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Oksana Verbova

D.Sc. in Economics, Professor of the Department of Management, Lviv University of Trade and Economics, Lviv, Ukraine;
ORCID: [0000-0002-9584-629X](https://orcid.org/0000-0002-9584-629X)

Tetyana Pachomova

D.Sc. in Public Administration, Professor of the Department of Local Self-Government and Development of Territories, National University "Odessa Polytechnic", Odessa, Ukraine;
ORCID: [0000-0001-9940-1418](https://orcid.org/0000-0001-9940-1418)

Roman Prots

Candidate of Agricultural Sciences, does not have of the Department of National Security, Public Management and Administration, Zhytomyr Polytechnic State University, Zhytomyr, Ukraine;
ORCID: [0009-0008-9143-2234](https://orcid.org/0009-0008-9143-2234)

Iryna Martusenko

PhD in Geological Sciences, Associate Professor of the Department of Economics, Accounting and Taxation, West Ukrainian National University, Vinnytsia, Ukraine;
ORCID: [0000-0003-3953-9903](https://orcid.org/0000-0003-3953-9903)

Magdalena Gorska

Founder of WSHIU University, WSHIU University, Poznan, Poland;
ORCID: [0000-0002-5208-1637](https://orcid.org/0000-0002-5208-1637)

Lidiia Bondarenko

PhD in Economics, Associate Professor of the Department of Finance, Lviv Polytechnic National University, Lviv, Ukraine;
e-mail: lidiia.p.bondarenko@lpnu.ua
ORCID: [0000-0002-3313-3569](https://orcid.org/0000-0002-3313-3569)
(Corresponding author)

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CHANGES IN DEMAND AND SUPPLY IN THE ALTERNATIVE ENERGY MARKET (USING THE EXAMPLE OF SOLAR ENERGY) OF THE EUROPEAN UNION

ABSTRACT

The study is devoted to the econometric analysis of the solar energy market situation in the European Union countries over the past decade. The purpose of the work is to theoretically substantiate and empirically verify the relationship between long-term contract prices for solar electricity and the volumes of its consumption and production. The relevance of the chosen topic is due to the urgent need of the EU member states to rapidly expand renewable generation to achieve climate goals and strengthen energy security. The least squares method was used to construct two linear regression models – demand and supply, where the independent variable is the average price of long-term contracts (Power Purchase Agreement). As a result, a high degree of market sensitivity to changes in the cost of electricity was established, and the key role of cheaper technologies in accelerating the energy transformation was confirmed. The article provides a detailed econometric modelling of the solar energy market situation in the European Union countries for 2014–2024. It is proven that the price decrease was accompanied by an increase in consumption and generation. High absolute values of elasticity coefficients were obtained, which indicate a significant sensitivity of the market to the cost of electricity. A forecast was made for 2026–2027, showing that further reduction in PPA prices will lead to an increase in demand to ~215 billion kWh and supply. The work is intended for economists, financial market analysts, policymakers, and managers of energy companies who make decisions on the development of energy and investment in it. The practical value of the results obtained lies in the possibility of using the proposed approach to modelling in the activities of modern enterprises that invest in the development of alternative energy in the EU countries.

Keywords: solar energy, econometric modelling, demand, supply, PPA price, European Union, elasticity, forecasting

JEL Classification: Q41, Q42, C22

INTRODUCTION

Over the past decade, the development of alternative energy has become a central issue in the energy and climate policy of the European Union. This topic is extremely relevant because the transition to renewable sources is considered by the world community as a key way to achieve carbon neutrality and strengthen the energy security of individual countries. Consequently, the reduction in the cost of photovoltaic modules, the scaling of wind parks, and the activation of investment mechanisms have created conditions under which green electricity is becoming increasingly competitive. Given this, an empirical study of the relationship between the prices of long-term contracts for renewable generation and the volumes of supply and demand is relevant not only in an academic but also in a practical context. In particular, for regulators, financial institutions, and energy sector enterprises. The current wave of alternative energy growth is widely considered to have begun in 2014, when the cost of solar electricity first became competitive with new fossil fuel-based generation capacities. Since then, the European Union has consistently set increasingly ambitious goals in the field of renewable sources. This process was further accelerated by the 2015 Paris Climate Agreement, which provided

a global impetus for strengthening commitments. The outbreak of the COVID-19 pandemic in 2020 became a test of resilience for the energy system. Although quarantine restrictions temporarily slowed this trend, they did not reverse its overall trajectory. Thus, the decrease in demand for electricity was less noticeable than in other industries and production areas. At the same time, the green generation, due to its priority access to the grid, even increased its share. Russia's invasion of Ukraine in February 2022 elevated the issue to a geopolitical dimension. The risks associated with fossil fuel supply forced the European Union to adopt the REPowerEU plan, which provides for a sharp acceleration in the transition to local renewable resources. Within two years of the initiative's launch, the solar sector had reached new record levels. In 2023 alone, solar photovoltaic capacity increased by nearly 56–61 GW, representing a 40–45% rise compared to the previous year. This dynamic growth demonstrated that the decreasing cost of technology, combined with political incentives, is transforming the market faster than earlier forecasts had anticipated. As of the end of 2024, renewable sources accounted for nearly half of the electricity supply in the countries of the European Union, with solar power becoming the second-largest source after wind energy. Under these conditions, an in-depth analysis of the relationship between contract prices and the volumes of generation and consumption becomes particularly relevant, as the accuracy of such estimates determines the development of tariff policies, the planning of grid infrastructure, and the design of support mechanisms.

LITERATURE REVIEW

When conducting a literature review, it is important to critically examine the financial dimension of the alternative energy market. This relevance stems from the fact that financing the transition to renewable energy has become a central issue for the countries of the European Union. Access to "green" capital directly determines the pace of infrastructure development and the diffusion of innovation. In practice, the concept of green finance is increasingly viewed as a driving force behind technological innovation and transformation. Therefore, the empirical model confirms that the expansion of green financial instruments directly stimulates innovation in renewable generation, especially when it comes to solar electricity (Shi & Shi, 2025).

At the same time, the capacity of targeted investments in sustainable energy to accelerate the deployment of new technologies while simultaneously enhancing energy security in European Union countries remains a key concern (Rabbani et al., 2025).

The theoretical foundations of these ideas are expanded by research into the correlation between the development of sectoral economies and the volume of renewable energy consumption. This research demonstrates that market incentives provided by green financial products reduce barriers to the integration of clean solar electricity (Getachew et al., 2024). As we can see, today, more and more scientific and practical attention is being paid to the problems of solar electricity. Especially when the focus of the research is the financial and socio-economic side of the problem.

At the same time, studies indicate that it is well-designed financing schemes (from auctions to direct tax incentives) that significantly accelerate the commercialization of photovoltaic technologies, especially in countries with high fiscal and regulatory risks (Ahmed et al., 2019). In the countries of the European Union, where price competition among various renewable sources has already taken shape, incentive measures are increasingly shifting into the financial domain. In this context, clearing mechanisms for PPA (Power Purchase Agreement) auctions and targeted subsidies for research and development are becoming prominent examples. The Global Review of Green Finance confirms that it is financial instruments, rather than direct subsidies, that create long-term motivation for investors in conditions of market uncertainty (Samar, 2022).

It is undeniable that government intervention, through various forms of support, plays a crucial role in stabilizing the alternative energy market. But at the same time, the ability of the private sector to transform future revenue streams from PV (Photovoltaic) installations into liquid securities is also extremely important. Asset securitization, as demonstrated by residential PV systems in the US, allows for a significant reduction in the cost of capital by diversifying risks and redirecting them to investors with lower funding costs (Alafita & Pearce, 2014). Given this, the modern European market, with its diversified financial infrastructure and high demand for ESG (Environmental, Social, and Governance) assets, shows the greatest potential for scaling such mechanisms. The potential of the European market is limitless, and it is here that all efforts for the safe development of alternative energy, especially solar, are centralized. It should be noted that the financial performance of solar projects is closely related to the concept of economic efficiency of energy use. As early as the early 2010s, it was scientifically proven that maintaining sustainable economic growth rates is only possible with increased energy efficiency and reduced resource consumption intensity (Bojnec & Papler, 2011).

Subsequent studies detail that increased energy efficiency is not only a consequence of technical progress, but also a catalyst for increasing the renewable share in the energy balance, as it makes capital-intensive projects more attractive to

investors (Stasytyte & Ignatas, 2016). This logic is particularly relevant to solar energy. Fundamentally, photovoltaic installations involve high upfront investment costs, and their competitiveness is directly dependent on the speed of capital recovery. In turn, this is determined by the efficiency of energy consumption. The demand side of the market also shapes the conditions for the deployment of photovoltaics.

Research on the environmental value structure shows that environmental perceptions and personal responsibility are positively correlated with the willingness to support green technologies (Torkar & Bogner, 2019). In practice, this translates into consumer decisions. An example here is the "green marketing–green brand" model, which shows that transparent communication about sustainability and low carbon footprint significantly increases the likelihood of choosing energy-efficient products, including home PV systems (Hutagaol & Laksmidewi, 2025). This means that the more consumers understand the benefits of renewable sources, the more strongly environmental beliefs are translated into intentions to purchase clean energy (Ahmed et al., 2020).

In summary, in the EU market, where greening programs for production and public awareness are systematized, solar energy is rapidly integrating both into the public sector and into the sphere of small businesses. This, in turn, significantly stimulates the expansion of demand and supply for solar electricity, which is taking place against the background of the dynamic development of financial instruments of the "green" economy. The findings of the above-mentioned studies suggest that financial innovations such as PPA mechanisms, green bonds, and tax incentives, in close interaction with public policy and the growing environmental awareness of consumers, are becoming the key drivers of structural transformation in the energy market. However, despite a wide range of both practical and theoretical approaches, econometric patterns of the influence of long-term contract prices on the dynamics of demand and supply in the context of solar energy in the EU countries have not been sufficiently studied to date.

AIMS AND OBJECTIVES

The purpose of the article is to assess the impact of long-term contract prices (PPA) on the volumes of consumption and production of solar electricity in the countries of the European Union and to form a short-term forecast for this, as well. The task is to construct separate models of demand and supply and to perform the corresponding forecast based on these models.

METHODS

The methodology is based on econometric modelling and the least squares method. Thus, the least squares method was used to construct econometric models of supply and demand in the solar energy market. As a result, numerical coefficients of the equation are obtained that provide the best approximation of empirical data (Coxe, et.al., 2009; Lee, 2022). The independent variable X is the price P_t (average long-term PPA cost, EUR/MWh), and the dependent variables Y are the volumes of consumption (demand D_t) and production (supply S_t) of solar electricity (in million kWh), respectively. A linear form of communication is envisaged:

Demand model: $D_t = \alpha_0 + \alpha_1 P_t + \varepsilon_t$

Supply model: $S_t = \beta_0 + \beta_1 P_t + u_t$

where α_0 , α_1 , β_0 , β_1 – are estimated parameters, and ε_t , u_t – are random errors. For each model, the coefficients were manually calculated using the formulas corresponding to the least squares method.

In particular, the coefficient for the price variable is estimated as follows (1):

$$\hat{\alpha}_1 = \frac{N \sum_{t=1}^N P_t Y_t - \sum_{t=1}^N P_t \sum_{t=1}^N Y_t}{\sum_{t=1}^N P_t^2 - (\sum_{t=1}^N P_t)^2} \quad (1)$$

where N – number of observations (years), Y and P – mean values of the corresponding variables. For demand $Y=D$, for supply $Y=S$.

The calculations are based on actual data for 2014–2024. It should be noted that the study is based on official statistical series regarding the average long-term contract price of electricity and annual volumes of its consumption and production. The input data are structured in the form of time observations, which corresponds to the assumptions of classical econometrics on the independence of the sample and constant periodicity. Such preparation ensures the correctness of the

calculations, minimizes the risk of bias, and allows the use of the least squares method to estimate the parameters of the models.

At the final stage, a short-term forecast for two years was constructed by directly substituting the predicted prices in the regression formulas. The trend extrapolation method allows for a prompt assessment of future market volumes with minimal information.

RESULTS

Initially, we conduct a data analysis that serves as the baseline for subsequent modelling. Between 2014 and 2024, the European Union experienced a sharp increase in both the production and consumption of solar electricity, against the backdrop of a substantial decline in its generation cost. The price of electricity produced by solar panels, which is determined through power purchase agreements (PPAs), which are long-term contracts between electricity producers and buyers, has fallen significantly in recent decades, leading to a boom in solar energy. It is estimated that the average PPA contract price for subsidy-free projects in the EU has decreased from 93.1 EUR/MWh in 2014 to 53.3 EUR/MWh in 2024, while consumption (demand) for solar electricity has increased from 85,501 to 306,132 million kWh, and production (supply) from 89,301 to 321,339 million kWh over this period (Figure 1).

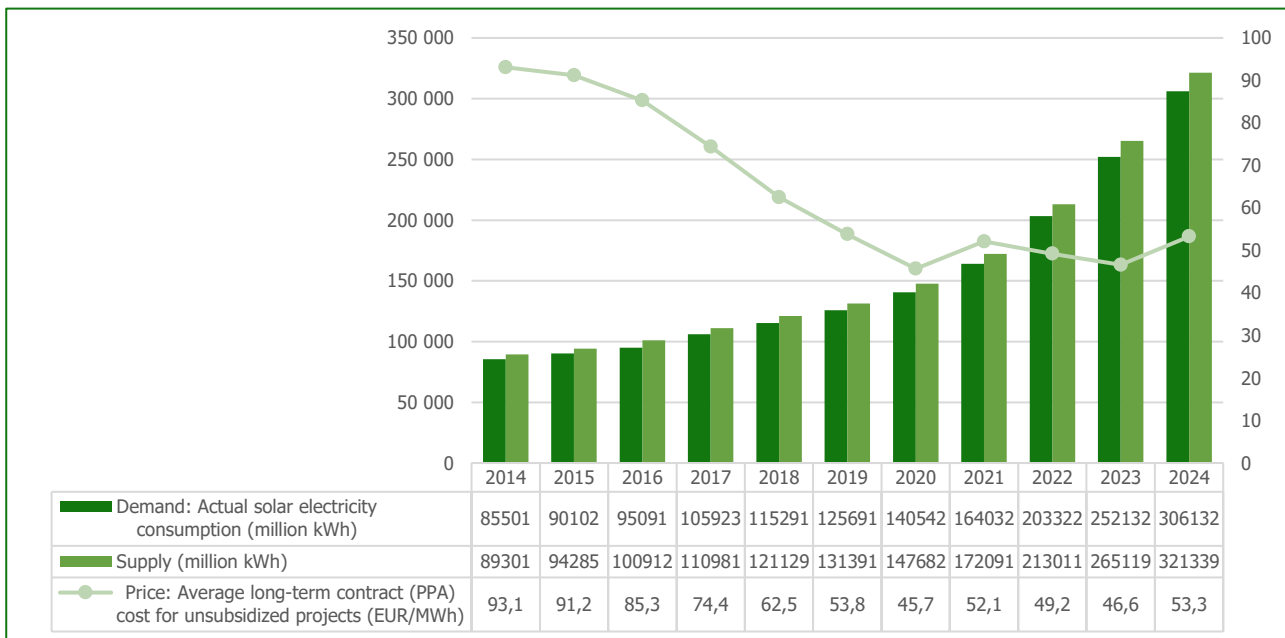


Figure 1. A systematized list of initial data on the alternative energy market in the EU for further modelling. (Source: Formed by the authors based on Eurostat database (2025) and Solar PV (2025))

It should be noted that the excess of supply over demand in our model is a natural phenomenon, since the European solar energy market is characterized by outstripping investments in generating capacity compared to the growth rate of final consumption. In this context, producers, having long-term PPA contracts, state auctions, and available green financing, can commission new photovoltaic parks for the future. In this way, they form a reserve for future demand, integration of storage systems, and energy export to neighbouring member states of the European Union. To analyze these trends, econometric models of supply and demand in the solar energy market were built using the least squares method.

To begin, the demand equation should be constructed, followed by the supply equation. Accordingly, based on the input data, Table 1 was compiled with values of price P_t (as X) and consumption volumes D_t (as Y) for 2014–2024 years was formed, and auxiliary indicators $X^2=P_t^2$ and $XY=P_t \cdot D_t$. Table 1 contains data and intermediate calculations for the demand model in the EU alternative energy market.

Table 1. Input data and calculation parameters for estimating the demand equation in the EU solar electricity market.

Year	P _t (EUR/MWh)	D _t (million kWh)	P _t ²	P _t ·D _t
2014	93.1	85 501	8 667.61	7 960 143.1
2015	91.2	90 102	8 317.44	8 217 302.4
2016	85.3	95 091	7 276.09	8 111 262.3
2017	74.4	105 923	5 535.36	7 880 671.2
2018	62.5	115 291	3 906.25	7 205 687.5
2019	53.8	125 691	2 894.44	6 762 175.8
2020	45.7	140 542	2 088.49	6 422 769.4
2021	52.1	164 032	2 714.41	8 546 067.2
2022	49.2	203 322	2 420.64	10 003 442.4
2023	46.6	252 132	2 171.56	11 749 351.2
2024	53.3	306 132	2 840.89	16 316 835.6
Σ	707.2	1 683 759	48 833.18	99 175 708.1

Based on the summary characteristics (last line of Table 1), the regression characteristics for demand are calculated. We substitute these values into the formulas according to the least squares method. The coefficient at the price is equal to (2):

$$\hat{\alpha}_1 = \frac{11 \cdot 99175708.1 - (707.2) \cdot (1683759)}{11 \cdot 48833.18 - (707.2)^2} = -2695.47 \quad (2)$$

The obtained coefficient $\alpha_1 = -2695.5$ (million kWh per each EUR/MWh) is negative, in accordance with the law of demand, whereby a reduction in the PPA price results in higher consumption D_t . The absolute value of the coefficient is quite high, indicating strong price sensitivity. Next, we calculate the intercept term. The average value of demand is $D^- = 153\,978.09$ million kWh (i.e., 1,683,759 divided by 11, the number of years used for modelling). The average price is $P^- = 707.211$ EUR/MWh ($707.2/11$ (i.e., 7,779.32 divided by 11)). Accordingly, we obtain Equation (3):

$$\hat{\alpha}_0 = D^- - \alpha_1 P^- = 326\,363 \quad (3)$$

Therefore, the estimated demand equation (linear model) has the form (4):

$$D_t = 326\,363 - 2695.47 P_t \quad (4)$$

Therefore, equation (4) approximates the historical relationship. According to this relationship, at zero price, consumption would be 326 billion kWh, and each price increase of 1 EUR/MWh reduces consumption. The empirical data confirms the negative slope. As the PPA price fell, demand for solar electricity increased rapidly.

Similarly, the supply equation was estimated. Table 2 presents the input data on price and supply for the period 2014–2024, along with the calculated auxiliary indicators P_t^2 and $P_t \cdot S_t$ used in the supply model.

Table 2. Input data and calculation parameters for estimating the supply equation in the EU solar electricity market.

Year	P _t (EUR/MWh)	D _t (million kWh)	P _t ²	P _t ·D _t
2014	93.1	89 301	8 667.61	8 313 923.1
2015	91.2	94 285	8 317.44	8 598 792.
2016	85.3	100 912	7 276.09	8 607 793.6
2017	74.4	110 981	5 535.36	8 256 986.4
2018	62.5	121 129	3 906.25	7 570 562.5
2019	53.8	131 391	2 894.44	7 068 835.8
2020	45.7	147 682	2 088.49	6 749 067.4
2021	52.1	172 091	2 714.41	8 965 941.1
2022	49.2	213 011	2 420.64	10 480 141.2
2023	46.6	265 119	2 171.56	12 354 545.4
2024	53.3	321 339	2 840.89	17 127 368.7
Σ	707.2	1 767 241	48 833.18	104 093 957.2

Based on the summary characteristics (last line of Table 1), the regression characteristics for the offer are calculated. We substitute these values into the formulas according to the least squares method. The coefficient at the price is equal to (5):

$$\hat{\beta}_1 = \frac{11 \cdot 104093957.2 - (707.2) \cdot (1767241)}{11 \cdot 48833.18 - (707.2)^2} = -2828.8 \quad (5)$$

The resulting coefficient shows that supply increases when the price has been falling. In our case, the negative slope is explained by long-term structural factors. Therefore, the cost of solar electricity has fallen sharply due to technological progress and large-scale introduction of capacities, which allowed producers to increase generation even at lower PPA prices. Therefore, the estimated supply equation (linear model) is (6):

$$S_t = 342\,524 - 2828.8 P_t \quad (6)$$

Note that the actual supply exceeded demand in each year. This means that the market was characterized by surplus production, possible exports, or a need to store excess energy. The results show that a price decrease of 1 EUR/MWh was associated with an increase in supply in EU countries.

Comparing the two models, it can be noted that both functions are very sensitive to price, but the direction of the effect is different from the point of view of market equilibrium. Consequently, for demand, the negative elasticity is normal (the cheaper, the more they buy), while for supply, the negative elasticity indicates the dominance of factors that reduce costs and price (technology, scale) over the direct influence of price on the decisions of producers.

Next, we apply the obtained supply and demand models to forecast volumes for two years ahead (2026–2027). Since the regression equations express D_t and S_t as functions of price P_t , it is necessary to define forecast values for the PPA price to generate predictions. Based on the trend from 2014 to 2024, the PPA price decreased by an average of about 4 EUR/MWh per year. Let us assume that this gradual decrease will continue after 2024. Then the forecast price levels can be taken as, for example, ~45.3 EUR/MWh in 2026 and ~41.3 EUR/MWh in 2027 (trend extrapolation based on an average annual decline of ~4 EUR/MWh). Substituting these values into the equation, we obtain the forecast volumes of demand D^{\wedge} and supply S^{\wedge} . Calculation formulas for each year (Figure 2):

$$25. \quad D^{\wedge} = (326\,363 \cdot 45.3 - 2695.47 \cdot 45.3) / 12 = +17012.6 \text{ million kWh}$$

$$26. \quad D^{\wedge} = (326\,363 - 2695.47 \cdot 41.3) / 12 = +17906.5 \text{ million kWh}$$

$$27. \quad S^{\wedge} = (342\,524 - 2828.8 \cdot 45.3) / 13 = +16\,482.1 \text{ million kWh}$$

$$28. \quad S^{\wedge} = (342\,524 - 2828.8 \cdot 41.3) / 13 = +17\,348.1 \text{ million kWh}$$

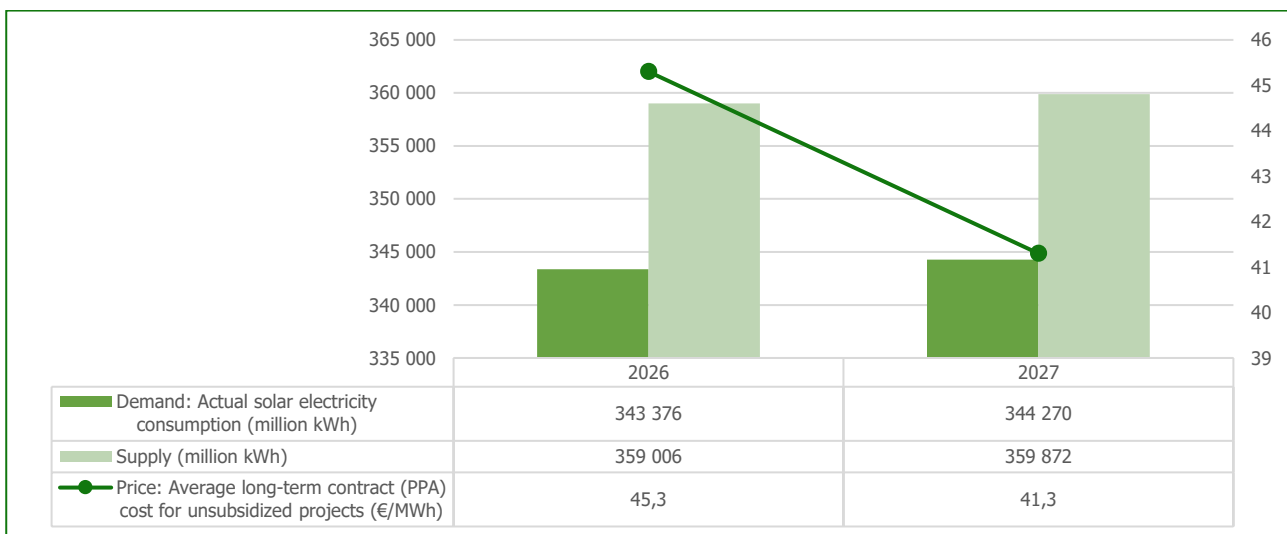


Figure 2. Projected values of solar electricity demand and supply in the EU for 2026-2027 (assuming continuation of the downward trend in PPA prices).

According to the extrapolative assessment conducted, the continued decline in the cost of solar electricity is expected to lead to further growth in both its consumption and production. This indicates that market dynamics have shifted from a

linear trend to a phase of accelerated expansion. Between 2021 and 2024, the volume of green capital in the European Union increased sharply. In this context, we observe record-high issuances of green bonds, historically low capital costs, and rapid inflows of private infrastructure investment funds, which have enabled the construction of large-scale PV parks at a much faster pace than in the previous decade. The crisis-related gas price surges after 2022 have radically improved the relative margins of solar projects. Thus, even a moderate reduction in the PPA price provided manufacturers with an extremely profitable spread against fossil generation, which immediately increased the investment drive. Such financial and economic factors, aggravated by the scale effect and cheaper modules, have put the sector on a trajectory of accelerated growth.

In conclusion, from the perspective of renewable energy development policy, the modelling results demonstrate strong potential for achieving significant practical outcomes. Therefore, the elasticity of demand means that measures to reduce the cost of "green" electricity (such as investments in technology, stimulation of competition in the PPA market, reduction of taxes or fees) will lead to a significant increase in consumption in the long term. At the same time, this is extremely important for achieving decarbonization goals. Consequently, consumers demonstrate a higher propensity to adopt lower-cost renewable electricity sources, particularly when supported by favourable pricing policies.

At the same time, the negative supply elasticity observed during the study period highlights the role of innovation and sectoral support. Declining costs enable producers to increase output even in the absence of rising market prices. The findings support the argument that the continued development of solar energy requires maintaining conditions that further reduce technology costs. For example, in this context, measures can be implemented to support scientific research, the safe development of domestic production of solar panels, and the elimination of trade barriers. An equally important direction is to stimulate the introduction of new capacities, such as simplified construction permits, favourable auction conditions, etc. At the same time, it is necessary to take care of the infrastructure for balancing supply and demand. Since supply is growing faster than demand, there is a need for energy storage systems and rational integration of European markets to prevent excess production and price volatility.

DISCUSSION

In order to confirm the relevance and validity of the obtained results, we consider it necessary to compare them with research conducted in similar thematic areas. In this context, it should be noted that our modelling of the solar energy market in the European Union demonstrated high price elasticity on both sides of the market, namely, supply and demand. These findings are consistent with the results of the study by Adekoya et al. (2021). In this paper, the authors concluded that financial instruments reduce volatility and make the cost of capital more predictable, thereby enhancing the response of consumers and producers to changes in the cost of electricity. We believe that the authors' study reinforces the argument that when the financing market becomes more economically resilient, even a slight reduction in price can significantly stimulate the growth of alternative energy. A similar inverse relationship was identified in the study by Alharbi et al. (2023). According to their findings, the market interprets price reductions not as a signal of collapse, but as a consequence of increased economic and technological efficiency. We argue that this effect is particularly evident in the solar energy segment, where capital and technologies are mobilized more rapidly than in any other type of alternative energy (Bhutta et al., 2022). Zheng et al. (2023) prove in their work that it is "green" capital that is a systemic catalyst for the transition to renewable technologies in most economies of the world. While our study details this conclusion using the example of the European Union. It can be argued that the effect of "green" financial infrastructure is not limited to attracting cheap resources, but also creates confidence in the long-term payback of solar projects. The results of our work correlate with the findings of Hailiang et al. (2022). Thus, the authors note that investments in renewable energy provide simultaneous economic and environmental effects. The key distinction, however, is that in the case of the European Union, solar generation has already moved beyond the stage of pilot programs and entered a phase of deep market penetration. In light of this, the current stage requires more precise econometric tools to evaluate the impact of price-based incentives.

CONCLUSIONS

Following the sharp increase in fossil fuel supply risks caused by the Russian Federation's invasion of Ukraine in February 2022, energy security has become a critical issue, accelerating the adoption of the REPowerEU initiative and the record deployment of new photovoltaic capacity. The revealed high sensitivity of supply and demand to price fluctuations indicates that even a slight further reduction in price can significantly accelerate the increase in production and consumption of "green" electricity. Therefore, accurate econometric modelling of the relationship between long-term contract value and market volumes is extremely relevant for the formation of effective tariff policy, planning of network infrastructure, and

optimization of financial incentives, which together will determine the pace of achieving the climate goals of the European Union. It should be noted that the conducted modelling demonstrates a clear interdependence of price trends and the growth of renewable energy. In this context, the reduction in the contract price acts as a catalyst for both consumers and producers. In our opinion, the study confirmed the systemic nature of the relationship between the reduction in the cost of solar electricity and the growth of both demand and supply. Linear models clearly show high price elasticity.

The constructed econometric models confirm that the EU solar energy market in 2014-2024 developed under the influence of a trend of rapidly decreasing technology prices. Consequently, the downward trajectory of prices stimulated the growth of both demand and supply. To support this trend, EU countries should continue ambitious climate and energy policies that combine investments in innovation, mechanisms to support renewable sources, and measures to increase the flexibility of the energy system. Such an approach will contribute to achieving the goals of increasing the share of solar energy while ensuring a sustainable reduction in costs and a balanced development of the renewable electricity market in the EU.

The prospects for further research suggest expanding the set of factors (subsidies, carbon taxes, storage costs) to improve the efficiency of the model. It is also important to conduct a critical study of the role of small and medium-sized businesses in decentralized generation.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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Вербова О., Пахомова Т., Проць Р., Мартусенко М., Горська М., Бондаренко Л.

ЗМІНИ В ПОПИТІ Й ПРОПОЗИЦІЇ НА РИНКУ АЛЬТЕРНАТИВНОЇ ЕНЕРГЕТИКИ (НА ПРИКЛАДІ СОНЯЧНОЇ ЕНЕРГЕТИКИ) ЄВРОПЕЙСЬКОГО СОЮЗУ

Дослідження присвячене економетричному аналізу кон'юнктури ринку сонячної енергетики в країнах Європейського Союзу в динаміці останнього десятиліття. Метою роботи є теоретичне обґрунтування та емпірична перевірка взаємозв'язку між довгостроковими контрактними цінами на сонячну електроенергію та обсягами її споживання й виробництва. Актуальність обраної теми обумовлена нагальною потребою держав-членів Європейського Союзу в швидкому розширенні відновлюваної генерації задля досягнення кліматичних цілей і зміцнення енергетичної безпеки. Застосовано метод найменших квадратів для побудови двох лінійних регресійних моделей – попиту й пропозиції, де незалежною змінною є середня ціна довгострокових контрактів (Power Purchase Agreement). Водночас у результаті встановлено наявність високого ступеня чутливості ринку до змін вартості електроенергії та підтверджено ключову роль здешевлення технологій у прискоренні енергетичної трансформації. Проведено детальне економетричне моделювання кон'юнктури ринку сонячної енергетики країн Європейського Союзу за 2014–2024 рр. Доведено, що зниження ціни супроводжувалося зростанням споживання та генерації. Отримано високі (за модулем) коефіцієнти еластичності, що свідчить про значну чутливість ринку до вартості електроенергії. Зроблено прогноз на 2026–2027 роки, який показав, що подальше здешевлення PPA год зумовить приріст попиту до ~215 млрд кВт·год і пропозиції. Робота розрахована на економістів, аналітиків фінансових ринків, розробників державної політики й менеджерів енергетичних компаній, які ухвалюють рішення щодо розвитку енергетики та інвестування в неї. Практична цінність отриманих результатів полягає в можливості використання запропонованого підходу до моделювання в діяльності сучасних підприємств, що займаються інвестуванням у розвиток альтернативної енергетики в країнах ЄС.

Ключові слова: сонячна енергетика, економетричне моделювання, попит, пропозиція, ціна PPA, Європейський Союз, еластичність, прогнозування

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