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POLICY PROPOSED FOR RENEWAL ENERGY MARKET IN VIETNAM BASED ON EPM MODEL

ĐỀ XUẤT CHÍNH SÁCH CHO THỊ TRƯỜNG NĂNG LƯỢNG TÁI TẠO TẠI VIỆT NAM DỰA TRÊN MÔ HÌNH EPM

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Abstract:

Vietnam is a developing country with a high growth rate, so the demand for energy increases with the amount of greenhouse gas emissions. To realize the dual goal of ensuring a parallel growth rate with the decarbonization of the economy, Vietnam has been accelerating the transition to energy balance with all resources, while enhancing cooperation and support from development partners. According to Vietnam's Eighth National Power Development Plan, the goal is to gradually reduce electricity using fossil fuels, giving priority to the development of renewable energy, new and clean energy. The development of mechanisms and policies for renewable energy development must be built continuously and in the long term, ensuring a fair energy transition, and meeting the country's sustainable development requirements. However, at present, there is still no comprehensive approach to support strategic planners to develop specific policies and mechanisms to promote renewable energy through the interaction of members, towards the electricity market innovation ecosystem and ancillary services. This article analyzes the structure of Vietnam's electricity market, and its relationships, how members interact with each other, proposing policies for the renewable energy market in Vietnam and by Ecosystem Pie Model (EPM).

Keywords:

Policy, renewable energy, Ecosystem Pie Model (EPM), visual strategy tool, innovation ecosystem, electricity market.

Tóm tắt:

Việt Nam là quốc gia đang phát triển với tốc độ tăng trưởng cao, do đó nhu cầu năng lượng ngày càng tăng cùng với lượng phát thải khí nhà kính. Để hiện thực hóa mục tiêu kép vừa đảm bảo tốc độ tăng trưởng song song với quá trình phi cacbon hóa nền kinh tế, Việt Nam đã và đang đẩy nhanh quá trình chuyển dịch cơ cấu năng lượng theo hướng cân đối mọi nguồn lực, đồng thời tăng cường hợp tác và hỗ trợ từ các đối tác phát triển. Theo Quy hoạch phát triển điện lực quốc gia lần thứ VIII của Việt Nam, mục tiêu là từng bước giảm điện than, ưu tiên phát triển năng lượng tái tạo, năng lượng mới, năng lượng sạch. Việc xây dựng cơ chế, chính sách phát triển năng lượng tái tạo cần được xây dựng liên tục và dài hạn, đảm bảo quá trình chuyển đổi năng lượng công bằng, đáp ứng yêu cầu phát triển bền vững của đất nước. Tuy nhiên, hiện nay vẫn chưa có một cách tiếp cận toàn diện hỗ trợ các nhà hoạch định chính sách chiến lược xây dựng các chính sách, cơ chế cụ thể thúc đẩy năng lượng tái tạo thông qua sự tương tác của các thành phần trong hệ thống năng lượng, hướng tới hệ sinh thái đổi mới thị trường điện và dịch vụ phụ trợ. Bài báo phân tích cấu trúc thị trường điện Việt Nam, mối quan hệ và sự tương tác giữa các thành phần, từ đó ứng dụng mô hình hệ sinh thái (EPM) đề xuất các chính sách cho thị trường năng lượng tái tạo tại Việt Nam.

Từ khóa:

Chính sách, năng lượng tái tạo, Mô hình hệ sinh thái (EPM), công cụ chiến lược trực quan, hệ sinh thái đổi mới, thị trường điện.

1. INTRODUCTION

Vietnam's Eighth National Power Development Plan (PDP VIII) sets out key goals. The first goal is to firmly ensure national energy security, and to meet the requirements of socio-economic development industrialization, and modernization of the country. The second goal is to successfully implement a fair energy transition associated with modernizing production, building a smart grid, and advanced power system management, in line with the trend of green transition and emission reduction and energy production, scientific and technological development of the world. To achieve this central goal, the electricity market and ancillary services need to form an integrated innovation ecosystem, promoting the development of renewable energy and new energy [1]. In particular, the development of mechanisms and policies for renewable energy development needs to be built continuously and in the long term, ensuring a fair energy transition, and meeting the country's sustainable development requirements.

The relationship and interaction between members are arranged into a visual strategy tool called the Ecosystem Pie Model (EPM) from which to build an overall picture and propose policies for the renewable energy market in Vietnam.

2. INNOVATION ECOSYSTEM AND VISUAL STRATEGY TOOL ECOSYSTEM PIE MODEL (EPM)

In the innovation ecosystem, it is necessary to find the pillar components, then put all these actors into a circular diagram called the Ecosystem Pie Model (EPM). To find motivating policies, we need to analyze building blocks at the ecosystem level; and building blocks at the agent level; then analyze the relationships between actors, observing how actors interact [2].

There are different views on the innovation ecosystem. According to Adner (2017), an innova tion ecosystem is a network of organizations whose (innovative) products or services come together to achieve overall value (of the ecosystem). Any innovation ecosystem depends on the attributes of individual actors, as well as the properties of the ecosystem network. Therefore, when designing, it is necessary to correctly identify building components at the ecosystem level and the actor level.

2.1. Building blocks at the ecosystem level [2]

(1) Actors: The pillars will depend on each other, providing certain complementary services and forming an interconnected network, which when interacting with each other will create value for the end user. When sorted into the EPM, each actor is represented by an area of the 'ecosystem pie' and is arranged clockwise to represent the area between these actors. These actors form a value chain in which the next actor takes the product/service of the previous actor as input and produces an output that combines several value-added elements from that actor.

(2) The overall value of the ecosystem: is the aggregate output of the entire ecosystem towards the end user. This is the center of EPM. All actors are arranged around, participating directly or indirectly contributing to value creation towards overall value.

(3) User segmentation: one of the important actors participating in the value creation process, arranged in a separate area in EPM, is the user. Users can participate early in the product/service development process, providing regular feedback to form the basis for product/service development through their own experiences.

With additional functionality, users promote the introduction and expansion of the market for new potential users, contributing to improving the quality of the ecosystem.

2.2. Building block in agent level [2]

In each actor, the overall picture should consider that actor's value-added factor or resource factor.

(4) Value added: Actors participate as producers (possibly possessing a comparative advantage over other actors). The combination of actors through complementary services aims to achieve overall value.

(5) Resources: the important factor that creates the foundation for the value creation of a specific actor is resources. Resources include all types of tangible and intangible assets, capabilities, organizational processes, attributes, information, and knowledge about the business available to actors to perform value-creating activities.

(6) Activities: In the building block, activities are the mechanisms by which actors use available resources and contribute to the ecosystem.

Thus, activities often cross the actor's boundaries and combine with the activities of other actors to create a value-added chain. Through the EPM map, activities and interactions are seen more clearly.

(7) Captured value: For an actor, the higher the resources, activities, and added value factors contributing to the ecosystem, the higher the ability to capture the expected value. This value can be financial or non-financial. When assessing relevance, the opportunity to capture value must be compared with the costs (including opportunity costs) associated with realizing that value. Therefore, for potential (not yet operational) ecosystems, the value capture may include informational value in conditional form, reflecting the actor's minimum expectations.

(8) Dependency: An ecosystem is a synthetic network of dependent and interactive relationships including many different actors measured at three levels: L - low level of dependence, M - medium level of dependence, and H - high degree of dependence. This respective level of dependence is marked on the factor divider on the corresponding circle.

(9) Risk: In theory, when designing the EPM map, we need to assume the willingness and ability of the subjects to contribute. To come up with a strategy for developing the ecosystem in the short, medium, and long term, we need to evaluate and forecast the level of risk. Therefore, agents need to be represented as low, medium, and high risk on the map.

3. MODEL STRUCTURE OF VIETNAM'S ELECTRICITY MARKET AND THE TREND OF ENERGY BALANCE TRANSITION

3.1. Abbreviations Structure of Vietnam's Electricity Market

The original structure of Vietnam's electricity market was a vertically linked monopoly power market model. A Company or Group (usually the Government) owns all power generation plants, transmission systems, electricity distribution, and retail units, holds the control function, and operates the power system. Electricity consumers in an area can only buy electricity from an electricity distributor and retailer [1]. However, currently, the electricity markets in countries around the world and in Vietnam have developed into competitive electricity market models, of which the popular model is the competitive wholesale electricity market and a more complete model. It is a competitive retail electricity market.

Table 1, Vietnam's Electricity Market Development Roadmap

Level 1	*Level 2*	*Level 3*
Generation Market (VCGM)	Wholesale Electricity Market (VWEM)	Competitive Retail Market (VREM)
Pilot: 2011-2012	Pilot: 2016-2018	Pilot: 2021-2023
Official: 2012-2018	Official: from 2019	Official: from 2023

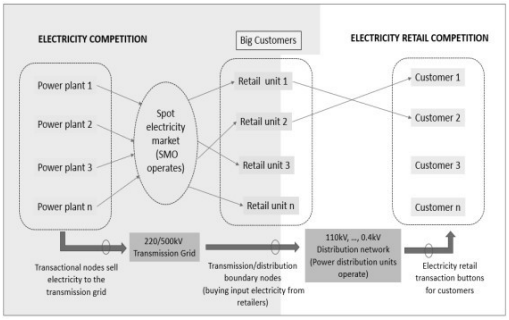

Figure 1. Competitive retail market

3.2. Power Development Plan VIII and Energy Balance Shifting Trend

At COP 26, Vietnam committed to reducing net emissions to zero by 2050. To achieve this goal, the Government of Vietnam has proactively made efforts to implement and set plans for the short, medium, and long term. In particular, it focuses on developing renewable energy fields such as wind and solar energy, protecting forests and reducing methane, and converting from fossil energy to fossil energy, fuel for clean energy [3].

Regarding the scale of the power system: The total power capacity of the entire system reaches about 77,800 MW, an increase of about 1,400 MW compared to 2021, according to the report at the end of 2022. Vietnam Electricity Group (EVN) holds 29,901 MW (including direct and indirect) - accounting for 38.4% of the total system capacity. The total capacity of renewable energy sources including wind power and solar power is about 20,165 MW - accounting for 26.4%, coal thermal power is 25,312 MW - accounting for 32.5%, and gas thermal power is 9.2% respectively. With 7,160 MW, hydropower (including small hydropower) is 22,544 MW - accounting for 29.0%. With this capacity, Vietnam's power system is among the top in the ASEAN region.

Figure 2 shows the power structure of the whole system by the end of 2022.

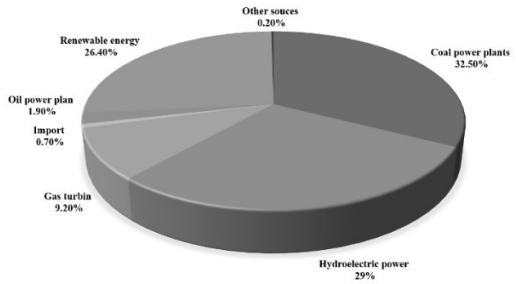

Figure 2. The power structure of the whole system by the end of 2022

Regarding electricity production and supply:

- The electricity output produced and imported throughout Vietnam's electricity system in 2022 is about 268.4 billion kWh, an increase of 5.26% compared to 2021. The maximum load capacity of the entire system in 2022 is 45,434 MW, an increase of 4.41% equivalent to 43,518 MW compared to 2021 (Data calculated on June 21, 2022).

- In 2022, the electricity output produced and purchased by Vietnam Electricity Group will be about 261.2 billion kWh, an increase of 6.08% compared to 2021, of which electricity purchased from sources outside the Electricity Group is 139.4 billion kWh, an increase of 13.6% compared to 2021 (53.4%).

- To meet the forecast growth requirement of about 7%/year in the period 2021-2030, and about 6.5

to 7.5%/year in the period 2031-2050, the Power Development Plan needs to develop a strategy and development roadmap. Specifically, sustainably, ensuring national energy security during these periods.

Accordingly, Vietnam's Eighth National Power Development Plan prioritizes strong development, bringing electricity produced from renewable energy sources into the grid, meeting the requirements of socio-economic development and global trends. This power source is estimated to reach a rate of about 30.9 - 39.2% by 2030. By 2050, the rate of renewable energy is expected to reach 67.5 - 71.5% [1].

4. ANALYSIS OF ELECTRICITY MARKET COMPONENTS VIA EPM VISUALIZATION TOOL

Competitive retail electricity market model: The ecosystem-level building block consists of actors clockwise from certifiers/public institutions to producers, and wholesalers, from consulting and network operators to retailers and user segments. The entire ecosystem is towards the overall value of the competitive, open, and transparent renewable energy market [4]. Electricity market structure and relationships in EPM are shown in Figure 3.

Current renewable energy development policies include:

- Building a competitive electricity market step by step and actively. Upgrading the transmission system to integrate renewable energy.

- Commitment to clean energy strengthens its position in Vietnam's attractive FDI market. Strengthen dispute resolution to improve investor confidence.

- Creating a level playing field between public and private investors (IPP and EVN), and domestic and foreign investors. Building a transparent bidding process, and a specific roadmap.

- Enhance the independence of market participants to ensure effective competition. Facilitating access to land for renewable energy development [5].

By creating links between actors, the analytical model shows that current policies are largely focused on creating a legal corridor, promoting

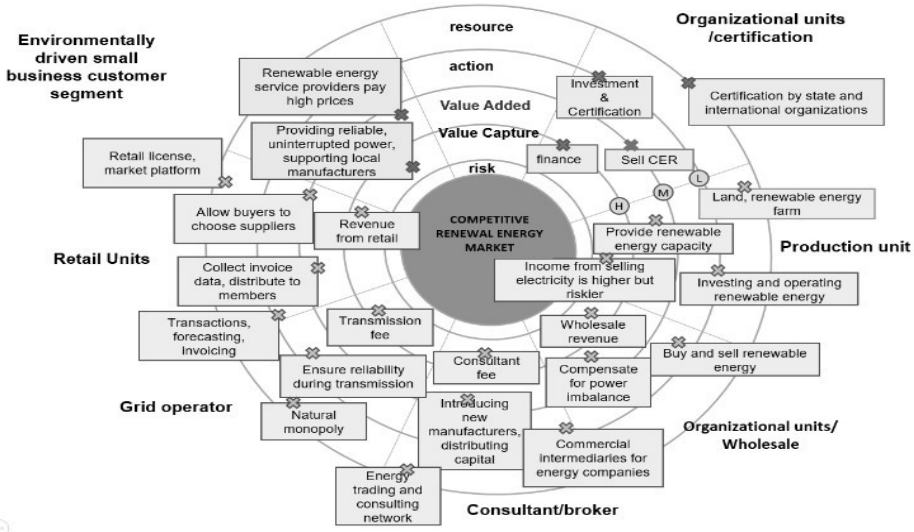

Figure 3. Electricity market structure and relationships in EPM

and transparent among actors, and operators. The role of the consultant and the cooperation with community funds have not been mentioned.

In addition, because the renewable energy supply is highly dependent on nature, the ecosystem needs to rely on partners to provide energy from fossils, and ancillary services: operating storage, and storage according to the needs of the ecosystem. planning, voltage control, black start, and short-circuit power contribution. In which the operational reserve service includes inertial response services, primary and secondary frequency regulation, flexible reserve, interregional tuning reserve, etc. Therefore, it is necessary to have a compensating mechanism and institutions for allocating costs from consumers.

Innovation in the electricity market structure and relationships in EPM are depicted in Figure 4.

5. PROPOSING RENEWABLE ENERGY DEVELOPMENT POLICIES

To achieve the goal of reducing greenhouse gas emissions, the strategy to achieve the goal of net zero emission reduction by 2050, policies should focus on:

- The Government needs to develop strategic mechanisms and policies to promote the outstanding development of renewable energy sources, prioritize the use of wind power, and solar power, and invest in developing bioelectric power plants. The block is associated with environmental protection, national economic development, and circular economy. Atthe same time, it promotes research and application of energy exploitation technologies from geothermal, waves, tides, ocean currents, and hydrogen, and needs to develop clear specific directions and plans in the center and long term.

- Completing promote the development of components in the development ecosystem, the state and Vietnam Electricity (EVN) need to gradually improve the policy framework and build a clear legal basis for power source and grid development, electricity, development of renewable energy (including rooftop solar power, self-produced and self-consumed solar power), focusing on promoting

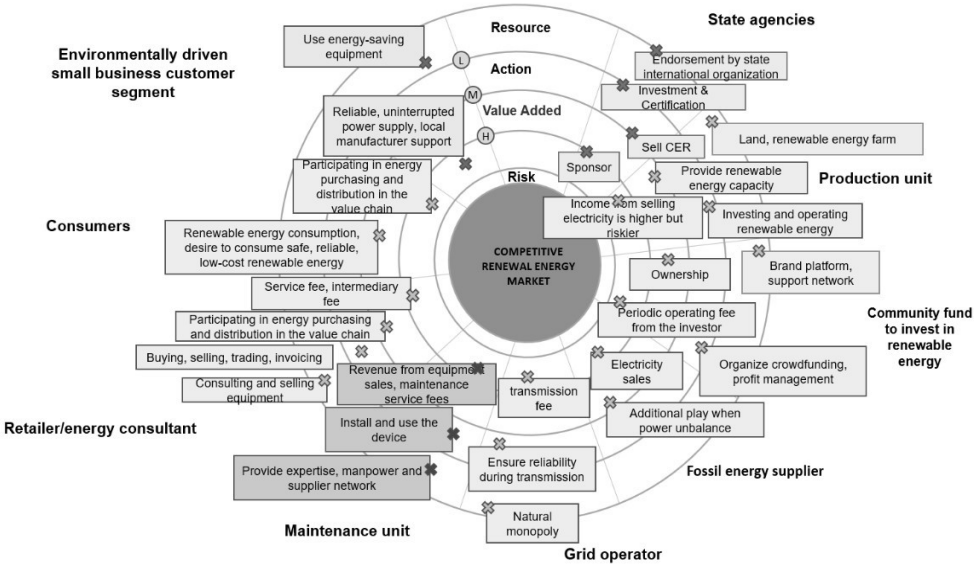

Figure 4. Innovation Power market structure and relationships in EPM

awareness of economical and efficient use of electricity and other regulations related:

+ Develop and propose amendments to the Electricity Law to improve investment policies, planning and adjust electricity prices transparently and mechanisms. Successful energy transition, focusing on developing a competitive electricity market and removing institutional obstacles. Concurrently, the government needs to encourage and strongly promote the development of power sources using renewable energy connected to the national grid. Separate the role of state management from production and business of enterprises through different levels of electricity market development.

+ During the period of amending the Electricity Law and perfecting the competitive electricity market model at the competitive retail level, the Government needs to build a centralized and transparent auction and bidding mechanism to select investors with good reputations. Specially qualified in selecting contractors for rooftop solar power and offshore wind power projects.

+ In past and present years, Vietnam's transmission grid has been a natural monopoly. In the future, with a competitive retail market model, the state needs to research and build infrastructure and legal corridors to concretize the policy of socializing investment in power transmission grids at the retail stage.

+ Promulgate a pilot, moving towards officially building a direct electricity purchase contract mechanism between renewable energy power producers and consumers in sync with the amendment of the Electricity Law and roadmap for implementing the electricity market competition. Research and develop regulations on fee collection for direct power purchase contracts (DPPA). This is the key point to encourage and promote the successful transition to a fair and transparent electricity retail market.

+ Continue to improve the electricity price management mechanism according to the market mechanism with the State's regulation, ensuring a harmonious combination between the State's political - economic - social goals and production goals. business and financial autonomy of electricity enterprises.

+ Energy development in the trend of reducing greenhouse gas emissions requires many synch ronous solutions to encourage the development of renewable energy. Therefore, it is necessary to research and develop a separate set of laws for Renewable Energy.

+ Quickly complete and amend the Law on Eco nomical and Efficient Use of Energy to raise people's awareness, creating a strong change in the economical and efficient use of energy in industry, agriculture, services, and households. Promulgate sanctions and mandatory standards and regulations on efficient energy use for key energy–using industrial enterprises.

- Develop mechanisms and policies to ensure harmonious relationships of interests between state entities, businesses providing inputs for renewable energy development, and businesses directly producing and trading energy. renewable energy to renewable energy transmission and distribution businesses. Encourage entities to proactively cooperate and contribute to the development of renewable energy in particular and national development in general.

- Governments need to develop long-term development strategies that focus on policies to encourage domestic energy use to improve independence and reduce electricity import costs.

- Develop mechanisms and policies to promote electricity imports through a memorandum of understanding, etc. Develop the power transmission system synchronously with the progress of power sources, the needs of local load development, using modern technology, ensuring international standards, and ready to connect the region.

- Develop power transmission systems and smart power grids in sync with construction progress, develop power sources, meet the load development needs of localities, and use modern and advanced technology to ensure international standards, and ready for regional connection. It is necessary to prioritize and put at the forefront programs committed to cooperation and human resource training for the renewable energy industry. Grants and incentives are publicly awarded to investors, ensuring efficiency in the use of capital.

- The government needs to set out clear price plans, have a roadmap for investors to be aware of and grasp future trends, and guide the approval process to simplify the procedure. Administrative delays and project abandonment delays. Develop a power transmission grid with long-term backup, increase the use of multi-circuit poles, and multiple voltage levels to reduce the land-occupied area, and encourage the construction of transmission substations connected with power supply for substations neighboring loads.

6. CONCLUSION

Building mechanisms and policies for renewable energy development should be developed towards the goal of gradually reducing power sources using fossil fuels, prioritizing the development of renewable energy, and new and clean energy sources [6].

Continuity and long-term construction, ensuring a fair energy transition, meeting the country's sustainable development requirements. The paper has proposed a strategic tool to model ecosystems according to structural components. This tool is used to review and integrate relevant ecosystem attributes such as interdependence, complementarity, and linkage risk. The EPM analysis tool, helps strategic planners develop specific policies and mechanisms to promote renewable energy for Vietnam's electricity market.

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