

Le Ngoc Dang; Taghizadeh-Hesary, Farhad

**Working Paper**

## Avoiding energy insecurity by promoting private investment: The case of the Vietnamese power sector

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**ADB Working Paper Series**

**AVOIDING ENERGY INSECURITY BY  
PROMOTING PRIVATE INVESTMENT—  
THE CASE OF THE VIETNAMESE  
POWER SECTOR**

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Le Ngoc Dang and  
Farhad Taghizadeh-Hesary

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Le Ngoc Dang is a faculty member at the Academy of Finance in Ha Noi. Farhad Taghizadeh-Hesary is an assistant professor at the Faculty of Political Science and Economics of Waseda University in Tokyo.

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Please contact the authors for information about this paper.

Email: [ngoc.dangle@hvtc.edu.vn](mailto:ngoc.dangle@hvtc.edu.vn)

Asian Development Bank Institute  
Kasumigaseki Building, 8th Floor  
3-2-5 Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500  
Fax: +81-3-3593-5571  
URL: [www.adbi.org](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

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**Abstract**

Viet Nam needs huge investment in the energy sector in the coming 30 years to satisfy the rapid increase in the energy demand. Given the current status of the electricity sector, which is primarily dependent on fossil fuels (coal) and increasingly reliant on imports, as well as the weak level of diversification in the energy supply, the threat of energy insecurity is emerging. As Viet Nam is becoming a middle-income country, it is necessary to look for alternative finance for energy projects that were previously dependent on the government's preferential borrowing and on-lending. Serving the energy transition process, the involvement of the private sector is essential to ensure the smooth and effective sector reform that the country expects from relying mostly on private investment. This study analyzes the fundamental issues in accelerating the private participation in the power sector: (1) the regulatory system is uncertain and unstable; (2) there is a concern in terms of reforming the power SOE sector toward a competitive, transparent and equal treatment environment for market players in the field; (3) the infrastructure development does not keep pace with the electricity generation; and (4) the local financial market is immature in catering to the needs of the foreign private sector in the field.

**Keywords:** energy insecurity, Viet Nam, power sector, renewable energy

**JEL Classification:** H11, P18, P28, Q42

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## 1. INTRODUCTION

Viet Nam is undergoing a period of transition in the energy sector from fossil fuel intensity to large-share deployment of low-carbon energy. This transition is necessary to ensure that the country is able to meet its huge demand for energy to serve the economic development. Furthermore, the additional deployment of renewables enables the country to unlock its high potential as well as to avoid energy insecurity in terms of the demand and diversification of the energy supply. The *Revised Power Development Plan (PDP 7)* (Government of Viet Nam 2016) estimates that the investment in the electricity sector alone until 2030 will be \$152 billion–\$185 billion, and the private sector must participate in this sector as essential investors to make up 47% in 2020 and 75% in 2030 of the total capital investment in the electricity sector (World Bank 2018). In the context of the shortage of investment in the power infrastructure and power generation from the government as well as power SOEs, which were previously major players in investing in energy projects, finding an alternative source is the most pressing issue to address the threat of energy insecurity. Only accelerating private investment can solve this problem; otherwise, energy insecurity is highly likely to emerge.

This study examines the status of the energy sector, including the signals of energy insecurity threats that the country needs to address by accelerating private investments. In addition, it analyzes the bottlenecks that limit the participation of the private sector in the power field.

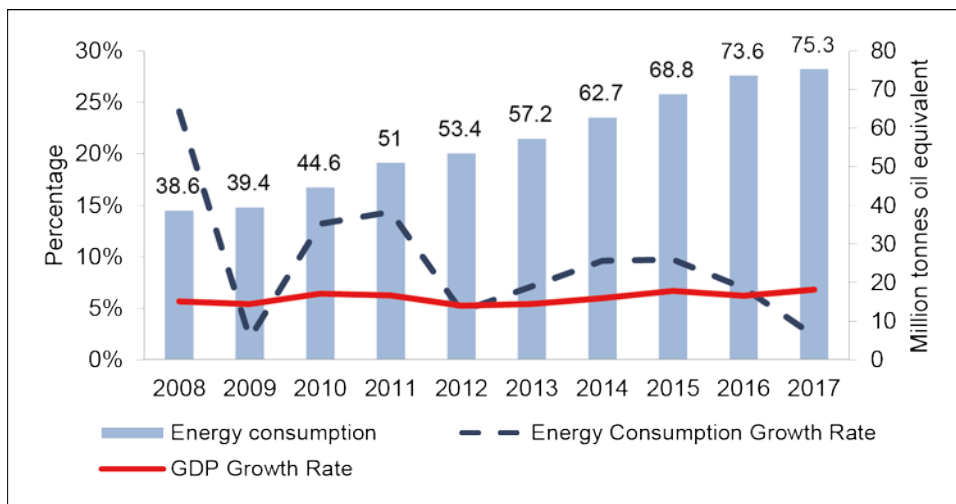
## 2. OVERVIEW OF THE ENERGY SECTOR AND INVESTMENT IN THE ENERGY SECTOR IN VIET NAM

### 2.1 The Status Quo and Trend of the Energy Sector

The growth of energy consumption has closely accompanied the development of the Vietnamese economy, with the strategy to “modernize and industrialize the economy.” Over the last decade, the annual growth rate of energy has been even higher than that of the GDP (World Bank 2018) (Figure 1). Energy consumption almost doubled in value from 38.6 in 2008 to 75.3 million tons of oil equivalent in 2017, which equals an average energy growth rate for the decade of 9.4%, much higher than that of the GDP of 6.01%.

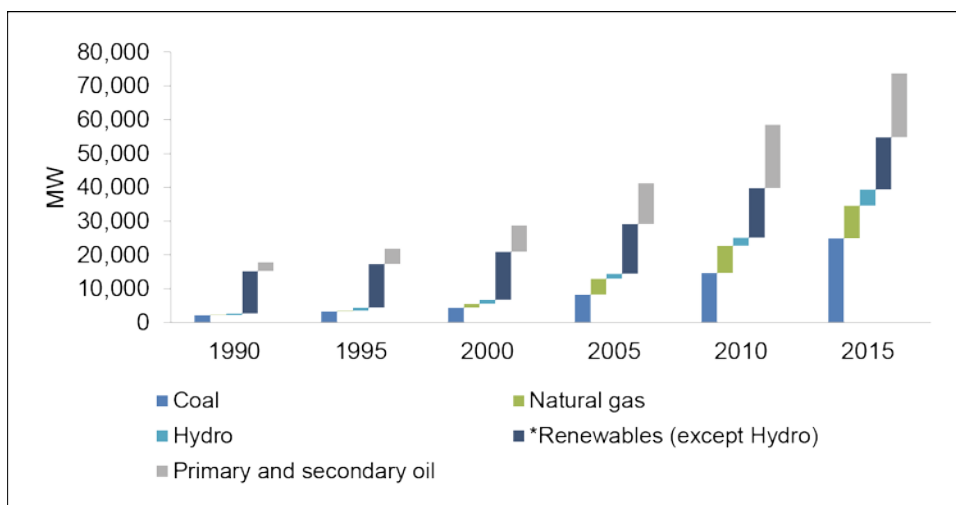
Regarding the evolution of the primary energy supply during the period from 1990 to 2015 (Figure 2), an escalating trend of coal in both absolute numbers and percentages is apparent. The proportion of the coal supply in the energy basket of the country rose rapidly from an average of 14% in the 1990s to 19% in the 2000s and reached 30% in the period from 2001 to 2015. This noteworthy figure is because of the Government of Viet Nam’s (GOV) policy that determined coal as a primary source of energy for the country (GOV 2016). In contrast, the proportion of the renewable energy supply (mainly biomass generated in the countryside) decreased dramatically during the period from 1990 to 2015. Biomass used to be the greatest primary source, comprising 70% in 1990 and over 50% of the total energy supply before 2000; however, oil and coal rapidly replaced it and it stood at only around 20% in 2015 (IEA 2015), partly due to the improvement of the income in rural areas (Dang et al. 2009).

**Figure 1: GDP and Energy Consumption in Viet Nam (2008–2017)**



Source: World Bank (2018).

**Figure 2: Total Primary Energy Supply by Source in Viet Nam**



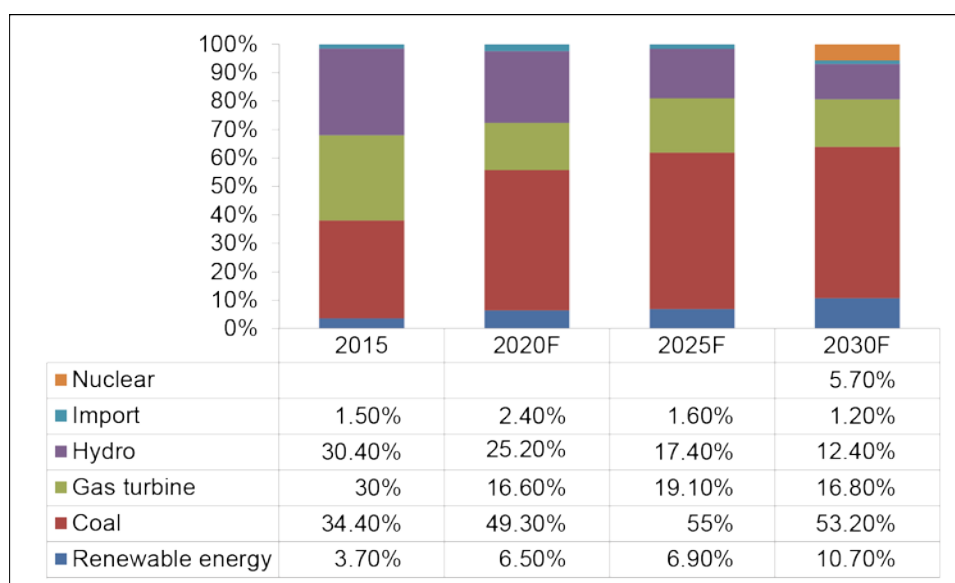
Source: IEA (2015).

Regarding electricity generation by source (Figure 3), although a variety of power sources currently exist, the major one is coal, which is also in line with the government’s electricity generation strategy for meeting the domestic energy demand based on its cheap operation cost. Viet Nam currently relies largely on hydro power for electricity production (30% of the total electricity generated). However, the expectation is that the contribution of hydropower will gradually reduce, and forecasts indicate that it will account for 17% by 2020 and about 12% by 2030 (GOV 2016). Meanwhile, they show that renewables will account for 10.7% of the final energy consumption in 2030.

In addition, in the revised PDP 7, the government expressed its interest in coal-fired projects by developing a plan that will derive the majority of the electricity supply for industrialization from coal. The forecast shows that the component of coal will be dominant, with a 49.3%, 55%, and 53.2% share in 2020, 2025, and 2030, respectively, (GOV 2016) in electricity generation. This policy questions whether the goal of reducing CO<sub>2</sub> through the application of a friendlier energy source that the country has committed to is achievable due to the negative impacts on the environment from coal-fired projects. In Viet Nam, the energy system emitted the largest share of the total

greenhouse gas emissions. Although there has been an improvement in the quality of technology used in thermal power projects, the CO<sub>2</sub> emissions from coal-fired power plants in Viet Nam rose from 28 Mt in 2011 to 40 Mt in 2013 and then 73 Mt in 2015. The numbers would be much larger if they took into account all coal-related CO<sub>2</sub> emissions (Nguyen 2017).

**Figure 3: Structure of Power Sources as Shares of the Total Electricity Supply in Viet Nam**



Source: GOV (2016).

Regarding the energy demand forecasting, estimations indicate that the energy need will increase significantly in the next two decades (Table 1). According to the forecasts in the revised PDP 7 (GOV 2016), the growth in the demand for electricity will be the greatest (7.9%) from 2016 to 2035, followed by natural gas (5.7%) and oil products (5.1%).

**Table 1: Growth Rate of the Final Energy Demand by Fuel Source as Forecasted (%)**

	2016–2020	2021–2025	2026–2030	2031–2035	Average 2016–2035
Coal	3.7	3.4	3.0	1.4	2.9
Oil products	6.1	5.8	5.2	3.4	5.1
Natural gas	10.4	6.4	4.4	1.6	5.7
Electricity	9.8	8.6	7.4	5.9	7.9
Total	5.3	4.9	4.8	3.7	4.7

Source: GOV (2016).



The Power Development Plan VII (Revised) aims to supplement 24,500 MW of electricity from renewable energy (not from large hydropower), and it expects solar power to make the largest contribution to the total renewable energy generation, which will consist of solar power (12,000 MW), wind power (6,000 MW), and biomass energy (2,000 MW), and small hydropower to contribute 4,500 MW by 2030. The belief is that the total amount of renewable energy generated (21% of total installed capacity) will provide at least 10% of electricity, meaning about 57.2–63.2 billion kWh (including 19.80 billion kWh of solar energy, 14.3 billion kWh of inland/coastal wind power, and 4.8 billion kWh of offshore wind energy), and the rest will be energy from biomass and small hydropower plants. Accordingly, the report also estimates that the GHG emissions from electricity generation will reduce by 12%–15% compared with the usual scenario forecast of 385 million tons of CO<sub>2</sub> equivalent (mt CO<sub>2</sub>e) in 2025 and 663 million tons of CO<sub>2</sub>e in 2035.

Despite the fact that renewable energy will meet the additional energy demand, coal and LNG imports are unavoidable and are likely to increase in the future to meet the growing demand for electricity. This is a threat to the energy supply security due to the vulnerability of the energy import sources when the largest source of coal for energy in Viet Nam is the People's Republic of China (PRC), with a fluctuating coal price, and the LNG import price is likely to increase gradually in the long term. To avoid energy insecurity on the supply side, Viet Nam must seek a sustainable energy source with a preference for domestic potential, which is renewable energy.

Like any form of power generation, coal-fired generation has its benefits and drawbacks. Many argue that Viet Nam still needs to rely heavily on coal power due to its low electricity generation costs as well as being “more reliable” in the case of intermittency. However, this is not necessarily accurate in the Vietnamese context. First, regarding the cost of coal-fired generation, previously and currently, the cost for electricity price production from coal may be low when the domestic supply is sufficient to meet the demand. However, since 2015, when the domestic resources were no longer sufficient to fulfill the need of the electricity generation company, Viet Nam has become a coal-importing country facing an increasing cost of imports. Moreover, the cost for renewable installation, such as solar power modules, has been decreasing significantly; today, when compared with coal-fired technology, LCOE from solar power is significantly cheaper than power generated from coal. The availability and cost of the supply source for coal challenge its “reliability.” According to the revised PDP 7, with the huge share of electricity generated from coal, the amount of coal that Viet Nam needs to import under the national power development plan is huge (tens of millions of tons) and will increase rapidly in the coming years. The imported coal is mainly from ASEAN countries, including Indonesia, Malaysia, Australia, the PRC, and the Russian Federation. In addition, South Africa and Canada are potential partners. Although coal from South Africa and Canada has a good freight on board (FOB) price, due to the high cost of transportation, the cost, insurance, and freight (CIF) is much more expensive than that imported from a closer location, such as Australia or the Asian region (Nguyen 2017). Therefore, it is possible to state that the actual cost of electricity generated from coal will increase and become more difficult to forecast with increasing dependence on imports with a fluctuating price. Furthermore, an unstable source of supply will negatively affect the energy security. The government should not consider coal as the first and foremost choice for electricity generation as before. Heavy reliance on electricity production from coal threatens the reliability of the energy supply source and puts the country into a situation of energy insecurity with regard to the energy supply. At the same time, the investment in coal is at the expense of other potential energy sources, particularly renewables.

It is possible to state that the energy sector in Viet Nam has possibilities of insecurity, such as a high concentration on specific types of energy source (the primary one is fossil fuel) coupled with less diversification in the electricity generation input sources; increasing reliance on imports for the primary electricity source; and a lack of financial sources to meet the high demand in the energy infrastructure, which may negatively affect the transmission and distribution grid system. To tackle those threats, scaling up the investment in renewables in the country with greater participation from the private sector should be a priority. In fact, with the energy transition process being underway, the Vietnamese energy sector is a potential market in private investors' eyes. The high demand for electricity means that large investment is necessary and leaves room for making profits if proper and attractive regulations and policies for private investment are in place.

## **2.2 Private Investment in the Energy Sector: Status and Trend**

Meeting the electricity requirement for a vibrant economic growth rate involves the compound annual growth rate of the electricity demand, which has been 13% since 2000; this has also resulted in the doubling of electricity consumption every six years. To keep pace with the energy demand, the electricity sector investment will need to accelerate substantially to around \$8 billion–\$12 billion annually for the period 2016–2030 (World Bank 2018), even if the energy mix further diversifies.

Previously, over the period 2011–2015, the Vietnamese electricity sector achieved investments of \$7.8 billion per year on average. This is a significant total figure within the constraints of the government budget. Over 80% of this investment has been concentrated in the power generation segment, and almost all of this has funded large coal-fired, gas-fired, and hydro-power projects. According to the government's Revised Power Development Plan VII, the total investment needs in the power sector for the forecast period 2016–2030 are \$152 billion–\$185 billion, including one-third of the investment in the energy infrastructure. It is a major challenge to find a sufficient finance supply (World Bank 2018).

Table 2 presents the investment growth forecasted over the period 2016–2030 compared with the previous period and based on three scenarios with regard to electricity consumption (low, medium, and high). It can be seen that, in all three scenarios, the annual investment rate growth has increased significantly for network investment. For example, during the period 2016–2020, the investment increased by 11.6% for the lowest electricity demand scenario and will remain the same amount over the period until 2030, requiring the mobilization of a huge amount of money for this sector, at least \$152 billion. In terms of electricity generation, except hydro, for which the forecast is uncertain, the expectation is that the electricity sources will attract a large amount of investment. Coal-fired electricity generation has an expected growth rate for annual investment of over 7% in 2016–2020, which will decrease gradually to roughly 4% by 2030. The high annual growth rate in the long term makes the total investment in coal power \$75 billion–\$92 billion; at the same time, the investment in renewables is likely to above 1% during the period 2016–2010 and roughly 2% by 2030. The long-term plan of the government somehow contradicts the emphasis on coal-fired electricity generation in the future, and it may put the country in an energy insecurity situation.

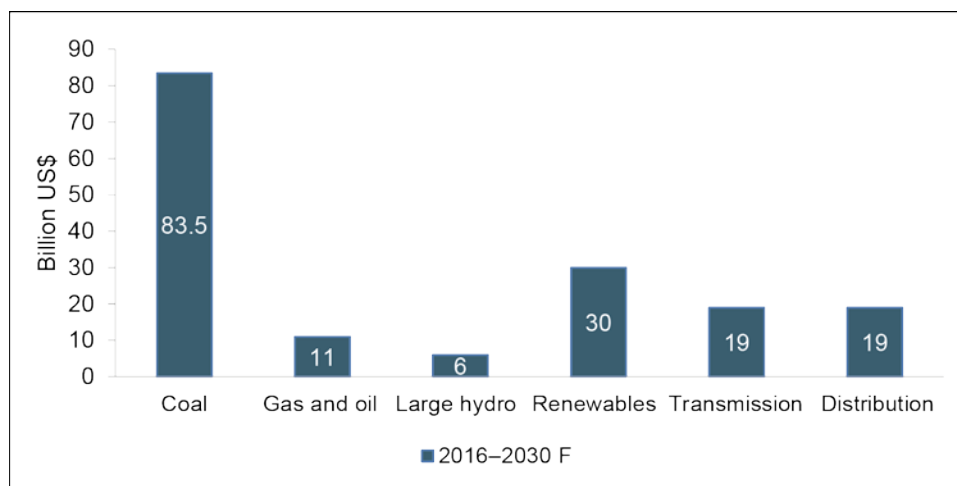
**Table 2: Investment in the Power Sector in Viet Nam’s Historical and Future Forecasted Data**

	Average per Year in Investment Growth (%)				Total Amount (Billion US\$)
	2011–2015	2016–2020 F	2020–2025 F	2025–2030 F	
Electricity Generation	6.6	9.8–12	7.8–9.5	6.0–7.3	118–144
Coal	3.6	7.2–8.8	3.9–4.7	3.9–4.7	75–92
Gas and Oil	0.4	1.2–1.4	0.8–1.0	0.0–0.1	10–12
Large Hydro	2.5	0.3–0.4	0.8–0.9	–	5–7
Renewables	0.1	1.1–1.3	2.3–2.9	2.0–2.5	27–33
Network Investment	1.2	1.7–2.1	2.4–2.9	2.6–3.2	34–41
Transmission	0.5	0.8–1.0	1.3–1.5	1.3–1.6	17–21
Distribution	0.7	0.9–1.1	1.1–1.4	1.3–1.6	17–21
Total	7.8	11.6–14.1	10.1–12.4	8.6–10.5	152–185

Source: World Bank (2018).

To achieve the country’s climate change targets, large-scale gas developments of about 20 GW, demand side energy savings of 12 GW, and increased hydropower imports from the Lao People’s Democratic Republic of 5 GW by 2030 are necessary. If those investments are not forthcoming, imported coal will play an even greater role than currently planned. Furthermore, the balance of future investment is shifting slightly from generation toward the network infrastructure, which accounts for about a third of the total investment requirements, to keep pace with the rapid deployment of new energy generation projects, particularly renewables.

**Figure 4: Total Investment in the Power Sector over the Period 2016–2030 F in Generation and T&D**



Source: Government of Viet Nam (2016).

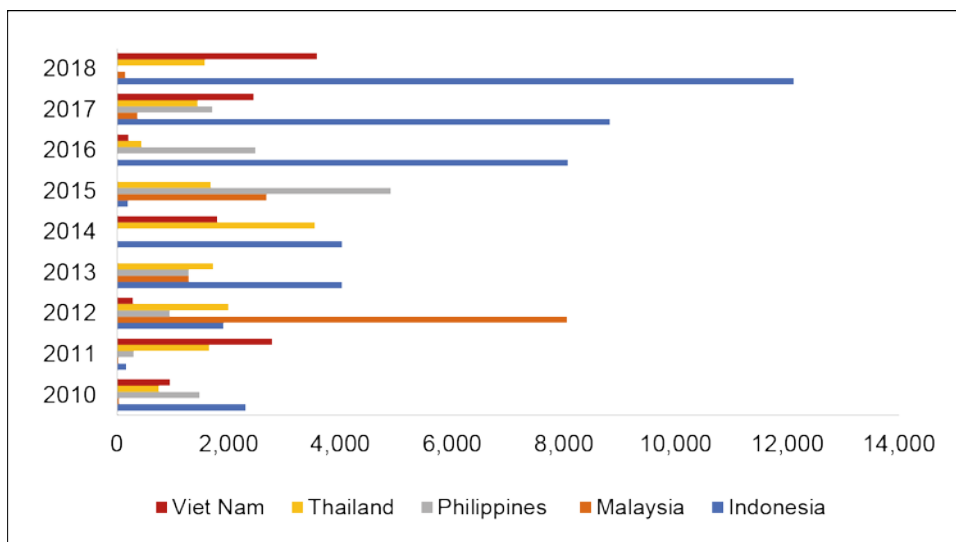
The electricity sector has so far relied primarily on state-guaranteed debt to finance the bulk of its investment program through the national utility—Electricity of Viet Nam (EVN). During the period 2010–2015, EVN financed as much as 96% of its capital expenditure through debt, leading to a total debt amount of \$9 billion in 2016. The Ministry of Finance backs part of EVN’s debt de facto, meaning that it is on-lent debt that it had borrowed it

from a variety of IFIs, and part of the loans that EVN received directly came from a variety of domestic and international commercial banks, which the MOF backed through direct debt guarantees. Both categories of borrowing count toward public debt. In addition to the MOF, domestic commercial and private banks are major financiers of the electricity sector or EVN. Those organizations implemented borrowing typically on a corporate basis rather than a non-recourse project finance basis. Estimations show that five major banks (VCB, CTG, BIDV, TCB, and SHB) channel about 5% of the total outstanding loans to the electricity sector (World Bank 2018). However, this source of financing for the energy sector will be more limited because of the Single Borrower Limit requirement of 15% of the banks' equity capital, which constrains the lending of many of the banks. Moreover, the sector concentration limits that banks set for prudential purposes further constrain their lending.

The traditional model of depending mostly on government borrowing to finance the electricity infrastructure is unsustainable and no longer suitable. At a time when Viet Nam is strategizing substantial electricity investments, the country's historical method of power sector funding will experience severe constraints for two major reasons. First, Viet Nam's fiscal status has deteriorated in recent years, and the government is rapidly reaching its secured public debt threshold. With the sizable fiscal deficits in recent years, the public debt rose steeply from 51.7% of the GDP in 2010 to an estimated 63.3% of the GDP (the ceiling is 65% of the GDP) in 2016 and just reduced to 58.4% in 2018. Outstanding publicly guaranteed and on-lent debt to EVN already accounts for 4% of the GDP, and the scope to expand this further over the coming years is extremely limited given the public debt cap. In practice, this means that it will be challenging for the government to back EVN with additional funding or for EVN to borrow from commercial banks or international development finance institutions (IDFIs) with the support of a Ministry of Finance guarantee, as previously. Second, due to its recently gained middle-income status, Viet Nam has reduced access to concessional resources, particularly official development assistance (ODA) loan. As a middle-income country, it has already experienced a dramatic reduction in IDFI financing.

The World Bank (2018) suggests that at least 75% of the energy investment requirement needs to come from the private sector until 2030. Currently, the private involvement in the energy sector in Viet Nam is negligible. From 1992 to 2016, Viet Nam attracted \$13.8 billion to invest in infrastructure (including energy, transport, and water), of which the energy sector occupies a dominant share with \$8.3 billion investment, equivalent to more than 60% of PPI capital. Notable projects in the energy sector include the Phu My 2.2 (gas build-operation-transfer (BOT) power plant, 2002), Nam Con Son gas pipeline (2002), Phu My 3 (gas-powered BOT power plant, 2003), and Mong Duong (coal-fired BOT power plant, 2011). In total, these projects accounted for 6.7 billion PPI, equivalent to 49% of the total PPI in Viet Nam in the period 1992–2016. The four projects mentioned above are in the form of BOT, foreign ownership accounts for the majority, and long-term international commercial debt and benefits from government commitments and guarantees protect the private participants but avoid some political and project-related risks, including converting the dong into US dollars and transferring it abroad. The Nam Con Son gas pipeline is the only project in the field of natural gas transmission and distribution that receives investment from the private sector (\$1.3 billion).

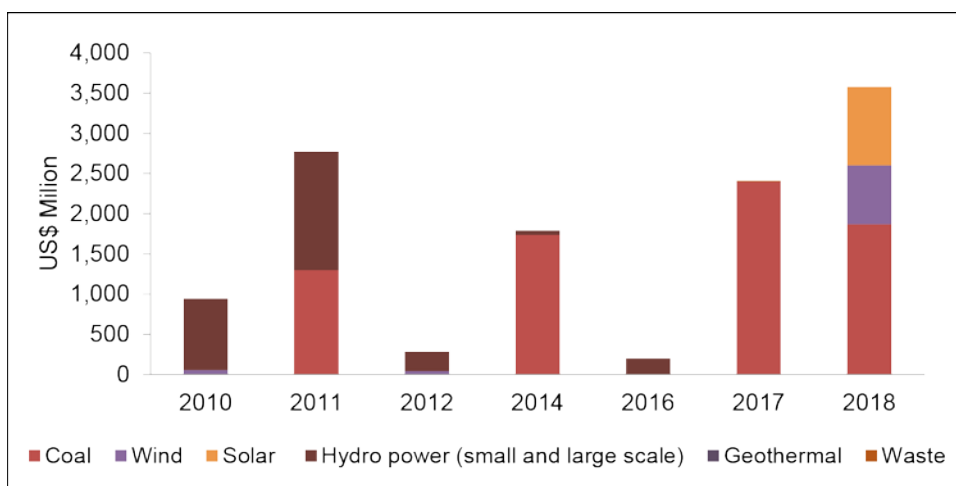
**Figure 5: Private Investment in the Energy Sector in Southeast Asian Countries**



Source: World Bank (2019).

In comparison with the private investment in the energy sector within ASEAN countries, Viet Nam has become increasingly attractive to private investors recently (Figure 5). In 2017 and 2018, it even surpassed Thailand and became the second destination for private investment in the energy sector within the region, with \$2,447 and \$3,577 million in 2017 and 2018, respectively. However, it is noteworthy that the private investment during the last two decades has focused almost entirely on coal-fired electricity generation, including hydro power (Figure 6). Since 2012, the appearance of wind projects marked an important stepping stone in RE investment in Viet Nam with the active participation of the private sector.

**Figure 6: Private Investment in the Power Sector in Viet Nam**



Source: World Bank (2019).

The government currently provides the FIT as the fundamental incentive for investment in renewable energy along with the tax policy. It bases hydropower on the regionally differentiated avoided cost of thermal generation, whilst for solar power it applies a relatively high feed-in tariff (FIT) of \$0.0935 per kilowatt-hour. Previously, the FIT for wind at \$0.078 per kilowatt-hour did not attract much investment, and the government is currently reviewing it. Both solar and wind FITs (as well as the prices under recently approved imported coal-fired power plants) are higher than the average cost of wholesale power purchase of \$0.072 per kilowatt-hour, which has resulted in the booming of both ground-mounted and rooftop solar power projects in Viet Nam.

However, the future image of renewable energy development is still unknown due to the significant changes in the FIT policy after 30 June 2019. The government has not yet finalized the FIT policy after the “preference time,” but it has drafted a classification into four different zones, and the FIT rate will decline significantly in locations with high radiation levels, such as Ninh Thuan and Binh Thuan provinces, which currently have the largest number of solar and wind projects in operation as well as in the construction process. Furthermore, the proposed FIT for rooftop solar PV deployment is the most attractive compared with land-mounted and floating solar projects within the same region. Once the government has adopted the official new FIT policy, it forecasts decreasing investment in land-mounted solar power and quick installation of rooftop solar PV power in the high-potential locations that pave the way for private sector participation in both residential and commercial and industrial (C&I) scale investment.

As mentioned earlier, RE plays an essential role in ensuring an efficient and sustainable energy supply for the country, an aspect that plays an important role in avoiding energy insecurity. Furthermore, encouraging the development of RE is in line with the commitment to reducing CO<sub>2</sub> emissions in the Paris agreement. According to the revised PDP 7, RE will contribute only 7.5% of the total energy generation in the country by 2030.

The following table calculates the capital investment in RE required to achieve the government’s target.

**Table 3: Total Accumulated Generation Capacity and Investment Requirement for Renewable Energy (Hydro Power Included)**

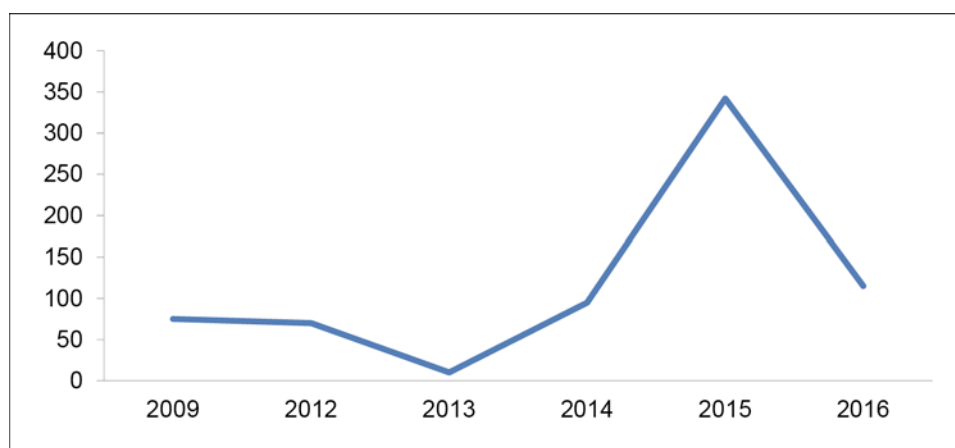
<b>Year</b>	<b>Accumulated Capacity According to Revised PDP 7 (MW)</b>	<b>Investment Requirement (Million US\$)</b>
2019	2,372	1,004
2020	3,103	731
2021	4,193	1,090
2022	5,393	1,200
2023	6,393	1,000
2024	7,593	1,200
2025	9,393	1,800
2026	11,553	2,160
2027	14,463	2,910
2028	17,703	3,240
2029	21,053	3,350
2030	24,583	3,530

Source: Calculation from the revised PDP 7 (GOV 2016).

The investment needed will reach \$23.7 billion over the period 2019–2030. This huge figure will be difficult to achieve without the participation of foreign investment in the energy sector in Viet Nam. To date, domestic investors have mainly developed renewable energy projects due to the international private sector's lack of confidence in PPA contracts. A number of smaller private investors have also mobilized financing for projects of up to 30 MW, albeit with a deadline for awarding the preferred FIT only if the projects attain the commercial operation date on 30 June 2019. This policy aims to attract a large amount of foreign direct investment in the energy sector. In 2009, there were only two FDI projects in renewable energy in Viet Nam, with total registered investment capital of \$90.5 million. The FDI in this sector decreased in 2013 and then gradually increased in 2014. In 2015, the registered capital in this sector reached over \$356 million. In 2016, the figure reached \$8.4 billion.

Previously, international investors' participation in renewable energy was negligible due to concerns about the bankability and sustainability of contractual documentations. They invested roughly \$8 billion in the power sector from 1990 to 2016, when the international private sector financed several large gas- and coal-fired power projects. Furthermore, a few hydropower projects have originated from foreign debt (often benefitting from a government guarantee), and some foreign investors, including IFC, have made small equity investments in hydropower projects and the development of solar PV projects. More recently, increasing financing for energy in Viet Nam has come from the international private sector.

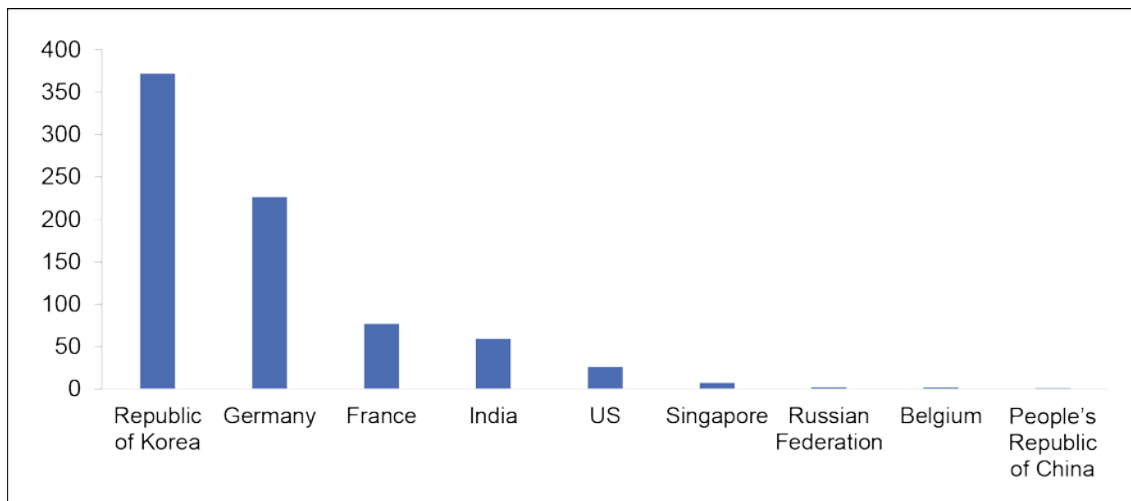
**Figure 7: Registered FDI Capital in the RE Sector in Viet Nam**



Source: MPI (2017).

Until the end of 2016, 9 countries had invested in green energy via FDI projects, specifically the Republic of Korea, Germany, France, India, the United States, Singapore, the Russian Federation, Belgium, and the PRC. In particular, Korean investors lead with total registered investment capital of over \$371 million, accounting for 48%. Germany is second with total registered capital of \$226.68 million, accounting for 29.3% of the total registered investment capital in the green energy sector. French, Indian, and US investors follow with total registered investment capital of \$77.12 million, \$59.22 million, and \$26 million, respectively.

**Figure 8: FDI Investment in Renewable Energy in Viet Nam by Host Country (Data until 2016)**



Source: MPI (2017).

In 2017, the FDI in power generation stood at \$8.4 billion, accounting for 23% of the total FDI in that year, which is more than the total FDI during the last decade. Japan and Singapore invested in three electricity mega projects—the \$2.8 billion Nghi Son 2 thermal power plant, the \$2.6 billion Van Phong 1 thermal power plant, and the \$2.1 billion Nam Dinh 1 thermal power plant—all of which are under the BOT model with government support. The Republic of Korea’s FDI is also funding the \$1.3 billion Block B O Mon gas pipeline project.

Due to the lack of confidence resulting from the perceived risks, international private investments in the power sector have required payment guarantees from the Government of Viet Nam in the past. They benefit from a Government Guarantee and Undertaking to cover certain institutional and political risks, including non-performance of SOEs in terms of offtake and supply, exchange rate risk with VND convertibility and inflation adjustment, and termination payment obligations. Unlike the Ministry of Finance guarantees for the commercial bank loans that EVN borrowed, these non-debt-related contingent liabilities are not recorded as part of the publicly guaranteed debt but have a potentially significant fiscal burden that needs stringent control. Most FDI in the green energy sector in Viet Nam is concentrated in provinces that can use wind and solar energy, such as Ninh Thuan, Ben Tre, Tra Vinh, and Soc Trang. In particular, Ninh Thuan is outstanding, with total registered investment capital of \$224.67 million in 2017; the provinces of Ben Tre, Tra Vinh, and Soc Trang follow, with total registered investment capital for green energy projects of respectively \$152 million, \$120 million, and \$70 million (EVN 2019).



### **3. BOTTLENECKS IN ACCELERATING PRIVATE INVESTMENT IN THE ENERGY SECTOR TO LESSEN THE THREAT OF ENERGY INSECURITY**

Given the situation that the Vietnamese government state budget faces huge public debt and that the finance for the energy sector is limited as before, domestic and foreign private capital will become the major investment source for addressing the threat of energy insecurity regarding the instability of input for energy generation and increasing reliance on imported fossil fuels. Accordingly, the government must address the barriers to scaling up the private investment.

#### **3.1 Uncertainty and Instability of the Legal Framework**

The government has implemented a number of incentives to attract private investment to the electricity sector through the tax and FIT policies. It is undeniable that the FIT policy is showing its effects in increasing the attractiveness of the private sector with a high volume of RE capacity installed in a short time. Immediately after the increase in the FIT for solar PV projects, 9.35 US cents in 2017, there was an unprecedented trend in solar power investment in the country. More than 60% of Viet Nam's solar power output belongs to new projects integrated into the national grid in June 2019, which investors tried to complete before 30 June to receive a generous FIT rate. The time required to complete the average solar power project in Viet Nam is 275 days, which is extremely fast. The Electricity of Vietnam (EVN 2019) revealed that the country has already connected 82 solar power projects with a total capacity of 4,460 MW to the national grid. This means that solar power currently accounts for 10% of the country's total electricity output. In addition, about 13 projects with a total capacity of 630 MW are under construction and due to become operational later the year of 2019. The unprecedented development of solar power projects makes Viet Nam an emerging market for RE in Southeast Asia.

However, what this trend will be when the FIT is amended after 30 June 2019 is unknown, and the government has not yet promulgated the regulation for the new FIT after this time. The new FIT draft engenders considerable reluctance among future investors interested in solar power projects, as the intention is that the new FIT will decrease significantly, particularly for ground-mounted solar projects, and the new FIT draft classifies investment into four zones, applying the lowest FIT to ground-mounted solar and the locations that have the highest level of radiation. That is also where many ground-mounted solar projects are in operation and under construction. If the draft of the new FIT becomes official, there is likely to be a huge decrease in the utility scale of solar power projects.

Furthermore, people usually consider the FIT contract duration as an important determinant of the FIT support. However, the guarantee of grid access to avoid congestion and curtailment plays an important role in inducing larger deployment. Both criteria are crucial to enhance the confidence of investors in signing a PPA contract. A study has also affirmed the matter of non-economic factors (Zhang, 2013), and the author argued that, although FITs have worked to accelerate investment, high remuneration levels do not necessarily have commensurate greater levels of installation. Non-economic hindrances could contribute to the weak correlation between incentives and investment. In fact, the markets offering generous incentives may happen to be the ones that have serious problems involving non-economic obstacles. Excessive subsidies could also provide rent-seeking opportunities or allow investment in high-cost sites.

Regarding the grid access and dispatch matter, with the impressive amount of investment in solar power projects due to the preferential FIT for solar power projects that have commercial operation date (COD) by 30 June 2019, the dispatch problem is a critical concern of all PPA private contractors to ensure that their generated electricity is able to integrate well with the grid. This issue appeared on the agenda recently, when congestion affected almost all of those projects due to the intensity of big solar projects within the same region. In several days in June 2019, only about 65% of the electricity generated from solar projects in Ninh Thuan and Binh Thuan entered the grid, which means that 35% of the electricity produced was wasted, and this is causing confusion among developers regarding whether this situation will happen again in the future. If so, large RE projects will appear to be a risky investment, particularly in foreign developers' and financiers' eyes.

The uncertainty and lack of stability of regulation in the energy sector hinder the acceleration of private participation in the long run. In addition to the short-term FIT policy, energy regulation lacks strong and protectable terms in PPAs. Major concerns emphasize the single and greatest buyers of almost all RE projects. The uncertainty of regulation in the energy sector at the same time creates a challenge in forecasting the electricity price, which is the essential element in decision making in PPA and direct PPA contracts from private investors.

### **3.2 State-Owned Enterprise Reform toward a Playing Field for Private Participation**

In developing economies, where significant parts of the population do not yet have electricity access, governments may also use SOEs as a means to control strategically sensitive energy supply chains, and energy SOEs can provide important public revenue. SOEs can also be vehicles to obtain foreign technologies and know-how. In the Vietnamese situation, this is not necessarily the case. Viet Nam now has 99% electrification (World Bank 2017), and the country is now facing obstacles regarding a lack of money to serve the advanced energy need for industrialization rather than the coverage ratio of the population able to access electricity.

As mentioned earlier, about 75% of energy investment until 2030 should come from the private sector; otherwise, the energy supply is unlikely to satisfy the electricity demand in the future. The degree of state intervention in the energy system via SOEs plays a major role in the types of stakeholders that are critical to shaping the investment environment. In fact, SOEs' interests may not be aligned with the wider energy transition with additional players in the field, particularly as their operation is dependent on fossil fuels. In Viet Nam, the Ministry of Industry and Trade is responsible for electricity sector reforms and regulation and aligns closely with the SOE Electricity of Viet Nam (EVN) in prioritizing fossil fuels for a number of reasons, such as the fact that renewables will require higher upfront costs and new investments in the distribution infrastructure, and therefore they prefer fossil fuel.

**Table 4: Levels of State Ownership of the 10 Largest Electricity-Generating Companies Worldwide**

Company	Country	Ownership Form	State Ownership
Commission Federal	Mexico	Unlisted	100
Corpoelec-EMP Elec Socialista	Venezuela		100
Egyptian Elec Holding Co	Egypt	Unlisted	100
Electricity of Vietnam	Viet Nam	Unlisted	100
Eskom Holdings Soc Ltd	South Africa	Unlisted	100
Hydro Quebec	Canada	Unlisted	100
PT PLN Persero	Indonesia	Unlisted	100
Rosenergoatom Ojsc	Russian Federation	Unlisted	100
State Grid Corp of China	PRC	Unlisted	100
[Taipei,China] Power Corp	Taipei,China	Unlisted	100

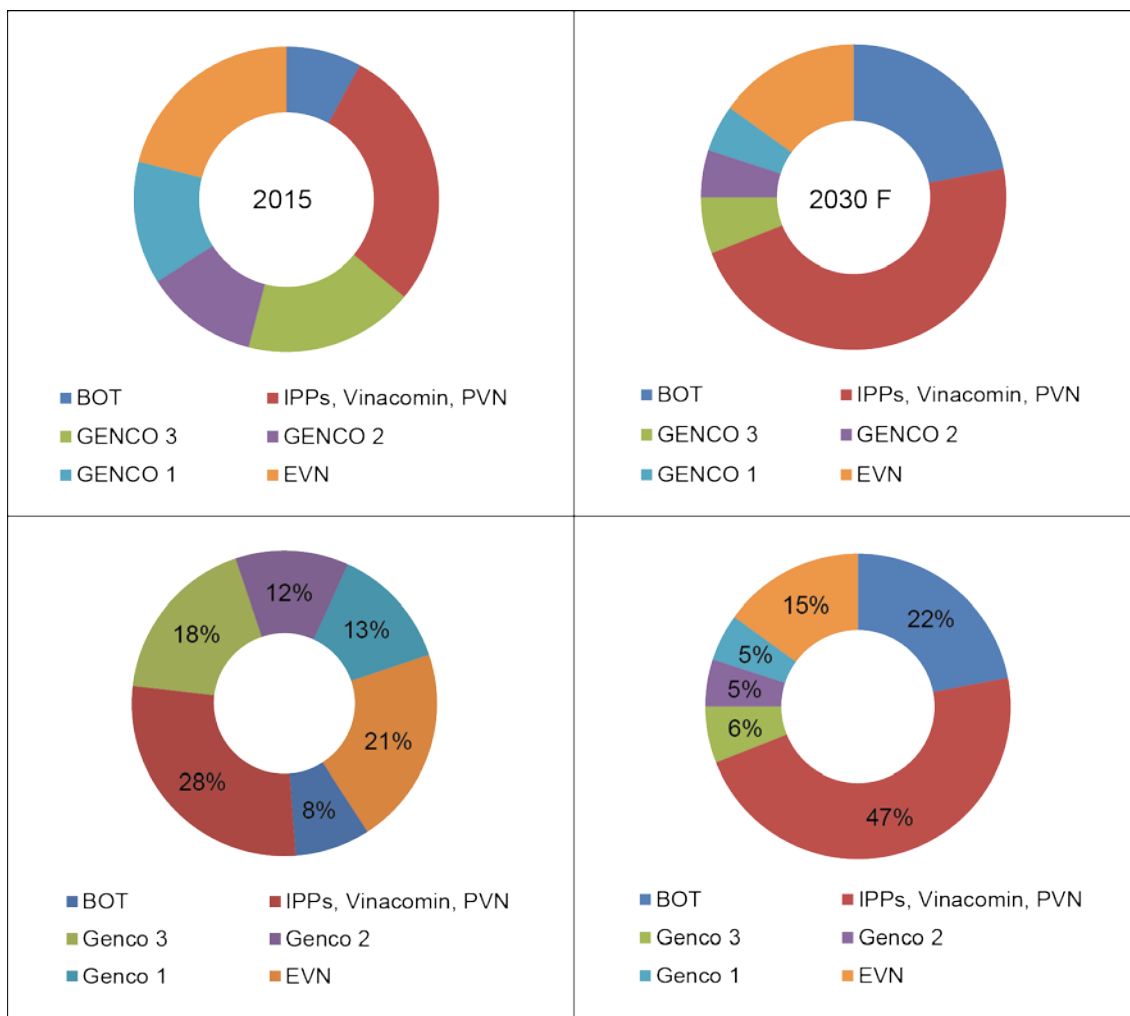
Source: Prag, Röttgers, and Scherrer (2018).

Viet Nam has been among the top countries with the largest power SOEs all over the world, with EVN as a 100% state-owned enterprise (Table 4). EVN was formed in 1995 as a vertically integrated, state-owned enterprise responsible for Viet Nam's power subsector. In mid-2006, EVN was reconstructed into a holding group. The firm is still the key player in the power sector, with wholly owned subsidiaries: three power generation corporations (GENCOs); the National Power Transmission Corporation in charge of power transmission; and the five power corporations responsible for electricity distribution. EVN also owns the National Load Dispatch Center, which operates as the system and market operator (SMO); strategic power plants, including multipurpose hydropower plants; and the Electric Power Trading Company (EPTC). It is also the largest shareholder of partially privatized power plants in the Vietnam Competitive Generation Market.

In 2014, EVN and its joint-stock companies owned 61% of the generated electricity capacity in the country, while domestic independent power producers (IPPs) and foreign investors with the BOT<sup>1</sup> arrangement produced the rest (ADB 2016). Turning to 2015, the situation was the same as in the previous period, when EVN and its GENCOs altogether shared 64% of the electricity generation in Viet Nam, whereas the forecast shows that it will reduce to 31% by the end of 2030, with an increasing contribution from the private sector from only 8% in 2015 to 22% in 2030 (World Bank 2018). The estimated figure for 2030 is based on the reform plan for electrical energy as well as EVN and its subsidiaries, with the ambitious target that the private sector will make up two-thirds of the generation, whereas EVN will account for 15% of the total capacity.

<sup>1</sup> Viet Nam classifies the power plants that domestic investors fund as independent power producers and those that foreign investors wholly own and operate as build–operate–transfer (BOT) power plants.

**Figure 9: Electricity Generation Ownership 2015 and 2030 (Forecasted)**



Source: ADB (2016).

The reforming process of EVN with the purpose of paving the way for creating a level playing field in the power sector and encouraging the additional participation of private investment. While the country’s management authority from EVN was explicitly a stepping stone for the reform, the management authority in the sector now lies with the Ministry of Industry and Trade, while EVN now functions as a normal SOE. Although its role and position have strongly influenced the sector, EVN no longer has the ultimate state authority. This transition in the power management of EVN gives consumer groups more bargaining power in their relationship with EVN.

Nevertheless, EVN still holds distinct rights and power on many key aspects, including electricity prices, developing and managing the transmission system, and dealing with investors, as the single buyer in the wholesale market and PPA contracts in renewables. This raises concern about the transparency and convincingness of its decisions regarding electricity prices and electricity buying from non-EVN power plants. As mentioned several times in the paper, the effectiveness and result from reforming the power sector, including EVN and its subsidiaries, are the largest barriers to investment decisions from private investors, and many believe that it will take a long time to reform those organizations fully.

From the private investment perspective, power SOEs deserve particular attention due to their characteristics as market participants: notably the potential preferential treatment from governments that they may enjoy and the influence of policy mandates on their operations, such as low-interest rate debt and “readiness” to make a loss due to the responsibility for an unclear mandate in serving the social and development mission (Box 1).

**Box 1: Lack of Accurate Reports from SOEs’ Operation from EVN with a Number of Unprofitable Investment Transactions**

The State Audit’s report, published on 25 July 2014, indicated explicitly the case of EVN. The State Audit concluded that “EVN has declared revenue inaccurately.” Specifically, EVN increased the electricity price of two power plants, Uong Bi Thermal Power Company and Can Tho Thermal Power Company, yielding a benefit of VND865.8 billion. In addition, EVN decreased the selling price of electricity to five electricity corporations in the sector by VND1,717 billion to offset the losses in the other businesses. EVN did not register allocation criteria and comply with the allocation ratio for the losses of foreign exchange rate differences according to the roadmap in the electricity-selling price plan. The parent company of EVN had overinvestment (VND21,312 billion higher than its charter capital) with low efficiency of investment.

Source: CIEM (2015).

In the still highly regulated electricity sector of Viet Nam, although the reform is in process, the nature of the relationship of SOEs with authorized ministries and transmission system operators might allow it more easily to anticipate and influence regulation, receive permits, and achieve easier grid connection and priority dispatch. It is still vertically integrated and controls transmission as well as conventional large-scale power generation, mainly based on coal and hydro power. In the plan for restructuring, EVN still owns 100% of the transmission company and at the same time is a major owner of a power company (over 51% of ownership), remaining the most powerful player in the market. This position is questionable regarding whether transparent and equitable treatment exists for renewable electricity generation from independent producers. In fact, the PPA contract for RE in Viet Nam is currently encountering problems relating to the technical concerns about grid stability. The lack of transparent data and convincing information demonstrates the low degree in managing of a fair competition from the regulators and formal owners, thereby causing substantial regulatory and market uncertainty for IPPs in Viet Nam.

For investment in renewable energy, if preferential financing occurs as a key form of SOE advantage, it also creates a more serious situation. Renewables have initial capital costs that weigh heavily compared with the operational costs for most fossil fuel projects. If SOEs have access to explicit or implicit forms of preferential capital, such as preferential loans from governments or state-controlled financial institutions with a better guarantee, this can restrict access to new entrants in the industry.

Firstly, despite the fact that the government has issued the plan officially, the duration and process for SOEs’ reform in practice are unclear, and it will be very hard to determine whether it is complete. This means that, for the private sector, particularly the foreign one, the uncertainty of a more competitive energy market with less control of SOEs is an issue. The low creditworthiness of EVN makes it difficult for foreign developers to find

affordable borrowing sources or otherwise with a high interest rate for a “risky” PPA that lasts 20 years or more.

Furthermore, the creditworthiness of EVN as a single buyer in a PPA contract for grid-connected RE projects is questionable. The electricity giant has so far depended primarily on state-guaranteed debt in investment programs through the national utility EVN. During the period 2010–2015, debt accounted for 96% of EVN’s capital expenditure, leading to a total debt amount of \$9 billion in 2016.

EVN’s borrowing is primarily in foreign currencies (particularly US dollars and Japanese yen), while only 30% of EVN’s loans are denominated in the local currency, leaving the company heavily exposed to foreign exchange risk. Much of EVN’s borrowing is short term, yet it has sourced debt to acquire long-term assets for up to 25 years, thus causing a duration mismatch between the firm’s assets and its liabilities. It is important to note that the bulk of EVN’s foreign currency loans does not have full concessional financing terms, even when they originated from IFIs; this is because they typically flow through the government, which on-lends them to EVN, adding an on-lending fee, including pass-through of foreign exchange risk, so the Ministry of Finance partially retains the benefits of concessional finance (like the obligation to service the debt).

**Table 5: Debt and Equity of EVN**

	2010	2011	2012	2013	2014	2015	2016
Foreign Commercial	0.6	0.2	0.6	1.0	1.5	1.4	0.6
Domestic Commercial	0.6	0.7	0.8	1.5	1.8	1.2	1.0
IFIs and Bilateral	1.2	1.3	1.4	1.5	1.3	1.2	1.2
Total	3.0	2.2	2.8	4.0	4.6	3.7	2.8
EVN Equity	0.3	0.3	0.3	0.7	0.7	0.5	0.9
EVN Equity (%)	10.9	13.1	9.1	16.9	16.1	13.5	31

Source: World Bank (2018).

Recently, Fitch has rated EVN as BB. This is an important milestone for EVN, offering this enterprise easier access to foreign capital without totally relying on the government. Thanks to the positive credit rating, EVN is planning to issue international bonds for the first time. It is also planning a credit rating for its distribution and distribution companies (NPT and PCs).

The government also approved the privatization plan for EVN’s power generation companies, including GENCO 1, GENCO 2, and GENCO 3 in the near future, with EVN’s holding rate of at least 51%, and is proceeding to divest. Under this policy, EVN will only hold all multi-purpose hydropower plants; power generation companies or houses will equitize all other power plants under development. By 2030, the expectation is that all GENCOs will be fully equitized and EVN will only maintain ownership of strategic generation assets (such as multi-purpose hydropower plants). However, the failed IPO of GENCO 3 in early 2018 clearly shows that the privatization of power SOEs is struggling. Foreign investors do not seem to want to invest in large energy corporations like GENCOs, and part of the reason for investors buying shares may be easier access to information.

In line with the strategy for reforming EVN, the restructuring of the energy market toward a wholesale and retail electricity market has taken place. However, the result and impact

of this transformation are debatable. After the pilot phase, the Viet Nam wholesale electricity market (VWEM) officially came into operation in January 2019. The activeness of three power corporations plus the participation of some large power plants in the market are fundamental advantages for the VWEM to enter the “race” officially. According to the decision 852-QD-TTG (GOV 2017), by 2020, the government must privatize all three electricity generation corporations that belong to EVN. EVN is planning many solutions to implement this significant reform. The SOEs emphasize the importance of restructuring the organization and ownership, considering it a breakthrough to improve production efficiency in business, increase labor productivity, and at the same time provide more transparent business production news of EVN. The focus of this period is on the completion of the privatization of the three power generation companies. Specifically, EVN conducted EVN GENCO 3 CPH procedures in 2016 and determined the enterprise value, followed by GENCO 1 and GENCO 2 in 2017 and 2018.

However, until mid-2019, only GENCO 3 had completed this process, with the unexpected result that only 0.81% of state ownership was sold and the remaining share of the GOV is 99.19%. The goal of divesting all three GENCOs with state ownership below 50% by 2020 appears to be unachievable.

GENCO 3, for the first time, went to an IPO. However, with only a negligible share of less than 1% state ownership sold, EVN is now almost 100% SOE. With state ownership still accounting for 99.19% of GENCO 3 and the forecasted trend being the same for the upcoming GENCO 1 and GENCO 2 in 2019, the reform of the three GENCOs as part of the process of establishing a wholesale electricity market to start in 2020 is highly likely to fail.

If the wholesale market and then the retail market do not operate effectively enough, they will in turn produce many other negative consequences for a targeted liberal electricity market and private participants. For example, the standard duration for signing a PPA or DPPA<sup>2</sup> and pegging it to a fixed price is 20 years. In fact, without a market-based electricity system, it is challenging for contractors to forecast the market price based on a reliable market database, leading to a high level of uncertainty and risk in signing the contract in the long term. That is, as mentioned previously, the largest constraint on PPAs in Viet Nam.

According to Decision 63/2013/QD-TTg, dated 8 November 2013, the Vietnamese electricity market’s formation and development consists of three levels: a competitive wholesale electricity market (piloted from 2015 to 2016 and completed from 2017 to 2021), a pilot competitive electricity retail market (from 2021 to 2023), and a fully competitive electricity retail market (after 2023). After nearly six years, the Ministry of Industry and Trade has so far only implemented the competitive electricity market, from 1 January 2019, adopting a competitive electricity wholesale market model, and the outcome of this process to attain the goal to have a comprehensive and competitive wholesale market and work toward a retail market is challenging due to a number of factors, such as the unsuccessful GENCO equitization and the ineffective and functional competitive wholesale market.

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<sup>2</sup> Direct PPA is a special, newly developed PPA contract for implementation in Viet Nam.

Thus, although changes have taken place, it is possible to say that Viet Nam's electricity industry still follows a vertical monopoly model, as EVN is both a dominant power generation unit (over 61%) and owns transport and operates the sole power trading unit (power trading company), transmission unit, electric system operating unit, and operating market transactions. Accordingly, the vertical linkage between EVN's units at all the stages of the electricity industry (power generation, transmission, distribution, and retail) can create competitive advantages for EVN-affiliated companies, especially as the market increases and more private investors become involved. In other words, there is still a lack of a competitive market, because it does not guarantee the independence of enterprises in the production, transmission, distribution, and retail stages. Therefore, implications can arise: (i) negotiating and signing contracts for electricity purchase from new power sources outside EVN may be more difficult, lack transparency, and often be prolonged; (ii) the electricity selling price depends on EVN's decision; and (iii) EVN's monopoly may significantly hinder the attraction of private investment and foreign direct investment, thus greatly hindering the development of the electricity industry, which has huge investment costs.

### **3.3 Infrastructure for Expanding and Integrating New Energy Projects**

The infrastructure poses a major challenge for energy project development. The speed of infrastructure development that keeps pace with the rapid power project development prevents prospective projects from progressing, particularly renewable energy projects. The key infrastructure challenges include system constraints, a lack of grid access, high grid connection expenses, limited grid capacity and coverage, a lack of technical standards and certification, and a lack of operation and maintenance facilities. Inadequate development of new transmission networks will continue to be a barrier when the generation capacity increases. New large-scale projects must have sufficient transmission components with well-planned financing of the grid extension.

Under the standardized PPA for small renewable energy producers, developers are responsible for the immediate connection costs (to the nearest substation or passing 110 kV line). Based on recent experience with small hydro, ERAV estimated the incremental network costs in 2011 at \$51/kW, compared with \$4/kW for gas CCGT and \$12/kW for coal. While equivalent figures do not exist for wind and solar, because of their remote location (particularly in the case of wind), these are likely to fall toward the upper end of this range. Meeting targets for the expansion of renewable energy generation capacity will therefore require substantial grid infrastructure investments to facilitate the necessary connectivity.

Coupled with the wave of renewable investment from the private sector in a southern location, the grid capacity is a fundamental concern of the investors. EVN is the sole buyer for all RE projects; however, it is not responsible for the problems in electricity dispatch if congestion or curtailment happens. The government, at the same time, is encouraging developers to invest in the grid transmission line to aid projects' connection success. However, from the investors' point of view, this is an infeasible and risky solution due to the high cost of building the transmission line without secured long-term profit.



### **3.4 Unfunctional Financial System with Limited Conditions to Channel Private Project Finance**

The main channels for domestic financing flow through the banking system. Despite progress in recent years, the financial infrastructure and the regulatory and supervisory framework are still weak and deficient, with a primary focus on short-term lending and backing by collateral rather than project finance, which requires different methods of credit appraisal with a long-term loan duration. Energy projects are a kind of infrastructural projects. The maturity of infrastructure projects is long term. Therefore, to finance infrastructure projects, access to long-term finance is necessary.

Due to the structure of their deposits, commercial banks find it difficult to offer longer-term finance. If banks allocate their resources to infrastructure and long-term projects, a maturity mismatch will occur. Vietnamese banks typically provide short-term loans, as they lack longer-term sources of funding to finance medium (1–3 years) and long-term lending (more than 5 years). In fact, longer-term loans themselves come from short-term deposits based on a prudential ratio of 50%, creating an asset–liability mismatch and intermediation problems for banks.

There are two fundamental reasons for the lack of long-term deposits. Firstly, the main reason is the flat yield curve by duration for deposits in the local market with only 80 basis points of interest rate differential between deposits with a longer duration and deposits with a shorter duration than 12 months. This discourages lenders from making medium- and long-term deposits. The short-term lending interest rates in Viet Nam are also high, currently ranging from 7.5 to 9.5%, although they are slightly lower for specific sectors (like energy) that the government promotes in the form of directed credit. Another reason derives from the economic instability and perceived risks regarding the interest rate, inflation rate, or foreign exchange rate fluctuation, which reduce the volume of the long-term deposit supply. Therefore, raising longer-term debt to cover the duration of power projects, which often have a payback period of longer than seven years, is difficult in Viet Nam.

The limited source of long-term funding prevents commercial banks from financing the energy sector, as do their lack of sector knowhow and exposure to single borrower limits. Although commercial banks are interested in financing renewable energy and LNG projects, which they consider to be a high-potential sector in the country, they have generally not been able to obtain a great deal of finance for several reasons. First, the short-term nature of their deposits, as mentioned earlier, makes it difficult to structure financial products that can match their short-term deposits with the cash flows from such long-term projects. Second, local banks often lack the necessary in-house technical expertise in credit appraisal for the renewable energy sector, thereby increasing their perceived risks.

Beyond the banking sector, the local capital market remains relatively underdeveloped compared with that of neighboring countries in Southeast Asia. Viet Nam's stock market capitalization was 76% of the GDP in 2016, but its liquidity is low. Although several state-owned enterprises are listed, in practice the government retains tight control over their management when they have only negligible privatized shares.

Another consideration for the long-term financing channel comes from the bond market. However, the corporate bond market development in Viet Nam is still in the nascent stage, with a total issuance value of just 1% of the GDP and a limited number of large companies as well as limited demand from institutional investors to participate. Cumbersome procedures for bond issuance, coming from high transaction costs and a lack of transparency and information for investors, also hamper it. The market has

structured the most recent bond issuance placements as quasi-loan transactions and distributed them mainly through local banks in the form of private placements. There is also a plan to issue “green bonds” before 2020 that could benefit EVN in funding RE projects. Nevertheless, without adequate basic conditions of a functional market, green bonds for EVN and other green projects have a low chance of success.

The institutional investor market is currently very small, and it channels most investments into government bonds. The government should encourage institutional investors with longer-term horizons, such as pension funds, to be more active in financing the economy.

Compared with Southeast Asia countries, Viet Nam is less competitive in the finance sector than Malaysia, the Philippines, Singapore, and Thailand, where banking has good expertise regarding project financing for renewable energy and the competence to conduct relevant professional transactions (IRENA 2018). The Industrial Finance Corporation of Thailand was the pioneer financial service firm in the region to operate debt instruments. In Viet Nam, while, in a few cases, local banks actively provide lending without support from international capital, most transactions are in collaboration with development finance institutions and other international banks. The local financial institutions often lack capacity and in-house expertise to finance renewable energy projects due to limited knowledge of technical solutions (reflecting the past experience in only fossil-fuel power projects).

## 4. CONCLUSION AND RECOMMENDATIONS

With the huge demand for energy, particularly electricity, Viet Nam is a capital-hungry country for the power sector. Given the new position of public finance, while ODA and preferential loans were previously a major source of energy investment, they have reduced significantly. The country has witnessed the threat of energy security if sufficient capital to invest in infrastructure and new energy, such as RE, cannot be raised. Putting capital into the energy sector will enhance the electricity demand security by reducing the increasing reliance on imports with a lack of energy generation diversification, at the same time unlocking the potential for RE deployment in the country. Energy insecurity is an apparent threat to the Viet Nam economy without the timely involvement of the private sector, as forecasts indicate that this type of capital will account for 75% of the capital required in the power sector until 2030. Among the barriers that are hindering the participation of the private sector, non-economic ones, including legal or regulatory obstacles with a low level of certainty and issues concerning grid access for private projects, are the most pressing. Instability and inconsistency in the energy policy with the weakness in PPA terms regarding EVN make the investment decision tougher and costly. In addition, the effectiveness and real outcome of the energy sector reform with the privatization of EVN and its GENCOs to ensure a functional and competitive energy market are questionable.

To improve the investment environment for private domestic and international investors, the study provides the following recommendations.

**The first recommendation is to address the non-economic barriers.** Rather than just focusing on the financial incentives, like the FIT, which has become the agenda in the country with a debate relating to the rate and how to distribute it, addressing the non-economic concerns is more important. An energy sector policy that encourages the involvement of the private sector should aim to shift incentives to value medium- and long-term planning by enabling countries to take advantage of the carbon financing available from well-developed countries in this field. The effective policy should be based on long-term power sector planning with careful analysis of different scenarios regarding

changes domestically and internationally and should consider the improvement of the energy infrastructure accordingly. Policy making needs to consider more seriously the pros and cons of the short-term supporting policies. In the Vietnamese case, to accelerate the private investment, increasing the creditworthiness and financial healthiness of the EVN as the sole buyer in PPA is highly important, and it will create a healthy and positive image of offtakers in PPA contracts that directly affects the confidence and profitability evaluation of the investor.

Furthermore, the country should form a competitive energy market more quickly by speeding up the reform and restructuring of the energy market. It is undeniable that this process will take time due to the complexity of the current energy system, and its results will affect the status of different stakeholders in the field (the government, EVN, power SOEs, and the private sector). However, if the reform policy does not have stringent and disciplined implementation, serious consequences will arise for the investment climate in the country. More specifically, the functionality of the wholesale and retail electricity market, to which the GOV is committed, is fundamental for the long-term investment consideration of the private sector, particularly the foreign one. Because a functional, transparent, and competitive market will enable investors to forecast electricity prices better in the future, it is the key to decision making regarding PPA contracts.

**The second recommendation is to consider employing an innovative contract, such as a direct power purchase agreement (DPPA).** This type of contract allows private electricity buyers and sellers to sign an agreement directly for electricity transactions. A DPPA is suitable for application in Viet Nam for various reasons. (1) In the case of worries about offtaker creditworthiness in traditional PPAs, the offtakers of a DPPA are usually large electricity consumers as well as well-known enterprises. The better credit rating of offtakers in the contract will allow the developers better access to financing sources from debtors; therefore, it is beneficial in finding cheaper loans for project development, which is the case of intensive initial capital in renewable energy projects. For example, in Viet Nam, there are now several potentials for electricity buyers in DPPAs, such as ABB, Apple, and Nike. Those corporates' credit ratings are much higher compared with the creditworthiness of EVN, ranked at BB, it is possible to see that the better quality of off-takers in the contract will affect the profitability of the developers, and a better offtaker profile paves the way for projects' bankability. (2) Viet Nam is now the home of many FDI firms, and many of them are already in the RE100, committed to a large portion of electricity consumption from RE. Therefore, applying a DPPA will benefit both the government, which is calling for the interest of private investment in the energy sector, and private international firms, which are seeking RE sources to meet their commitment to green energy consumption.

**The third recommendation is to improve the functionality of the domestic financial market.** To attract more private sector involvement in energy development, particularly renewables, the government should use key facets to enhance the function of the domestic financial market: developing the domestic bond market as a basis for long-term lending as well as a stepping stone to green bond issuance and strengthening the capacity of financial and banking institutions in funding RE energy projects that require long-term loan access and expertise in power sector credit appraisal.

In addition to relying on the banking system for long-term financing, introducing pension funds to provide long-term finance might also be a practical solution. In the bank-dominated financial system of Viet Nam, with a relatively high interest rate and a significant amount of non-performing loans (NFSC 2017), as well as the limitation that banks face in entering the RE energy sector due to the Basel capital accord, many banks are not showing an interest in financing RE projects. In this situation, pension funds and

insurance companies could be alternatives, as they are available for long-term deposits (20 years, 30 years, and 40 years), which are appropriate for long-term projects such as those in the RE sector. On the other hand, Viet Nam does not have an effective management for pension fund system that is expected to witness deficits at 2035 due to the aging population that the country will confront in the near future. The reforming and restructuring pension fund system will secure the future social security payments and at the same time provide long-term financing for those sectors that are seeking long-term financing and will provide high returns, such as the RE sector.

Coupled with the aforementioned recommendations, other solutions include utilizing the spillover effect of the energy supply in the form of a tax return to the private sector. Having said that, the government often regulates electricity tariffs, which makes it difficult for private financial institutions, such as pension funds or insurance companies, to finance energy projects. Hence, to increase the investment incentives, it is necessary to utilize the spillover effects originally created by energy supplies and refund the tax revenues to the investors in energy projects. The energy supply will bring factories and businesses to the region. New residences will emerge and property values will rise. Corporate tax, income tax, property tax, and sales tax will rise in the area of new energy supply. Either the local government or the central government collect all these spillover tax revenues, and it does not return them to the investors in energy projects. Investors only rely on user charges accrued from the electricity supply. If part of the spillover tax revenues were returned to private investors, the rate of return of energy projects would increase not only in one period but also over a longer period, which can support their maintenance costs (Yoshino, Taghizadeh-Hesary, and Nakahigashi 2019). Another recommendation is the establishment of a credit guarantee scheme to reduce the risk of investment in energy projects, especially renewable energy projects, to incentivize private investments (Taghizadeh-Hesary and Yoshino 2019; Yoshino and Taghizadeh-Hesary 2019).

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