity. As a result, electricity sellers can sell most of the electricity generated to consumers, and sell the remainder back to the grid. A further revised version of the tariff is expected to take down the rate even further, and a solar power auction system is expected to be implemented from 2022. Lower FiT, coupled with high investment costs can be a deterrent to foreign investors. In contrast with solar, in 2018, the Vietnamese government increased the initial level of FiT for wind energy plants, to make them commercially viable for developers and these rates are in place until 2023, when the auction system is expected to take over.

In 2020, FiT for bioenergy were also increased and put in place until 2023, with the aim to increase the uptake of energy generation from biomass.

Viet Nam also offers numerous **incentives** for renewable energy stakeholders. Viet Nam does not impose local content requirements as a condition for preferential FiTs as is used in some of the other ASEAN countries, which enables a level playing field for investors and reduces technology costs. For wind energy, developers may receive a corporate tax exemption for the first four years, followed by 50% discount for the next nine years, as well as an import tax exemption for imported renewable energy goods, to establish fixed assets, materials, and semi-finished products. Income from investment in the production of renewable energy, clean energy and waste-to-energy process is entitled to a preferential tax rate of 10% for 15 years. Some renewable energy projects invested in a difficult/extremely difficult socioeconomic location can benefit from exemption from land lease and land tax. In order to tackle the transmission issues, Viet Nam allows the private sector to invest in transmission lines to connect their plants and other projects in the same area to the main grid.

Between 2021-2022, Viet Nam is also piloting a **Direct Power Purchasing Agreement (DPPA)** scheme, for larger off-site renewable energy projects in solar and wind. The DPPA will speed-up purchasing agreements, by bringing other buyers, apart from EVN, to the table, and therefore lowering project costs. Buyers under the DPPA are manufacturers, with priority given to those with international commitments in implementing targets on the environment, climate change and sustainable development. From the domestic point of view, supporting local industries play a crucial role in the development and quicker adoption of renewable energy technologies, however these have not received as much government support. Viet Nam could benefit considerably by supporting domestic SMEs by offering capital subsidies and incentives such as tax breaks and preferential loans, and a competitive supporting industry can contribute to reducing investment costs for renewable projects.

Among other measures, Viet Nam has approved the creation of an emissions trading scheme, to be piloted in small capacity between 2021-2025 and rolled out nationally afterwards, accompanied by carbon tax, green certificates, bonds, and funds.



MARKET ENTRY

Viet Nam would need around US \$10 billion annually between 2020 - 2030 to keep up with the increasing demand. Driven by this, in addition to numerous favourable regulations, the government has allowed 100% foreign ownership of Vietnamese companies in the energy sector. Foreign investors can choose among permitted investment forms: 100% foreign-invested company, joint venture or public-private partnership (PPP) in the form of a BOT contract (build-operate-transfer). Considering low feed-in-tariffs and high production costs, PPP would be the most effective way to enter the market, and reduce risks. However, partnering with a local entity, is the best way into the market. Many of the large projects are state-owned and the procurement process is often through bidding, where foreign companies are not allowed to submit a tender and must form a joint venture or utilise a local distributor. This is important, considering that foreign investors need to deal with five different government bodies to complete all necessary procedures. Some foreign firms, to test the market, start by jointly bidding for projects with a local partner, and undertaking general contractor roles, before deciding to invest directly.

Networking opportunities and partner searches can be carried out through:

- <https://nangluongsachvietnam.vn/> - Vietnam Clean Energy Association
- <https://vietnamenergy.vn/> - Vietnam Energy Association (VEA) is a voluntary social-professional organization of 330 organisations and individuals operating in the energy sector
- <http://vecea.vn/> - Vietnam Energy Conservation and Energy Efficiency Association
- <https://en.vcci.com.vn/> - the Vietnam Chamber of Commerce and Industry

Important trade fairs are:

- <https://www.terrapinn.com/exhibition/future-energy-show-vietnam/index.stm>
- Future Energy Show Vietnam
- <https://www.solarshowvietnam.com/> - Solar Show Vietnam
- <https://entechvietnam.net/wp/en/> - Vietnam Environment and Energy Tech
- <https://electricvietnam.com/> - Electric and Power Vietnam



RECOMMENDATIONS AND TRENDS

In the **waste-to-energy** sector, local firms are in need of technical expertise and financing, which offers an opportunity for technology suppliers and investors in different areas:

Machinery – collection and sorting equipment, waste processing machinery, and incinerators.

Technical expertise – processing, recycling, and waste management technologies, plant design and engineering solutions.

Funding and financing – investing capital in upcoming and existing plants and working with engineering firms and municipal governments.

Dealing with waste is also a major rural issue, with local governments under pressure from the central government to burn waste and empty landfills, while the sustainable technological capabilities might not yet be there. Companies should also explore the smaller cities and communities around the country to find opportunities to supply their technologies and expertise. During rainy periods, the waste supplied as fuel tends to be wet, so suitable technologies, e.g., pre-drying waste during rainy periods, could be very fitting and valuable.

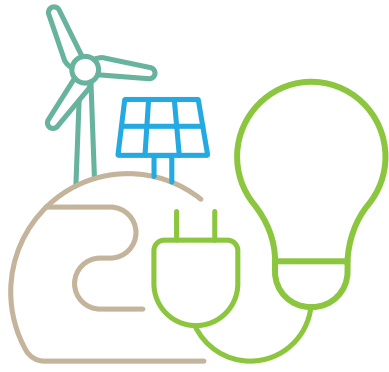
In wastewater, adoption of new technologies for waste, sludge and ground water treatment, distribution, and leakage control, that can re-route the water back to industrial, agricultural, and household use, are needed.

Biomass is a sector where there is a considerable lack of state-of-the-art technologies. In terms of biomass sources, while wood pellets and rice husks are mostly used up already, the market is wide open to the use of rice straw as an energy source, as opposed to burning them, and to relevant technologies. Additionally, bagasse is a major biomass fuel which faces seasonal challenges, and there could be a market for multi-fuel technologies, to overcome seasonality of bagasse.

Led by the government, many municipalities, including Ho Chi Minh City, are increasingly turning their attention to rooftop solar projects, and policies bringing energy generators and consumers directly together, have the potential to make the market more attractive.

Within **transmission and distribution**, solutions that optimise operation, lower cost and energy loss, and increase productivity are needed. Expertise and technologies for the development of smart grid and undergrounding electricity cables are sought after in big cities. The government's aim to create a competitive electricity market provides opportunities for consulting firms. In rural areas, there is significant potential for micro grid projects.

In conclusion, Viet Nam recognises that the transition to green energy has never been more urgent. As one of the fastest-growing economies in Southeast Asia, the country has demonstrated its seriousness in pursuing the green energy transition. Combined with well-designed, executed and constantly improving supporting regulations and policies, as well as with abundant renewable energy resources, the question is not if Viet Nam will become Southeast Asia's cleantech powerhouse, but when.



CLEANTECH SECTOR BRIEF