

Trong Co Nguyen; Anh Tu Chuc; Le Ngoc Dang

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**GREEN FINANCE IN VIET NAM:
BARRIERS AND SOLUTIONS**

Trong Co Nguyen, Anh Tu Chuc,
and Le Ngoc Dang

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Trong Co Nguyen is director at the Academy of Finance, Ministry of Finance, Ha Noi. Anh Tu Chuc is an associate professor also at the Academy of Finance, Ministry of Finance, Ha Noi. Le Ngoc Dang is a faculty member of the International Finance Department, Academy of Finance, Ministry of Finance, Ha Noi.

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Please contact the authors for information about this paper.

Email: 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
E-mail: info@adbi.org

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Abstract

Viet Nam's energy sector has made considerable strides in recent years in achieving high percentage of nationwide electrification and a relatively diversified energy mix that is dominated by hydropower, followed by gas and coal. However, sustaining those achievements including addressing gradually depleted domestic resources, keeping pace with growing energy demand from the energy-intensive economy and meeting ambitious climate change targets under the Nationally determined contributions in Paris Agreement need to call large sums of new investment, particularly in renewables. If those necessary investments are not satisfied, it will further increase Viet Nam's dependence on imported coal to cater its future energy needs with substantial negative environmental, health, climate change and economic consequences. Based on the existing challenges, the authors make recommendations including establishing more conducive conditions for private investment and strengthening the domestic funding environment through a functional financial market.

Keywords: renewable energy, green finance, energy security, Viet Nam

JEL Classification: F21, H23, Q42, Q54, Q58

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1. INTRODUCTION

Currently, Viet Nam is a fossil fuel-intensive economy that derives nearly two-thirds of its energy supply from coal, oil, and gas (Government of Viet Nam 2016b). The domestic market's increasing demand for energy in recent years has made the country a coal importer since 2015. Viet Nam, however, is a potentially rich country with abundant sources of renewable energy (RE), particularly wind power, solar power and biomass, that remain substantially untapped. In 2015, only 3.7% of the total electricity supply derived from renewable energy. The overreliance on fossil fuel in the energy mix is threatening the energy security of the nation. In addition, Viet Nam has been experiencing severe environmental issues related to climate change and local air pollution. All of those issues require the gradual replacement of fossil fuels with green and environmentally friendly energy sources. This chapter aims to analyze the rationales for the development of the RE industry in Viet Nam followed by the current position of RE financing in the country. Furthermore, it studies the fundamental obstacles that challenge RE financing. Despite the advantage of finding financial sources for renewable energy, namely a proper national energy strategy to provide a concrete foundation to lure private investment with basic financial incentives such as FIT and preferential tax, a large number of hindrances still exist, such as the low-regulated price of electricity, which makes it difficult for RE projects to be profitable considering the uncertainty of the creditworthiness of Viet Nam Electricity (EVN), a state-owned enterprise (SOE) dominating the electricity industry. Moreover, the underdeveloped financial system lacks the capacity to deliver long-term capital and the banking system has weak competence in implementing green credit appraisal. Based on the existing challenges, the authors make recommendations including reviewing the energy price policy by implementing a fiscal policy reform to encourage RE investment and developing a fully functional domestic financial system combined with sustainable business performance of EVN to increase foreign investors' trust.

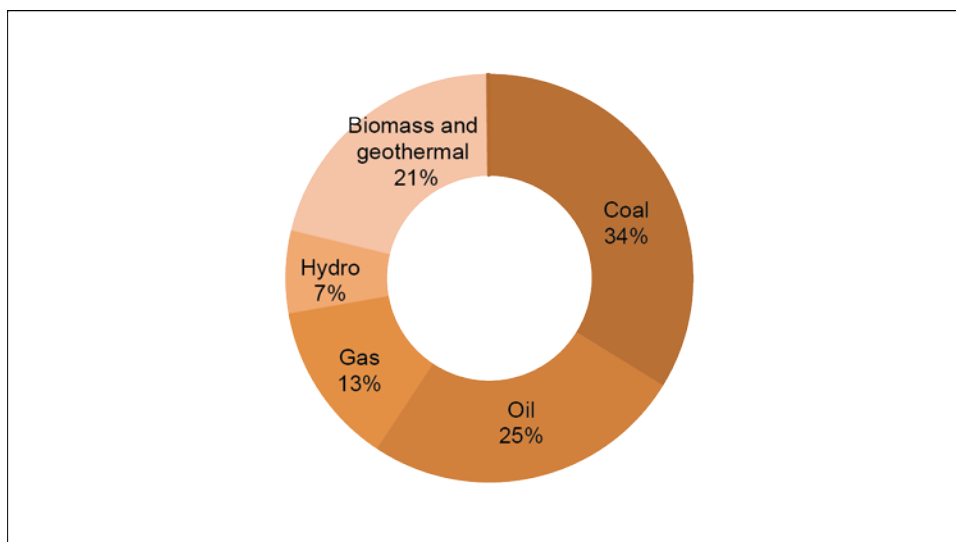
2. MOTIVATIONS FOR ACCELERATING GREEN ENERGY DEPLOYMENT IN VIET NAM

2.1 Diversification of the Energy Mix and Energy Self-Sufficiency

Viet Nam possesses an energy supply basket with prominent coal, oil, biomass, and geothermal energy (Figure 1). In 2015, the total primary energy supply was 70,588 KTOE, of which coal occupied the largest part (34%), followed by oil (25%) and biomass and thermal (21%); meanwhile, natural gas and hydro accounted for minor shares of 13% and 7%, respectively (IEA 2016).

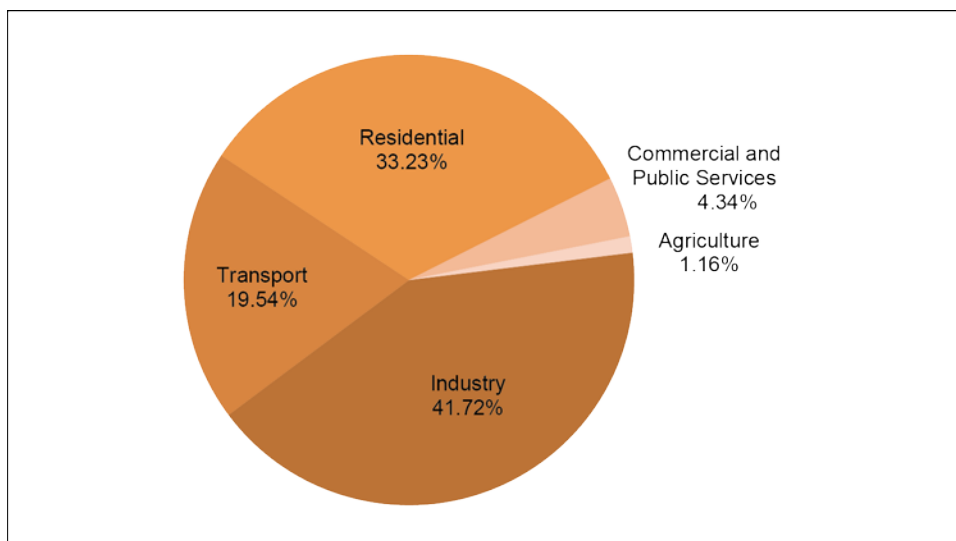
Regarding the final energy consumption (Figure 2), based on 2015 data (IEA 2015), the energy that the industrial sector consumed ranked first, with 41.72% of the total energy consumption nationwide, followed by the residential (33.23%) and transportation sectors (19.54%). Industrialization used a significant share of the energy, consisting of many energy-intensive industries, such as the production of steel, fertilizers, cement, pulp, and paper, which often rely on outdated production technologies (Danish Energy Agency 2017).

Figure 1: Viet Nam’s Primary Energy Supply by Source (2015)



Source: IEA (2016).

Figure 2: Final Energy Consumption by Sector in Viet Nam (2015)

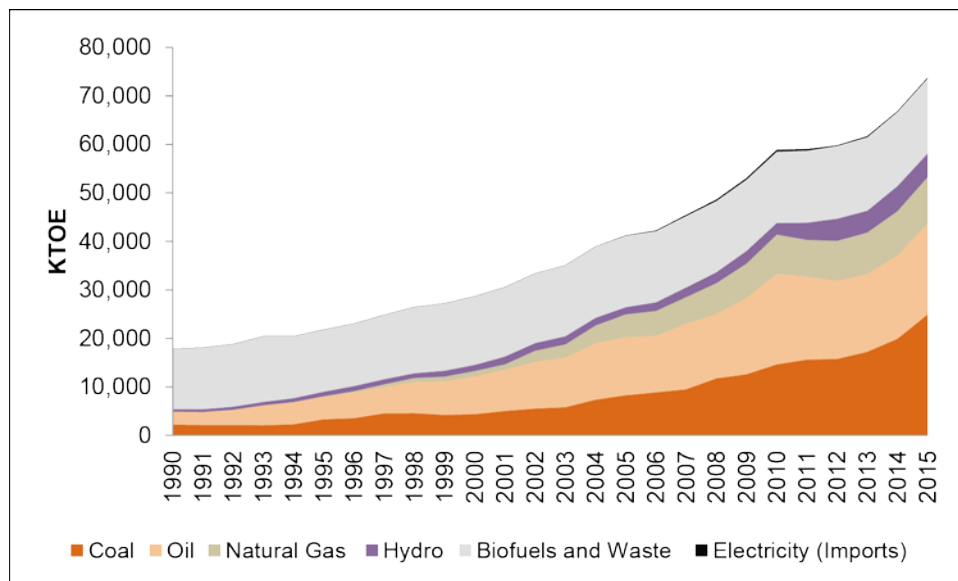


Source: IEA (2015).

The evolution of the primary energy supply over a longer period, from 1990 to 2015 (Figure 3), shows a gradual increase in the total amount of energy over the years. More notably, an obvious increasing trend of coal in both absolute numbers and percentages is apparent. The proportion of the coal supply in the energy basket of the country expanded significantly from an average of 14% in the 1990s to 19% in the 2000s and 30% in the period from 2001 to 2015. This noteworthy figure is a result of the Vietnamese Government’s policy that determined coal as the primary source of the energy supply for the country, the Power Development Plan 7 (PDP 7), revised in 2016 (Government of Viet Nam 2016b). In contrast, the contribution of biomass and waste has tended to decrease. There was a dramatically decreasing proportion in the renewable energy supply (mainly biomass generated in the countryside) during the period 1990 to 2015. Biomass was previously the 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 consequently accounted for only around 20% in 2015, partly due to the increasing income of rural areas (Dang et al. 2009).

Figure 3: Evolution of the Primary Energy Supply in Viet Nam (1990–2015)

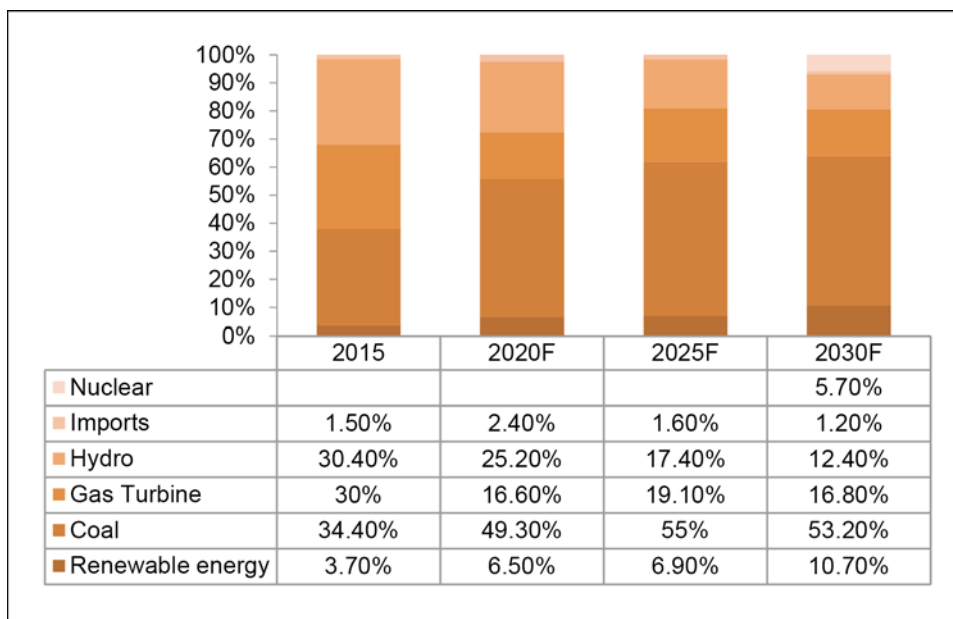


Source: IEA (2015).

An analysis of the primary energy mix (Figure 4), although it currently includes a variety of energy sources, indicates that the major contribution is from coal, which is also in line with the energy strategy of the government to meet the domestic energy demand based on its cheap operation cost for energy generation. In the revised version of the PDP 7 in March 2016, the government expressed its interest in coal-fired energy by developing a plan to derive the majority of the energy supply for industrialization from coal. It forecasted the component of coal to dominate with 49.3%, 55%, and 53.2% in 2020, 2025, and 2030, respectively (Government of Viet Nam 2016b).

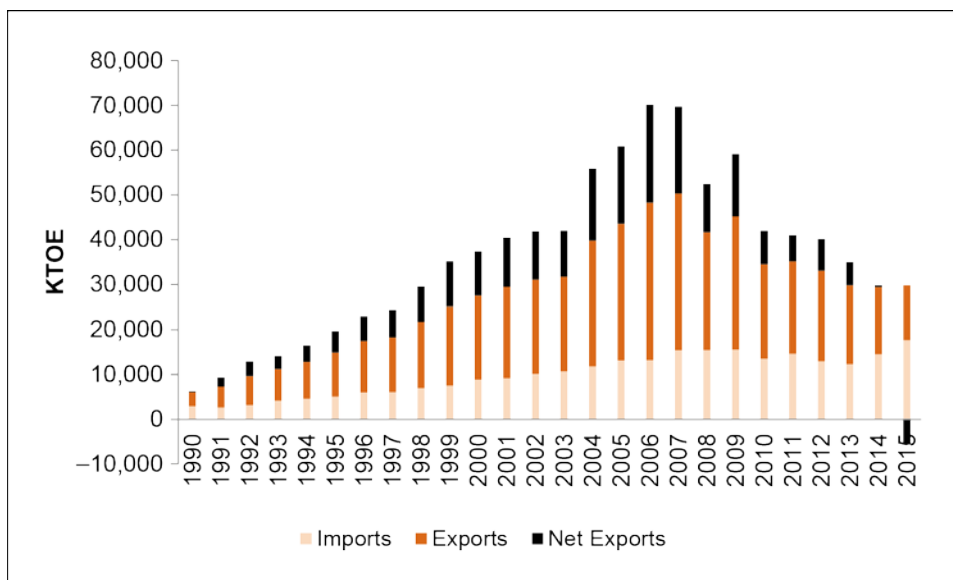
In order to satisfy the high demand for domestic energy, the import volume of coal has risen significantly since 2014 (Figure 5). The value of energy imports is greater than that of exports as a result of the decline in coal exports and the increase in coal imports, with net imports of 12% in 2015. The coal imports in 2016 amounted to more than 10 million tons; the expectation is that this amount will increase in the coming years (Government of Viet Nam 2016b). With the increasing energy demand and the recent fluctuations in energy imports and exports, Viet Nam has been a net energy importer since 2015 (Figure 5). At the same time, the volume of energy exports has declined, with an export volume of nearly 12 thousand KTOE in 2015 that equals only 40% of the amount in 2009.

Figure 4: Structure of Power Sources as a Share of the Total Electricity Supply in Viet Nam



Source: Government of Viet Nam (2016b).

Figure 5: Viet Nam Energy Imports – Exports Position



Source: IEA (2015).

The situation of imported coal and the forecasted energy supply, as the Revised PDP 7 demonstrates, has raised significant concerns with regard to the energy security of the country. First, it makes the country more import dependent, reduces its energy self-sufficiency, and makes it vulnerable to external energy price shocks. Several studies have found that reliance on fewer energy resources will reduce the energy security, among which Taghizadeh-Hesary, Yoshino, and Rasoulinezhad (2017) shed light on the energy-consuming sectors in Japan after the Fukushima nuclear disaster, which resulted in nuclear power shutdown and substitution of the nuclear loss with the

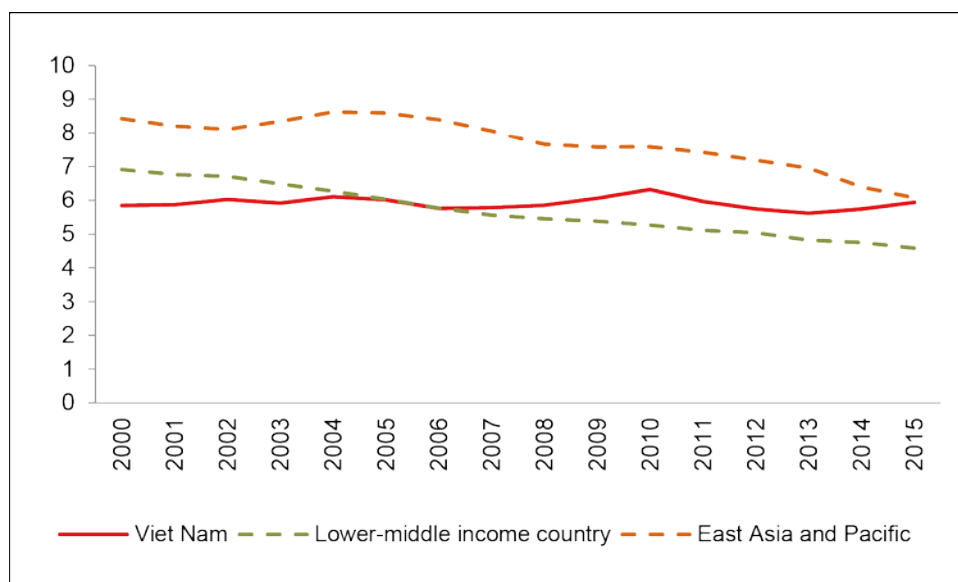
importing of more coal, oil, and liquefied natural gas (LNG). Their results showed that the absolute value of elasticities of most oil consumption sectors in Japan decreased after this disaster because of the increased dependency on oil consumption, which endangered the energy security of the country. They proposed that, to increase the energy self-dependence and energy security, Japan needs to diversify its energy supplies from too much dependency on fossil fuel to a combination of fossil fuel and RE. Second, as the domestic price for fossil fuels is currently below the world market price, public sources would have to bridge this price gap for imports, putting pressure on a government budget that is already in deficit. Third, the fact that over 50% of the energy supply is coal illustrates the improper energy diversification of the country.

For those reasons, a transition of the economy from industry that has less intensive energy use or the substitution of fossil fuels with alternative sources of energy – such as renewables – as highly desirable from the perspective of increased energy security.

2.2 Higher Energy Efficiency and Lower GHG Emissions

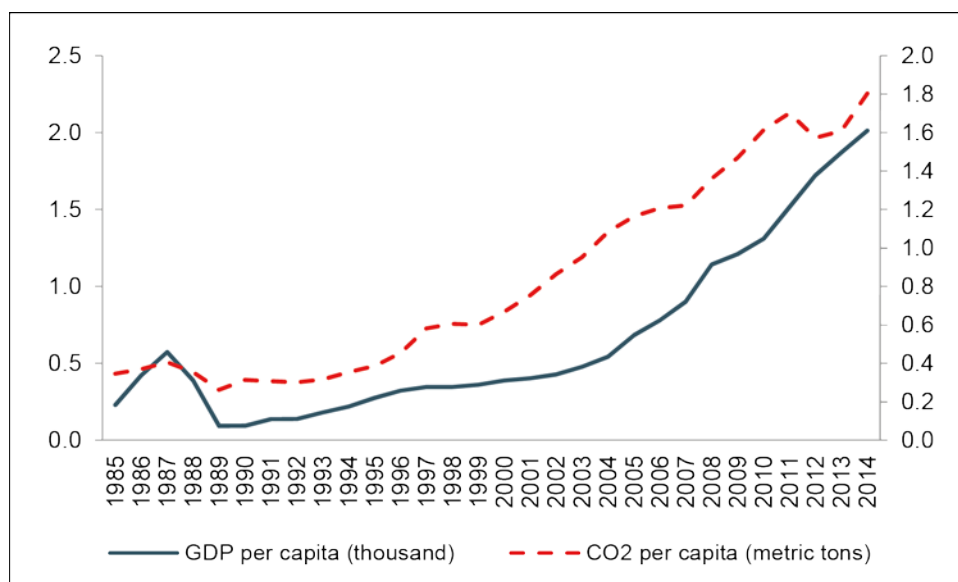
Viet Nam’s GHG emission growth is among the largest in the world, and its carbon intensity is the second highest among the Asian countries (World Bank 2015). Level of energy intensity is gradually increasing and predictions indicate that it will become a major greenhouse gas (GHG) emitter in the region considering the decline among other countries in East Asia and the Pacific as well as lower-middle income countries (Figure 6). These projections are mainly based on the growth in the use of coal, as this source will account for more than 50% of the energy mix by 2030 for power generation, as illustrated in the revised PDP 7 (Government of Viet Nam, 2016b).

Figure 6: Energy Intensity Level of Primary Energy Source from 2000 to 2015



Source: World Bank (2015).

Figure 7: Per Capita CO₂ Emissions vs. Per Capita GDP in Viet Nam (1985–2014)



Source: World Bank (2015).

Figure 7 shows the positive correlation between the CO₂ emissions per capita and the GDP growth per capita of the country in three consecutive decades (from 1985 to 2014). Viet Nam witnessed an impressive economic growth rate with an average per annum of 6% from 1985 to 2014. However, at the same time, the amount of CO₂ emissions per capita experienced an identical pattern, increasing four times during the period, with absolute emissions rising from 21.168,924 kt in 1990 to 166.910,839 kt in 2014. The strong coupling between economic growth and CO₂ emission generation requires a less CO₂-intensive industrialization strategy in the future.

As mentioned before, Viet Nam is continuing to develop coal-fired thermal power plants, determining coal as the primary source of the electricity supply for the economy. Koplitz et al. (2017), in their study, investigated the growth of emissions in relation to changes in the carbon intensity in Viet Nam, finding that the large increases after 1990 are mainly attributable to the increased use of oil but that coal plays a significant role. Emissions, which are the main source of air pollution and lead to climate change, have adversely affected the national growth and poverty reduction in many nations, including Viet Nam.

According to the Global Climate Risk Index’s Vulnerability Index (Germanwatch 2017), Viet Nam ranked 8th among the 10 countries most affected by extreme weather events. The country has suffered negative changes, including a higher temperature, a sea level rise, heavy and abnormal storms, floods, and droughts. The poor in remote areas are exposed to the greatest risk given their dependence on natural resources for their livelihood. The Mekong River Delta and Red River Delta have been experiencing saltwater intrusion, worsening the agricultural productivity. Urban dwellings in big cities, such as Ha Noi and Ho Chi Minh City, have also witnessed heat and humidity extremes combined with unusual floods and storms.

As the global climate change has a broad extent when measuring the impact of Viet Nam in responding to this universal phenomenon (Zimmer, Jakob, and Steckel 2015), it seems to be obvious to take into account the severe local pollution issue. Generating energy from coal is costlier than it appears due to the underlying expenses for the local environment, health, and livelihoods. Furthermore, it is necessary to transport and bury

as landfill the huge amount of waste from coal projects, while its price often does not include air pollution and other externalities.

As of 2011, Viet Nam has 38 coal-fired power plants in operation; projections indicate that this number will reach 133 by 2030. Coal-fired power plants are important polluters in the local environment in which factories are established. They discharge more than 3 million tons of coal slag each year, in addition to releasing a large amount of fly ash into the atmosphere. If all the plants become operational, the bottom ash slag will increase to 14 million tons per year by 2020, with nearly 35 million tons of bottom ash by 2030, along with tens of millions of fly ash, mainly SO₂, NO_x, and primary PM 2.5 gases. Koplitz et al. (2017) predicted that, by 2030, the total number of deaths due to coal pollution in Viet Nam would be 19,220, mainly due to heart disease and stroke.

Therefore, an ambitious strategy from the authorities that is cleaner and more environmentally friendly, not only globally with a broad extent but specifically for the local environment first, requires a significant change in the country's strategic energy deployment. Because it is impossible to abandon and discontinue a large number of coal-fired projects, the country must consider the employment of technology for cleaner coal-fired power plants as the most important solution, since currently almost all the coal energy generators in Viet Nam are out of date (ECA 2016). A variety of models for greening and modernizing the technology of the coal-fired industry that benefit the greening energy sector process are available; Isogo thermal power plant in Japan provides an example.

2.3 Unleashing the Substantial Untapped Potential of Renewable Energy

Viet Nam has abandoned sources of RE generation, although they offer a large number of advantages due to its geographic location. Wind, solar, and biomass are the three most promising energy sources for generating green energy.

Biomass is an important and abundant source of energy in Viet Nam, since a large number of citizens are located in rural areas and the agricultural sector. Agricultural waste is abundant in the Mekong Delta region, accounting for roughly 50% of the waste of the whole country, and, in the Red River Delta, it comprises 15% of the country's waste. Before 2000, nearly 90% of rural areas' energy consumption derived from biomass, such as fuel wood, agricultural residues, and charcoal. Moreover, biomass fuel is an important source of energy for micro and small industries located mainly in remote areas.

Due to its favorable geographic conditions, Viet Nam has huge potential for solar energy production, with 1,600–2,700 sunlight hours per year and average direct normal irradiance of 4–5 kWh per sqm per day (GE 2018). Specifically, Viet Nam has rich potential for solar photovoltaic (PV) power. This type of energy production has great advantages, such as very few negative environmental impacts and zero GHG emissions. After the initial investment, except for small amounts of costs for maintenance, solar panel cleaning, and liability insurance, there are no other operational costs. The costs of generating electricity from solar PV are steadily reducing. Globally, government and private sector incentives to invest in renewable energy have grown as a way of reducing fossil fuel dependency and environmental damage. Due to these new investments, the renewable energy field has experienced vast growth in recent years. In the field of solar electricity in particular, the annual solar PV electricity production increased from 4 TWh in 2005 to 247 TWh in 2015 (IEA 2017). Moreover, the accumulated solar electricity plant capacity grew from

100,504 MW in 2012 to 368,000 MW in 2017. One of the factors supporting this growth in the solar electricity sector is the reduction in the cost of solar modules (Taghizadeh-Hesary, Yoshino, and Inagaki 2018).

With regard to wind energy, Viet Nam's potential capacity is considerable compared with that of Thailand, the Lao People's Democratic Republic (Lao PDR), or Cambodia. With a coastline of more than 3,000 km and a location in the monsoonal climate zone, Viet Nam has considerable potential for harnessing its wind resources. The provinces with the most promising wind potential include BinhThuan, NinhThuan, Vung Tau, Ben Tre, SocTrang, Bac Lieu, Ca Mau, and the Central Highlands. Estimates indicate that the total technical potential for wind power development in the country is 24 GW, according to an atlas (GIZ 2013).

In terms of renewable energy generation from solid waste, with a population of more than 93 million people, the volume of waste disposed of in Viet Nam is huge. On average, the country discharges nearly 35,000 tons of urban daily life waste and 34,000 tons of domestic waste. In big cities like Ha Noi and Ho Chi Minh City, 7,000 to 8,000 tons of waste accumulate each day (Schneider et al. 2017). However, the amount of waste has not been used thoroughly as a source of energy for life. Currently, the country treats nearly 85% of the current waste mainly with landfill technology, which requires large land funds; 80% of landfills are not hygienic, potentially contaminating the environment. With 35,000 tons of rubbish buried each day, this is a wasted resource that Viet Nam has not fully utilized for energy generation.

Box 1: RE Potential in Viet Nam

Small Hydro – Small hydropower projects account for 1914 MW of total energy with the potential for a further 7,000 MW.

Wind Energy – technical potential of 26.7 GW (development of 10–12 GW in 2035);

Biomass – technical potential of 10.3 GW (development of 2.9–3.7 GW in 2035);

Biogas – technical potential of 5.3 GW;

Solid wastes – technical potential of 1.55 GW;

Solar – technical potential of about 300 GW (development of 21–40 GW in 2035).

Source: GIZ (2016).

3. FINANCING FOR RENEWABLE ENERGY IN VIET NAM

3.1 Key Policy Regulations Related to Renewable Energy Financing

Since 2011, the Viet Nam government has issued a sequence of regulations to support the implementation of RE in the country financially; Table 1 summarizes the essential legal documents.

Table 1: Key Policy Regulations Related to Renewable Energy

	Name of Regulation	Year Issued	Key Points	Targeted Renewable Source
1	National Power Development Plan 2011–2030 (suspended and revised in 2016)	2011	Financial instruments (financial incentives, tax relief, FIT, premium)	Wind (onshore), biomass
2	Accelerated depreciation tax relief for renewable projects	2013	Tax relief	All renewable sources, hydro power, solar
3	Decision on support mechanism for waste-to-energy and biomass power projects (biomass FIT)	2014	FIT, premium	Biomass
4	Viet Nam Renewable Energy Development Strategy 2016–2030 with Outlook until 2050	2016	Strategic planning	All renewable sources
5	Revised National Power Development Plan 7 (PDP 7 rev.)	2016	Strategic planning	All renewable sources

Source: Government of Viet Nam (2001–2016b).

Furthermore, the government has issued regulations in response to the increasing concerns about national climate change risks. The growing global attention to the achievement of low-carbon and climate-resilient development in the country also spurred this interest. The most relevant policies and regulations in this context include the following:

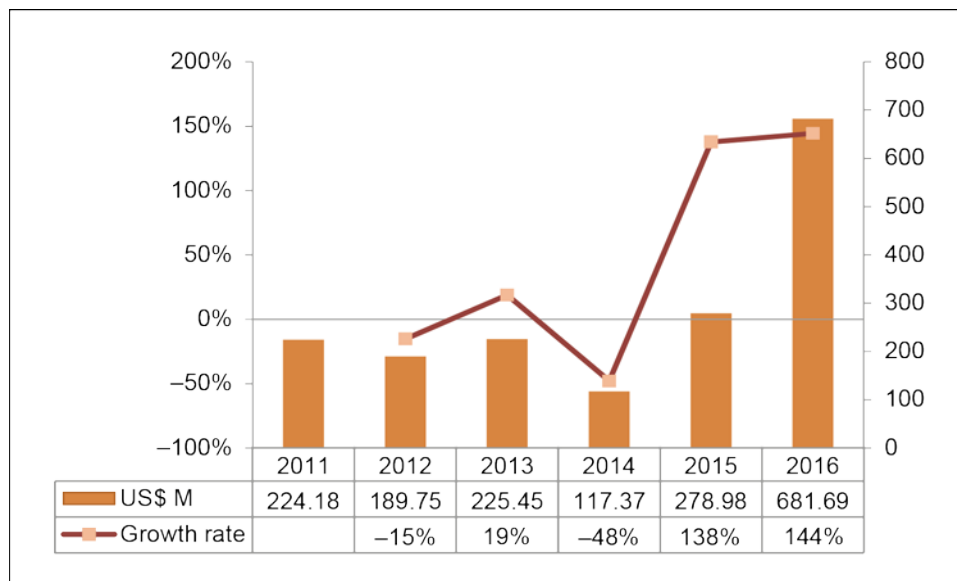
- The Government of Viet Nam prioritized climate change actions in the National Target Program to Respond to Climate Change (NTP-RCC), which it promulgated in 2008 through the Decision of the Prime Minister No. 158.
- In addition, in Decision No. 82/2002, the government established the Viet Nam Environment Protection Fund (VEPF) with the purpose of collecting environmental protection activities and appointing the Ministry of Finance and the State Bank of Viet Nam as members of the VEPF. A later decision (No. 35/2008) updated the legal status of the VEPF and established it as a revolving fund with charter capital of VND 500 billion.
- Furthermore, relating to climate finance, the government introduced the Support Program to Respond to Climate Change (SP-RCC) (Decision No. 5613/VP-CP-QHQT). It created this program specifically to mobilize climate finance from international sources in support of national climate change programs and infrastructure investment projects. People consider the SP-RCC to be a successful program in Viet Nam in terms of the total funding support and the large number of donors and government agencies involved at both the national and the local level.

3.2 Renewable Energy Investment in Viet Nam

Figure 8 shows the value of annual new investment in RE in Viet Nam from 2011 to 2016. At the beginning of the period covered, the annual investment in the RE industry was a small amount, under \$300 million from 2011 to 2015; in 2014, the figure even decreased significantly by 48% compared with the previous year. However, in 2016, there was a noticeable sign when investment soared by a further 130% and stood at \$682 million, making the total value of the renewable energy industry in Viet Nam until 2016 \$2,355.73 million (Figure 8). The belief is that the amended Power Development Plan 7 has had a positive effect on Viet Nam's RE industry and that 2016 was a

remarkable year for renewable energy investment in the country. Moreover, in the same year, the value of new RE investment in Viet Nam was equal to that of Singapore and Taipei,China but still lower than that of Thailand and the Philippines (Table 2).

Figure 8: Renewable Energy Investment in Viet Nam (2011–2016)



Source: Climatescope (2017).

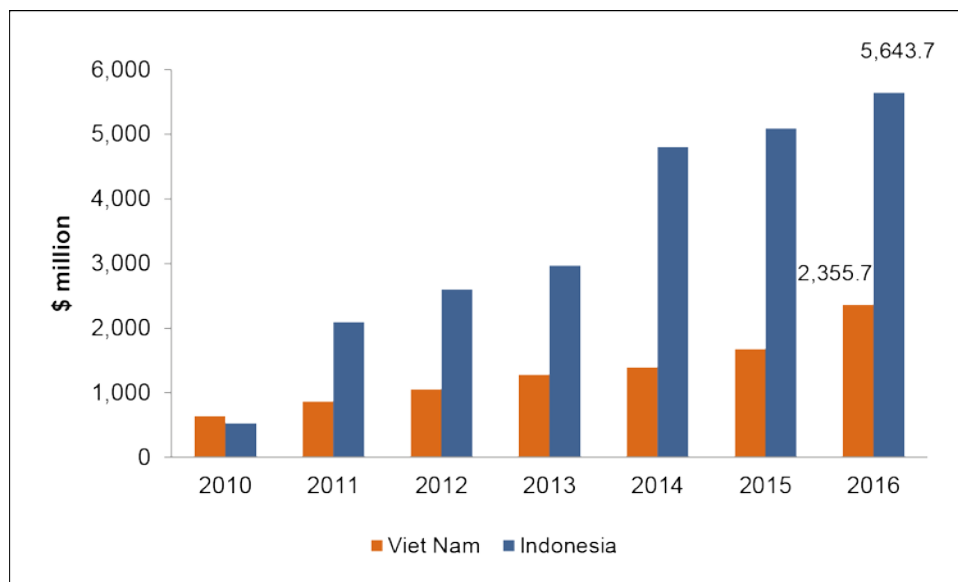
Table 2: Renewable Energy Investment in 2016 in Asian Countries

Criteria	Renewable Energy Investment in 2016 \$ Billion	Growth Rate – % (Compared with the Previous Year)
Thailand	1.4	4%
Philippines	1	-47%
Pakistan	0.9	-58%
Singapore	0.7	1328%
Viet Nam	0.682	143%
Taipei,China	0.7	-2%
Indonesia	0.5	84%

Source: Climatescope (2017).

It is noteworthy that, when comparing the entire RE investment value over the years among Asian countries, such as Thailand or Indonesia, Viet Nam is only a minor player. Figure 9 shows the accumulated value of RE financing in Viet Nam and Indonesia during the period 2010–2016. Surprisingly, in 2010, the values of the two markets were similar: the value was even slightly higher in Viet Nam. However, Indonesia witnessed a dramatic increase in the subsequent years; meanwhile, Viet Nam lagged far behind its neighboring nation. At the end of 2016, the accumulated value of RE investment for Indonesia was \$5,643.7 million, which is more than twice that of Viet Nam.

Figure 9: Accumulated Value of RE Investment in Viet Nam and Indonesia (2010–2016)



Source: Climatescope (2017).

As estimated by GIZ (2013), the renewable energy tapped in Viet Nam is currently only 3.4% of the total potential; therefore, the country requires huge capital to unleash it. There has been an explosion of renewable energy investment all over the world, and South-East Asia is one of the leading regions and has invested a huge amount of money in RE projects. In 2015 and 2016, the values of new investment for RE in that location were \$3.8 and \$2.6 billion, respectively (IRENA 2018).

The value of the RE industry’s investment in Viet Nam is negligible and not commensurate with the country’s demand to unlock the substantial potential. For a long time, this industry did not receive adequate attention from the government, which seems to have neglected it until it issued the revised PDP 7. Viet Nam is a “latecomer” in a trending industry and therefore requires stronger commitment from the authorities to unleash this huge potential in the future. Without the government’s efforts and commitment to investing in renewable energy, Viet Nam may become an “outsider” of the global investment wave.

3.3 Financial Incentives for Renewable Energy Projects in Viet Nam

Regarding the financial incentives to unlock the RE potential in the country, feed-in tariffs are an important component that can help to initiate a surge of renewable energy in the market. The regulations below describe the FITs for multiple types of renewable energy sectors in Viet Nam (Table 3).

Table 3: Financial Incentives for Renewable Energy Projects

Renewable Electricity Source	Regulation	Investment Area	Supporting Mechanism	Support in Detail
Wind	Decision No. 37/2011/QD-TTg (6/2011)	Electricity production	FIT for 20 years	7.8 US cents/Kwh excluding VAT
Biomass	Decision No. 25/2014/QD-TTg (3/2014)	Electricity generation	FIT for 20 years	7.551 US cents/KWh (north) 7.3458 US cents/KWh (central) 7.4846 US cents/KWh (south)
Solid waste	Decision No. 31/2014/QD-TTg (5/2014)	Direct burning	FIT for 20 years	10.5 US cents/KWh (south)
		Landfill for gas	FIT for 20 years	7.28 US cents/KWh (south)
Solar	Decision No. 11/2017/QD-TTg (4/2017)	Grid connection generation	FIT for 20 years	9.35 US cents/KWh
Small hydro power	Adjusted annually by MOIT	Electricity generation	Avoided cost tariff	~ 5 US cents/KWh

Source: Government of Viet Nam (2011, 2014, 2017).

In addition to the FIT, the regulations include investment incentives for RE developments:

- Long-Term Standard Power Purchase Agreement (20 yrs PPA).
- Income indexed to the exchange rate quoted in US dollars (not for small hydro).
- Import duty exemption on equipment: There is an exemption from import duty in respect of goods imported to construct or form fixed assets, such as raw materials, manufactured materials, and other components.
- Corporate income tax exemption and reduction: Income from new investment projects for renewable energy production will be subject to corporate income tax at the rate of 10% for the first 15 years.
- Land-related incentives: Investors may be entitled to exemption from the land use fee that would usually apply for 11 years or, in cases in which the investment project is in a region facing extreme socioeconomic difficulties, 15 years. In addition, during the capital construction period of a project (the period of construction of a new building or plant for up to 3 years from the effective date of the land lease contracts), investors are entitled to exemption from land rents and water surface rents. Furthermore, the government provides land clearance compensation and support in accordance with the Law on Land. The relevant provincial People's Committees handle all land leases and land allocation for renewable power projects.

Despite the fact that the Viet Nam government adopted a feed-in tariff for multiple types of renewable energy (with EVN it has the sole responsibility for buying the whole electric output from renewable power projects), this current subsidized tariff is not attractive in comparison with that in other ASEAN countries (for example, wind power's FIT is 19 US cents/kWh in Thailand and 21.8 US cents/kWh in the Philippines).

Furthermore, potential foreign producers have raised concerns about the purchasing price, while the current cost of electricity generated from renewable power plants is still quite high due to the large technical investment. If the FIT is not increased to regional levels, while there is no clear road map for negotiating the PPA, it will be very difficult to attract private investment.

3.4 Financial Instruments for Promoting Green Energy Deployment in Viet Nam

One of the main goals of the Macro Economic Reform, in particular the Green Financial Sector Reform Component, is to set up a green financial policy framework and create green financial instruments to mobilize funding for sustainable development in Viet Nam via the financial market by implementing innovative financial instruments. The government will implement the essential instruments in the financial market to support RE development.

3.4.1 Green Bond for Long-Term Loan Instruments

According to the National Strategy for Green Growth 2011–2020 and the vision to 2050, from 2012, Viet Nam has had an orientation toward green finance and green financial products for the Viet Nam stock market to create financial resources for green growth. In the road map for bond market development in 2017–2020, with a vision to 2030 (Decision No. 1191/QĐ-TTg of the Prime Minister dated 14 August 2017), the mechanisms and policies for the distribution of the green bond market aim to enable issuers to raise capital through the issuance of bonds to carry out green projects.

In recent years, corresponding ministries have implemented a large number of measures to support the green bond market, such as guiding enterprises to disclose information and provide transparency on green finance activities and encouraging businesses listing on the stock market to publish financial reports and annual reports referring to sustainable development and green development. Ha Noi Stock Exchange (HNX) and Ho Chi Minh City Stock Exchange (HOSE) have actively been working on measures to realize the investment attraction in the green bond market of Viet Nam. At the same time, Viet Nam is actively cooperating with some international organizations to issue green bonds.

To date, official green bond issuance has not occurred in the Viet Nam bond market due to the need for a revised legal framework and reporting guidelines to support the inadequate level of sustainable growth. The limited application of international standards remains, and there are insufficient independent organizations to assess sustainable development indicators for companies (such as credit rating agencies that have adequate expertise to provide creditworthiness in term of “green business”).

However, in 2016, in cooperation with the German International Cooperation Agency (GIZ), the Ministry of Finance jointly implemented a pilot program to issue green bonds. This is a trial program to prepare for official issuance in the near future. Box 2 below presents the details of the pilot project.

Box 2: Pilot Project for Green Bond Issuance in Viet Nam

Type of bonds: Local government bonds in two piloted locations: Ho Chi Minh City and Ba Ria Vung Tau.

Regarding Ho Chi Minh City

- Bond type: green local government bonds
- Term of bonds: 15 years
- Total volume: VND 523,5 billion (equal to approximately \$24 million)
- Usage: Capital from bond issuance was disbursed to 11 green projects in the areas of sustainable water management, adaptation to climate change, and sustainable infrastructure.

Regarding Ba Ria Vung Tau

- Bond type: Green local government bond
- Term of bonds: 5 years
- Total volume: VND 80 billion (equal to \$3.7 million)
- Usage: Capital from bond issuance was planned for a project related to sustainable water management.

Source: MOF (2017).

3.4.2 Green Credit Programs to Facilitate Access to Finance for RE Projects and Green SMEs in Viet Nam

It is important to create an enabling framework that consists of clear and enforceable rules, economic incentives, and information. Often banks refrain from lending to certain companies or sectors – for example, dedicated green business models focusing on renewable energy or energy efficiency – because they are unwilling to or cannot take additional risks, especially within the strict banking standard Basel II with higher reserves in banks in response to higher risky loans. Traditionally, Vietnamese banks have lent to large state-owned enterprises and conventional business activities, meaning that dealing with new technologies, such as renewable technology projects, is still unfamiliar to many banks.

Furthermore, large-scale grid-connected projects run by large firms have so far dominated the RE industry. However, the necessity for the involvement of SMEs in RE development should be reconsidered, since they account for 98% of the total number of enterprises (NCIF 2017). SMEs, in fact, may play different roles to ensure that the greening energy plan is achievable for a number of reasons: (1) SMEs will increase the energy efficiency and RE deployment of the whole economy if their business operation applies RE technology; (2) they might be outsourcing partners, such as sub-contractors or maintenance services for larger RE developers, as well as being part of the clean energy value chains. In practice, SMEs may actively be involved in the small equipment manufacturing business, providing civil works, retail, and maintenance, which can have rich potential in waste for energy treatment or biomass.

Based on the strategy of the government to support green credit growth, the State Bank of Viet Nam (SBV) drafted a pilot green credit program for SMEs with a total amount of approximately \$100 million, in which 3 state commercial banks (Vietcombank, BIDV, and Agribank) as well as 1 private commercial bank (Sacombank) participated. To date, the number of renewable energy, waste management, and organic agriculture projects receiving loans from that program is 26 (GIZ 2016). The

cost of the loans that the scheme will provide for SMEs will be 1%–3% lower than that of the market. The SBV will refinance the banks participating in the program at interest rates that are 1% lower than usual.

3.4.3 Green Index

In Viet Nam, a green index is combined with a sustainable index to produce the Green and Sustainable Index (VNSI). This index, after a pilot period from January 2017 to July 2017, became official in Ho Chi Minh Stock Exchange (HOSE). The index includes 30 top stocks from important sectors and is reassessed annually in July.

After half a year in operation, according to the HOSE (2018), on 29 December 2017, the VNSI stood at 1,256 (1,000 basis in 7/2017), an increase of 25.6% compared with the basis, which is relatively lower than the other essential indices, such as the VN index or the VN30, with 29.55% and 33.91%, respectively.

However, researchers consider the VNSI to be more stable than others with good liquidity until 29 December 2017 of nearly VND1,300 billion, comprising 28% of the stock market (HOSE 2018). In addition, regularly updating and revising the set of evaluation criteria partly contribute to improving the representativeness and objectivity of the VNSI, providing an effective reference tool for investors looking for sustainable and green investment.

4. MAJOR CHALLENGES IN FINANCING RENEWABLE ENERGY IN VIET NAM

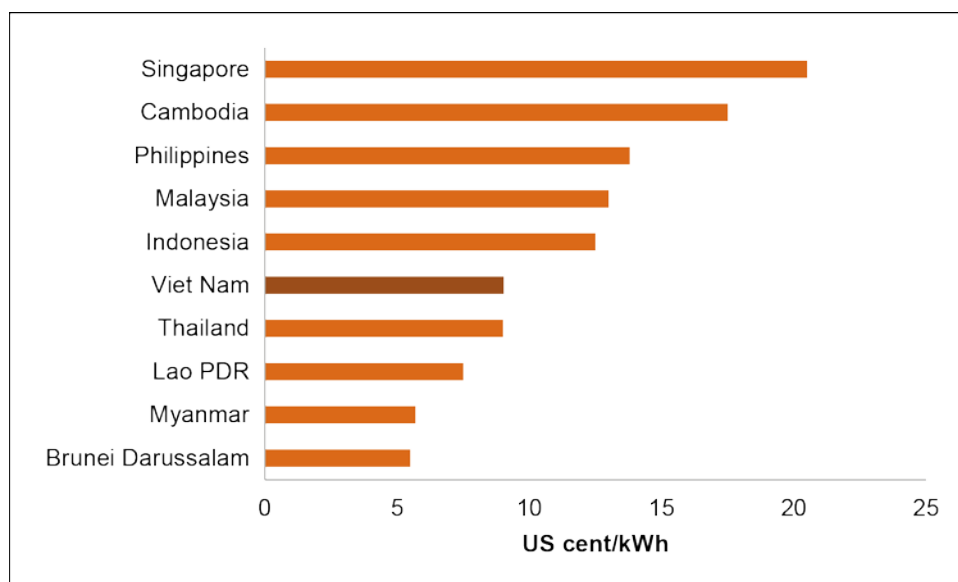
4.1 Inappropriate Energy Pricing Policy

The electricity price in Viet Nam has been highly regulated for a long time. The domestic coal prices are well below the world market prices. There are price ceilings in the refined petroleum markets, as well as the application of various taxes and tax waivers.

It might be irrelevant to compare the electricity tariff among different countries due to difficulties in calculating the average for each country, which varies according to the customer type, volume of electricity used, high demand time of day, and so on. Nevertheless, not many countries possess such a low average electricity tariff as Viet Nam. Figure 10 shows a comparison of the electricity prices within the ASEAN region; it is apparent that Viet Nam has one of the lowest electricity prices, only higher than those of Myanmar, the Lao PDR, and Brunei Darussalam, and it has almost the same tariff as Thailand.

The fossil fuel subsidies through the electricity price control place pressure on the state budget, which has been experiencing a long-term deficit and has insufficient funds to invest in other development projects. The subsidies fluctuated between \$1.2 billion and \$4.49 billion per year for the period 2007–2012, based on the price gap approach, with the largest component being spent on electricity. After 2012, the total amount of subsidies for energy and electricity gradually decreased and stood at 1.8, 1, 0.2, and 0.1 (\$ billion) in 2013, 2014, 2015, and 2016, respectively (GIZ 2016).

Figure 10: Average Power Tariff among the ASEAN Countries (2014)



Source: GIZ (2016).

In the revised PDP 7, with the application of FITs for multiple types of RE projects, the forecasted subsidies for power generation in Viet Nam are still significantly increasing in volume, as Table 4 illustrates.

Table 4: Forecasted Subsidies for Power Generation

	RE Type	2020	2025	2030	2035
Power generation	Solar	3.88	7.62	18.86	24.77
	Wind	4.31	7.97	17.55	55.45
	Biomass	1.67	5.59	15.67	30.54
Forecasted subsidies* – billion \$	Solar	0.16	0.31	0.77	1.01
	Wind	0.11	0.20	0.44	1.39
	Biomass	0.01	0.03	0.08	0.16
	Total	0.28	0.54	1.29	2.56

Note: (*) A gap between the FIT and the average electricity price that EVN set at the end of 2016.

Source: Government of Viet Nam (2016b).

In addition to the increase in budget spending, the artificially low price of electricity is arguably a weak factor in liberalizing and opening the domestic market and one of the most concerning issues that prevents investment from the private sector. Numerous investors have expressed concerns relating to the bankability of RE projects, as the low energy price does not ensure projects’ proper rate of return when the electricity tariff may not compensate for the production cost.

Besides the electrification of rural and mountainous areas through the low electricity tariff, the Viet Nam government believes that there is a way to increase the economy’s competitiveness in attracting investment, especially FDI. However, Garg, Bridle, and Clarke’s (2015) study reported an important finding that Viet Nam’s ability to attract FDI is not based on low energy prices as an input for manufacturing. Their survey results showed that firms do not typically invest in Viet Nam to utilize low energy prices.

Instead, foreign firms highly concern about the sufficiency of the power supply and the electricity supply's sustainability. The survey also questioned the respondents to determine the annual level of nominal power price appreciation over the medium term that would lead them to reconsider future investments in Viet Nam. Of the respondents, 54% reported that they would be willing to bear annual power price rises of more than 15%; meanwhile, 67% were willing to pay for sustained price rises of more than 10%. Those findings should be a referenced source for the government in reconsidering energy pricing to make it more attractive to private investors.

4.2 Non-preferential Feed-In Tariff

While some RE technologies are already cost-competitive, almost all RE projects find it difficult to rival the subsidized conventional energy power generation. In fact, the government does not consider the negative externalities in traditional energy generation, leading to artificially low electricity prices that do not reflect the true cost of manufacturing.

The feed-in tariffs that the Viet Nam government offers to remedy this situation, however, are arguably not sufficient to ensure RE projects' bankability; the standard electricity tariff is still lower than the manufacturing cost in conventional energy projects, and the cost is much higher in RE projects. For example, in 2011, the weighted average retail electricity price in the country was only US 6 cents/kWh, while the long-run marginal cost was US 9.5 cents/kWh (Nguyen 2012).

4.3 Undeveloped Financial System That Is Inefficient in Funding Long-Term Loans and Applying Innovative Financial Devices

Viet Nam's financial market is immature, with a small market size and undiversified financial instrument types. The domestic stock market is small in scale and weak in structure, with a lack of diversity in market commodities. In addition, it has an immature bond market structure, in which the government bond segment holds the majority market share. In 2014, the government issued bonds up to VND 248.024 trillion, which is equivalent to 6.24% of the GDP, whilst corporate bonds accounted for only VND 22.922 trillion, which equals less than 1% of the GDP. Furthermore, it is difficult to issue long-term bonds, since the market prefers short-maturity ones. In 2017, the bonds with over a 10-year period only comprised 22% of the total outstanding value of bonds issued. Because of the small size of the capital market, financing for businesses is heavily reliant on bank credit capital (Banking Strategy Institute 2015).

However, funding via Viet Nam's banking system is also challenging due to the common view among domestic banks that RE projects are a risky and strange business. Although, Vietnamese banks have been more interested in their green lending portfolio to date, the most significant obstacle that banks face is their inadequate capacity for processing green credit appraisals, including the risk assessment and evaluation of new technologies. Green energy lending deals therefore have often only been successful with the involvement of international financial institutes, such as ADB or the World Bank, or donors, such as development organizations.

The expectation for new and innovative financial vehicles, such as green bonds, is that they will provide an additional financial channel for renewable energy financing. However, the not fully developed financial market in Viet Nam seems not to be ready with those types of instruments yet.

Venture capital is another source of financing for RE deployment. Project finance or the stock market should target large-scale RE deployment, including wind power or utility scale solar power. Bank funding often focuses on enterprises or business models employing RE technology. Venture capital investors are interested in start-ups in RE transportation, energy storage, and other subsectors in the value chain or supporting industries (Ghosh and Nanda 2010). Notwithstanding the greater development that it has experienced in recent years, Viet Nam's venture capital is still an infant sector with a lack of participating angel domestic and foreign investors or private equity funds; the lack of supportive regulations from the government also constitutes a key barrier that prevents Viet Nam's venture capital from thriving compared with that of other nations in the region.

4.4 EVN's Creditworthiness Concern

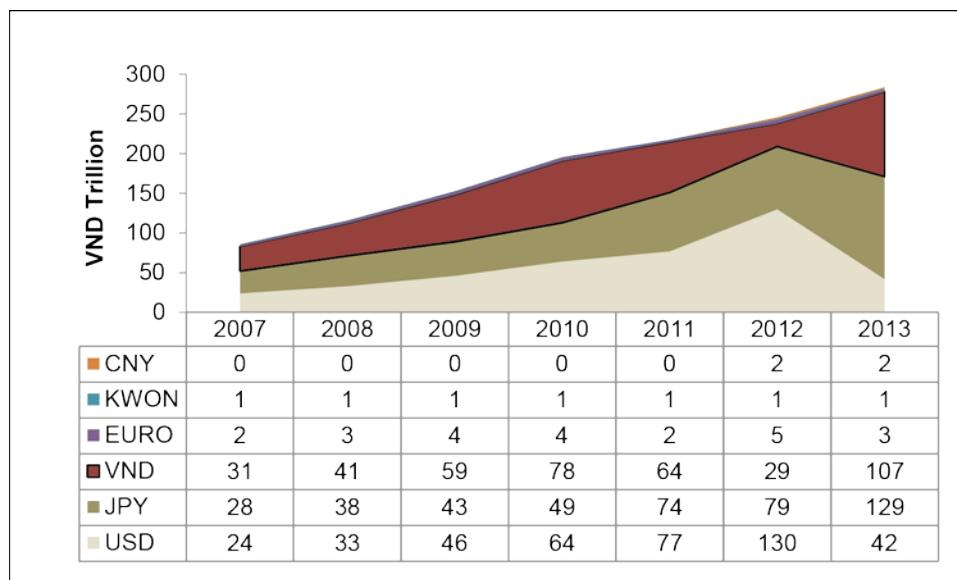
EVN is a giant state-owned enterprise among three SOEs in the energy sector. It possesses a robust market share of the energy market and accounts for over 60% of the country's total electricity generation (World Bank 2016). In the revised PDP 7, the government regulated EVN as a major buyer and made it responsible for consuming electricity generated from all RE projects in the country.

However, the financial health status of this SOE raises significant concern for RE developers, especially foreign ones. The fact that the energy price is highly controlled to be lower than the manufacturing costs means that it is highly likely that EVN will make losses. In 2010 and 2011, it reported more than VND 10,000 billion of losses, which was equal to \$500 million at that time, and the value of debt accounted for 85% of the total assets (World Bank 2016). Although there has been a noticeable improvement in EVN's financial performance since 2012, when it became profitable, and Fitch recently ranked it BB for credit rating, equaling the sovereign rating of Viet Nam (FitchRatings 2018), EVN's creditworthiness is still an issue.

According to the Fitch rating agency, the drivers of EVN with the best rating mainly derive from its status as a "super" state-owned enterprise, receiving strong support from the government (FitchRatings 2018). Although the expectation is that the government's direct support and subsidies will reduce over time, the incentive for the government to support EVN is apparent to increase its profitability, because, to date, the guaranteed loan for EVN accounts for 37% of the total value of loans that the Viet Nam Government guarantees (VietnamFinance 2017). However, with the process of SOEs' restructuring and equitization, the tight linkage between EVN and the government is questionable in the future.

Moreover, EVN's financial performance is highly vulnerable, as it is seriously exposed to the exchange rate fluctuation, which mainly caused losses in 2011 and 2012 (World Bank 2016). Figure 11 shows the component of EVN's total debt by currency; the percentage of foreign currency-denominated debt consistently comprised over 60% of the total debt over the period 2007–2013 and increased to over 70% in 2017 (World Bank 2016). If the adverse movement of the VND against the USD and JPY happens with the limitation of domestic market vehicles for hedging exchange rate risk such as derivatives, EVN will face a challenge in sustaining its profitability.

Figure 11: Components of EVN's Debt by Currency

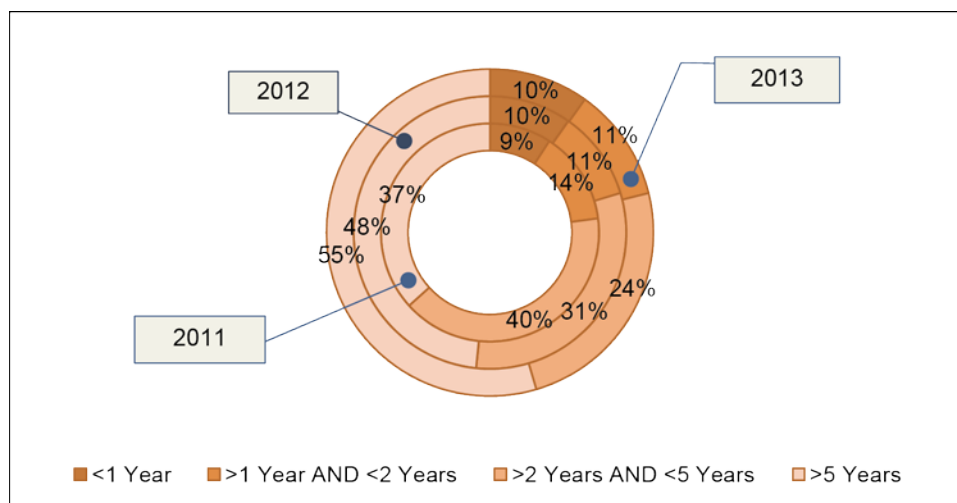


Source: World Bank (2016).

From 2014 to 2020, EVN demanded investment of \$53 million to deal with an increase in the energy need, address the shortage of existing power plants, and provide finance for new power generation, transmission, and distribution, including nuclear and renewable energy projects (World Bank 2016). With its ambitious and unprecedented plan for capital expenditure, EVN faces huge pressure in finding long-term funding. At the same time, EVN's debt structure is unhealthy, since half of it consists of short-term loans with maturity of less than 5 years (Figure 11); meanwhile, the assets that EVN has acquired have long lives of up to 25 years. Thus, there is a mismatch between the assets and the liabilities of the enterprise.

Under the uncertainty of securing its profitability in future, the worry of investors in EVN is reasonable regarding how it can create profits in the future and fulfill its responsibility through payment in full and on time once their RE projects take place.

Figure 12: Component of EVN'S Debt by Maturity in 2011, 2012, and 2013



Source: World Bank (2016).

5. CONCLUSION AND POLICY RECOMMENDATIONS

To achieve the green growth strategy to which the Viet Nam government has committed, the development of renewable energy is a stepping stone. Allowing the integration of RE into the energy system is beneficial for ensuring national energy security in response to the increasing dependence on energy imports. Furthermore, the severe impacts of climate change and local environmental pollution, which are partly due to the exploitation of fossil fuel, require the deployment of alternative sources, especially when Viet Nam is a potentially RE-rich country, particularly in wind power, solar power, and biomass.

Viet Nam is lagging far behind several neighboring countries in investing in non-hydro renewable energy. To be able to meet the annual growth in the energy demand of 13%, Viet Nam needs huge investments for the green energy sector. However, due to the limitation of the state budget and low-creditworthiness energy SOEs, estimations indicate that 50% of the total investment for RE development must come from the private sector. To attract private investment, the government has offered investment incentives such as a FIT and a preferential tax rate and fees. However, those financial incentives are unattractive; combined with the low electricity tariff based on subsidies, they question the bankability of RE projects, which require huge initial investment and are vulnerable to political and environmental changes. Underdeveloped domestic financial systems with a poor finance infrastructure and limited financial channels for attracting long-term loans are another issue. Considering those barriers to financing RE projects in Viet Nam, the authors' major recommendations are presented below.

5.1 Revise the Energy Price Policy to Result in a More Reasonable Energy Price and Feed-In Tariff

Adopting the market mechanism for electricity price determination and privatization of the power generation and transmission similar to the most recent experience in many countries, such as Japan, and the earlier experience of France would make the power market more interesting for the private investors in the RE sector as well as sustaining the profitability of EVN.

The artificially low electricity price in the domestic market is one of the most unattractive criteria for the participation of the private sector in the RE industry in Viet Nam. The government should revise the energy pricing to make it more reasonable and offer a greater chance for bankable renewable projects; if implemented in terms of removing fossil fuel subsidies, there are debates in the country regarding whether increasing the energy price, particularly electricity, will lead to a negative impact on remote areas and vulnerable businesses, such as SMEs. According to the research that Neefjes and Dang (2017) conducted, the advantage of cutting subsidies outweighs the disadvantage in Viet Nam due to the fact that the GDP in general will increase with better energy efficiency and this in turn will contribute more to social welfare, having a long-term positive impact. Furthermore, low-income households may suffer from the energy price increase but at the same time may enjoy additional revenue if RE projects are located in their area. With regard to SMEs, which people believe to be the most vulnerable and energy inefficient, a higher electricity price could provide motivation for energy efficiency application, and the gain will be achieved in the long term.

The Government of Viet Nam should have a stronger commitment to creating market-oriented pricing that would reduce the demand for coal compared with cleaner-burning natural gas and other alternative energy sources. Nguyen (2012), in his research, also

affirmed that the benefit of restructuring the energy price system will exceed the cost by a wide margin for Viet Nam, since it will provide an opportunity for increasing the social welfare system instead of energy subsidy spending.

According to the World Bank (2016), to ensure financial sustainability for EVN as well as creating an attractive energy price to attract investment, the energy price should increase by around 10% per year rather than reflecting the inflation rate with an annual average of below 5%. In the medium term, reforming Viet Nam's electricity pricing and cutting subsidies for fossil fuel technologies will enable more investment in RE technology and allow them to compete equally.

To ensure an adequate FIT to encourage investment from the private sector, the government should revise the FITs for renewable energy generation projects. In terms of wind power, Cuong and Dersch (2014) stated that, with the forecasted wind-generated electricity share in the total national energy generation at 0.7% and 2.4% in 2020 and 2030, respectively, the FIT should increase to \$0.104 for onshore and \$0.112 for near shore. If the government adopts this new FIT, it should trigger fully fledged development of the domestic wind industry. For solar power, the proposal for the should-be FIT is 15 US cents/kWh.

5.2 Increase the Creditworthiness of EVN

It is notable that a pricing reform cannot work without a reform of wide-ranging aspects such as reducing and gradually phasing out government subsidies and restructuring energy SOEs, which require remarkable dedication and commitment from the government. Achieving healthy and profitable business for EVN is also a way to increase the trust of private investors in RE development in Viet Nam.

Meanwhile, increasing the creditworthiness of EVN in particular and SOEs in general is a broad issue that involves a wide variety of policy implications. However, the major aforementioned threats to EVN's financial stability are the mismatch between debt and assets and the high risk of exchange rate loss. Therefore, with the purpose of sustaining profitability, reconstructing the debt portfolio with a proper ratio between short-term and long-term loans is essential. In addition, risk management in terms of the foreign exchange rate risk is crucial in the case that foreign currency-denominated debt remains a major part of the total value of debt.

5.3 Implement Fiscal Policy Reform Discouraging CO₂-Intensive Sectors and Facilitating the Deployment of RE Technology

Finding a financial source for funding renewable energy projects with a limited budget, especially in developing countries, where the state budget is constrained, is still a fundamental problem. One of the major solutions is to design a carbon tax system in which the taxes collected will refinance green energy technologies.

Yoshino and Taghizadeh-Hesary (2018) argued in their paper that, due to electricity, especially renewable energy, being public goods, to maximize its potential, investing in infrastructure projects is governments' responsibility. Otherwise, the investment incentives need to be adequate to lure private investment. One of the best practices to provide better incentives for investors is to utilize the spillover effect from the carbon tax to reallocate funds to renewable energy projects that the private sector will finance. This fiscal policy via the tax regime will be beneficial for discouraging CO₂ emissions as well as creating a funding source for renewable energy projects in the country.

For Viet Nam, as indicated in the revised PDP 7, the subsidies for fossil fuel will exceed \$540 million in 2025 and \$2.56 billion in 2030. Thus, it is important to ensure an adequate financial source based on the revenue from taxes/fees derived from fossil fuel consumption and generation to compensate for the spending. For instance, the government could consider imposing a carbon tax of \$5/ton on fossil fuels such as coal, oil products, and natural gas based on their consumption levels to create revenue for the Renewable Energy Development Fund to invest back in RE projects.

5.4 Develop a Wide Range of Financial Vehicles to Facilitate Long-Term Finance and Risk Mitigation

Cuong and Dersch (2014) showed that the availability of debt funding is the key to unlocking RE investment. They believed that, even if the FIT is amended by a sufficient value, the lack of adequate long-term-maturity funding with an interest rate below 6% still does not ensure bankable RE wind power-generated projects, which require an IRR of 10%. Since 2014, the domestic interest rate for long-maturity loans in the banking system has fluctuated around 6%–6.5%, which is affordable for RE financing; however, historically, the interest rate for long-term maturity loans has climbed to over 9% (in 2013 and 2014), so maintaining a healthy monetary system to ensure stable and predictable interest rates is crucial for attracting RE in the future.

The World Bank (2016) indicated that the failure to obtain a proper debt structure for EVN is a result of the inadequacy of Viet Nam's capital market rather than the enterprise's competence. Viet Nam's financial market is currently underdeveloped and lacks sufficient financial infrastructure. Thus, despite the preparation of financial instruments to finance green energy projects, such as green bonds, so far these vehicles are not operational. To attract more private sector involvement in green energy development, it is necessary to enhance the functions of the domestic financial market, especially through a number of key areas: developing the domestic bond market as a basis for the development of the green bond market for clean energy projects; building and developing investment funds and the venture capital market for seed capital for starting up RE development; enhancing the effectiveness of the implementation of a credit guarantee scheme to provide more concessional loans and increase access to finance for RE projects as well as green SMEs; building up credit rating agencies with a high capacity to conduct credit appraisal of energy projects; and strengthening the capacity of financial and banking institutions to fund RE energy projects via effective and efficient lending appraisal.

In addition to relying on the banking system for long-term financing, introducing pension funds for bringing in 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), and due to banks' limitation 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 provide an alternative, as they hold long-term money (20 years, 30 years, and 40 years) that is appropriate for long-term lending to the RE sector. On the other hand, Viet Nam does not have a pension fund system; due to the aging population that the country will face in the future, the development of a strong pension fund system will secure future social security payments and at the same time provide long-term financing for those sectors that are seeking it, such as the RE sector, along with a high return.

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