



TRANSFER OF RENEWABLE ENERGY IN THE STRUCTURE OF THE ELECTRICITY SECTOR AND POLICIES TO PROMOTE THE DEVELOPMENT OF RENEWABLE ENERGY IN VIETNAM

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Abstract

The paper aims to learn about renewable energy in the structure of the electricity industry in the world and in Vietnam. The transfer of structure in recent years and the position of renewable energy in the revised power master plan VII and orientation in the power master plan VIII will be submitted to the Government. The paper also provides comments on the potential and challenges of renewable energy development, mechanisms and policies of the Government to promote renewable energy development in Vietnam.

Keywords: Renewable energy, power master plan VII, power master plan VIII

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1. Overview

Nowadays, the electric industry in the world is mainly based on thermoelectric and hydroelectric technologies. The electric industry has brought the civilization of electricity to the humans but has also revealed its reverse side to the environment. With the burning of fossil fuels (coal, oil and gas), the energy industry has become the largest source of greenhouse gas emission which causes climate change [1].

History has proven that nuclear power technology is not safe and poses enormous dangers to human. Radiological hazards can be seen as Chernobyl (1986), Fukushima (2010) and they have long-term harm to the environment. Therefore, in 21st Century with global sustainable development strategies, especially the period of "green economy" and "green energy" development, it can be seen with new technologies for producing electricity from "cleaner" fuels, including the generation of electricity from renewable energy sources which are endless in nature or always arising with human life. These are technologies that generate electricity from the available renewable energy sources such as solar, wind, small hydroelectricity, biomass, ocean waves, tides, geothermal and marine heat,... [1].

Developed countries have pioneered the development of technology to exploit electricity from renewable energy. The European Union in 2014 pledged that by 2020, the amount of electricity produced from renewable energy will account for 20% of the total amount consumed by countries of the Union. According to a report of the United Nations Environment Program, global investment in renewable energy in 2014 amounted to USD 270 billion, an increase of 17% compared to 2013. Corresponding to this investment, the power capacity from renewable energy sources increased from 86GW in 2013 to 103GW in 2014 [2].

Energy demand of Vietnam is increasing meanwhile the ability to provide domestic energy sources is limited. We currently has to import coal and gas for thermal power. In this context, Decision No. 1208 was approved by the Prime Minister on the power master plan for the period of 2011 - 2020, with the vision to 2030 (power master plan VII) and Decision No. 428/ QD-TTg on approval of the adjustment of the national power development plan for the period of 2011 - 2020, with a vision to 2030, are the legal bases for renewable energy development [2, 4].

Although it is assessed that the country has abundant renewable energy resources, the application of renewable energy technology is still at a very early stage and still has many limitations in Vietnam. According to the "National energy development strategy of Vietnam until

2020, with a vision to 2050", approved by the Prime Minister in 2007, the goal of new and renewable energy sources remains at a modest level (reaching about 5% of the total primary commercial energy by 2010 and 11% by 2050). Meanwhile, demand for energy has been rapidly increasing in Vietnam [3].

2. Subjects and methods of the study

2.1. Subjects of the study

Types of renewable energy and its structure in the electric industry of Vietnam and in the world

2.2. Research methods

- Method of collecting and reviewing documents

Collect and review documents from the governmental portal, Vietnam Electricity (EVN), web portal of the World Bank, documents of the electric industry in years, etc.

- Method of Data processing

Summarize the data collected from various sources then conduct analysis, comparison and evaluation.

- Process data using excel.

3. Results and discussions

3.1. Renewable energy structure of electric industry in the world

The structure of the electric industry in the world has shifted towards the trend of decreasing thermal power from oil from 4.2% in 2013 to 4% in 2017, reducing thermal power from coal from 39.9% in 2013 to 38% in 2017.

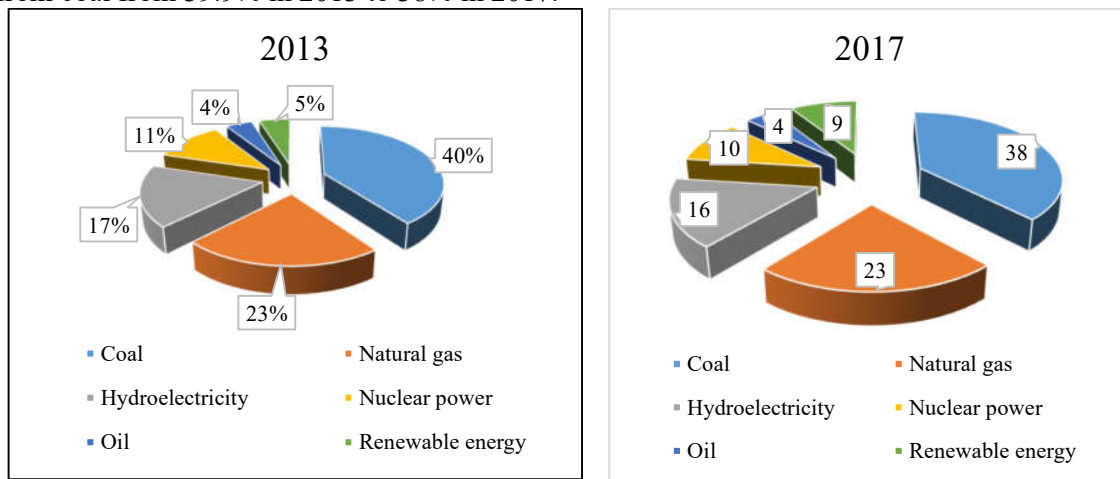


Figure 1: Structure of electricity production by energy source in 2013 and 2017 in the world

Thermal power from gas increased from 22.6% in 2013 to 23% in 2017. Especially, power from renewable energy increased from 4.9% in 2013 to over 10% in 2018. However, it still accounts for a small part in the structure of electric industry

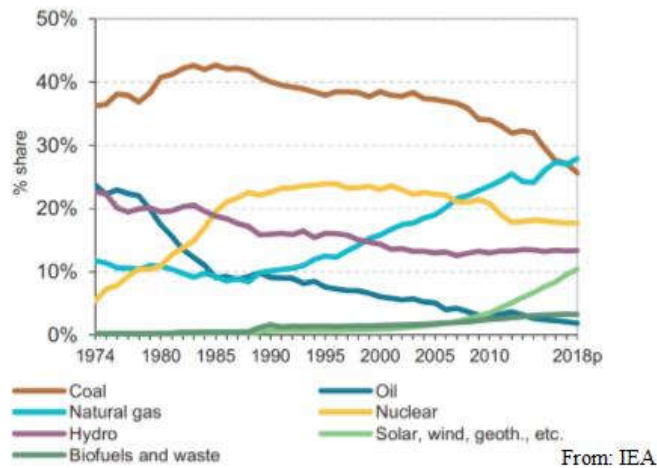


Figure 2: Restructuring of electric industry over the years from 1974 - 2018 of OECD countries

Around the world, from 1980 to 2004, nearly 100% of the electricity of the world was produced using three main types of energy: fossil fuels accounting for 67 - 70%, hydroelectricity accounting for 22 - 25% and nuclear energy accounting for 7 - 10% of total power capacity.

From 2005 to now, the structure of the electric industry has begun to change dramatically as people gradually apply new types of technology which allow the exploitation of renewable energy sources to generate electricity more widely and effectively. Wind power, solar power, biomass power and geothermal power have gradually contributed to the structure of power sources.

3.2. Renewable energy structure in the electricity sector in Vietnam

According to the reports of the electric industry, the structure of the electric industry of Vietnam through the years is presented in Figure 3.

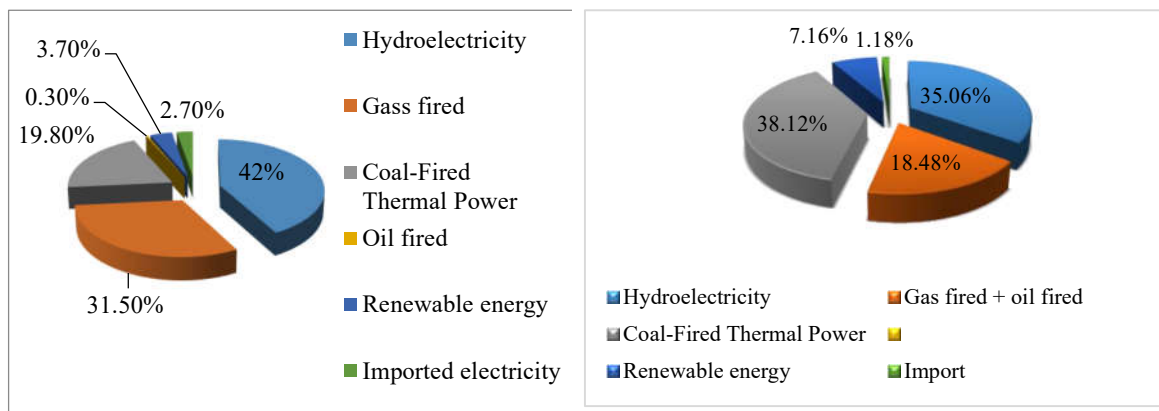


Figure 3: Structure of electric industry of Vietnam in 2013 and 2018

Renewable energy in the expected electric source structure in 2020, 2025 and 2030 in the adjusted power master plan VII is shown in Fig. 4.

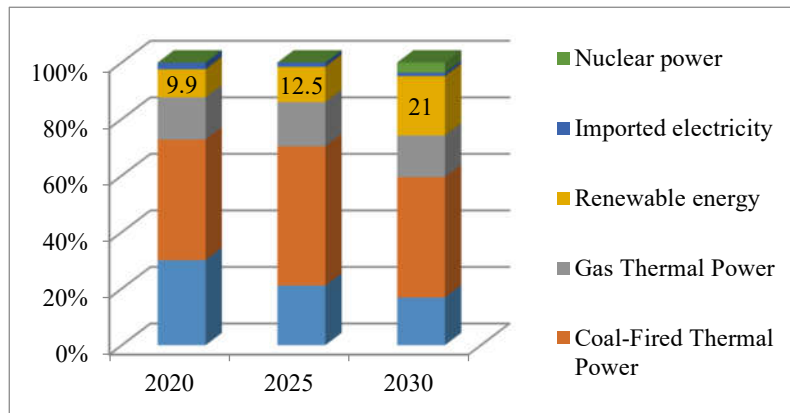


Figure 4: Renewable energy in the expected electric source structure in 2020, 2025 and 2030

According to Decision 2068/ QD-TTg "Decision on approving Vietnam renewable energy development strategy till 2030, with a vision to 2050", renewable energy development strategy is presented in Figure 4. From the electric source structure, it can be seen that renewable energy is oriented to develop rapidly over the years.

3.3. Policies to promote renewable energy in Vietnam

Currently, the Government has issued many policies to encourage and support the development of renewable energy, including supporting people at 15% of cost when installing solar cells, supporting the development of biomass energy, wind energy, etc.

Power master plan VII is a national electricity plan for the period of 2011 - 2020 with a vision to 2030, which was approved by the Prime Minister in Decision No. 1208/QD-TTg dated July 21, 2011.

The plan on adjustment of the Power master plan VII No. 428/QD-TTg which was approved by the Prime Minister. With the goal of providing electricity for socio-economic development with an average GDP growth of about 7.0% / year in the period of 2016 - 2030

Decision No. 1264/QD-TTg on approving the assignment of national electricity development plan for the period of 2021 - 2030, with a vision to 2045 (the project on preparation of power master plan VIII).

Decision No. 2068/QD-TTg on approving Vietnam renewable energy development strategy till 2030, with a vision to 2050.

Decision No. 39/2018/QD-TTg dated September 10, 2018 on amending and supplementing articles of Decision No. 37/2011/QD-TTg dated June 29, 2011 on the mechanism to support the development of wind power projects in Vietnam.

Decision No. 08/2020/QD-TTg dated March 5, 2020 on amending and supplementing articles of Decision No. 24/2014/QD-TTg dated March 24, 2014 of the Prime Minister on the mechanism to support the development of biomass power projects in Vietnam.

Decision No. 13/2020/QD-TTg dated April 6, 2020 on mechanism to promote solar power in Vietnam.

Currently, the government also has many policies to encourage and support the development of renewable energy, including: supporting people 15% of the amount when installing solar cells, supporting the development of biomass energy, wind energy, etc.

3.4. Solutions to promote renewable energy in Vietnam

The first is the quota mechanism (norms): The Government requires the producing units (or consuming units) to ensure a certain amount of produced/ consumed electricity from renewable energy sources, otherwise, they will be fined according to the norms by the rate. The advantage of this mechanism is to create a competitive market among renewable energy technologies, thereby reducing the cost of producing renewable energy. This mechanism helps the Government to set quotas in order to achieve the goals for renewable energy, and the price will be decided by the competitive market. The penalty is calculated and set as the ceiling limit for the total cost affecting

consumers. The disadvantage of this mechanism is that the production unit will bear risks and costs beyond its control. Moreover, this mechanism will prioritize the development of lowest cost technologies, so it will not promote the development of less competitive technologies.

The second is the fixed price mechanism: The Government sets the price for each kWh produced from renewable energy; the price may vary for different renewable energy technologies. Usually, this price is higher than the price of electricity produced from fossil energy sources, so it will encourage and ensure economic benefits for renewable energy. The Government either finances the fixed price mechanism from the State capital or forces the producers and transmitters to buy all electricity produced from renewable energy sources. This mechanism minimizes risks for investors in renewable energy. With fixed prices to be set for different types of renewable energy, the Government can encourage investment in renewable energy technologies that need to be developed with different goals. However, the limitation of this mechanism is that the fixed price for a long time will be difficult to control the profits of investors. Gradual price reduction may be applicable, but it must be clearly stated to minimize risks to investors. If this mechanism is applied, the Government does not know in advance how many renewable energy projects will be invested, the total cost for this mechanism in the short and long term will not be estimated in advance. Another limitation is the increase in the cost of moderation and the arising of technical problems for the power system because managers of electrical grids are forced to receive electricity from renewable energy sources.

The third is the procurement mechanism: The Government will set competitive procurement criteria, which can be specific for each type of renewable energy technology. The list of renewable energy projects will be selected from low to high until they meet the development goals set for each type of renewable energy and will be published. The Government, or an authorized governing body, will then force the power producing units to consume the electric capacity of winning bid projects (with subsidy). The advantage of this mechanism is that competition reduces minimum subsidy. The Government can fully control the number of selected projects, that is, control the cost of losses. In addition, the fixed price for winning projects is also a guarantee for long-term investors. But this mechanism also reveals some disadvantages that when an investor is awarded the project, he may delay project implementation due to many reasons such as waiting for opportunities to reduce investment cost, accepting loss bidding just to get the project out of competition, and then not running a loss project, etc. The Government could introduce sanctions to limit these shortcomings.

The fourth is a certification mechanism: It can be a production certificate, or an investment certificate, and this mechanism is operated under the principle that investment in renewable energy is exempt from production tax for each kWh, or deducted from other investment projects. This mechanism has the advantage of ensuring high stability, especially when it is used in combination with other mechanisms to increase efficiency. However, this stability must be clearly stated in the document on the duration of the certification. Another drawback is that this mechanism is in favor of large, potential units with many investment projects to easily deduct tax on it.

Currently, Vietnam has no mechanism to support the development of renewable energy in general, in addition to the mechanism of specific subsidy for wind power adopted in 2011. In a number of research projects conducted by the Institute of Energy in the past, other mechanisms such as the procurement mechanism or the quota mechanism have also shown their suitability, along with proposing several institutions to promote renewable energy. In addition, to support small and independent (off-grid) renewable energy projects, the above studies also show that "a mechanism of direct credit to consumers" is appropriate in conditions of Vietnam. However, the application of any mechanism should also apply additional sanctions or other support mechanisms to maximize the support for renewable energy development.

4. Conclusion

In order to develop renewable energy of Vietnam in a sustainable and effective way, there should be a consensus on the opinion of renewable energy development. At the same time, the Government should direct ministries, branches and localities to prepare plans on renewable energy

development. Based on the forecast of energy demand and supply capacity of renewable energy sources throughout the country, developing plans on development of renewable energy resources.

In addition, it is necessary to develop the Law on Renewable energy. Currently, our country has the Law on Electricity, the Law on Energy Efficiency and Conservation, so it is necessary to develop the Law on Renewable energy. From the successful experience of foreign countries, the development of Law on Renewable energy will be a key and prerequisite solution for renewable energy development. The Ministry of Science and Technology should be assigned to lead and develop the Law on Renewable energy.

In addition, the work of developing national standards and regulations on renewable energy is necessary; Building key laboratories of renewable energy.

Simultaneously, establishing the Sustainable Energy Development Fund which uses capital from the State budget, revenues from environment fees for fossil fuels, funding sources and contributions of organizations and individuals in the country or from foreign countries and other lawful capital sources to finance the promotion of renewable energy nationwide. This fund can be used to support the community in developing renewable energy using models, piloting and eventually replicating models of green houses, green buildings, green urban centers and green rural areas (villages, communes).

On the other hand, enterprises should be encouraged to participate in this market. The State should have a mechanism to support capital for enterprises that produce, assemble and repair equipment such as water heaters, small hydroelectricity, wind engines, biogas digesters, etc. ; Tax of import of equipment, new technology, production, circulation of equipment should be preferential; inventions should be copyrighted and technical improvements in the field of renewable energy should be implemented; List of investment projects should be opened, domestic and foreign economic sectors should be encouraged to invest in the field of renewable energy.

Finally, it is necessary to promote the propaganda and dissemination of knowledge to people about the importance, socio-economic efficiency and environmental protection of the development and use of renewable energy in the sustainable development process, from which there are practical actions contributing to the development and use of this source of energy.

REFERENCES

- [1]. Nguyen Xuan Cu, Luu Duc Hai, Tran Thanh Lam, Tran Van Quy (2009). *Potential and orientation for exploitation of renewable energy in Vietnam*. Labor Publishing House.
- [2]. Decision No. 1208/QĐ-TTg of Prime Minister dated July 21, 2011 *on Approving the National Power Development Plan for the period of 2011 - 2020 with a vision till 2030*.
- [3]. Decision No. 2068/QĐ-TTg of the Prime Minister dated November 25, 2015 *on Approving Vietnam Renewable Energy Development Strategy till 2030, with a vision to 2050*.
- [4]. Decision No. 428/QĐ-TTg of the Prime Minister dated 18 March, 2016 *on Approving the Adjustment of the National Electricity Development Plan for the period of 2011 - 2020 with a vision to 2030*.
- [5]. Vietnam Electricity (2015, 2016, 2017, 2018, 2019). *Reports of electric industry*.
- [6]. <http://www.evn.com.vn>