

## Renewable energy development in Vietnam: Potential, Policy, Solution

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**Abstract:** Many experts say that to develop renewable electricity, Vietnam should create opportunities for private investors instead of allowing EVN to monopolize the entire electricity market as before. Despite the potential for renewable energy (RE), the investment in renewable energy development in Vietnam has not yet met the potential and strengths available. The cause of this situation is mainly the economics of renewable energy sources are not really attractive, along with barriers related to policy mechanism, implementation organization, technology application level has limited implementation of renewable energy projects.

**Keywords:** renewable energy, electricity, technology application.

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### 1. Introduction

Vietnam's wind power potential is enormous as Vietnam has a long coastline. According to the World Bank's wind map, the installed capacity of wind power in Vietnam is about 501 GW (for comparison, the capacity of the Hoa Binh Hydropower Plant, the main power source for the entire North. More than 1 GW). The density of wind power over the total national electricity output depends on how well you define your wind power development goals. However, in order to accurately assess the potential, the market factors need to be taken into account. For example, in Japan, they have very few resources for energy, people pay very high for electricity prices but this is still a very attractive place for investors to invest in electricity projects, because The Japanese government has a mechanism to ensure that investors will never go bankrupt when investing in the sector. The Vietnamese government not only says that we want renewable energy but also set a target of 800 MW by 2020. However, I must say that this is an ambitious goal because now the figure is only 160 MW. To create a market that promotes renewable energy, especially wind energy, is a very complex matter. Germany takes 20 years to reach today. If I were the Government of Vietnam, I would spend time researching what I was doing, determining what I wanted, wanting to follow the model of the country, and how to apply it in Vietnam. Many people think that they can copy the model of Thailand or the Philippines and impose on Vietnam. It will not work, especially as the political context of Vietnam is very different now.

Currently, GIZ is advising the Vietnam Energy Administration / Ministry of Industry and Trade on scenarios that Vietnam can pursue and find the best solution for deployment in Vietnam.



Figure 1. Wind-electricity energy in Vietnam

Renewable energy includes wind, solar, hydropower, geothermal, biomass (wood, rice husk, agricultural byproducts and forestry), biogas, biofuels, and tidal / wave. The use of renewable energy mainly for cooking, hot water supply and electricity supply has been around for a long time. However, the development of renewable energy technologies for generating electricity and fuel in new transport has been implemented in recent times, mainly hydropower, solar, wind, geothermal and biofuel. Improved technology and knowledge of

materials, reduced costs associated with state support policy has contributed to the strong development of renewable energy.

In the world, the main impetus for renewable energy development was the 1973 and 1979-1980 oil crises, followed by environmental factors, energy security, and diversification of energy sources. For Vietnam, the development of renewable energy is essential to ensure energy security, contribute to improving public health, protecting the environment, responding to climate change, creating jobs. To do so, Vietnam will need coordinated, sustainable policies at the national and territorial levels to expand the renewable energy market; Promote and deploy new technology; Provide appropriate opportunities to encourage the use of renewable energy in all key areas of the energy market.

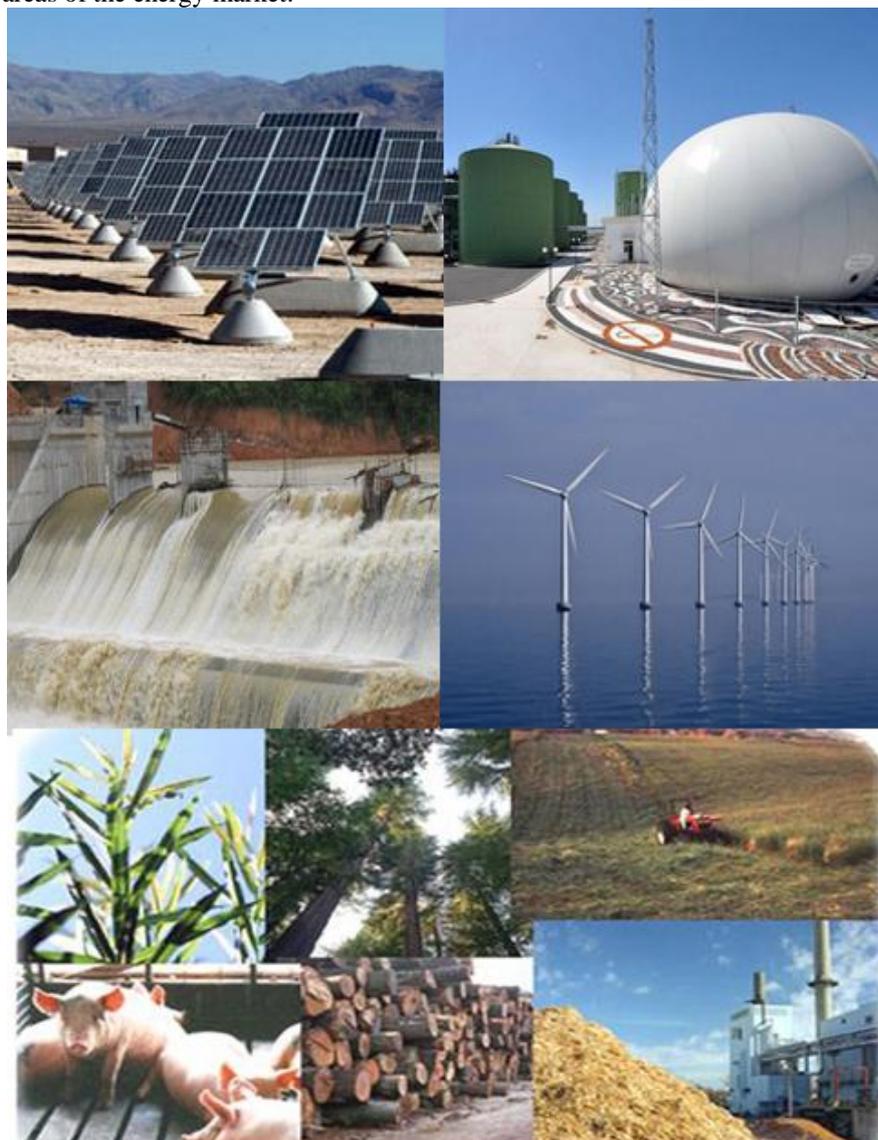


Figure 2. Renewable energy source

Although renewable energy (except hydroelectric) is a small part of the total energy supply in the world and in Vietnam, renewable energy projects in Vietnam have more than doubled from 2000 to 2010, although current electricity prices from renewable energy projects are not attractive to investors. By the end of 2010, renewable energy accounts for about 3.5% of the total installed capacity of the power system. However, according to experts, many small and micro hydro plants are inactive and Biomass power plants operate moderately or seasonally. Excluding small hydropower, the installed capacity of renewable energy is about 790MW in 2010, mainly from biomass, wind and solar. Growth in the biomass sector has dramatically shifted the power structure. The total installed capacity of biomass is 150 MW, and some factories have already sold electricity to the grid and have plans to expand.

## 2. Potential, Policy and Solution

**Small hydropower** is considered to be the most economically viable form of renewable energy in terms of economy and finance. Based on the most recent evaluation reports, over 1,000 sites have been identified that have the potential for small hydropower development, ranging in size from 100kW to 30MW with a total installed capacity of over 7,000MW. This is mainly concentrated in the Northern Mountains, the South Central Coast and the Central Highlands.

**Wind energy** is considered as a potential country for wind power development but current data on wind energy potential in Vietnam has not been sufficiently quantified by lack of survey and measurement. Wind power potential estimates range from 1.800MW to over 9,000MW, even over 100,000MW. According to reports, the wind power potential of Vietnam is most concentrated in the Central Coast, South, Central Highlands and islands.

**Biomass energy:** As an agricultural country, Vietnam has great potential for biomass energy. The main biomass types are: energy wood, waste - crop by-products, livestock waste, municipal waste and other organic wastes. The ability to sustainably exploit biomass for energy production in Vietnam is about 150 million tons per year. Some types of biomass can be technically exploited for power generation or the application of cogeneration technologies (both electrical and thermal): Culvert in the Mekong Delta, Excessive sugar mills, municipal solid waste, livestock wastes from livestock farms, households and other organic wastes from agro-forestry-seafood processing.

**Solar energy:** Vietnam has the potential for solar energy, which can be exploited for: (i) hot water, (ii) electricity generation and (iii) Cooking ... With a total sunshine hours of up to 2,500 hours a year, the average annual radiation volume of about 230-250 kcal / cm<sup>2</sup> towards the south is a good basis for the development of Solar technology.

**Geothermal energy:** Although geothermal resources have not been investigated and well calculated. However, with the most recent survey and evaluation data, the geothermal potential in Vietnam can be exploited to over 300 MW. The area that can be effectively exploited is the Central. At present, the use of renewable energy in Vietnam is mainly biomass energy in raw form for household cooking. In 2010, consumption reached nearly 13 million tons of oil. In addition to the use of biomass for heat demand, there is another amount of renewable energy being exploited for power generation. According to the latest data up to 2010, the total electricity generated from renewable energy sources has reached the national grid of nearly 2,000 million kWh, accounting for about 2% of total electricity output to the grid system.

On November 25, 2015, the Prime Minister approved the Strategy for Renewable Energy Development of Vietnam to 2030, with a vision to 2050 in Decision No. 2068 / QD-TTg. With a view to combining the development of renewable energy development with the realization of economic, social and environmental objectives; Development and use of renewable energy combined with the development of renewable energy industry; Combining the use of short-term technology with long-term technology development; Combining preferential policies, support with market mechanisms and combining restructuring with capacity building for state management in the field of renewable energy, Vietnam's renewable energy development strategy up to five 2030, Vision 2050 (Strategy) sets out nine goals and development orientations in the following phases:

### The period from now to 2030

- + Develop and use independent renewable energy sources to meet rural electrification objectives
- + To invest in the development of grid-connected renewable power plants
- + Develop and use renewable energy sources to provide heat
- + Develop and use biofuels

### Orientations to 2050

To concentrate resources, exploit and use the maximum potential of renewable energy in the country with advanced technologies suitable to the practical conditions of each region and bring about efficiency. High on economic, social and environmental. To strongly develop the market of renewable energy technology, the machinery and equipment industry and the supply of renewable energy services in the country. Strengthen the potential for research, development, transfer and application of new forms of renewable energy. At the same time, the Strategy for development orientation in the fields of hydroelectric power, biomass energy, wind power, solar energy and the development of mechanisms and policies to implement as follows:

- Encourage organizations and individuals with different forms of ownership to participate in the development and use of renewable energy. The State protects the legitimate rights and interests of organizations and individuals Develop and use renewable energy.

- The electricity units are responsible for purchasing all the electricity produced from the use of renewable energy sources connected to the grid managed by their units. The purchase and sale of electricity is

made through the model purchase contract, which is regulated by the Ministry of Industry and Trade. Electricity projects using renewable energy sources for electricity generation are given priority in connection with the national electricity system.

- Organizations and individuals operating in the electricity sector are responsible for contributing to the development of the country's renewable energy sector.

- End-users of electricity are purchasing electricity from the national electricity grid, developing renewable energy sources with the main purpose of securing their electricity needs, Clearing system.

- Projects on the development and use of renewable energy sources are entitled to investment credit preferences under the current law provisions on investment credits and export credits of the State.

- Projects on the development and use of renewable energy sources shall be exempt from import tax for imported goods in order to create fixed assets for the projects; Imported goods are raw materials, supplies and semi-finished products which cannot be produced in the country and are imported to serve the production of the projects in accordance with current regulations on export tax and import tax.

- The exemption and reduction of enterprise income tax on projects on the development and use of renewable energy sources shall be the same as for projects in the domains eligible for investment preferences under the current tax law. .

- Projects on development and use of renewable energy sources shall be exempted or reduced the land use levies and land rents according to the current law applicable to projects in the domains entitled to investment preferences.

- To prioritize researches related to the development and use of renewable energy resources in the fields of scientific and technological development and hi-tech industry development; Funding from funds to support scientific and technological research in pilot projects, industrialization projects for the development and use of renewable energy, and promotion of technological improvements related to The development and use of renewable energy, reduction of production costs of renewable energy products and improvement of product quality. etc ...

The characteristics of renewable energy depend heavily on natural conditions (water, sun, wind, geographic location ...), technology and production costs. Therefore, to promote renewable energy development, Vietnam should have supportive policies such as quota mechanism, fixed price mechanism, bidding mechanism and certification mechanism.

**Quota mechanism (norm allocation):** The government stipulates that production units (or consumers) must ensure that a portion of electricity produced / consumed from renewable energy sources is financed. Norms set out proportional. This mechanism has the advantage of creating a competitive market among renewable energy technologies, thereby reducing the cost of renewable energy production. This mechanism helps the government set quotas only to meet targets set for renewable energy, while prices will be determined by the competitive market. Penalties are calculated and given as ceiling limits for total costs affecting consumers. The downside of this mechanism is that the manufacturing unit will incur significant risks and costs beyond its control. Moreover, this mechanism will prioritize the development of the lowest cost technologies, so that it will not promote the development of less competitive forms of technology.

**Fixed price mechanism:** The government sets the price for each kWh produced from renewable energy, which may vary for different renewable technologies. Normally, this price is higher than the price of electricity produced from fossil-fuel forms, thus encouraging and ensuring economic benefits for renewable energy. The government sponsors fixed price mechanisms from state capital or forces the production and transmission units to buy out electricity from renewable energy sources. This mechanism minimizes risks for investors in renewable energy. With fixed prices set differently for renewable energy forms, the Government can encourage investment in renewable technologies that need to develop with different objectives. However, this mechanism is limited to fixed prices for a long time will be difficult to control the profits of investors. Fixed price reductions can be applied, but must be clearly announced to minimize the risk to investors. Applying this mechanism, the Government can not foresee how many renewable energy projects will be invested, so it is unforeseen that the total cost of this mechanism is both short-term and long-term. Another limitation is the increased costs of regulation and the emergence of technical problems for the grid system as grid managers are forced to adopt renewable energy sources.

**Bidding mechanism:** The Government will set up competitive bidding criteria, which may be specific to each type of RE technology. The list of renewable energy projects will be selected from low to high until the development targets set for each renewable energy type and published. Then the government, or the authorized management agency, will force the electricity generating units to collect output from the winning projects (with subsidized subsidies). The advantage of this mechanism is that competition reduces the minimum cost of compensation. The government can completely control the number of projects selected, which means

that the cost of loss compensation is controlled. In addition, fixing prices for winning projects is also a guarantee for long-term investors. But this mechanism also reveals some disadvantages that when winning the contract, investors may delay the project implementation due to many reasons: waiting for the opportunity to reduce investment costs, accept the bid losses. It only aims to keep the project from competing with other units and will not launch any loss projects. The government can impose penalties to limit these disadvantages.

This mechanism can be either a production certificate or an investment certificate, operating on the principle of allowing entities investing in renewable energy to be exempted from production tax per kWh, or deductible. Into other investment projects. This mechanism has the advantage of ensuring high stability, especially when the mechanism 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 certificate. The restriction is that the mechanism favors large, potential, and investment-friendly units for easy tax deduction.

At present, Vietnam does not have a comprehensive mechanism to support the development of renewable energy, in addition to the specific price support mechanism for wind power passed in 2011. In several research projects conducted by the Institute of Energy in Over time, other mechanisms, such as the bidding mechanism or the quota system, have also been found to be appropriate, along with proposing some institutions to promote renewable energy development. In addition, to support small and off-grid renewable energy projects, these studies also show that a "direct credit scheme for consumers" is appropriate in Vietnam's context. However, the application of any mechanism should apply additional sanctions or other supporting mechanisms to maximize the efficiency of support for renewable energy development.

### 3. Conclusions

The objective of developing Vietnam's wind and solar power sources by 2030 under the VII Power Plan (revised) is clearly much more ambitious than 2020, with a capacity of 6,000 MW of wind power and 12,000 MW of electricity. Solar power. This means that wind power is up nearly 8 times and solar power is up 15 times. This is a goal, but also a great challenge for government regulators, and investors. Therefore, the Government and related ministries should soon study and develop a binding mechanism for investors to produce electricity from fossil fuels.

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