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INDUSTRIAL DEVELOPMENT ORGANIZATION



World Small Hydropower Development Report 2016



3.4.9

Viet Nam

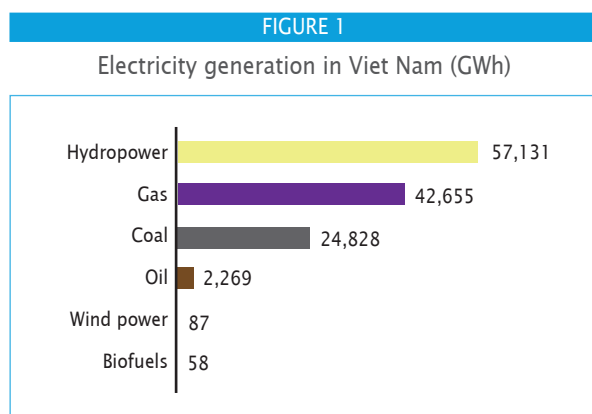
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Key facts

Population	90,728,900 ¹
Area	330,972 km ² ¹
Climate	Viet Nam is a long, narrow country with climate varying considerably from north to south. The northern regions experience a humid and subtropical climate, whereas the south is exposed to a tropical climate. In the north, seasonal variations are more distinct, with temperatures ranging from 15-20°C in winter to 22-27°C in summer. In the south temperatures remain around 26-29°C throughout the year. ⁴
Topography	The general terrain elevation declines from the north-west to the south-east with almost all the rivers in Viet Nam following that direction. Mountains and hills occupy three-quarters of the territory; however, about 85 per cent among them are below 500 metres above sea level. The highest point is Fan Si Pan in the northwest of the country at 3,143 metres above sea level. ⁵
Rain pattern	Most rainfall is caused by monsoon, which brings heavy rains from May to October in the north and the south; and from September to January in the central parts of the country. Average annual precipitation is around 1,800 mm. The average air humidity is over 80 per cent. ⁵
General dissipation of rivers and other water sources	The two major rivers in Viet Nam are the Red River in the north and the Mekong River in the south, with a length of 510 km and 220 km respectively. The total length of all rivers in Viet Nam is 41,000 km with a total flow of nearly 300 billion m ³ of water per year. ⁵

Electricity sector overview

Electricity generation in 2013 was 127,028 GWh, consisting of hydro (44 per cent), gas (33 per cent), coal (19 per cent), oil (1.7 per cent), wind and biofuels (0.1 per cent). The country also imported 2,821 GWh and exported 1,290 GWh, totalling the domestic supply at 128,559 GWh (Figure 1).²



Source: IEA²

In 2014, the total installed capacity of power plants in Viet Nam was 34,080 MW. The amount of electricity produced the same year was estimated at 145,500 GWh, which was 2.7 times more than in 2005 and 1.7 times more than in 2009. Hydropower dominates the power generation mix

with a total installed capacity of 15,703 MW, accounting for 54 per cent of the country's total generation capacity. For over two decades, Viet Nam has rapidly built many hydropower plants around the midlands of the northern mountains, the central highlands and the south-eastern regions.⁶ However, the share of hydropower is expected to decrease to 28.7 per cent by 2020 and to 17.8 per cent by 2030. On the contrary, the share of coal is expected to grow up to 50 per cent by 2030.³

Although Viet Nam has significant energy resources, including coal, natural gas and hydro, to meet its electricity demand the country has to export energy with exports growing at about 9 per cent annually.³ During 2005-2014, the country's electricity demand grew by approximately 12 per cent, increasing from 45,600 GWh to 128,400 GWh.³ In order to meet this growing electricity demand, it is planned to further develop the national grid, which includes developing additional transmission lines and creating new power plants by 2020.⁷

According to the Power Master Plan VII for 2011-2020 with the vision to 2030, the key directions of the country's energy development are: ensuring national energy security, supplying sufficient and high-quality energy for socioeconomic development, using and managing primary domestic energy resources efficiently, diversifying energy investments, establishing a competitive energy market, promoting new and renewable energy sources,

and ensuring sustainable development.³ Realization of this plan includes four practical targets:

- ▶ To increase the aggregate output of imported and produced electricity to approximately 330-362 TWh by 2020 and to 695-834 TWh by 2030;
- ▶ To increase the share of renewable energy sources to 4.5 per cent in 2020 and to 6 per cent in 2030;
- ▶ To reduce the average elasticity ratio of energy production to 1.0 in 2020;
- ▶ To reach almost 100 per cent rural electrification by 2020.⁸

Vietnam has already made outstanding progress in electrification with approximately 98.6 per cent of the population having access to electricity compared with 50 per cent in 1995.³

The state remains the main actor in the electricity sector with the state-owned Electricity Corporation of Viet Nam (EVN) owning about 22 per cent of the country's total installed capacity. The country also has three subsidiary generation companies (GENCOs) owning 39 per cent of the electricity sector, and state-owned companies PetroVietnam and Vinacomin owning 16 per cent. The remaining 23 per cent is owned by the private sector.³

The Electricity Regulatory Authority of Viet Nam (ERAV) is responsible for monitoring and setting electricity tariffs in the country. In 2009 the Government embarked on tariff reforms aimed at establishing market-based retail tariffs with performance-based tariffs for transmission and distribution. As of March 2015, the average electricity retail tariff was VND 1,622/kWh (US\$0.07/kWh).³

The country's electric system is operated at high voltage of 110 kV, 220 kV and 500 kV; and a medium voltage of 6 kV to 35 kV, which is integrated to the 500 kV transmission network. The power transmission lines of 220 kV and 500 kV are managed by EVN's National Transmission Power Corporation (NTC), while the 6 kV, 35 kV and 110 kV lines are managed by regional power utilities.¹²

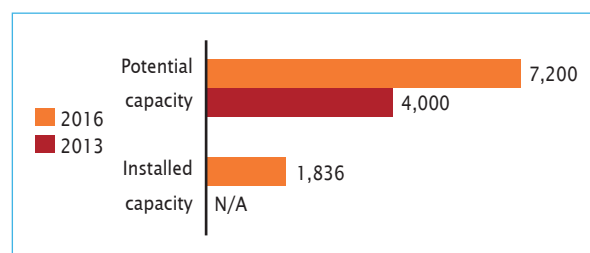
Small hydropower sector overview and potential

The definition of small hydropower (SHP) in Viet Nam is up to 30 MW (as per Decision of Ministry of Industry – No 3454/QD-BCN dated 18 October 2005). Due to its dense river and stream systems, the country has a great SHP potential, which is estimated at 7,200 MW.³ As of 2015, installed capacity of SHP of up to 30 MW per plant was at least 1,836 MW.¹⁸ A comparison with the *World Small Hydropower Development Report (WSHPDR) 2013* for SHP plants of up to 30 MW is shown in Figure 2. It should be noted that a comparison of installed capacity will not be given as the previous report cited data for a 10 MW or less definition of SHP. However, Figure 3 demonstrates SHP development since that period.

SHP plants are concentrated in the northern and central parts of the country. The first plants were constructed and funded by the Government between 1960 and 1985. Between 1985 and 1990, the hydropower sector received investments from other parties, including ministries, industries, provinces, military units and cooperatives. In 2003 the electricity market was liberalized and the private sector started investing as well.⁹

FIGURE 2

SHP capacities of up to 30 MW 2013-2016 in Viet Nam (MW)

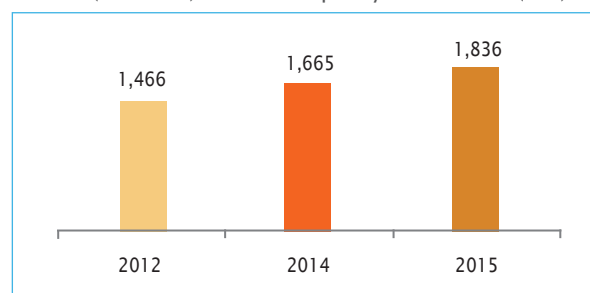


Sources: *WSHPDR 2013*,⁶ Asian Development Bank,³ Electricity of Vietnam¹⁸

Note: Data in 2013 report (up to 10 MW) was 621.7 MW installed and 2,205 MW potential. The comparison is between data from *WSHPDR 2013* and *WSHPDR 2016*.

FIGURE 3

SHP (< 30 MW) installed capacity in Viet Nam (MW)



Sources: World Bank,¹⁹ ESMAP,²⁰ EVN¹⁸

TABLE 1

SHP projects cancelled as of April 2013

Reason	No. of projects	Installed capacity (MW)
Absence of project developers	206	391.9
Low economic value	31	100.7
Environmental and land acquisition issues	16	83.3
Nature reserves	8	34.1
Difficult grid connection	10	24.8
Downstream impact	7	26.2
Others	17	75.0
Cancelled before 2013	41	234.9

Source: Industrial Decisions, Inc.²¹

SHP remains the main sources of renewable energy in the country. Over a decade the number of SHP plants in the country increased dramatically, in particular due

to a high flow of private investments. However, the lack of expertise and violation of agreements on the part of some developers have resulted in floods, dam breaks, earthquakes, forest loss and environmental degradation.¹¹ This pushed the Government to cancel multiple planned SHP projects including those already under construction. In October 2013, 418 projects with a total capacity of 1,174 MW were removed from the country's hydraulic development plan (Table 1).²¹ The Government is planning to strengthen oversight on hydropower projects, especially small-scale ones.

Renewable energy policy

Viet Nam has high potential for the development of renewable energy sources such as solar, hydro, wind and biomass. Promotion of new and renewable energy sources is one of the objectives of the country's national energy development strategy 2020. The goal is to increase the capacity of wind power to approximately 1,000 MW by 2020 and 6,200 MW by 2030; biomass to 500 MW by 2020 and 2,000 MW by 2030; and hydropower to 17,400 MW by 2020. With hydropower, particular attention will be paid to multipurpose projects combining flood control, water supply and power production.⁸

The main instrument for the promotion of renewable energy in Viet Nam is the standardized Special Power Purchase Agreement for plants up to 30 MW and a

standard tariff for small generators. There are also three feed-in-tariffs (FITs) in place for grid-connected renewable energy projects, namely for wind, biomass and solid waste. A FIT for solar energy is under consideration.³

Legislation on small hydropower

Relevant laws and regulations for renewable energy are:

- ▶ Law on Electricity dated 14 December 2004;
- ▶ Decision No. 1208/QĐ-TTg - The National Power Development Plan 2011-2020 with aims to reach development goals by 2030 (Master Plan VII), dated 21 July 2011;
- ▶ Decision 1855/QĐ-TTg Development Strategy of Energy's National Renewable Viet Nam 2020 vision in 2050 dated 27 December 2007.

Barriers to small hydropower development

While the country has developed more than 1,800 MW of SHP the main barriers for continued SHP development in Viet Nam are:

- ▶ Lack of a strong institutional and regulatory framework;
- ▶ Lack of technical capacity;
- ▶ High environmental and social risks;
- ▶ Low return on investment;
- ▶ Poor quality and safety control.