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JEL Classification: G21*Tkachenko A.M., Levchenko S.A.***AMBIVALENCE TO THE PROCESS OF DECARBONIZATION OF ENTERPRISES ENERGY****“Zaporizhzhia Polytechnic” National University, Zaporizhzhia, Ukraine**

The article states that by joining The European Green Deal, the European Union’s ambitious strategy to make the European continent climate-neutral by 2050, Ukraine has chosen the path of energy transition to achieve decarbonisation of the economy / energy and integration of Ukrainian energy systems with European ones. Instead, the process of decarbonization is characterized by ambivalence, which creates new problems and requires an immediate search for solutions. It was emphasized that in order to ensure the achievement of the climate goals, the EU plans to introduce a mechanism for cross-border carbon regulation in the near future. It was stressed that for Ukraine such a mechanism could be an obstacle to the decarbonisation of the economy, as Ukraine currently remains one of the most carbon-intensive economies among the EU countries. It is substantiated that energy enterprises are generally recognized as the most vulnerable to CBAM, which is due to the high carbon content of marginal coal-generating capacities. According to the scenario approach, the expected consequences of the introduction of CBAM for Ukrainian electricity exports are analyzed. It was stressed that in the event of synchronization with ENTSO-E and consolidation of electricity markets, CBAM will de facto become a barrier to importing electricity of Ukrainian origin to the EU, but the possibility of its implementation by electricity producers with relatively zero emissions or low-emission generation will continue. Provided that if the UES of Ukraine is not synchronized with ENTSO-E and remains without the unification of the electricity markets of Ukraine and the EU, CBAM will de facto become a barrier to accessing electricity from Ukraine to the EU market and commercial exports will be stopped. In order to avoid the negative consequences of the introduction of CBAM and to alleviate the pressure of the decarbonization process on energy companies, it is proposed to take supranational and national measures to accelerate the process of decarbonization of the energy sector and, consequently, the transition to climate neutrality.

Keywords: decarbonization process, ambivalence of decarbonization process, mechanism of boundary carbon regulation, decarbonization pressure.

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Introduction and problem statement

Modern realities in which we happened to live motivate to the responsible consumption of natural resources and encourage the preservation of the environment. Therefore, the process of decarbonization of the economy as a new challenge to save the environment and people from «dirty

technologies» is one of the main issues on the agenda of both the EU countries and Ukraine. In the green package, the EU announced a sharp reduction in CO₂ emissions for a 30-year period until 2050, namely by 90% compared to 2019.

With the environmental trends that the EU sets in its space, Ukraine risks being included in the

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list of countries whose products will be subject to restrictive duties or taxes on CO₂ content, which is fraught with the loss of access to the European market, which is closer to the borders of Ukraine, which makes it a priority. To maintain a trade balance in the EU market, it is important and necessary for Ukraine to find its place in the European hierarchy of environmental tasks and plans [1]. Therefore, Ukraine, which has acquired the international status of a member state of numerous multilateral agreements and arrangements to comply with the course of reducing greenhouse gas emissions and curbing the galloping pace of climate change, has developed and adopted a number of documents, including the Strategy for 2030 [2]; Low carbon development strategy [3]; Action plans on energy efficiency and renewable energy sources [4]; National plan to reduce pollutant emissions from large combustion plants [5]; Law of Ukraine «On Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions» [6] and others.

As of 2018 [7] Ukraine managed to reduce emissions by 64% compared to 1990. However, the achievement of this indicator was facilitated by a decrease in industrial production, and not by effective state policy and the modernization of technological processes with an emphasis on environmental friendliness. According to the estimates of the Ministry of Environmental Protection and Natural Resources, Ukraine is able to reduce emissions by more than 70% of the 1990 level. One of the main reasons for the erroneous climate course is the versatility of legislation and the insufficient integration of the climate agenda of strategic documents into the direct activities of all sectors of the economy, and above all, the energy sector [8]. That is why the definition of strategic guidelines for achieving carbon neutrality of Ukraine and intensifying the process of decarbonization, in particular, energy companies is one of the most pressing issues today.

Analysis of recent studies and publications

An analysis of recent studies and publications shows that the issue of decarbonization of the energy industry has long been a concern for both practitioners and scientists. In particular, in the works of such scientists as Boboshko O., Veklych O., Vervehy T., Novytska N., Olekhova O., Pashkova M., Sidenko V., Markevich K., Stetsiuk P., Gonchar M., Stukalenko I. Popova S., Khlebnikova I. Chekunova S. and others, it is well-founded that accelerating the decarbonisation process requires increased investment in clean energy, which opens an unprecedented level of market opportunities throughout the clean energy supply chain, reduce environmental pollution and

counteract. Instead, scientists ignore the impact of decarbonization pressure on the future of energy companies and their financial stability.

The purpose of the article

The purpose of the article is to substantiate the truth of the hypothesis that the process of decarbonization is characterized by ambivalence, which creates obstacles to accelerate the transition of Ukrainian energy companies to climate neutrality.

Presentation of the main research material with full justification of the obtained scientific results.

In 1991, Ukraine inherited from the USSR a huge energy complex, entirely focused on achieving the plans set by the Soviet leadership. Despite the large shortage of financial resources and problems of public administration related to systemic changes in 1992–2002, the main tasks of restructuring and transformation of the energy sector of Ukraine to ensure reliable supply of industry and households with fuel and energy resources were generally met [9, p. 96].

Among the notable achievements of Ukrainian energy at that time was the implementation in 1995–2002 in the western region of the country of a project to create «Amber Island» to operate a separate part of the UES in synchronous mode with the European network ENTSO-E. This project was a harbinger of the future synchronization of the entire ECO with European networks, which is planned to begin in 2023 [9, p. 99].

Liberalization of the electricity market, in accordance with the provisions of Directive 2009/2/EC, has been identified among other prerequisites for the implementation of this strategic project. After all, the single buyer model valid until 2019 in Ukraine largely did not agree with it and did not stimulate investment in the reconstruction of obsolete energy infrastructure. In accordance with the requirements of the Law «On the Electricity Market» of 13.04.2017 for -2019-VIII [10] (hereinafter – the Law №2019-VIII) in Ukraine from July 1, 2019 launched a new market model designed to ensure its functioning in principles of this Directive [9, p. 99].

The adoption of Law №2019-VIII [10] was a historic event for the whole country, as it brought the entry of the Ukrainian electricity market as close as possible to the single energy legal space of the EU. However, with its introduction, some shortcomings of the new market model were revealed, due primarily to the difficulty of adapting European legislation to Ukrainian socio-economic conditions [9, p. 99]. However, despite the trials that befell our country due to the global economic downturn of

2008 (accompanied by high inflation and the crisis of the banking system), Russia's annexation of Crimea and the occupation of certain territories of Donetsk and Luhansk regions in 2014. energy on the peninsula and temporarily occupied territories), long quarantine restrictions (in connection with the COVID-19 pandemic), it can be stated that Ukraine is on the path of energy transition to achieve decarbonization of the economy/energy [9, p. 104].

By joining The European Green Deal, the European Union's ambitious strategy to make the European continent climate-neutral by 2050, Ukraine has chosen the path of energy transition to achieve decarbonisation of the economy/energy and integration of Ukrainian and European energy systems [9, p. 111]. In 2021, electricity production amounted to 156.576 billion kWh, 5.2% more than in 2020. In terms of electricity companies, the share of NPPs was 55.1%, TPPs and CHPs – 29.3%, HPPs and PSP – 6.7%, RES (SES, WPP and biomass) – 8.9% [11, p.58] or 9,507.9 MW, of which terrestrial SES 6,386 MW and domestic SES 1,057 MW, Wind farms – 1,672.9 MW, biomass – 151.8 MW, biogas – 120.2 MW, small hydropower plants – 120 MW. During 2021 production of «green» electricity increased by 15.2% to 12,519.7 thousand MWh [12].

Instead, in early 2021, the situation in the day-ahead market (RDF) became unfavorable for generation, creating conditions for enriching individual players and pushing state-owned generating companies, which are the main sellers of electricity actually produced in this market segment, to the brink of bankruptcy.

Electricity prices at RDN decreased and sometimes were below the cost of electricity (433.85 UAH / MWh in May, 734.85 UAH / MWh in July), which deprived real producers opportunities to accelerate the process of decarbonization [11, p. 56].

There was no improvement in the RES sector, as debts remained outstanding and not backed by appropriate support instruments: Feed-inPremium (sale of electricity by electricity producers on the market for difference (instead of the green tariff), improvement of the auction support model, which should have given priority to the development of wind, bio and hydropower Corporate PPA, as well as guarantees of origin, Net Billing, especially for solar energy, as indicators of SES almost three times higher than the corresponding data on wind and bioenergy [11, p. 59].

In the near future, the EU plans to introduce a Carbon border adjustment mechanism under the Green Agreement, which will apply to imports of certain energy and carbon-intensive goods coming

from outside the EU [13]. For Ukraine, such a mechanism could be an obstacle to decarbonising the economy/energy, as Ukraine currently remains one of the most carbon-intensive economies in the EU due to:

- lack of progress in the transition from energy-intensive production with low added value to high-tech;

- slow implementation of «clean» technologies and energy saving measures, in particular in the industrial sector;

- insignificant in comparison with the EU countries, capacities working on RES.

Also, in Ukraine there is almost no progress in weakening the relationship between economic growth from CO₂ emissions (the concept of «eco-economic decoupling») (Fig. 1), despite the fact that along with the reduction of total GDP in 2019 to levels 1990 by 34%, total CO₂ emissions decreased by 70% [14, p. 45].

Due to the inadequate technical condition of fixed assets (in 2019, the degree of depreciation of fixed assets at industrial enterprises was 59.1% [15]) Ukraine remains a producer of CO₂. Although CO₂ emissions have decreased by 32% over the last decade (in 2019 they amounted to 185.4 million CO₂), compared to 2009 (271.5 million CO₂). Instead, it is less related to the introduction of energy efficiency measures and the transition to RES in the industrial sector, and more – to structural changes in the economy [14, p. 45], which increases the risks of applying to Ukrainian products carbon cross-border mechanism – CBAM [14, p. 45].

Climate experts believe that CBAM is a path to rapid decarbonisation, and the Ukrainian Business Association calls this mechanism a «Pandora's box». CBAM aims to stimulate production to reduce CO₂ emissions and thus avoid the process of so-called «carbon leakage», because with its introduction, carbon prices between European products and imports will be equalized, thus ensuring that the EU's climate goals are not undermined by displacement. production to countries with less ambitious environmental policies. Instead, according to preliminary estimates [16], the additional costs of Ukrainian companies in the case of exports to the EU could increase by almost € 600 million/year. At the same time, energy enterprises are generally recognized as the most vulnerable to CBAM, which is due to the high carbon content of marginal coal-generating capacities in Ukraine [17, p. 45].

The main supply of electricity to the EU from Ukraine comes from the so-called «Burshtyn TPP Island» – part of the power system of the Western

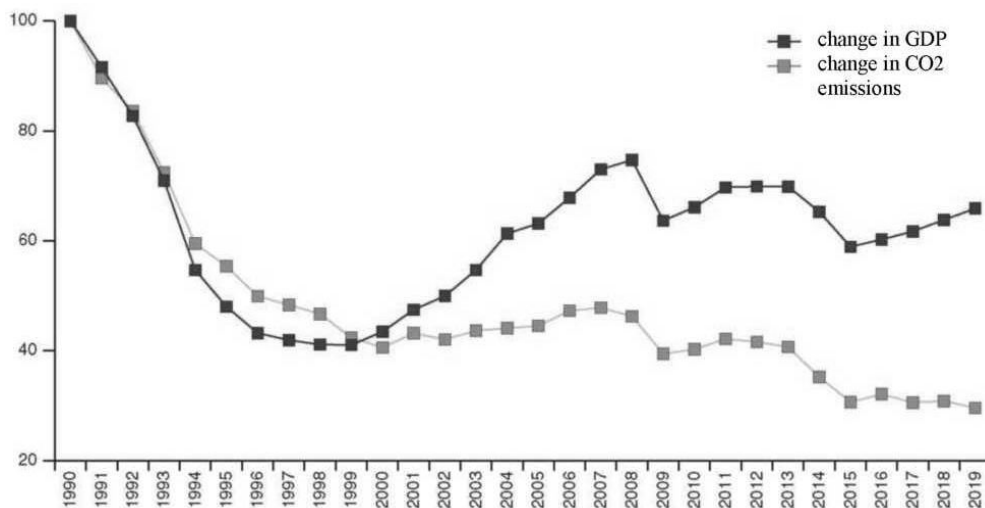


Fig. 1. Relationship between GDP and CO₂ emissions in Ukraine (1990 = 100%) [14, p. 44]

region, which operates synchronously as part of the Union of Energy Systems of Europe (ENTSO-E). Burshtyn TPP Island consists of Burshtyn TPP, Kalush TPP and Tereble-Ritska HPP, as well as electricity networks and own electricity consumers within the Transcarpathian and partially Ivano-Frankivsk and Lviv regions. The total allowable flow of power from Burshtyn TPP Island to ENTSO-E is 650 MW. In addition, it is possible to import to Poland the so-called «directed transfer» of power Dobrotvirsk TPP-Zamost (Poland) with a maximum capacity of 210 MW from the allocated power units of Dobrotvirsk TPP. In addition, in the first quarter of 2023, the transition of Ukraine's UES to synchronous operation with the European energy system is planned, and by the end of 2023 commercial flows of electricity in synchronous operation will be possible [17, p. 18].

Taking into account that CBAM will be applied from January 1, 2026, the Resource and Analytical Center «Society and Environment» analyzed the consequences of its introduction for Ukrainian electricity exports in two possible scenarios.

First, subject to synchronization with ENTSO-E and consolidation of electricity markets, CBAM will de facto become a barrier mechanism for imports into the EU of electricity of Ukrainian origin purchased on the day-ahead market (RDN) and intraday market (VDR). Under this scenario, CBAM will de facto become a barrier to importing into the EU electricity of Ukrainian origin purchased on the day-ahead market (RDN) and the intraday market (VDR). This is due to the fact that coal generation is and is likely to remain pricing for a long time in these segments of the Ukrainian market for most of

the daily load schedule [17, p. 24].

CBAM will be able to import into the EU electricity of Ukrainian origin purchased under bilateral agreements directly from producers with relatively zero emissions or low-emission types - from RES, nuclear power plants and highly maneuverable high-efficiency generation based on natural gas.

For RES generation and NPPs in this scenario, CBAM will not have significant direct financial implications given relatively large exports to justify additional administrative and transaction costs;

Secondly, provided that the UES of Ukraine is not synchronized with ENTSO-E and without the integration of the electricity markets of Ukraine and the EU, CBAM will de facto become a barrier to accessing electricity from Ukraine to the EU market and commercial exports will be stopped. This will reduce electricity exports from Ukraine to the EU by up to 6 billion kWh by up to € 300 million annually [17, p. 24].

It is possible to avoid such a situation with a clear understanding of the bottlenecks in the development of energy companies [14, p. 44]. To this end, the Razumkov Center has compiled a forecast energy balance of Ukraine and calculated the dynamics of growth of RES capacity, generation of «green» electricity and charging producers for it (Fig. 2) [18].

The construction of the energy balance took into account Ukraine's commitment to gradually reduce heat generation in the structure of annual electricity production from 27.5% in 2021 to 19% in 2029 while increasing the share of RES from 14.4% (2021) up to 28.4% (2029), as well as maintaining the role of nuclear power plants at 55%...58%.

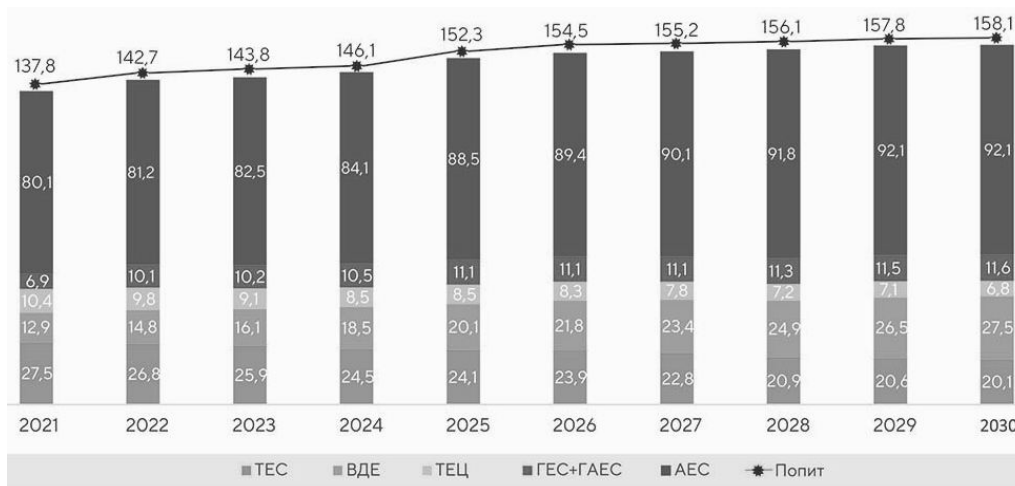


Fig. 2. Forecast energy balance of Ukraine, billion kW/year [18]

That is, there will be a decrease in the volume of thermal generation in the structure of annual electricity production, with a simultaneous increase in the share of RES with virtually unchanged role of nuclear power units. Therefore, it is expected that such a generation structure will meet the requirements of the European policy of «green» transition to a new energy economy, as the proposed option of integrating RES into Ukraine’s UES balance at up to 25% will replace 3.21 GW of TPP capacity [18].

Instead, the minimum load of TPP units is expected to be 3920 MW, which will lead to:

- first, the rate of accumulation of power at the level of 0.042 units/hour, which is insufficient for the performance of payload jumps, because under such conditions the deficit will be approximately 0.9 GW;

- secondly, the continuation of subsidies for non-market electricity prices for the population until

2030. At the same time, the estimated deficit of funds of the State Enterprise «Guaranteed Buyer» only within the PSO, starting in 2026, will amount to more than UAH 100 billion. (Fig. 3) [18].

The shortage of funds will directly affect the loss of financial capacity of the energy market and reduce the liquidity ratio of energy companies to a critically low range: 0.1... 0.2. Achieving this level of liquidity will lead to the final bankruptcy of the system-forming enterprises of the energy sector and increase the energy intensity of the country’s GDP [18].

Thus, joining the European green course, on the one hand, provides an opportunity to strengthen and diversify the process of decarbonization of energy, stimulates Ukraine to develop mutually beneficial contacts with the EU, able to unleash the potential of the Ukrainian economy. But on the other hand, it implies a commitment to the implementation of

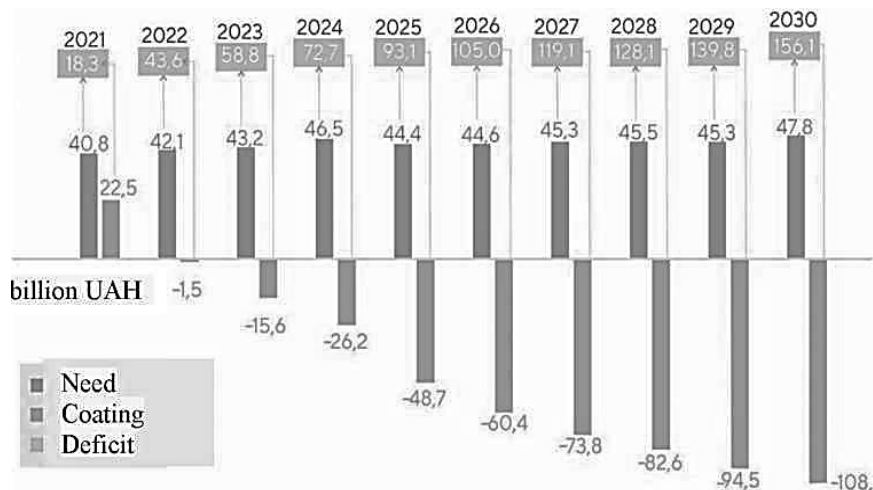


Fig. 3. Lack of funds to subsidize the cost of electricity for the population [18]

European climate standards and to pass the appropriate production certification. The state needs:

– between Ukraine and the EU to decide that Ukraine can implement EU energy legislation not in an adapted but in an authentic form with obligations and rights identical to the EU member states. Moreover, the Energy Community may undergo a significant transformation in the context of Brussels' involvement of the Western Balkans in the EU. As a result, these countries will continue to implement EU energy legislation in an authentic way. In practice, after the accession of the Balkan countries to the EU, the Energy Community will be narrowed down to the three countries of the Eastern Partnership - Ukraine, Moldova and Georgia, which have association agreements with the EU. From this perspective, it is important to seek from the EU the transition to the implementation of energy legislation in its authentic form in order to create a homogeneous energy space in Eastern Europe [14, p.26];

– take care of the introduction of programs to support greening processes, and business - on technological modernization. It is fundamentally important to introduce an ecosystem approach in the management of Ukrainian enterprises [14, p.51];

– ensure the necessary impact and consideration of proposals during the development of the CBAM (Carbon Border Adjustment Mechanism). Participate actively in the process led by the EC to develop the CBAM mechanism to ensure a level playing field between EU and Ukrainian companies. Build an EU-Ukraine dialogue on a new mechanism for finding a common position;

– to consider the establishment of Ukraine as a full (at the level of EU member) participant in the EU energy market as one of the priorities in the foreign policy of the Government of Ukraine (Office of the Deputy Prime Minister for European and Euro-Atlantic Integration (coordination), Foreign Ministry, Ministry of Energy, Ministry of Economy). To achieve this priority, use opportunities to participate in international organizations and initiatives: BSEC (Black Sea Economic Cooperation Organization), GUAM (Organization for Democracy and Economic Development), the Three Seas Initiative (3SI) and the Eastern Partnership, etc. [14, p. 53];

– change the taxation system in order to bring the environmental tax system in line with EU standards, so that taxes will not only fill the State Budget, but also become an effective tool for environmental protection;

– expand the list of environmental measures

for which funds from the eco-tax can be used. The list of environmental measures provided for in the Resolution of the Cabinet of Ministers of Ukraine "On approval of the list of activities related to environmental measures" needs to be updated and updated, as it was formed before Ukraine signed the Association Agreement [14, p. 55].

Conclusions

Thus, according to the results of the study, it was stated that by joining the European Green Course, Ukraine has chosen the path of energy transition to achieve decarbonization of the economy / energy and integration of Ukrainian energy systems into European ones. As of 2018, Ukraine managed to reduce emissions by 64% compared to 1990. However, this indicator was facilitated by the reduction of industrial production, rather than effective government policy and modernization of technological processes. Therefore, there is almost no progress in Ukraine in weakening the link between economic growth from CO₂ emissions, and therefore, with the introduction of the EU in the Carbon border adjustment mechanism, Ukrainian companies face additional costs of almost € 600 million / year. At the same time, according to experts, the most vulnerable to SWAM are energy companies, which is due to the high carbon content of marginal coal-generating capacity. Thus, the study proves the truth of the hypothesis that the process of decarbonization is characterized by ambivalence, which creates obstacles to accelerate the transition of energy companies to climate neutrality.

The scenario analysis of the consequences of the introduction of SWAM for Ukrainian electricity exports revealed that if synchronized with ENTSO-E and the integration of electricity markets, SWAM will de facto become a barrier to importing electricity of Ukrainian origin to the EU, but the possibility of its implementation by producers zero-emission or low-emission electricity will continue to exist. Provided that if the UES of Ukraine is not synchronized with ENTSO-E and remains without the unification of the electricity markets of Ukraine and the EU, SWAM will de facto become a barrier to accessing electricity from Ukraine to the EU market and commercial exports will be stopped.

In order to avoid the negative consequences of the introduction of SWAM and to alleviate the pressure of the decarbonization process on energy companies, it is proposed to take supranational and national measures to accelerate the process of decarbonization of the energy sector and, consequently, the transition to climate neutrality.

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АМБІВАЛЕНТНІСТЬ ПРОЦЕСУ ДЕКАРБОНІЗАЦІЇ ПІДПРИЄМСТВ ЕНЕРГЕТИКИ

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У статті констатовано, що доєднавшись до «Європейського зеленого курсу» (ЄЗК, *The European Green Deal*) — амбітної стратегії Євросоюзу щодо перетворення європейського континенту на кліматично нейтральний до 2050 р., Україна обрала шлях енергетичного переходу для досягнення декарбонізації економіки/енергетики та інтеграції українських енергосистем з європейськими. Натомість процесу декарбонізації характерна амбівалентність, що створює нові проблеми, і потребує негайний пошук їх вирішення. Акцентовано, що з метою забезпечення досягнення кліматичних цілей ЄС у рамках Зеленої угоди планує найближчим часом запровадити механізм прикордонного вуглецевого регулювання. Наголошено, що для України такий механізм може стати перешкодою на шляху декарбонізації економіки, оскільки Україна наразі залишається однією з найбільш вуглецеємних економік з-поміж країн ЄС. Обґрунтовано, що найбільш вразливими до СВМ загальноєвропейського підприємства енергетики, що пов'язано з високою карбонемністю маржинальних електрогенеруючих потужностей на вугіллі. Проаналізовано за сценарним підходом передбачувані наслідки запровадження СВМ для українського експорту електроенергії. Підкреслено, що за умови синхронізації з ENTSO-E та об'єднання ринків електроенергії, СВМ де-факто стане заборонювальним механізмом для імпорту до ЄС електроенергії українського походження, проте можливість його здійснення виробниками електроенергії із умовно нульовими викидами або низькоемісійними видами генерації існуватиме і надалі. За умови ж, якщо ОЕС України не буде синхронізована з ENTSO-E та залишиться без об'єднання ринків електроенергії України та ЄС, тож СВМ де-факто стане заборонювальним механізмом доступу електроенергії з України на ринок ЄС і комерційний експорт буде припинено. З метою уникнення негативних наслідків запровадження СВМ та пом'якшення тиску процесу декарбонізації на підприємства енергетики запропоновано вжиття заходів наднаціонального та національного рівня, які забезпечать прискорення процесу декарбонізації галузі енергетики, а отже, і процес переходу до кліматичної нейтральності.

Ключові слова: процес декарбонізації, амбівалентність процесу декарбонізації, механізм прикордонного вуглецевого регулювання, тиск декарбонізації.

АМБІВАЛЕНТНОСТЬ ПРОЦЕССА ДЕКАРБОНИЗАЦИИ ПРЕДПРИЯТИЙ ЭНЕРГЕТИКИ

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В статье констатировано, что присоединившись к «Европейскому зеленому курсу» (ЕЗК, *The European Green Deal*) — амбициозной стратегии Евросоюза по превращению европейского континента в климатически нейтральный к 2050 г. Украина выбрала путь энергетического перехода для достижения декарбонизации экономики/энергетики и интеграции украинских энергосистем с европейскими. Зато процессу декарбонизации характерна амбивалентность, что создает новые проблемы, и требует немедленного поиска их решения. Акцентировано, что в целях обеспечения достижения климатических целей ЕС в рамках Зеленого соглашения планирует в ближайшее время ввести механизм пограничного углеродного регулирования. Отмечено, что для Украины такой механизм может стать препятствием на пути декарбонизации экономики, поскольку Украина остается одной из наиболее углеродных экономик среди стран ЕС. Обосновано, что наиболее уязвимыми к СВМ общепризнаны предприятия энергетики, что связано с высокой карбонемностью маргинальных электрогенерирующих мощностей на угле. Проанализированы по сценарному подходу предполагаемые последствия внедрения СВМ для украинского экспорта электроэнергии. Подчеркнуто, что при синхронизации с ENTSO-E и объединения рынков электроэнергии, СВМ де-факто станет преградой для импорта в ЕС электроэнергии украинского происхождения, однако возможность его осуществления производителями электроэнергии с условно нулевыми выбросами или низкоэмиссионными видами генерации будет существовать и в дальнейшем. При условии же, если ОЭС Украины не будет синхронизирована с ENTSO-E и останется без объединения рынков электроэнергии Украины и ЕС, СВМ де-факто станет преградой доступа электроэнергии с Украины на рынок ЕС и коммерческий экспорт будет прекращен. Во избежание негативных последствий внедрения СВМ и смягчения давления процесса декарбонизации на предприятия энергетики предложено принятие мер наднационального и национального уровня, которые обеспечат ускорение процесса декарбонизации отрасли энергетики, следовательно, и процесс перехода к климатической нейтральности.

Ключевые слова: процесс декарбонизации, амбивалентность процесса декарбонизации, механизм пограничного углеродного регулирования, давление декарбонизации.

**AMBIVALENCE TO THE PROCESS OF
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The article states that by joining The European Green Deal, the European Union’s ambitious strategy to make the European continent climate-neutral by 2050, Ukraine has chosen the path of energy transition to achieve decarbonisation of the economy / energy and integration of Ukrainian energy systems with European ones. Instead, the process of decarbonization is characterized by ambivalence, which creates new problems and requires an immediate search for solutions. It was emphasized that in order to ensure the achievement of the climate goals, the EU plans to introduce a mechanism for cross-border carbon regulation in the near future. It was stressed that for Ukraine such a mechanism could be an obstacle to the decarbonisation of the economy, as Ukraine currently remains one of the most carbon-intensive economies among the EU countries. It is substantiated that energy enterprises are generally recognized as the most vulnerable to CBAM, which is due to the high carbon content of marginal coal-generating capacities. According to the scenario approach, the expected consequences of the introduction of CBAM for Ukrainian electricity exports are analyzed. It was stressed that in the event of synchronization with ENTSO-E and consolidation of electricity markets, CBAM will de facto become a barrier to importing electricity of Ukrainian origin to the EU, but the possibility of its implementation by electricity producers with relatively zero emissions or low-emission generation will continue. Provided that if the UES of Ukraine is not synchronized with ENTSO-E and remains without the unification of the electricity markets of Ukraine and the EU, CBAM will de facto become a barrier to accessing electricity from Ukraine to the EU market and commercial exports will be stopped. In order to avoid the negative consequences of the introduction of CBAM and to alleviate the pressure of the decarbonization process on energy companies, it is proposed to take supranational and national measures to accelerate the process of decarbonization of the energy sector and, consequently, the transition to climate neutrality.

Keywords: decarbonization process, ambivalence of decarbonization process, mechanism of boundary carbon regulation, decarbonization pressure.

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