



# International Journal of Research in Finance and Management

P-ISSN: 2617-5754  
E-ISSN: 2617-5762  
IJRFM 2020; 3(1): 26-32  
Received: 13-11-2019  
Accepted: 17-12-2019

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## Green economy as an opportunity for Vietnamese business in renewable energy sector

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### Abstract

Green or green economy development is a new trend in the process of restructuring the economy due to the effects of climate change as well as rising sea levels and the impact of the global economic recession. In December 2011, the climate change conference in South Africa with 194 participating countries agreed to set up a Green Climate Fund and take new steps to reduce greenhouse gas emissions after 2020. Currently, the biggest concern of the world community is climate change, to mitigate and adapt to climate change, countries are making efforts, one of the basic factors to have. by the low-carbon economy or the green economy, besides the green economy, the exhaustion of fuel sources is due to meeting most of human energy needs, so the research and use New renewable energy sources such as wind, solar, geothermal or biomass energy are an essential need. In this paper, author refers to green economy and some key causes to promote the development of renewable energy, opportunities for Vietnamese businesses. Moreover, author also sets out the main reasons that hinder the development and exploitation of renewable energy sources in Vietnam.

**Keywords:** Green economy climate change, renewable energy

### Introduction

#### Green economy

#### Concept of green economy

According to Truong Quang Ngoc - Hoang Van Thang (2014) <sup>[41]</sup>, the United Nations Environment Program (UNEP, 2011) identified a green economy as an economy that brings both human happiness and social justice while reducing environmental risks and ecological crisis. Put simply, green economy is a low carbon economy, saving resources, creating jobs and social justice. Green economy is a model of economic development based on sustainable development and knowledge of ecological economics. The activities in the dormitory create profits or beneficial values, towards the development of the life of the social community. At the same time, these activities are environmentally friendly <sup>[10]</sup>.

According to Trang Tran (2017) <sup>[39]</sup>, a green economy is considered in relation to the older and broader concepts of the term sustainable development including economic, social and environmental aspects, principles of equitable distribution of economic resources <sup>[8]</sup>.

According to Anh Quan (2017) <sup>[32]</sup>, a green economy with development policy is based on the following criteria: market orientation with the foundation of a traditional economy with the goal of harmonizing the economy and the environment. The new driving force of the dormitory is to protect the environment, develop clean production technology and clean energy, and quickly achieve sustainable economic growth. The lessons of green economy development of countries show many approaches to promote green growth, such as how to follow each sector of the economy or interdisciplinary approach across sectors <sup>[1]</sup>.

#### The role of green economy in the world

Green economy contributes to hunger eradication and poverty alleviation. Green economy is a way to reduce poverty and improve the overall quality of life. In a green investment scenario, 2% of global GDP is allocated to "greening" the fields of energy, transportation, construction, waste, agriculture, fisheries, water and forests. The KTX provides energy sources that can support 1.4 billion people currently without electricity and more than 700 million others without access to modern energy services. Renewable energy technologies

such as solar, wind power and energy support policies promise to contribute significantly to improving the lives and health of a segment of low-income people. Especially, for those who currently do not have access to energy. The United Nations Summit on Sustainable Development, Rio + 20 in 2012, unanimously approved an important document entitled "The Future We Want" and decided to spend \$ 323 billion on the initiative of the President. Secretary Ban Ki-moon, entitled "Sustainable Energy for All", aims to ensure that more than 1.3 billion people in poor countries will have access to clean and efficient energy by 2030.

Green economy mitigates climate change: It is estimated that only 1.25% of global GDP is needed to improve the efficiency and development of renewable energy including second generation biofuels; worldwide energy consumption could be reduced by 36% by 2030 and annual CO<sub>2</sub> emissions will be reduced from 30.6 billion tons in 2010 to 20 billion tons in 2050. In addition, thanks to green agriculture, the green economy scenario estimates that greenhouse gas concentrations will be reduced to 450 ppm by 2050, a reasonable and sufficient level to limit global warming at 2 °C.

Green economy maintains and enhances natural capital. According to UNESCO (2011), green investments in forestry and agriculture fields will help reverse the current trend of forest land degradation, the ability to regenerate about 4.5 billion hectares of this important resource over the next 40 years. Investing in green agriculture is both improving productivity and reducing the amount of land used for agriculture and livestock by 6% and improving the quality of agricultural land to 25% by 2050. In addition Investing to increase water supply, expanding access and improving management will provide an additional 10% of global water supply, both immediate and long-term.

Green economy is inevitable trend. Initiatives promoted by the United Nations agencies towards green economy such as: Climate-smart agriculture (launched by FAO), Clean technology investment (WB), jobs Green (ILO), KTX (UNEP), Education for Sustainable Development (UNESCO), Greening the Health Sector (WHO), Green Technology Market (WIPO), Green Information Technology Standards (ITU), Green Energy Solutions (UN WTO), Cleaner Production and Resource Efficiency (UNEP and UNIDO), Cities and Climate Change (UN-HABITAT), Ship Recycling (IMO) are collecting get many nice results. According to UNEP calculations, in 2009, the EU and US communities created 2 - 3.5 million jobs when building green buildings; China creates 10 million jobs in the field of recycling and renewable energy with a turnover of 17 billion USD / year. The World Bank assesses the need for investment in developing green economy infrastructure in construction, energy, and transport in developing countries to US \$ 563 billion by 2030 along with US \$ 100 billion to adapt to the variable climate change. The above data shows that creating green growth is a strategy for sustainable development in the future. United Nations Conference on Sustainable Development, Rio + 20 Conference (June 2012) laid the foundations for the dormitory. All 30 specialized international organizations in the United Nations system, coordinated by UNEP with the leading countries in the global green wave such as Japan, China and Korea, EU countries; especially Germany and Northern European

countries, together came up with the common message that the world community needs to move quickly to global dormitories to save the earth and humanity<sup>[10]</sup>.

### **Development of renewable energy in Vietnam Potential and opportunities for renewable energy**

The Government of Vietnam has issued many policies to encourage the development of renewable energy, set targets for renewable energy and towards a competitive electricity market with diversified investments and business models. The Prime Minister approved Vietnam's National Renewable Energy Development Strategy to 2020 with a vision to 2050<sup>[8]</sup>, the Government encouraged the development and use of new and renewable energy; provide financial support for pilot production research and development of pilot models; Exempt import tax, production and circulation tax. Specifically, the Government has set a target to increase the share of renewable energy in the total of primary commercial energy from 3% in 2010 to 5% in 2020 and 11% in 2050 and increase the market share of electricity produced from sources. Renewable energy such as wind and biomass will account for 3.5% of total electricity production, 6% in 2030<sup>[9]</sup>.

### **Legal framework for wind power development**

In addition to the policies and regulations related to renewable energy development, The Government of Vietnam has issued Decision No. 37 / QD-TTg dated June 29, 2011 on the Mechanism to support the development of wind power projects in Vietnam<sup>[10]</sup>. The decision to set the price of wind power purchased by the Electricity Purchaser is VND 1,614 / kWh (excluding VAT, equivalent to 7.8 US cents / kWh), including a subsidy of VND 207 / kWh (equivalent to 1.0 UScent / kWh) of the Government through Vietnam Environment Protection Fund. The government also sets wind power development targets of about 1,000MW (equivalent to about 0.7% of total electricity capacity) by 2020, and about 6,200MW (about 2.4% of total electricity capacity) by year 2030<sup>[9]</sup>.

### **Legal framework for bioenergy**

The legal framework for biofuel production and trading in Vietnam is almost complete. Biofuels are seen as a key industry and biofuel production projects receive numerous investment incentives. According to Government planners, between 2007 and 2010, Vietnam will complete the Legal Framework to encourage the production and use of biofuels, and design a roadmap for the use of biofuels. Researching on biofuel technology, training human resources for this industry, planning and developing material production areas for biofuel production, building biofuel plants to meet 0.4% of the nation's gasoline demand until 2010 are basically on schedule.

In 2007, a set of standards for biofuel and biofuel was issued. In October 2008, the Ministry of Industry and Trade approved a project to plant trees as raw materials for biofuel production, develop biofuel production technologies, draft master plans and policies to support bio-fuel development. in Vietnam and testing and applying biofuel in Vietnam. In June 2008, MARD approved the research project to develop jatropa in Vietnam. In 2007 and 2008, the Ministry of Finance issued two circulars on budget support for biofuels

development programs. In 2009, the Ministry of Science and Technology issued two sets of national standards for biofuels. From 2011-2015 according to planners, Vietnam began to produce additives and enzymes as well as raw materials for biofuel production and expanded production, diversified development for high productivity, expansion the scale of biofuel plants to meet 1% of national petroleum demand until 2015. From 2016 to 2025, Vietnam will build a modern biofuel industry to produce 100% of the national demand for E5 and B5 gasoline, providing 5% of the fuel demand for all Vietnamese motorbikes.

### **The legal framework for biomass power generation includes**

- Electricity Law 2004 and 2012 require support for power generation from power sources amount of regeneration <sup>[11, 12]</sup>.
- Decision No. 1208 / QD-TTg, dated 21/07/2011, aims to install 2000MW of grid-connected biomass electricity in the period of 2011-2023 <sup>[9]</sup>.
- Decision No. 1855 / QD-TTg sets the target for renewable energy ratio (5% in 2020 and 11% in 2050) <sup>[8]</sup>.
- The Ministry of Industry and Trade has approved the General Scheme of renewable energy development for Vietnam in the period to 2020 and vision to 2030. The Energy Institute has prepared a final report and submitted it to the Government for approval.

### **Challenging difficulties in developing renewable energy in Vietnam**

#### **Regarding mechanisms, policies and organization of implementation**

Vietnam is a country with great potential for renewable energy sources but so far the number of projects implemented is very small, the proportion of renewable electricity in the total amount of electricity produced is negligible, which is due to: Lack of strong and synchronous policies including from investigation, potential exploration to exploitation and use; Lack of effective financial mechanisms for investing, managing and operating renewable electricity projects in remote and off-grid areas; Lack of a centralized focal point, with functions strong enough to operate.

#### **About databases, information**

Due to the particularity of renewable energy being dispersed, depending on the season and weather, data sources are not available. At present, no agency has been assigned to collect, update and statistic as it has done with other forms of commercial energy. At present, a thorough assessment of the potential for renewable energy is highly volatile due to the lack of a reliable database. Therefore, it is necessary to consider and implement this work.

A high priority is needed in the coming period: For biomass energy, surveys on several sources have been made. Many potential locations for biomass power projects have been identified; however, the data on these sites is insufficient and lacks credibility for carrying out detailed feasibility studies. Accurate investigation of biomass prices, their long-term changes and biomass characteristics, especially rice husks, may be necessary. There is a lack of necessary and

reliable data on wind speed for research and development of wind power in different regions of the country. Grid-connected wind power projects have not been installed so far. The long and difficult negotiation for the first wind power system in Binh Dinh proves the lack of specific technical knowledge and prerequisite institutional framework.

According to domestic experts, the current PPA is the biggest obstacle to the development of grid-connected wind power projects. The current price purchased is just under 5 UScent / kWh. It is estimated that if the purchase price is within the above range. 5UScents / kWh can enhance the grid integration of wind power projects. Electricity price issues for off-grid wind power projects are affected to a lesser extent because they are mainly for replacing diesel generators that are already very expensive. However, in the near future, when competing with network expansion, this issue will be a concern that needs to be addressed.

The popularity of other renewable energy technologies such as biogas, solar water heating has had many success stories, but so far very little information has been disseminated fully and not everyone knows about that.

Human resources as well as skills to manage and operate off-grid independent power projects in communes and villages are still very weak. This is the reason that renewable power development projects are inefficient and have low life expectancy.

Information barriers on renewable energy technologies such as tidal and wave power are insufficient. Although these technologies are now close to commercialization, there has been no significant support for investigating these resources and finding places to exploit.

#### **On technology application level**

Currently, there is a lack of commercial enterprises in the country that provide renewable energy equipment and electricity services related to renewable energy. Therefore, most of renewable energy technologies have not been domestically produced and have to be imported. Post-installation services are not available, especially in rural and remote areas.

Small hydroelectricity: For grid-connected power generation plants (capacity > 1MW), this is the capacity with developed technology, Vietnam has many experts in this field (such as design, construction and operation), and there are already industry standards and standards for development. However, the main problem currently exists mainly in off-grid projects. Sometimes it is difficult to distinguish between technical barriers and institutional barriers. Lack of standard training in operation, as well as instructional materials (such as how to avoid sediment accumulation, equipment selection, appropriate technology, etc.) have led to exploitation of ineffective works off-grid. In addition, issues of management and operation models suitable for each community area are also challenges for electrification of the off-grid area based on TBS.

Wind power: Wind power technology is undergoing rapid changes, especially in terms of capacity (10 years ago the standard capacity was 250 kW, nowadays it is popularly from 1 to 2 MW), in addition to including advances in material science. Recently, the increase in the price of wind turbines due to production capacity has not been able to

meet demand, but in the long term, the price of turbines is forecast to decrease. For Vietnam, so far no complete technology has been tested in typical climatic conditions (such as storms, high humidity, atmospheric parameters). In addition, there is a lack of experience in the selection of complete equipment, skills for exploitation, operation and maintenance, including small-scale wind power for off-grid areas (such as island districts where wind-diesel hybrid systems can be implemented at a lower cost than diesel only) and no management model exists and business on successful wind power projects - wind power model on Bach Long Vi island is a typical example.

**Biomass:** For grid-connected power projects, although proven and highly efficient biomass power technologies have been applied in the world, they are still not well known in Vietnam (such as electricity, husk, gasification technologies, methane recovery in landfills and incineration of domestic waste). Currently, no domestic companies provide biomass power technologies. Most technology has to be imported. Consulting and technical services for biomass power technologies are limited, especially after-installation maintenance and repair services.

**Other technologies:** There are also many barriers that are emerging recently, such as biogas, solar cells, tidal power and waves. Improving the performance of solar cells, and developing new materials, requires strong global research and application efforts. But unlike the case of biomass energy application, the application of this technology does not depend on the method of use as well as the type of biomass, so it is difficult to prove that these are priority areas. to fund basic research or manufacturing in Vietnam or not. However, it is necessary to develop specific standards and regulations for the application of solar cells and solar water heaters. According to the experience of most successful solar cell programs in China, Sri Lank quality control, operating standards and equipment certification are an important part of creating solar PV systems. Household stability (this is the same for solar water heating systems, biogas appliances). In most WB-funded solar power programs, the incentive to establish and mount technical standards is provided under the subsidy mechanism, which is: subsidies (usually \$ / Wp of installed capacity) for certificated suppliers and accredited devices only by independent laboratories. Biogas equipment has been developed in recent years due to the following factors: improved biogas production technology, abundant raw materials and great demand from the livestock industry, with funding and funding sources. However, the production of heat and electricity from biogas still faces technological barriers such as appliances (stoves, lamps, generators), mainly manufactured manually or renovated from used equipment. Therefore, the quality and compatibility of devices are not standardized.

#### **Regarding investment, price (Economic and financial)**

A more detailed assessment and assessment of economic barriers to renewable energy development is needed because this term often refers to high renewable energy investment costs. However, taking into account price subsidies and environmental costs, public health then this is not a barrier. If all the costs and benefits of renewable energy are calculated correctly when included in the economic

analysis, the economic benefits of renewable energy power projects could be higher than that of using fuel. High costs may reflect a lack of investment in research. However, the market barriers constitute an economic barrier. In the case of grid-connected renewable energy, Vietnam will form a competitive electricity market, but the competitive electricity market price does not reflect the costs of damaging the environment from fossil-powered power sources, and it may not reflect the true economic costs if the price of fuel in subsidized countries. The failure of renewable energy to enter this market explains the price intervention, as the costs of environmental damage are real costs for Vietnam. If avoided, that is a benefit of renewable energy. The Clean Development Mechanism (CDM) creates a global intervention to partially overcome market barriers in which the price of electricity does not reflect the costs of carbon emissions.

The market for off-grid electricity users is limited due to the low income of people, especially in remote areas, the Northern Uplands and lack of funding or financing for these projects. Creating market demand will create opportunities for development and investment in off-grid renewable electricity.

Financial barriers impede the execution of an economic project due to lack of access to appropriate financial resources, or lack of a sustainable mechanism to provide funding. Renewable energy development in Vietnam is currently constrained by both barriers.

Lack of access to appropriate financial resources is a matter of loan term. The intensity of the investment in renewable energy is so high that the total capital account for the total cost must be much greater than the heat source, which means that developers' capital flows are highly dependent on loan terms. Currently, the typical term is 5-8 years in the commercial banking system, the cash flow to investors in the early years is the smallest, which prolongs the payback period and therefore discourages investors.

The National Energy Development Strategy also points out the lack of financial access for renewable energy so one of the measures for financial and capital mobilization solutions mentioned is the priority of capital allocation and concessional credit from ODA and loans under bilateral agreements for investment in projects such as exploration and renewable energy development.

Inter-ministerial Circular No. 58/2008 / TTLT-BTC-BTN & MT <sup>[13]</sup> sets out specific mechanisms for subsidizing a number of renewable energy projects. While the proposed subsidy regime does not include small hydropower and biomass, it is open to subsidies for wind, solar and tidal projects when their added costs are much higher than the total. Costs are added to the revenue from sales of emission reductions (CERs). The most important feature of this mechanism is that subsidies will be made on the basis of the amount of kWh produced rather than subsidies for initial investment. This is contrary to the general experience of the world providing funding for renewable energy projects in the form of capital financing.

For example, in India, the Central Government will provide initial funding for the project if there is evidence that the project has been in good business for six months. But whether this proposed mechanism makes wind power projects successful or not, it has made them inefficient, the

problem is

- Do not encourage developers to maximize revenue from CER by subsidizing the entire difference between cost + profit and net revenue.
- The regulation does not provide for a ceiling of benefits or does not address the issue of subsidy allocation (which may be expected) if the application for benefits exceeds the fund. And the regulation does not regulate price competition and therefore discourages efficient investment projects with lower costs.
- How to determine "reasonable profits" and "actual production costs" in practice is unknown. EVN's previous experience with small hydropower developers negotiating electricity prices based on the same principles has shown that under the old system, the capital investment cost is higher (and in some schools). If the power output is declared lower than the actual one).
- For the proposed grant to have a value for financing the project, there should be a reserve for the official subsidy contract between the developer and the fund to secure the developers' loans (as the model PPA mentioned above). In order for the contract to be financially viable, it needs a kind of guarantee that the fund can afford and if there is a shortage, it is taken from the State budget.

### **Proposals for the development of renewable energy in Vietnam in the future**

The characteristics of renewable energy are highly dependent on natural conditions (water, sunshine, wind, geographic location), technology and production cost. Therefore, to promote the development of renewable energy, Vietnam needs to have more supporting policies such as quota mechanism, stable price mechanism, bidding mechanism and certification mechanism.

**Quota mechanism (quota norm):** The Government should stipulate that the units producing (or consuming) must ensure a certain amount of electricity produced/ consumed from renewable energy sources, otherwise, be punished according to the set norms according to the rate. 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 only set quotas to meet the set goals for renewable energy, while 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 give priority to the development of lowest cost technologies, so it will not promote the development of less competitive technologies.

**Fixed price mechanism:** The Government sets the price for each kWh produced from renewable energy, and the pricing may vary for different renewable energy technologies. Typically this is higher than the price of electricity produced from fossil fuels, thus encouraging and guaranteeing economic benefits for renewable energy. The Government finances the fixed price mechanism with state capital or forces production and transmission units to buy all electricity from renewable energy sources. This mechanism

minimizes risks for investors in renewable energy. Given the fixed prices 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, this mechanism is limited as 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. Applying this mechanism, the Government cannot know in advance how many renewable energy projects will be invested, so it is not possible to know in advance the total costs for this mechanism in the short and long term. Another constraint is the increased cost of moderation and the creation of technical problems for the electrical system, which is forced by grid managers to receive renewable energy.

**Financial mechanism:** According to experts, to develop renewable energy, it is necessary to have a quota mechanism, a price mechanism, a contract bidding mechanism and a tax credit mechanism to reduce risks for investors. Setting prices for each type of renewable energy will encourage the development of renewable energy technologies for different purposes. In addition, it is necessary to develop support policies with special priority in terms of finance, equipment technology, and international cooperation as well as policies to encourage and support the development of renewable energy for economic sectors. In addition, the development of human resources for the renewable energy industry is also an issue that needs attention from now on.

**Bidding mechanism:** The Government will set competitive bidding criteria, which may be specific to 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 are published. The Government, or an authorized governing body, will then force the power generation units to cover the output from the winning bid projects (with subsidy support). The advantage of this mechanism is that competition reduces costs to minimize costs. The government can fully control the number of projects selected, which means it can 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 winning a bid, investors may delay project implementation due to many reasons: waiting for opportunities to reduce investment costs, accepting loss bidding just to get the project out of competition, and not to run a loss project. The government could introduce sanctions to limit these shortcomings.

**Mechanism of issuing certificates:** With this mechanism, it can be production certificates, or investment certificates, operating on the principle that the units investing in renewable energy are exempt from the 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 and many investment projects to easily deduct taxes on it.

## Conclusion

As of 2018, the development of renewable energy in Vietnam has undergone a process of nearly three decades with many ups and downs. This change depends on the interest of the state and ministries in organizing research, construction, project implementation and financial support for renewable energy development. It is easy to see, only when the development of renewable energy has the interest and direction of the State through a system of policies, a unified program and appropriate funding from the state budget for international technical, technological and financial assistance can then achieve certain results. With less thorough, synchronized attention and spontaneous implementation, the results have been modest. This shows that, up to now, the contribution rate of renewable energy types in the national energy balance can be considered negligible (considering the percentage of renewable electricity in total electricity production).

Despite being a country with quite a diverse and large potential of renewable energy sources, it is essential to exploit the renewable energy sources in Vietnam, which requires a methodical, specific and strong investment at the national level. It must be put in an important position to create prerequisites for planning specific strategies, policies, plans and roadmaps. So far, Vietnam has not had a market for renewable energy. The activities related to this type of technology are still fragmented and not synchronized. The main reason for this situation is Firstly, most renewable energy technologies are often too expensive, operating and maintaining them are relatively complex, while they are often applied to rural and mountainous areas far from the national grid, in It is a large part of the rural population living with very low income and low educational level. In particular, due to the low profitability, the attractiveness of renewable energy projects is much lower than commercial energy projects (national electricity grid, oil products and coal... In some cases types of commercial energy are also subsidized and subsidized by the government) so not only farmers and mountainous areas, but even the state-owned and private economic sectors, are often inattentive and uninterested.

### **Second: The major policy and institutional obstacles outlined below have constrained the promotion of renewable energy technologies in the past**

- Lack of a practical policy and institutional basis to focus on renewable energy development within the framework of the national energy policy in general and the electrification policy based on off-grid scattered renewable energy sources, in particular, to serve the power supply in remote areas, which the national power grid will not reach in the near future.
- Lack of a clear legal basis and regulations as a basis for investigation, exploration, survey, exploitation and use of renewable energy sources in the direction of encouraging them to use and produce energy from sources. This is in rural and mountainous residential communities who benefit directly from renewable energy projects.
- Lack of effective financial mechanisms to enable rural and mountainous households, investors, cooperatives or local governments to receive initial investments in

renewable energy in the form of subsidized credits or appropriate concessional loans, to help them overcome the often large initial costs of developing renewable energy technology applications and deal with the risks in this application process.

**Third:** Lack of mechanisms / organizations in charge of renewable energy strong enough. A number of specialized renewable energy organizational mechanisms with the function of coordination, planning, management and operation of maintenance - repair - manufacturing of accessories for the development of renewable energy and maintenance of operation Stability and quality assurance have not been established during the development of renewable energy for more than two decades. Although the capacity and facilities of our mechanical engineering industry are not weak / insufficient, they have not been mobilized properly in harmonious coordination from research, manufacturing, testing to the market and the user. The lack of an effective management mechanism and the lack of maintenance and maintenance facilities (after installation) have led to the fact that equipment quality declines as quickly as practically proven.

Vietnam is facing the challenge of the risk of energy shortage within the next decade, so there should be timely measures to ensure energy security. In the period 2005 - 2030, Vietnam's energy demand will increase 4 times. Vietnam's electricity will increase by 10% / year by 2025. The Government of Vietnam recognizes the importance of renewable energy and prepares the Long-term Renewable Energy Development Master Plan. In addition, renewable energy development in Vietnam has many benefits such as stimulating rural development and creating employment opportunities, improving rural roads, reducing thermal power, thereby reducing environmental costs from fossil fuel use projects.

In recent years, many other regions are also aiming to use renewable energy and more and more people are seeing the benefits of this. An increase in people's awareness as well as their acceptance will help us overcome obstacles to change, those are political and social. With the aforementioned analysis of renewable energy development and use in Vietnam, only with the reduction of the electricity capacity to be used by locally sustainable renewable energy sources, the demand for energy consumption will be better addressed, the demand for electricity consumption will be significantly reduced, energy efficiency in regions will be higher, contributing to the sustainable and friendly development of Vietnam.

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