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RENEWABLE ENERGY PROMOTION WITH ECONOMIC INCENTIVES: THE CASE OF THE EU

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Abstract. The paper investigates the economic ways of green energy promotion in the European Union. It is stated that environmental friendliness and economic expediency are the main drivers of renewable energy development. The paper emphasizes that the EU has significant achievements in green energy promotion. The EU encourages the use of renewables in a variety of ways, including tariff and non-tariff instruments. In the research different economic incentives are classified by certain criteria. It is outlined in the research that the feed-in tariff was the first and most widely used mechanism of support for green energy producers. At the same time, it is gradually being replaced by a feed-in premium (a system of allowances for additional generation). The paper also highlights the importance of non-tariff instruments, including tax incentives, green certificate system, investment grants, and subsidies.

Keywords*: Economic incentives, Feed-in tariff, Green energy, Renewable energy promotion, Sustainable development.*

JEL Classification: Q28, Q42, Q48, Q58.

INTRODUCTION

The transition to sustainable development is not possible without the effective use of energy resources. From an environmental and economic point of view, renewable sources are a high-quality alternative to traditional energy. The drivers for the introduction of green energy are, firstly, its environmental friendliness (a significant reduction in pollution and resistance to climate change) and a trend of falling the cost of solar, wind, and other alternative sources of energy. According to the International Renewable Energy Agency (IRENA), the cost of solar panels from 2010 to 2019 decreased from 0.378 USD/kWh to 0.068 USD/kWh, that is, a decrease of 82% (International Renewable Energy Agency, 2019).

Many leading countries set certain targets in order to minimize the role of traditional energy and increase the share of renewables in the total energy mix. The member states of the European Union (EU) are no exception. The European Union's energy policy is based on sustainable development and a low-carbon economy. Thus, by 2050, the EU has set a goal to become the first climate-neutral continent. In 2019, in the EU, the share of renewable energy in the total energy structure was 19.7%, which is significantly higher than in previous years (in 2010 this figure was 12.2%, and in 2004 - only 8.5%) (Renewable Energy Policy Network for the 21st Century, 2020).

The EU uses a wide range of different ways to encourage the use of alternative energy sources. At the national and interstate levels, various instruments are being

introduced in order to ensure energy security, appropriate environmental conditions, and the opportunity to develop a competitive economy. The purpose of the research is to investigate the main economic incentives of green energy promotion in the EU member states.

1. LITERATURE REVIEW

Many scientists study the role of green energy promotion for sustainable development. For example, T. Güney determined that such kind of energy has a beneficial and statistically significant impact on countries' environmental sustainability (Güney, 2019). G. Gozgor and colleagues study the role of economic factors on renewable energy development in OECD economies (Gozgor et al., 2020).

R. Elavarasan and other scientists revealed the role of the federal government and local authorities in green energy promotion in certain Indian states. They emphasized that the Indian government has set certain renewable energy targets, which correspond with the UN Sustainable Development Goals. The authors also explain that India as a densely populated country significantly influences the world energy mix (Elavarasan et al., 2020). The role of government in the support of renewables was discussed by Y. Guo and colleagues. They state that in China R&D expenditures have a significant effect on green energy promotion (Guo et al., 2018).

S. Winter and L. Schlesewky in their publication conducted empirical research on the impact of a feed-in tariff for German green energy sector promotion. It states that such incentive has a positive influence on the micro-level, but has certain threats for the national economy in general (Winter & Schlesewsky, 2019). In addition, many scientists discussed the expediency of the transition from a traditional feed-in tariff to feed-in premium. For example, P. Rövekamp and colleagues indicated that a feed-in premium helps to link the market electricity price with the revenue of energy generating companies (Rövekamp et al., 2021). T. Eichner and R. Pethig emphasized the importance of non-tariff economic incentives (besides, subsidies) to develop advanced green technologies (Eichner & Pethig, 2014). F. Taghizadeh-Hesary and N. Yoshino focus on the advantages and drawbacks of long-term «green» investments. However, they explain that a certain governmental policy and legislative framework can allow to prevent certain risks and cover the green financing gap.

2. METHODOLOGY

A variety of research methods were used in the study. The observational method of research was used to figure out the tendency of green energy development in the EU and to outline the main economic incentives for such energy promotion. The comparative analysis was implicated in order to find out the advantages and drawbacks of different tariff and non-tariff instruments of renewable sector support. Synthesis, induction, deduction was also used. The research has a retrospective approach because it analyzes the long-run past tendency of different economic incentives implementation.

3. RESULTS

There are many economic and non-economic incentives for green energy promotion. In our study, the authors focus on economic instruments for such support,

which are widespread in the EU, including a feed-in tariff, a feed-in premium, green auctions, tax incentives, green certificate system, investment grants, a quota system. In Table 1 the classification of economic incentives (in accordance with two criteria) is presented. Two criteria include such features as: more or less liberal incentive, and tariff or non-tariff incentives. More liberal tariff incentive is a feed-in premium, whereas more liberal non-tariff incentives include investment grants, green auctions and green certificate system. Feed-in tariff is considered to be less liberal tariff incentive, and subsidies with quota system are non-tariff incentives. In our opinion, such classification can be used by policy-makers when choosing a way to stimulate green energy generation.

Table 1. The classification of economic incentives (created by authors)

	More liberal	**Less liberal**
Tariff incentives	-feed-in premium	-feed-in tariff
Non-tariff incentives	-investment grants -green auctions	-subsidies -quota system

A **feed-in tariff** became the first and most popular system of support for producers of renewable energy. In Germany, such a system was first introduced in 1990, in Switzerland - in 1991, and in Italy - in 1992 (Hitaj & Löschel, 2019). A feed-in tariff is a system in which producers receive an income (which is calculated with a fixed tariff) for the electricity generated. This revenue is independent of a market price. This approach has several advantages: in practice, it has shown high efficiency and low risks for manufacturers. Therefore, it became extremely popular at the beginning of the development of the renewable energy industry.

The main types of feed-in tariffs that currently apply in EU countries include:

- fixed preferential tariff - the tariff remains unchanged during the term of the contract, does not depend on the retail price of electricity, inflation, fossil fuel prices, etc., thus creating stable conditions for investors (operates in Germany, Portugal).
- regulated preferential tariff, which is not strictly fixed from the moment of putting the generating object into operation.
- regressive preferential tariff - a tariff at which higher payment rates are offered in the first years of the project (usually the first 5-10 years), after which payments are reduced.

Such a tariff policy allows producers to get the most benefit during the period when it is necessary to repay the loans that were raised for the project, and maintain reliable sources of income after the borrowed capital is fully or to a greater extent repaid (in Switzerland, Slovenia).

However, a feed-in tariff does not respond to changes in the market price of electricity: this often leads to inefficient use of assets and is poorly combined with the principles of the free market. Therefore, it is gradually being replaced by a system of allowances (**feed-in premium**). It stipulates that producers sell electricity on the market and receive an additional generation income from renewable energy. The surcharge can be fixed or defined as the difference between the market price and the feed-in tariff for a particular type of generation (Milanés-Montero et al., 2018). It is noticeable that when an electricity price falls, the producer of green energy gets less revenue.

According to International Renewable Energy Agency, the price of green energy constantly falls. For example, in 2019 a levelised cost of energy (LCOE) of solar energy is on average only $0.08-0.09/kWh globally (IRENA, 2019). Therefore, in many countries, renewables can already compete in an economic way with traditional energy. The slow transition to green energy in the world, in our opinion, can be explained by the fact that it requires a lot of primary investments. The return period of such investments is 5-7 years. Though, the world is gradually moving from incentive systems at the expense of public funds (feed-in tariffs) to mechanisms that provide competition between market participants. Such a mechanism is **green auctions**. The state announces the total capacity of new facilities to be offered to companies that want to invest in renewable energy projects. Companies submit auction bids that include the capacity of future facilities and the price at which they are willing to sell electricity. The winners of the auction are the bidders who offer the lowest price, as well as meet other selection criteria. The main advantage of green auctions is the ability to create competition between investors and stimulate companies that offer low prices for their electricity.

There are also **tax incentives** for the development of renewable energy. They include exemption from the payment of value-added tax and customs duties on the import of materials, equipment, components used for the production of energy from renewable sources, exemption from corporate income tax, reduction of the land tax. For example, in the Netherlands, the production of electricity from alternative sources is stimulated by the imposition of a lowered income tax on investments in alternative energy projects.

The **green certificate system** has become a strong tool among various methods of promoting renewable energy sources in the world, especially in the EU. In member states of the EU green certificates are called «Guarantees of Origin». The volume of the European electricity «Guarantees of Origin» market reached 596 TWh in 2018 (Hamburger, 2019) . Green certificates are a widespread instrument for accounting (confirmation of origin) and support of renewable energy sources in the electric power industry (they are used for all types of renewable energy sources, including solar energy, wind energy, geothermal energy, water energy, biomass energy, and others).

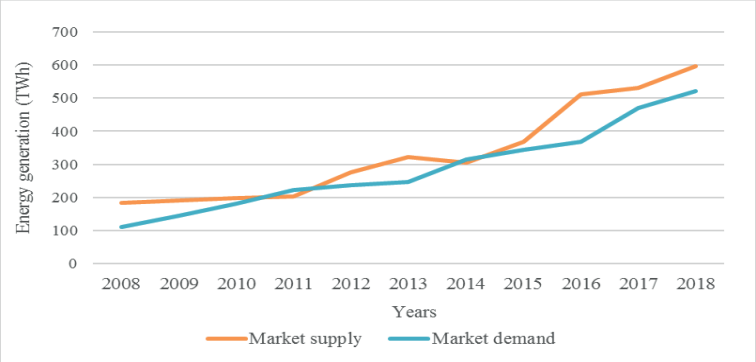

Fig. 1. The market state of Guarantees of Origin in the EU

The green certificate system usually works as follows: electricity from alternative energy sources, wholesalers, distribution companies, or retailers are required to supply and buy a certain percentage of electricity generated (Zhao et al., 2020). The main goal of this form of incentive is to achieve certain goals in increasing the share of alternative energy sources by fixing the volume of green electricity supplied by market participants. The price of green certificates is determined by the market (for example,

in TGE). Under favorable market conditions, this method of incentives should lead to the lowest costs of generating electricity from renewable sources.

Investment grants are widely used in many countries of the European Union. Grants are often awarded to stimulate business investment in energy efficiency, carbon footprint reduction, the introduction of innovative clean technologies, support for a waste-free economy, and improve the regulatory framework governing energy investment and resource efficiency. In Finland, in particular, investment grants and subsidies are the only ways to encourage the use of alternative energy sources. In 2020, the European Commission presented the Green Pact for Europe Investment Plan - a Sustainable Europe Investment Plan that aims to mobilize public investment and unlock private funds through EU financial instruments, in particular InvestEU, which will lead to an investment of at least 1 trillion euros. More than ever before, climate spending and environmental protection from the EU budget will focus on private financing, with the European Investment Bank playing a key role.

The Just Transition Mechanism (JTM) is a key tool for ensuring that the transition to a climate neutral economy happens in a fair manner. While all regions need funding and the Green Pact for Europe investment plan will provide this, the Facility is providing targeted support to help mobilize at least € 100 billion over the 2021–2027 period in the different regions for mitigation socio-economic impact of the transition. The mechanism will create the necessary investments to help workers and communities that rely on the fossil fuel value chain.

The Just Transition Fund will receive € 7.5 billion of EU funds, in addition to the Commission's proposal for the next long-term EU budget. In order to use their share in the Fund, Member States, in dialogue with the Commission, will have to identify suitable territories through special territorial equitable transition plans. They will also have to commit to matching each euro from the Equitable Transition Fund with money from the European Regional Development Fund and the European Social Fund Plus and to provide additional national resources. Together, this will provide financing of between 30 and 50 billion euros, which will attract even more investments. The foundation will mainly provide grants to the regions. This, for example, will help workers develop skills and competencies for the labor market of the future and help SMEs, start-ups and incubators create new economic opportunities in these regions. It will also support investments in clean energy transitions and energy efficiency.

A special scheme within the InvestEU is to mobilize up to 45 billion euros of investments. It will attract private investments, including in sustainable energy and transport, that benefits these regions and helps their economies find new sources of growth.

A public sector credit line with the European Investment Bank, funded by the EU budget, mobilizes investments of between 25 and 30 billion euros. It will be used for loans to the public sector, for example for investments in district heating networks and renovation of buildings. The Commission came up with a legislative proposal for its creation in March 2020.

The Just Transition Mechanism is more than funding: built on the Just Transition Platform, the Commission will provide technical assistance to Member States and investors and ensure the participation of communities, local authorities, social partners and non-governmental organizations. The Just Transition Mechanism will include a solid governance structure based on territorial Just Transition plans (Wang et al., 2020).

A **quota system** is a tool, in which a regulator has a certain minimum share of feed-in electricity, which must be in the total energy mix. At the same time, the regulator imposes obligations on the use of feed-in electricity on producers, retailers, and consumers by setting appropriate quotas. The system of such quotas is often combined with the use of green certificates for electricity from renewable sources. Such a mechanism of financial support for producers by the state is usually accompanied by possible penalties, which the parties pay in case of non-compliance with market rules (Alexander & Floyd, 2020). The most successful examples of quota systems use are Sweden and Norway.

CONCLUSION

The economic ways of renewable energy promotion in the European Union were discussed. It was determined that there are many tariff and non-tariff incentives, which have a direct or indirect impact on green energy promotion. The classification of economic incentives was developed according to two criteria. The feed-in tariff was the first and most commonly adopted source of support for green energy suppliers, according to the research. At the same time, a feed-in premium (a system of allowances for additional generation) is gradually replacing it. Non-tariff mechanisms, such as tax incentives, the green certificate system, investment grants, and subsidies, are also highlighted in the report. Therefore, the effective implementation of effective regulatory economic and legal mechanisms, the establishment of statutory goals to increase the share of renewable energy in the total energy mix have become the key to the rapid development of feed-in energy facilities in the EU.

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