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State Management Of Solar Energy: A Case Study In Vietnam

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Abstract : According to Vietnam's National Energy Development Strategy to 2020, vision to 2050, approved by the Prime Minister in 2007 has set the target towards new and renewable energy sources (about 5% of total commercial primary energy by 2020 and 11% by 2050). In recent years, Vietnam has increasingly focused on developing renewable energy to solve environmental problems, and at the same time contribute to diversifying power sources and ensuring energy security. Therefore, developing renewable energy is the right choice, towards sustainable development in the future. Vietnam is facing a high risk of electricity shortage in the period from 2021-2025, especially in 2023, the shortage is forecasted to be about 12 billion kWh. Therefore, it is necessary to develop power sources to meet the electricity demand for economic development and ensure national energy security. Vietnam has great potential for solar energy. In the past two years, there have been many policy documents with incentives , support and encouragement mechanisms to create favorable conditions for development. develop electricity face . Although of course, the play develop very fast, bring count sudden break the attend sentence electricity The recent sun has revealed difficulties, inadequacies and challenges . The main content of the in-depth article enter to hit price real status play develop electricity face heaven, just out the exist in and challenge awake, are from there offer some solutions to gradually remove and create conditions for the sustainable development of Solar energy in Vietnam Male.

Keywords : Renewable energy, Solar energy, Solar energy, Vietnam.

1. Introductory

Vietnam has a huge potential for solar energy , with great technical potential about 1677.5 GW. Solar energy is mostly concentrated in South Central The set, Winter male The set and West Original with the number of sunny days is 300 days/year, the daily radiation intensity is about 5 kWh/m ^{2} . In recent times, although Vietnam has had to mobilize maximum power sources, it is facing the risk of electricity shortage, especially in the period from 2021 to 2025. In particular, it is forecasted that by 2023, the system system there will be a shortfall of about 12 billion kWh. Therefore, it is necessary to develop power projects, including Solar energy, to meet the electricity demand for economic development and ensure national energy security. In order to create favorable conditions for the development of SOLAR ENERGY, in the past two years, many policy documents have been issued. Thanks to that, there are many SOLAR ENERGY projects have been, are and will be built. The development of SOLAR ENERGY projects, on the one hand , makes a great and meaningful contribution to the supply, Cut supply electrical energy to the system system in the context of power sources facing difficulties, contributing to ensuring energy security . On the other hand, the development is very fast , sudden Recent discoveries of Solar energy projects have revealed difficulties and challenges awake.

2. Solar energy development potential in Vietnam

Vietnam with a territory lying in the tropics of the Fruit soil and yes profit position to be one in countries that are in the distribution of the most sunshine of the year on the world solar radiation map . As a result, our country has a relatively high intensity of solar radiation and sunshine hours in regions , especially from the central region onwards.

In Vietnam, the potential exploitation of solar energy in general and Solar energy in particular is still modest. We have not yet taken advantage of the country's available natural conditions such as: Vietnam is one of the countries in the distribution of the most sunshine in the year on the world's solar radiation map. gender. According to research, Vietnam is a country with potential for Solar energy development with the total number of sunny hours per year is 1400-3000 hours, the average total radiation volume is about 230-250 kcal/cm2. However, the exploitation of solar energy sources in Vietnam is not significant at present. Most of the Solar energy projects across the country are on a small scale, only exploiting heat energy from solar energy such as using solar water heaters and other services using small amounts of electricity.

We have not brought into full play the potential and capacity of society to develop Solar energy. In particular, the investment from private enterprises is still very limited in research, application or trade. The growth rate of the Solar energy market is still very slow. The reality shows that there are many barriers related to mechanisms, policies and policy implementation process, leading to the pioneering enterprises investing in Solar energy are really having difficulty because they cannot find the output. consumption for its power products.

Although the State has a few policies to promote the development of Solar energy, these policies are still incomplete and lack synchronous coherence with the policy of developing energy sources - clean power and the policy of social economic development.

Our country still lacks effective incentive mechanisms to develop and produce equipment that can be applied and used Solar energy. Most Solar energy equipment or technologies are imported from abroad, which increases initial investment costs, especially creating difficulties for small and medium enterprises.

While the price of Solar energy in the world has dropped sharply in recent years, the investment cost of Solar energy in Vietnam is still very high and the Government has not yet issued a selling price for electricity using solar energy. This makes it less attractive to many investors.

Besides the lack of investment and development policies, our country also does not have policies to encourage highly qualified human resources to serve the new industry - Solar energy such as: System design engineer. system, construction, installation, repair and maintenance, operation management, etc. The specialized research and training system on solar energy has not been formed yet, leading to specialized human resources operating in the business. There is a serious shortage of Solar energy.

While traditional energy sources such as coal and oil are gradually exhausted, with high prices and unstable supply, many alternative energy sources are of interest to scientists, especially energy sources. Sun.

Accessing to take advantage of this new energy source not only contributes to meeting the energy needs of the society, but also helps to save electricity and reduce environmental pollution.

The geographical position has favored Vietnam with a huge source of renewable energy, especially solar energy. Stretching from latitude 23023' North to 8027' North, Vietnam is located in an area with relatively high solar radiation intensity. In which, the most must be mentioned in Ho Chi Minh City, followed by the Northwest region (Lai Chau, Son La, Lao Cai) and the North Central region (Thanh Hoa, Nghe An, Ha Tinh)...

Solar energy in Vietnam is available all year round, is quite stable and widely distributed across different regions of the country. In particular, the average number of sunny days in the central and southern provinces is about 300 days/year. Solar energy can be harnessed for two uses: generating electricity and providing heat

Solar energy has advantages such as: clean, low fuel and maintenance costs, safe for users... At the same time, developing the solar cell manufacturing industry will contribute to replacing energy sources. fossil fuels, reducing greenhouse gas emissions, protecting the environment. Therefore, this is considered a valuable source of energy, which can replace old forms of energy that are increasingly depleted.

For a long time, many parts of the world have used solar energy as an alternative to traditional resources. In Denmark, in 2000, more than 30% of households used solar panels to heat water. In Brazil, in rugged remote areas like the Amazon, Solar energy has always taken the top spot. Even in Southeast Asia, Solar energy in the Philippines also ensures the daily needs of 400,000 people.

Table 1: Solar radiation data in territories in Vietnam

No	Territory	Solar radiation intensity (kWh/m ^{2} .day)	Number of hours of sunshine in a year (hours/year)
1	northeast	3.3 – 4.1	1600-1750
2	northwest	4.1 – 4.9	1750-1800
3	North Central	4.6 – 5.2	1700-2000
4	South Central and Central Highlands	4.9 – 5.7	2000-2600
5	Southern	4.3 – 4.9	2200-2500
6	National average	4.6	1700-2500

According to research results on solar energy potential , Vietnam has a technical potential of about 1677.5 GW and economic potential ranging from 166 GW to 385.8 GW . Solar energy is distributed relatively evenly in the region Central and domain Male , part in the Northwest province of the region North.

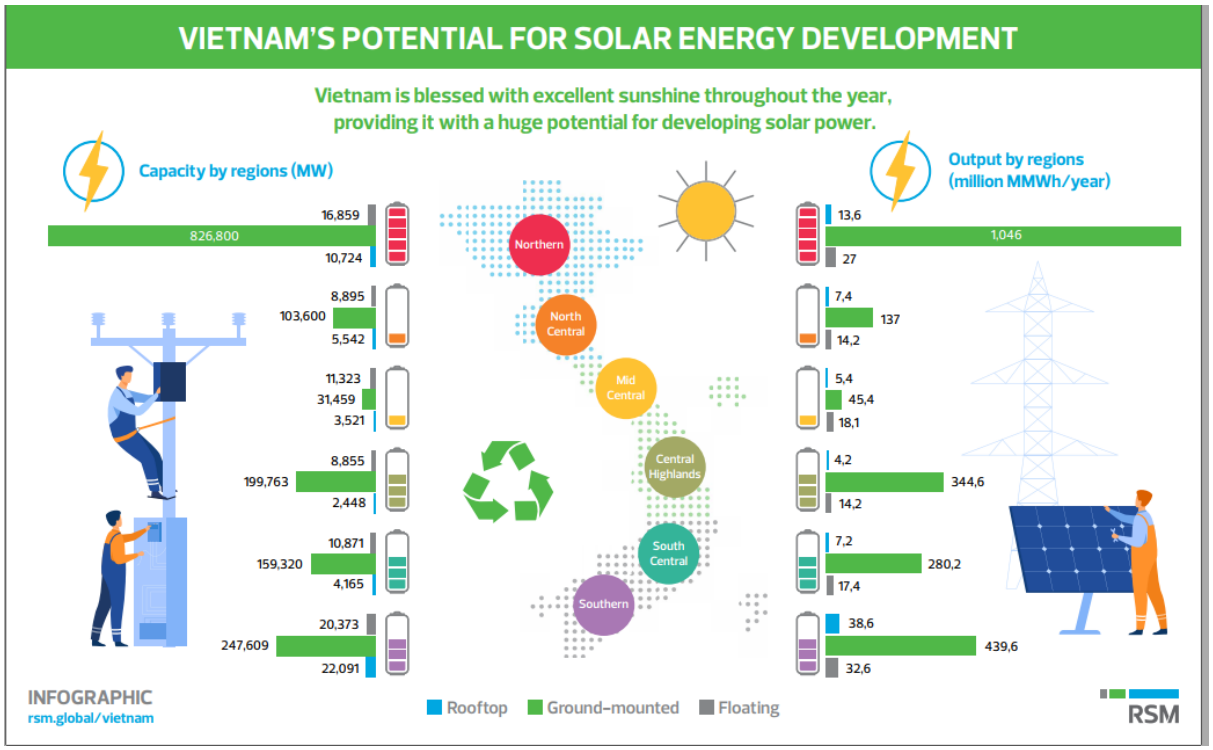

Figure 1: Vietnam's potential for solar energy development

Development policy of solar energy

Regarding the policy of strategic orientation for the development of SOLAR ENERGY , recently issued such as: The Government has issued Decision No. 2068/QD-TTg dated November 25, 2015 on the Strategy for Development of Renewable Energy (RE) in Vietnam to 2030 , with a vision arrive five 2050. Follow there, already corpse determined clear, develop SOLAR ENERGY to provide electricity for the national power system and in border areas , islands, remote and isolated areas that can not yet supply electricity from the national grid . Electricity produced from SOLAR ENERGY increases _ are from about ten million kWh five 2015 up about 1.4 billion kWh by 2020 ; about 35.4 billion kWh in 2030 and about 210 billion kWh in 2050. Bringing the proportion of electricity produced from renewable energy sources in total product quantity electricity product export are from negligible level today to about 0.5% in 2020 , about 6 % in 2030 and about 20% by 2050.

According to the Decision approving the adjustment of the national electricity development planning for the period 2011-2020

with a vision to 2030 of Thu Prime Minister in Decision No. 428/QD-TTg March 18, 2016 (Power planning VII adjustment): it is necessary to accelerate the development of power sources using solar energy, including concentrated sources of development above face soil and source feces canopy install above Roof. Increase the ratio of SOLAR ENERGY from the current negligible level now up 850MW enter five 2020; 4,000 won MW in 2025 and 12,000 MW in 2030. Solar energy accounts for a proportion time 0.5% turn in 2020; 1.6% in 2025 and 3.3% year 2030.

Up to now, in Vietnam, there is still a lack of national technical regulations on SOLAR ENERGY. Some legal documents related to the management and techniques of SOLAR ENERGY include:

- Circular No. 39/2015/TT-BCT dated November 18, 2015 of the Ministry of Industry and Trade regulating the power distribution system and Circular No. 25/2016/TT-BCT dated November 30, 2016 of the Ministry of Industry and Trade regulating transmission power system. In which, there are a number of technical requirements for the SOLAR ENERGY system connected to the low-voltage distribution grid.

- Decision No. 11/2017/QD-TTg dated 11/4/2017 of the Prime Minister on the mechanism to encourage the development of SOLAR ENERGY in Vietnam . In which, the purchase price of electricity from Solar energy systems at the power delivery point is VND 2,086/kWh (equivalent to 9.35 UScents/kWh). This Decision is effective from June 1, 2017 to date June 30, 2019.

- Pine private number 16/2017/TT-BCT day September 12, 2017 of the Ministry of Industry and Trade and Circular No. 05/2019/TT-BCT dated March 11, 2019 of the Ministry of Industry and Trade, Regulations on project development and Model Power Purchase Agreement applicable to projects SOLAR ENERGY both on the ground and on the roof home.

main contents of these documents are regulations for planning and development; muscle processing price, the main book pros treat; prime minister customary and technical requirements for connection and purchase contract . Decided determined number 11/2017/QD-TTg and Pine private No. 16/2017/TT-BCT together with one number muscle processing, Policies and measures to support RE development in general are specified in Vietnam 's Renewable Energy Development Strategy and Power Master Plan VII. thing correction already create background foundation muscle copy about muscle Regulations, policies and development orientation of RE in general and Solar energy in particular in Vietnam Male.

- Decision No. 2023/2019/QD-BCT dated July 5, 2019 of the Ministry of Industry and Trade Browser program to promote the development of rooftop solar PV in Vietnam in the period of 2019 - 2025. The overall objective is to implement the National Strategy on Development develop NLTT pine via the prize France about develop _ market school labour turmeric SOLAR ENERGY roof home. Instrument It is possible that by the end of 2025, one hundred thousand rooftop solar PV systems (or 1000 MWp equivalent) will be installed and operated worldwide . country.

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3. Status of state management of solar energy in Vietnam

3.1. Actual situation of promulgating documents guiding the implementation of policies on solar energy development

Solar energy development in Vietnam has been interested in by the Party and State since 2001. The Resolution of the Ninth Party Congress has oriented the development of renewable energy: “Priority is given to the development of new and renewable energy sources . renewable energy such as: Solar energy, hydroelectricity”… “Research and develop new and renewable forms of energy to meet the demand for energy use, especially for islands, remote areas and regions distant".

The National Assembly promulgated the 2004 Electricity Law and the 2012 Electricity Law amending and supplementing a number of articles of the 2004 Electricity Law. In 2004, the Prime Minister issued Decision No. 176/QD-TTg approving it. Strategy for development of Vietnam's electricity industry in the period 2004-2010, with orientation to 2020. Next, in 2007, the Prime Minister issued Decision No. 1855/QD-TTg approving Vietnam's national energy development strategy to 2020, with a vision to 2050.

On August 17, 2005, the Government issued Decree No. 105/2005/ND-CP detailing and guiding the implementation of a number of articles of the Electricity Law. This Decree details and guides the implementation of a number of articles of the Electricity Law

regarding large power plants, which are of particular importance; responsibility for investing in the construction of power stations; electricity demand management; save electricity; power purchase agreement; ensure power quality; electricity metering, electricity payment, electricity trading with foreign countries, electricity price; electricity activity license; electrical safety; support electricity units and state management contents in the field of electricity activities and electricity use. However, this Decree does not have a single Article, Clause related to the development of Solar energy.

On December 30, 2005, the Minister of Industry issued Decision No. 42/2005/QD-BCN stipulating the content, order and procedures for elaboration, appraisal and approval of electricity development planning. This Decision deals with the hydropower cascade planning of rivers, small and medium hydroelectricity planning, new energy planning, renewable energy. However, this decision does not refer to the Solar energy development plan.

On October 21, 2013, the Government issued Decree No. 137/ND-CP detailing the implementation of a number of articles of the Electricity Law and the Law amending and supplementing a number of articles of the Electricity Law. This Decree details the implementation of a number of articles of the Electricity Law on electricity planning and investment; electricity demand management; electricity trading; electricity price; electricity activity license; regulating electricity activities; Check electrical activity and electricity usage. However, this Decree does not have a single article or clause relating to the development of Solar energy .

On December 31, 2013, the Minister of Industry and Trade issued Circular No. 43/2013/TT-BCT stipulating the content, order and procedures for making, appraising, approving and adjusting the electricity development planning . This Circular stipulates the contents, order and procedures for formulation, appraisal and approval of the national electricity development planning, the electricity development plannings of the provinces and centrally run cities; stipulate the contents, order and procedures for formulation, appraisal and approval for adjustment of national electricity development planning, electricity development planning of provinces and centrally run cities; stipulate responsibilities for management and supervision of the implementation of electricity development planning at all levels. This Circular has no Articles, Clauses that refer to the content of Solar energy development planning.

3.2. Current status of Solar energy development planning

On the basis of the National Electricity Development Strategy and documents stipulating the content, order and procedures for formulation, appraisal and approval of the master plan and adjustment of the electricity development master plan, the Ministry of Industry and Trade has conducted prepare electricity development planning and submit it to the Prime Minister for approval, including the master plan on development of electricity from solar energy like:

- Decision No. 1208/QD-TTg dated July 21, 2011 approving the National Power Development Master Plan for the period 2011-2020 with a vision to 2030. This Decision mentions the priority orientation for the development of electromagnetic sources of electricity. renewable energy (wind power, Solar energy, biomass power...), developing rapidly, gradually increasing the proportion of electricity produced from renewable energy sources. However, there is no content to mention the orientation of Solar energy development planning .

- Decision No. 428/QD-TTg dated March 18, 2016 approving the adjustment of the National Electricity Development Master Plan for the period 2011 - 2020 taking into account five 2030. Follow decide determined this corpse determine: "To push strong play develop source electricity from renewable energy sources (hydroelectricity, wind power, Solar energy, biomass power, etc.), gradually increasing the proportion of electricity produced from renewable energy sources in the power source structure. In which, there are specific determinations: Accelerate the development of electricity using solar energy, including concentrated sources installed on the ground and distributed sources installed on the roof: Bring the total capacity of Solar energy sources. from the present insignificant level to about 850 MW by 2020, about 4,000 MW by 2025 and about 12,000 MW by 2030. Electricity produced from Solar energy will account for about 0.5% in 2020, about 1.6% in 2025 and about 3.3% in 2020. 2030.

Thus, over the past 10 years, the National Assembly, the Government, the Prime

Minister, the Ministry of Industry and now the Ministry of Industry and Trade have issued a number of documents to implement Vietnam's electricity development orientation, including: oriented to develop renewable energy sources (hydroelectricity, wind power, Solar energy, biomass power...). However, no specific document has been issued on Solar energy development yet. Until 2016, Decision 428 of the Prime Minister only mentioned the orientation of Solar energy development planning with the word as a separate power source separate from the goal of developing renewable power sources. This has significantly affected the implementation of the goal of developing Solar energy in Vietnam for more than 10 years via.

3.3. Current status of propaganda on the development of solar energy

Propaganda work is still not extensive, propaganda forms are not rich and less innovative. Mainly propaganda through mass media. So solar energy application is not yet popular wide everywhere. Mainly places with high living standards have access to this information through mass media and newspapers. Some remote areas, disadvantaged areas, and ethnic minorities have almost no information on the use of solar energy. This is also an area with difficult travel and sparse population, so propaganda is also difficult. Many experts believe that, due to the lack of successful typical projects, there has not been appropriate, proper and true communication to the community to create support and consensus in order to build a common sense of the country in the future. using solar energy devices .

The above limitations are partly due to the limited and uneven staff of propaganda staff on the development and application of solar energy in life and production. The coordination mechanism between agencies for propaganda is still unclear and there is an overlap. The coordination between the information and communication industry and broadcasters. Funding for propaganda, facilities and means of propaganda are limited, not meeting the propaganda work in accordance with the role of propaganda, so it has not been effective.

3.4. The development of Solar energy technology in Vietnam

Although still young, the Solar energy industry in Vietnam has also achieved remarkable initial achievements. In particular, Ho Chi Minh City, with its abundant "sunshine resources", and favorable conditions in terms of infrastructure as well as the quality of production force, is a potential center for the development of solar energy industry. Therefore, Ho Chi Minh City is considered as a "fulcrum", a breakthrough for the Solar energy industry in Vietnam with a roadmap of 20 five.

Up to now, the Solar energy industry in Ho Chi Minh City has built up a number of typical production facilities such as Module factory. The first industrial - scale PMT in Vietnam, the industrial infrastructure for manufacturing and manufacturing peripheral electronic devices for SOLAR ENERGY is built on the cooperation between Solar and Nam Thai Ha Joint Stock Company. , the “Solar Materials Incorporated” factory is capable of supplying both mono and multi-crystalline silicon for industrial use. PMT.

Some typical products such as PMT modules, inveter peripherals, smarts, grid-connected SOLAR equipment with SIPV technology have dominated the domestic market and initially reached out to the domestic market. regional and world markets.

According to scientists, the solar cell industry in Ho Chi Minh City has almost come to an end, currently only two stages are missing in a closed industrial process, which is refining silicon ore from sand and Fabrication of PMT wafers from silicon wafers. If the above two stages are completed, Vietnam will become one of the few countries in Asia with a closed PMT manufacturing industry. private.

Since the early 1990s, Vietnam has begun to build some infrastructure for research and application of Solar energy. The first meaningful step is the construction of the semiconductor laboratory of Ho Chi Minh National University (with 5 million USD) and the Nano laboratory of the Hi-Tech Park in Ho Chi Minh City. Ho Chi Minh (with 11 million VND) USD).

Around the same time, research and implementation organizations related to Solar energy were also born in a few other research institutes and universities, such as at the SolarLab Laboratory of the Vietnam Academy of Sciences in Ho Chi Minh City. Ho Chi Minh City, at the Renewable Energy Centers of Hanoi University of Science and Technology or at the Vietnam Energy Institute (under the Ministry of Industry and Trade).

In the first stage, investment sources for

research and exploitation using Solar energy were small, mainly from international organizations and the State. In recent years, a number of private companies have begun to pay more attention to invest in this new field, focusing on PV technology. Among them, Red Solar Energy Joint Stock Company was established in 2007 in Ho Chi Minh City. This company has supplied solar panels with capacity from 50 kWp to 175 kWp meeting European standards for solar panel factories in Binh Duong, Ho Chi Minh City, and deployed equipment. Design and install Solar energy system projects for localities.

The above-mentioned Solar energy production and deployment facilities, along with other facilities scattered across regions, are the first foundation for Vietnam to have a Solar energy industry in the near future. But in order to build such an industry, Vietnam needs to invest to soon have factories with a higher capacity of manufacturing solar cells and open up a new direction using other technologies, that is industry. solar thermal power or convergent Solar energy technology CSP (concentrating Solar energy plant).

3.5. Status of approval and implementation of solar energy projects

Solar energy projects are applying for permits, proposed or are being implemented. Licensing involves many procedures and takes a lot of time. Proposed Solar energy projects need to be reviewed, surveyed and appraised by competent authorities before an official decision is made. This work also takes a lot of time. It takes a long time and procedures make investors wait, so it affects capital mobilization. Therefore, long-term projects are implemented.

- Solar energy projects invested and put into operation:

The latest updated data to June 2016 shows that 47 Solar energy projects have been put into operation, the total installed capacity of Solar energy in Vietnam is only about 10 MW, mainly of small-scale power supply. on-site (off-grid area for households and some low-voltage grid-connected projects – installed on buildings and offices).

Among the 47 projects mentioned above, there are some typical solar projects such as: The first grid-connected Solar energy project in Vietnam on the roof of the Ministry of Industry and Trade building. The project has a capacity of 12kWp including 52 modules x 230Wp. Use batteries from SolarWorld. Sponsored by the Federal Republic of Germany, the German company Altus and the New Energy Center of Hanoi University of Science and Technology jointly deployed. Solar-diesel power project in Bai Huong village, Cu Lao Cham, Quang Nam. The 20kW Diesel system combines 28kW of solar cells. Installed by Systech Company. Total investment capital is 412,000 USD, of which the Swedish government sponsors 332,000 USD, the rest is invested by Quang Nam province. My Dinh National Convention Center. Total capacity 154kWp. Solar panels at Tam Ky Medical Center (Quang Nam). Capacity 3kWp, worth 720 million VND. Funded by the Spanish Government 50%. SolarLab installed, completed in May 2010. Project in Thuong Trach Commune, Bo Trach, Quang Binh. Capacity 11kWp, worth 160,000USD.The project is funded by the Suez Foundation and installed by the German Schenier Group. Minh Chau Primary School, Quan Lan and Minh Chau Medical Station. Battery capacity 1.3kWp . Within the framework of Solar Campus Vietnam project jointly installed by RCEE and Abakus Solar AG put.

Currently, Vietnam has a solar panel assembly plant operated by Red Solar Corporation with two main partners, Ho Chi Minh City Energy Saving Center and Commercial Limited Liability Company. - New Era economy built. The main products of the factory are solar panels with capacity from 50Wp to 175Wp, meeting European standards (IEC). With an efficiency of nearly 16% and an average lifespan of about 25 years. The main source of raw materials are photovoltaic cells (solar cells) which the company imports directly from Virtue.

In addition to the projects and works that have been installed and put into operation mentioned above, a number of grid-connected industrial- scale solar projects are being considered and implemented, about 30 projects are distributed in the provinces. the Central region (from Ha Tinh to Binh Thuan), the Southeast provinces (Tay Ninh, Binh Phuoc); Mekong Delta provinces (An Giang, Soc Tang, Ca Mau) and some Central Highlands provinces are in the process of construction at different levels such as: applying for investment site survey policy, applying for permits head private…

3.6. Existence and challenges in solar

energy development in developing countries

Exploiting renewable energy sources in general and Solar energy in particular is very important . economic , social , energy security and development _ _ _ _ durable steady. Especially, in old man scene Vietnamese Currently , the power system is facing difficulties in power supply bow then job play develop the attend sentence SOLAR ENERGY is a valuable and meaningful addition to the system , contributing to ensuring energy security. Outside out are not can are not tell arrive the profit useful other like this to be source power quantity clean, reduce waste greenhouse gases, combating climate change. However , the development develop fast, Carry count sudden break about the attend The recent SOLAR ENERGY project also revealed shortcomings and challenges small.

- Regarding policy documents, management:

Source power quantity face steam guide the home The more investment , the greater the challenge for the management units. Currently, there is no National Technical Regulation on SOLAR ENERGY. The Pepper standard country family (TCVN) contact mandarin to SOLAR ENERGY mostly converted from Standard standard standard do Commission you carefully jutsu electricity country economic construction (IEC). However, the instructions of EVN, power companies , consulting units , owners head private not yet topic access and see review pressure use according to TCVN, mainly as a guide , applied according to Standards IEC.

The technical regulation requirements for SOLAR ENERGY are currently applied according to the provisions of Circulars No. 39/2015/TT-BCT; Circular No. 16/2017/TT-BCT and Technical Standards national arts family contact mandarin arrive generation system electricity. In progress develop declare real presently the literature copy legislation, guiding documents, there have arisen a number of difficulties and problems related to connection, inspection and testing, and some requirements have not yet been agreed between Electricity companies . The instructions of the Regional and Provincial Power Company do not clearly show the duties of the Department of Industry and Trade in job direction guide, manager physical anime Rooftop SOLAR ENERGY development. Customers still have many difficulties in performing the procedures continue to install put SOLAR ENERGY roof home. The direction guide develop Rooftop solar declaration has not mentioned instructions and regulations on safety of truss structures the battery.

The implementation of national development planning of Solar energy family not yet answer application love bridge thing onion general development of SOLAR ENERGY. Regulation management _ _ development plan develop SOLAR ENERGY also short count department learn and Practice. Candlestick fit via already happen appear statue head private massively, following the movement , especially the investment too level into some areas cause very difficult in power transmission, release capacity of power plants , image enjoy arrive labour works luck onion generation national electricity system and affect the interests of investors .

Mechanisms and policies on electricity prices are not consistent there is a way submit long term. Job you onion not yet promptly cause confusion and difficulties for investors and management agencies because many projects have been approved by the competent authorities for investment policies . According to Decision 11/2017/QD-TTg, the price buying SOLAR ENERGY is 2,086 VND/kWh (equivalent to 9.35 UScents/kWh) only applied to grid-connected projects with efficiency of photovoltaic cells greater than 16%, or modules larger than 15 % have expired from June 30, 2019. Do there, not yet know price pressure use give projects sentence SOLAR ENERGY after there and in soy sauce hybrid will like how. Near the this best, after 9 month wait wait tell are from when Decision 11/2017/QD- TTg expires on 30/6/2019, day 04/06/2020 Main government gave onion Decided determined number 13/2020/QD-TTg about mechanism _ recommended encourage play develop SOLAR ENERGY in Vietnamese Male. According to the new Decision , the electricity purchase price for the floating Solar energy project is equivalent to 7.79 UScents/kWh, the ground Solar energy project is 7.09 UScents/kWh and the rooftop Solar energy system is 8.39 UScents/kWh. This price Okay pressure use give the attend sentence connect net (already having an investment decision before November 23, 2019) and rooftop Solar energy projects must have an operating period from July 1, 2019 to December 31, 2020. Other projects, not covered by this category, will be identified through the competitive mechanism painting.

In addition, lack of service network ; lack of trained operation, maintenance and maintenance workers ; lack of appropriate management mechanism; etc... should lead to the result that the efficiency of using the Solar energy source is not high, even wasteful.

- Regarding technology , techniques and related conditions : _

The scale of additional Solar energy source capacity is very large compared to that expected in the revised Power Master Plan VII , while the content of calculating and updating the power source structure and the national power system has not been fully implemented. , timely . More, grid infrastructure has not been developed in time, not ready to release capacity. Because it takes 3 to 5 years to invest in the transmission grid , while it takes about 1 year to make SOLAR ENERGY . Therefore, the hot and massive development of Solar energy projects concentrated in a few provinces such as Ninh Thuan and Binh Thuan has caused grid overload, not releasing full capacity . Specifically, in Ninh Thuan and Binh Thuan - the two leading localities in Solar energy : It is expected that by the end of 2020, while the capacity that wind power and Solar energy can produce born out than 4000 MW but follow central According to the national power system dispatching center , the load demand by the end of 2020 in Ninh Thuan will only range from 100-115 MW, while in Binh Thuan it will be 250-280 MW. Most of the lines from 110 - 500 KV through these two provinces are always in good condition too load. Drag follow there, much attend sentence SOLAR ENERGY Although the installation is complete , it cannot generate electricity, or some projects have to reduce the capacity to only about 40% of the original design. head.

Rooftop SOLAR ENERGY technology is still a new technology for Vietnam, so initially the deployment and development of grid-connected rooftop SOLAR ENERGY still has some shortcomings. Specifically, this new technology does not have many practical models, so both local electricity companies and households do not have much knowledge about installation, operation and electricity trading services. In the past During the construction process, there were a number of difficulties and problems related to the connection of rooftop Solar energy sources to the power grid. low voltage , equipment quality problems due to many suppliers . The power grid infrastructure in many densely populated areas has not yet been able to receive the amount of electricity that the Solar energy sources of many households transmit to the grid at the same time, especially enter the time time Between lunch row day in season summer.

Solar energy sources with low power factor (from 15% to 18%), unstable generating capacity will cause difficulties in control and regulation of the power system and must increase the backup of the power system to ensure safety. stabilize the power system. Operating the integrated grid requires a new, more complex approach,

actual SOLAR ENERGY projects often have large land use requirements , the proportion of land occupied by the projects ranges from 1.0 - 1.4 ha/MWp (Table 2). Some Solar energy plants have small capacity or in areas with low solar density , this ratio may be higher . Vietnam has a high population density (more than 5 time density _ people number central jar above position gender) so this is a big deal. According to Article 10, Circular No. 16/2017/TT-BCT, one in number the thing SOLAR ENERGY project investment condition is the long -term land use area not exceeding 1.2 ha/MWp.

Table 2: Statistics of some Solar energy plants in Vietnam

No	Factory Name	Conscious	Capacity (MWp)	Land area (ha)	Land occupation rate (ha/MWp)
1	Trung Nam Ninh Thuan Solar energy Plant	Ninh Thuan	258	264	1.02
2	CMX Renewable Vietnam Solar energy Plant	Ninh Thuan	168	186	1.11
3	Trung Nam Tra Vinh Solar energy Plant	Tra Vinh	156	171.17	1.10

4	My Son Solar energy Plant - Hoan Loc Viet	Ninh Thuan	50	64.57	1.29
5	Adani Phuoc Minh Solar energy Plant	Ninh Thuan	49.8	59.86	1.20
6	BP Solar 1 . Solar energy Plant	Ninh	forty six	62.26	1.35

Solar cells are made and manufactured from many different materials : glass, metals (lead, copper, gallium and cadmium), silicon solar cells, other synthetic materials , etc. Development Solar energy heating in this period also puts a lot of pressure in the future, which is the problem of handling the panels used to collect heat when they are no longer in use. Up to this point, there is no specific regulation or process for handling these panels . With the current rapid growth rate , environmental issues will surely become a challenge small for with Vietnamese male in few ten years if there is no timely solution time.

- Regarding finance, investment capital:

Recently , SOLAR ENERGY technology has had a dramatic decrease. Before year In 2010, the investment rate for the SOLAR ENERGY system is very high, usually ranging from 7000 - 9000 USD/kWp. However, from 2010 onwards , the investment rate for Solar energy has continuously decreased, mainly due to the rapid decrease in the price of solar cell modules , the current popular investment rate is around 1000 USD/kWp. Therefore, the price of SOLAR ENERGY also decreases. According to Assoc. Prof.Dr. Dang Dinh Mini - Festival Department learn labour turmeric use energy economically and efficiently said , the price of Solar energy decreased continuously, at a very fast rate , the world average fell more than 72% from 2010 to 2017. In 2010 the price of Solar energy was 36 UScents/kWh (USD). , then by 2017 it had decreased to only 10 UScents/kWh. According to forecasts, by 2030 and 2035, the price of Solar energy will continue to decrease deeply to about approx. 5.8 UScents/kWh and 5.4 UScents/kWh. Moreover , from 2025, it is forecasted that the price of Solar energy will be lower than the price of Solar energy plants source electricity chemistry jelly. Main Because so, ask for a favor With Decision 11/2017/QD-TTg promulgated in a timely manner, with preferential and attractive mechanisms of purchase price and special support from EVN , it has encouraged investors and households. family investment, creating a breakthrough in the development of SOLAR ENERGY in recent times via.

Due to the decreasing price of Solar energy , plus the high potential of SOLAR ENERGY, it will create conditions for the development of SOLAR ENERGY, increasing the proportion of SOLAR ENERGY in the system (currently the rate of Solar energy is about 10%), alter the structure of the power source . Therefore, it will affect the control and operation of the power system.

4. Solution

To overcome the above barriers, the Governments of various countries have introduced many regulatory mechanisms to promote the deployment of renewable energy to reduce energy consumption and increase energy access. At the same time, renewable energy deployment is mainstreamed into broader policies to make energy a catalyst for inclusive, sustainable and economic growth. Mechanisms and policies to help developed countries overcome barriers to Solar energy development include:

Deployment Policy

The new point of the implementation policy is to focus on setting long-term goals and the stability of financial support tools to help create confidence for investors. Long-term support mechanisms for capacity building or demand response and support schemes for renewable energy are widely used to guide investment in accordance with national priority policies that will attract investment. into private and public renewable energy. These support mechanisms will also promote investors to accelerate the construction of Solar energy plants to take advantage of incentives from the government.

Integration policies: the main content of this policy is to deploy distributed energy sources, improve the reliability of power grid infrastructure through systematic digitalization of technology. Engaging the local community, making it a fundamental part of the project, throughout all phases of project development and operation (e.g. through job creation, profit sharing with local residents). people). The systematic implementation of these policies will create flexibility throughout the power

sector leading to cost reduction, support for the energy transition and especially avoidance of conflicts arising between power owners and owners. private and community.

Support policy : this policy focuses on promoting research and development (R&D) strategies and receiving R&D results through grants. Use financial tools, corporate taxes to encourage businesses to switch to renewable energy. The supply chain of human resources for Solar energy development is consolidated and developed through human resource upgrading and development programs, industrial promotion programs to enhance the technology absorption capacity of Solar energy plants. enterprise.

Issues in Vietnam that need attention

In terms of technology: the Solar energy industry consists of manufacturers of modules, production lines and key inputs in close cooperation with research parties should: i) further improvement is needed. efficiency, performance ratio and durability of solar modules and systems; ii) strengthening research and technology development along the value chain of the Solar energy industry; iii) develop training programs, prepare human resources to design and operate systems corresponding to the future development of renewable energy; iv) strengthen cooperation and research and technology transfer with countries with experience in Solar energy development.

Management/policy: Government, policy makers need to remove barriers to implementation; establish frameworks to promote close cooperation between Solar energy and the electricity sector at large. To do this, the Government needs to: i) set or update long-term targets for solar PV deployment, including key short-term milestones in line with the national energy strategy; ii) develop a stable financial support mechanism in the long term, .have a plan to organize the implementation of support packages for investors in a specific way, thereby creating confidence in investors; iii) identify and provide an appropriate level of public funding for R&D commensurate with the cost reduction and potential of the technology and the CO2 reduction objective , strengthen international cooperation on R&D to make the best use capacity of countries; iv) when the Solar energy market has developed, gradually revise the policy framework on the capacity of investors to build projects, consider adjusting the electricity price structure for electricity users to ensure fully recover fixed costs on the grid, while maintaining the momentum for the deployment of distributed Solar energy generation.

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