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Energy transition in the European Union – institutional and legal factors

Introduction

The scope of the research problem concerns the importance of the institutional and legal (or, more broadly, political) factors of energy transition in the European Union. The theoretical tenets and research by Aleh Cherp and team indicate that these factors, in addition to socio-technical and techno-economic ones, are the main pillars of energy transition processes (Cherp et al., 2018, pp. 175–190). Interestingly, broadly understood energy transition studies refer to numerous definitions and interpretations of what energy transition is. Even the term 'transition' is questionable, being one of several terms used when naming the processes and changes in energy and fuel production or consumption structures. Other terms include, for example, 'substitution', 'transformation' or 'revolution'. They can be interchangeable in the literature on the subject, but their use may also depend on speakers' worldviews, or express a particular methodological and theoretical position (for more see: Rosicki, 2018, pp. 151–194).

The main purpose of the analysis is to present the relationships between institutional and legal, socio-technical, and techno-economic factors. In order to specify the scope of the research problem, the research question has been asked of the extent to which institutional and legal factors affect energy transition in the European Union. 'Energy transition' here means the processes and changes of energy carriers in the structure of production or consumption of energy and fuels. Changes in practices of energy use inherently involve the substitution of technologies associated with the use of these carriers. The analysis addresses the European Union as a dynamic structure that has been undergoing the historical processes of political, economic and social integration, from the European Communities to the present. The European Union can also be approached as a statistical unit in the analysis attempting to quantify its internal processes and changes (e.g., EU-27 and EU-28).

Cherp and his team present a comprehensive approach in which the political factor of energy transition is related to state objectives, political interests and institutional capabilities, as well as factors of other types. So, broadly defined political factors lead to other categories that are also important, for example in political science (Cherp et al., 2018, pp. 175–190). However, they can also be related to the multidimensional relationships among numerous political actors, ranging from states to different structures of sectoral

institutions, to social actors, and sometimes to actors in bottom-up processes and changes. All these different types of relations among political or social actors can be described in terms of various power relations. Flor Avelino and Jan Rotmans give particular attention to this issue in their attempt to provide a conceptual framework of power for energy transition studies (Avelino, Rotmans, 2009, pp. 543–569). The theoretical studies into power and power relations have been helpful here, which, to a greater or lesser extent, correspond to Steven Lukes’ considerations on this topic. Power can be considered in terms of its conditions, i.e., the existence of overt or covert conflicts, and corrective or persuasive means of interaction (Lukes, 2005; Scott, 2001, pp. 1–30).

Energy transition has been examined by many disciplines and research currents, including social studies on energy. Some researchers involved in energy studies refer to social studies on technology and science. Different disciplines of the social sciences have undergone various intellectual influences while drawing on various theoretical approaches, which has also been the case in the studies of technology and science. Scholars dealing with energy processes and changes conduct (1) historic, (2) theoretical, (3) social (taking various approaches), (4) synthesizing, and (5) quantitative studies (for more see: Rosicki, 2018). Despite various approaches, currents or paradigms existing in energy transition studies, they primarily address the issues of: (1) assessing the relevance of energy or energy technologies substitution, (2) assessing the extent of energy or energy technologies substitution, (3) assessing the importance of energy or energy technologies substitution, (4) assessing the rate of energy or energy technologies substitution.

1. Theoretical analysis

In their presentation of various planes of processes and changes in the energy industry, Cherp and his team identify three of them: (1) energy transfer in the energy production system and end-use, (2) the use of technology in energy production, and (3) political decision-making processes. The various processes and changes are associated with three types of systems: (1) techno-economic, (2) socio-economic and (3) political. Each of them is composed of interacting elements, which coevolve and thus mutually adapt. The main elements in the first system are resources, demand and infrastructure; in the second one: (1) innovation systems, (2) regimes and niches, and (3) technological diffusion processes; the third one, in turn, features (1) state objectives, (2) political interests, and (3) institutions and capacities (Cherp et al., 2018, pp. 175–190). It is evident that this concept draws heavily on various currents of research on techno-economic paradigms or technical regimes.

One example of an approach taken to study technological regimes is the multi-level perspective, represented by Frank W. Geels. He draws on a wide range of intellectual experiences, ranging from systemic approaches to neo-Schumpeterian evolutionary economics to social constructivism (Geels, Schot, 2007, pp. 399–417; Geels, 2011, pp. 24–40). Regardless of remarks by numerous commentators, this concept points to various types of relations between the main dimensions, namely socio-technical regimes, niches and landscape.

In the context of energy, the socio-technical regime should be considered as a reproduced pattern of particular practices in energy production, consumption, and transition. Its domination is expressed, among other things, in perpetuating common acceptance for particular types of energy processing, and for the system of assessing the economy and rationality of energy processing solutions. Although the multidimensional perspective refers to evolutionary economics, the regime should not be understood only in terms of economic institutions, especially those related to innovation processes. It also consists of social, cultural and political institutions, as well as infrastructure and technology (Rosen, 2002, pp. 1–27). Researchers, such as Adrian Smith, Andy Stirling and Frans Berkhout, as well as Arie Rip and René Kemp, describe regimes of this type as stable configurations of institutions, techniques and technologies, as well as rules, practices and relations that ultimately influence the development and use of technology. Thereby, they influence the trajectories of social, political, economic and technological innovations (Rip, Kemp, 1998, pp. 327–399; Smith, Stirling, Berkhout, 2005, pp. 1491–1510). The structural interdependence of various institutions and practices in the context of one energy carrier, coal, was thoroughly presented in the study of the living conditions of the working class in the industrial north of England before World War II, titled *The Road to Wigan Pier*, written by George Orwell in 1937 (Orwell, 2023; for a broader historical context, see also Dennis, Henriques, Slaughter, 1956; Slaughter, 1958, pp. 241–259; Scott et al., 1963; Warwick, Littlejohn, 1992; Ackers, 1994, pp. 383–414; Philips, 2018, pp. 39–59; Thorsheim, 2018).

At present, various realms of the state are strongly energy-related, which determines their openness or restraint towards the development of various types of innovations. The direct impact of energy on people’s daily lives results in political actors bearing the high costs of many policy actions and decisions. What seems rational for the economy and the environment becomes politically unwise, given its significant political costs (Rosicki, 2019, pp. 31–37). This is because radical changes often undermine established social or economic structures, significantly destabilize the lives of voters, and negatively mobilize the public. Due to the various types of systems coevolving alongside institutionalized policy systems, barriers to energy transition of a (1) technological, (2) sectoral, (3) organizational, (4) social and (5) institutional nature may arise (cf. Unruh, 2002, pp. 317–318).

Taking the neo-Schumpeterian approach and the multi-level perspective, other elements, including landscape and niches, are also relevant, as is the socio-technical regime. According to F. W. Geels, various configurations of relations between the three elements indicated above determine the various forms of processes and changes of energy carriers in the structure of production and consumption of energy and fuels. The term landscape refers to a stable arrangement including values, worldviews and beliefs, among other things. One example illustrating the meaning and impact of the landscape is environmental awareness. A niche, on the other hand, refers to an arrangement of conditions that facilitate the free development of radical innovations that are not subject to the selection mechanisms present in socio-technical regimes (Geels, 2011, pp. 24–40).

Although, initially, the neo-Schumpeterian and multi-level approaches refrained from implementing the category of power in its political sense in analyses of energy transition, it was often present there. After all, it is impossible to analyze socio-tech-

nical regimes ignoring their hegemonic nature and structure, including the energy context. Thus, the corrective or persuasive measures of influence present within regimes are actually the means of maintaining certain power relations (cf. Rosicki, 2018, pp. 17–44). It should be mentioned, however, that as studies in energy transition studies develop, the results and assumptions pertaining to power and politics are increasingly being implemented. This type of research can be illustrated by the texts by Flor Avelino, Adrian Ford, Peter Newell and Jan Rotmans (Avelino, Rotmans, 2009, pp. 543–569; Ford, Newell, 2021).

Avelino and Rotmans apply the category of power to analyze energy transition, which they understand as: (1) the ability to mobilize tangible and intangible resources to achieve goals, (2) the ability to identify new tangible and intangible resources and mobilize them to achieve goals, and (3) asymmetrical or symmetrical relations between social or political actors. Interestingly, however, the forms of power identified by these authors merely specify the mechanisms of relations between the above-mentioned three levels, characteristic of multi-level approaches in energy transition studies (Avelino, Rotmans, 2009, pp. 543–569; Avelino, 2011). Thus, Avelino and Rotmans extend the metaphorical language of pressure mechanisms (between the socio-technical regime, landscape and niche) rather than actually building a framework of the theory of power within energy transition studies. Resorting to metaphors is actually one of the main objections raised against multi-level approaches, as well as against constructivism within the framework of social studies of technology and science (cf. Woolgar, 1991, pp. 20–50; Winner, 1993, pp. 362–378). On the other hand, Ford and Newell try to use the concept of cultural hegemony, including the strategies of resistance and adaptation (and others) by Antoni Gramsci, to analyze the factors of energy transition. However, they too apply them only to specify the mechanisms of pressure between planes in a multi-level perspective. Addressing the intellectual efforts of Avelino, Ford, Newell, Rotmans and other authors who take a similar scholarly perspective, one cannot help but get the impression that they merely boil down to equating corrective and persuasive measures of power with the mechanisms of pressure between the main elements of the multi-level analysis in energy or environmental transition studies (Avelino, Rotmans, 2009, pp. 543–569; Avelino, 2011; Avelino, 2017, pp. 505–520). A similar observation can also be made in connection with attempts to apply the achiev ments of political and sociological sciences to transformational analyses as regards the various types of political and social actors able (or unable) to mobilize tangible and intangible resources to achieve their goals (cf. Avelino, Wittmayer, 2016, pp. 628–649; Avelino, 2017, pp. 505–520).

When analyzing various types of political factors and mechanisms employed in energy transition studies, most often as various social relations of power, the concept of coevolutionary systems by Cherp and his team is worth revisiting. This concept sees the political (institutional and legal) factor as a combination of political goals, political interests, as well as institutions and capacities. As indicated by their coevolutionary nature, they cannot be analyzed without taking into account their mutual relationships, techno-economic and socio-economic factors. This is because the capacity for energy transition is influenced by elements such as energy resources held, imports and exports of energy resources, the potential of renewable energy sources, the type and scale of

energy used, factors affecting the growth or decline in energy demand, energy efficiency, energy and transportation infrastructure, the structures of national and sectoral innovation systems, innovation capital, the structure and potential of regimes and niches, mechanisms of pressure between regimes and niches, and technological diffusion. It is worth noting here that political factors are also important, at least in some cases of energy transition (Cherp et al., 2018, pp. 175–190). For example, interest groups, party political agendas and bottom-up social movements, or their controlled mobilization, can fundamentally change transition directions or simply initiate and sustain transition. How states pursue their interests and function within specific geopolitical conditions or political institutions is of similar importance.

Generalizations can thus be made, and the broadly understood political factors be divided into internal and external, both of which have a stimulating or constraining effect on the trajectories of energy transition. Among significant internal factors are the actions and decisions of political actors driven by what they see as rational. What seems rational from the point of view of long-term and strategic actions (or what simply is rational from the point of view of the economy or the environment), in the context of electoral cycles and the fear of losing support hinders the substitution of energy and energy technologies (cf. Rosicki, 2022, pp. 7–12). Although politics and power are commonly considered in terms of their persuasive properties, it is the institutional and legal instruments wielded by politicians that remain among the most influential in managing energy processes and changes. Among external factors, on the other hand, geopolitical and institutional conditions are of great importance. They can be closely connected, with the European Union and its member states being a good example. The institutional and legal factor should be considered the most significant in the European Union, as illustrated by the processes of institutionalization of energy and climate policies being a consequence of the elimination of internal and external tensions and threats.

2. Problem analysis

2.1. Institutionalization processes

The institutional dimension of integration processes and the admissions of new member states are very important in terms of energy policy and energy transition in the European Union. Integration processes are formed by threats and challenges that member states seek to overcome with the help of the European Union (or its institutional predecessors). From the classical institutional perspective, the European Union is a functional and autonomous factor influencing the energy policy and the directions of energy transition. Taking a more dynamic perspective makes it possible to grasp the causes and regularities of this transition. From the dynamic perspective, the European Union is not a functional and autonomous factor, if only because of the influence of other actors, such as states.

The dynamic approach is expressed by attempting to define the stages of energy policy institutionalization in the broadest sense, including also the substitution of en-

ergy and energy technology in the European Union. Although the institutionalization of energy policy has not always been correlated temporally with energy processes and changes, it seems that broadly understood internal and external political factors are of great importance for the transition. The ‘game-changers’ should be considered the most relevant (cf. Avelino et al., 2017). Internal factors, whether considered in the European Union as a whole, or in individual member states, may include new political actors, bottom-up or controlled social movements, public opinion, unconventional responses of social, political and economic actors to energy threats, and so on. External factors, on the other hand, involve unexpected events, or events that have been expected but which have occurred with high intensity. These factors may include, among others: (1) armed conflicts producing economic consequences, (2) breaches in the security of energy or fuel supplies from external suppliers, (3) energy infrastructure disasters (e.g., power failures, nuclear facility failures), (4) environmental disasters (e.g. oil spills from tankers), (5) global climate change, and (6) diffusion of energy technologies (cf. Sovacool, Brown, 2010, pp. 77–108; Cherp, Jewell, 2014, pp. 415–421; Cherp, Jewell, 2011, pp. 202–212; Cherp, Jewell, Goldthau, 2011, pp. 75–88).

One of the responses to game-changers is an attempt to institutionalize mechanisms for dealing with such situations. It can therefore be said that institutionalization processes, at least in the initial stages, respond to threats or undesirable events, and then develop according to the domino effect or chain reaction logic. In Europe, this was already evident after World War II, when the European Coal and Steel Community, the European Economic Community and the European Atomic Energy Community were established (Kałążna, Rosicki, 2010; Nowacki, 2010; Gawlikowska-Fyk, 2011; Bogdanowicz, 2012). The economic development of Western Europe and the resulting demand for energy increased its dependence on imports and stimulated nuclear energy research (Kalka, 1972, p. 75; Konopka, 2002, p. 39). The high level of dependence on imports, coupled with external factors that included oil crises, led to a reconfiguration in the national systems of EEC countries. This resulted in yet another level of institutionalization of broadly understood energy policy and attempts to transform energy systems. In addition to oil crises, the Chernobyl disaster was another game-changer. It significantly decelerated investment processes, and inspired social movements and political actors to contest nuclear power development plans (e.g., Austria, Poland and Italy) (cf. Plokhy, 2019; Wróblewski, 2023). Nonetheless, the global projections for nuclear energy development made by the International Atomic Energy Agency’s (IAEA) in the 1990s seem to have been optimistic. At the same time, the issues of sustainable development, including ecological generational justice, rational management of natural resources and planning, and environmental cooperation were addressed on a broader international arena (Redclift, 2005, pp. 212–227; Rosicki, 2010, pp. 79–104; Kenig-Witkowska, 2011, pp. 13–75, 163–186; Egelston, 2013; Walewicz, 2021, pp. 138–160).

In the 1990s, political actors began to emphasize environmental issues even more clearly during political and electoral campaigns. This was true about the Labour Party government under Tony Blair in the UK and the Social Democratic Party of Germany under Gerhard Schröder. However, before the European Union more vigorously addressed green issues in the context of energy, it had already begun to shape the energy

market and the rules for its operation. It all started with directives on transit of electricity (1990), transparency of electricity and gas prices (1990), transit of natural gas (1991), and on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons (1994) (for more see: Nowacki, 2010). Another factor to be remembered is that the institutionalization of energy policy and taking measures to support energy transition were additionally hindered by treaty provisions at the time (Kałążna, Rosicki, 2010, pp. 86–164; Bogdanowicz, 2012, pp. 1–68; Szafrański, 2014, pp. 105–156).

The institutionalization of energy policy and energy transition in member states gained momentum with the three energy packages on electricity and gas markets (1996–1998, 2003 and 2009). The idea behind each package was to strengthen the single energy market through its liberalization, including what was named the separation of energy activities related to accounting, functional, legal and ownership aspects. The third package provided for the establishment of institutions to manage the various energy sectors: the EU Agency for the Cooperation of Energy Regulators (ACER), the European Network of Transmission System Operators for Electricity (ENTSO-E) and the European Network of Transmission System Operators for Gas (ENTSO-G) (cf. Grzegorczyk, 2012).

The construction of the single market in the European Union continued with the fourth energy package, which included EU directives and regulations on common rules for the internal market in electricity (Directive 2019/944), the internal market for electricity (Regulation 2019/943), risk preparedness in the electricity sector (Regulation 2019/941) and the establishment of the European Union Agency for the Cooperation of Energy Regulators (Regulation 2019/942). The main objective of the new legislation was to support energy transition in the European Union by: (1) removing obstacles to the creation of the internal market for electricity, (2) eliminating entry barriers on the electricity market, (3) strengthening cross-border exchanges in electricity, (4) allocating electricity transmission capacity, (5) building an efficient and transparent wholesale electricity market, (6) empowering energy consumers and their participation in the market, (7) assessing risks to the security of electricity supply, and (8) skillfully managing electricity crises.

While the four energy packages directly address the operation of energy markets, the climate and energy packages focus on achieving environmental and climate goals in the context of energy and fuel use. In 2009, a number of measures were put forward to promote renewable energy sources and cleaner energy use, including: (1) Directive 2009/28/EC on the promotion of the use of energy from renewable sources, (2) Directive 2009/29/EC on improving and extending the greenhouse gas emission allowance trading scheme of the Community, (3) Directive 2009/31/EC on the geological storage of carbon dioxide, and (4) Decision 2009/406/EC on reducing greenhouse gas emissions. Yet this package is most commonly identified with the four main objectives that were to be achieved by 2020: (1) reducing GHG emissions by 20%, (2) increasing the share of renewable energy to 20% of final energy consumption, (3) increasing energy efficiency by 20%, and (4) achieving a 10% share of biofuels in transportation fuel consumption. Due to disparities between member states, the package provided, for some of them: (1) the possibility of increasing GHG emissions, but only outside the

Emissions Trading System, (2) increasing the share of renewable energy to 15% in final energy consumption, and (3) derogation mechanisms in the Emissions Trading System.

Another package was provided by the 2030 Climate and Energy Policy Framework developed in 2014 and setting new targets to be achieved. These include: (1) a collective reduction in GHG emissions by at least 40% compared to 1990, (2) increasing the share of renewable energy to at least 27% of final energy consumption, (3) increasing energy efficiency by at least 27%, and (4) increasing the target share of interconnections to 15% (EUCO 169/14). Five years later, on account of intensifying climate change and the desire to update the Sustainable Development Goals, the European Commission presented its strategy named the European Green Deal. In the introduction, the Commission talks about a “growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use.” The Green Deal identifies the following main pursuits in the energy context: (1) more ambitious climate objectives for 2030 and 2050, (2) zero pollution for a toxic-free environment, (3) supplying clean, affordable and secure energy, and (4) efficient use of energy resources and electricity (after *The European Green Deal*, 2019).

The ‘Fit for 55’ package, which aims to reduce GHG emissions by 55% by 2030, implements the tenets of the Green Deal in practice. To achieve this objective, the European Union has proposed, among other things, reforming the institutional and financial mechanism of the emissions trading system, EU-ETS, and creating a non-ETS system along its lines. With reference to renewable energy sources, the package envisages that their share in energy consumed will increase to 40%. As regards energy efficiency, the package assumes that the European Union’s final energy consumption will decrease by 11.7% by 2030 compared to 2020. A significant transformation of the gas market assumes substitution by renewable and low-carbon gases and hydrogen (*‘Fit for 55’*, COM(2021) 550 final). Interestingly, the wording of the proposal dated March 28, 2023, for a directive on common rules for the internal markets in renewable and natural gases and in hydrogen*,* occasionally used terms associated with neo-Schumpeterian approaches and multi-level perspectives in transition studies, i.e., ‘trajectories’, ‘decarbonization trajectories’, and ‘lock-in effects’ to describe the gas transition (*Wniosek...*, ST-7911-2023-INIT). The proposal clearly indicates that gas is becoming only an interim fuel needed for a cleaner transition, while renewable and low-carbon gases and hydrogen will be alternative backup resources. They are intended to replace traditional gas and serve as a subsidiary fuel in the future, where decarbonization cannot be achieved by other means.

It is worth noting that the European Union discussed the fifth energy package at a time of high energy prices. These were due to at least two reasons: an increased demand for gas in better economic climate in the post-pandemic EU, and reduced spot gas supplies from the Russian Federation. These events turned out to have preceded the Russian Federation’s armed attack on Ukraine and the sabotage of Nord Stream 1 and 2 transmission infrastructure (Kardaś, Łoskot-Strachota, 2022). In the wake of the armed assault on Ukraine, the European Union had to update its premises for the

next energy package. The new proposals took the form of the REPowerEU plan, which focused on eliminating dependence on imports from the Russian Federation. With this objective in mind, the options are quite limited, which is why the REPowerEU plan has concentrated on elements that have long been part of the European Union’s energy policy, including the objectives of the ‘Fit for 55’ package, namely energy transition, diversification and savings. However, this time, the pace of change and the financial outlay should be greater (REPowerEU Plan, COM(2022) 230 final).

2.2. Transition processes

It is worth beginning by defining what the term ‘energy transition’ means. A common argument against energy transition is that it fails to produce the desired results. This is illustrated by the high level of fossil fuels in the structure of primary energy or electricity production. In the global perspective, the share of coal, gas and oil in the world’s total primary energy consumption in 1990 amounted to 25%, 18.8% and 37.4%, respectively. Twenty-eight years later, little has changed in this regard, as the percentage shares of each source respectively amounted to 26.7%, 22.7% and 31.9%. However, it should be borne in mind that these percentages do not reflect the quantitative scale of primary energy consumption. For example, the total consumption of primary energy from coal in the world increased in 2018 by about 73%, compared to 1990, while total primary energy consumption in general increased by approximately 63%. Visible declines in energy consumption could be seen during the pandemic, starting in 2020, but the same is true about basically every energy carrier and is related to the pandemic crisis. Similar, albeit not identical, observations can be made in relation to the transformation in global electricity production. In 1990, the percentages of solid fuels, gas, oil and nuclear energy in electricity production were, respectively: 37.2%, 14.8%, 10.2% and 17%. Over the next twenty-eight years, the importance of oil has declined, while that of gas has increased. In 2018, the share of energy carriers was as follows: 38.1%, 23.1%, 2.6% and 10.2%. Coal remained important during that period. Additionally, from the quantitative point of view, the production of electricity from coal increased by 130% compared to 1990 while the production of electricity in general increased by almost 125%.[2]

The European Union (EU-28) witnessed similar processes during this period, which by 2018, increased electricity production by 26% compared to 1990. However, the transformation of the structure of electricity production had its peculiarities. Since roughly 2008, the share of coal in electricity production saw a downward trend, dropping by 37% in 2018, compared to 1990. The share of nuclear power went up by only 4%, which may indicate certain stagnation in this respect within the European Union, or even some countries abandoning nuclear power altogether, which is particularly evident in Germany. After 2018, a slight decrease in the share of nuclear power in electricity production could be seen, which was illustrated by the shutdown of the last three nuclear power plants in Germany in April 2023 as an outcome of the policy of *Atom-*

[2] Quantitative data per IEA. Calculations based on secondary IEA data.

ausstieg (nuclear phase-out) (cf. *Atomausstieg in Deutschland...*, 2022).[3] It should also be remembered that the outages and maintenance work carried out at French nuclear power plants in 2022 played their part in the decline in nuclear power production.

Due to the search for ‘easy’ energy sources to replace less environmentally friendly solid fuels, the importance of gas in the electricity generation sector has been growing – its share increased by 224% in 2018, compared to 1990. This could be problematic in the event of gas blackmail from the Russian Federation, a threat that reached its apogee in 2021 and 2022.[4] Before the attack on Ukraine, the European Union bore the geopolitical costs of dependence in terms of economic costs. The cost of gas imports to the European Union in the last three months of 2021 increased to €58 billion (an increase of 391% compared to the same period in 2020). The overall cost of imports increased from €35.9 billion in 2020 to €120.8 billion in 2021, allowing Russia to collect €41.5 billion (+35.8 billion LNG), including gas delivered through pipelines (for more see: Księżpolski, 2022). In the wake of these events, the EU has been making progress. While its dependence on the imports of Russian gas was still quite high in early 2022 (with an over 40% share in all gas imports), by the middle of 2023 its share amounted to as little as 7% (gas supplied via pipelines). However, this does not change the fact that due to the lack of its own gas resources, the EU is dependent on imports from external suppliers (Directorate-General for Energy, 2023). The period when the Russian Federation used gas as an energy weapon and made its armed assault on Ukraine can be described as a game-changer in energy transition in the European Union. On the one hand, this has had an adverse impact on some assumptions developed by the EU, but on the other one, it has accelerated other activities, such as the building of markets for renewable and low-carbon gases and hydrogen. It has also opened up new directions for the development of electromobility, transforming both the automotive and transportation markets. Nevertheless, the disruption of external gas supplies has unquestionably enforced certain countermeasures to be taken.

Energy transition in the European Union is unquestionably characterized by the growing significance of renewable sources, which enhance both energy security and the achievement of climate goals. In 2018, renewables were the fourth main source in electricity generation, after nuclear power, coal and gas. Since 2018, their importance has continued to grow, due to the achievement of the third and fourth energy package objectives. Numerous energy strategies developed in the 21st century state that renewable energy sources are to distinguish the European Union from other areas or countries. However, from a quantitative point of view, China is the largest producer of electricity from renewable sources. The same is also true for wind and solar technologies, if analyzed individually. In this sense, the European Union is not the leading producer of energy from renewable sources, but it is trying to build a stable socio-technical regime on them (*Country rankings*, 2023).

Analyzing the changes that took place in the period from the presentation of the assumptions of the fourth energy package to 2022, it should be noted that the installed capacity of renewable energy sources in the European Union increased by 61% (*Renewable capacity...*, 2023). In 2022, wind and solar energy accounted for 22% of elec-

[3] Quantitative data per IEA. Calculations based on secondary IEA data.

[4] Quantitative data per IEA. Calculations based on secondary IEA data.

tricity generation in the EU, having overtaken gas and coal. It should be remembered that back at the beginning of the 21st century, when the Green Paper “Towards a European strategy for the security of energy supply” was presented, wind and solar energy accounted for only 1% in electricity production. Importantly, gas, coal and other fossil fuels still dominate electricity production with a 39% share. In 2022, electricity production from wind increased by 33 TWh (an increase of 8.6% over the previous year), while from solar sources by 39 TWh (an increase of 24% over the previous year). Interestingly, the growth in solar energy alone has made it possible to reduce the costs of increased gas demand in the EU by €10 billion (*European Electricity Review*, 2023). Renewable energy is thus becoming an instrument of both transformation, understood as achieving decarbonization and low-carbon targets, and energy security.

The pandemic and post-pandemic periods have had their peculiarities in terms of electricity production and consumption. After the 2008 crisis, the European Union saw the two largest declines in electricity production in 2020 and 2022, and the latter continued into the first half of 2023. Comparing the levels of electricity production in the first two quarters of 2023 with the same period in 2022, the decline amounted to almost 6%. Any increase in electricity production in the next year will depend on the growth of industrial production, as this is largely responsible for the reduction in energy consumption in the European Union during the period in question. High energy prices in 2022 negatively affected production levels in the energy-intensive aluminum, steel, paper and chemical industries (*Electricity Market Report...*, 2023). If this situation, where high prices are correlated with declining industrial production continues for longer, further transformation of industrial production in the European Union may ensue. Also, the large number of EU companies going bankrupt in the last three months of 2022 was mainly due to high energy prices, rather than other factors. This puts into question the accomplishment of objectives of the European Green Deal growth strategy.

Conclusions

The analysis presented in the article addressed the issues pertaining to institutional and legal (and, more broadly, political) factors in energy transition. In order to specify the research problem, the question has been asked of the extent to which the institutional and legal factors affect energy transition in the European Union. The European Union is an interesting subject of research in this regard, as it provides an example of an institutionally-driven energy transition. Substitutions of energy and energy technology can be spontaneous processes, for example, unregulated innovation processes emerging in economic niches. Unquestionably, however, state objectives, political interests, and the institutional capacity of political actors significantly influence such an important sphere as energy.

The energy sphere, like other socio-economic spheres, emerges as an object of interactions between various power relations, where corrective or persuasive measures are applied exemplifying overt and covert conflicts. The European Union seems to have gone a long way towards resolving overt and covert conflicts participated in by

various social, political, economic and institutional actors. This can be clearly seen when examining the process of institutionalizing energy policy and the successive energy packages developed. Nevertheless, in terms of a multi-level analysis, the European Union has been a regime flexible enough to both reproduce the established energy regime, and to change it due to external or internal pressures. Apart from objective factors related to resource potential, a large role has been played by political factors, related to the influence of internal interest groups and state actors, as well as external ones. Yet the most significant factors in the processes of institutional reactivity in energy policy and energy transition of the European Union were the game-changers – unexpected events, or events that were expected but occurred with high intensity. There are historical examples, but also the last decade has abounded such in events.

The European Union, as a configuration of institutions, techniques, technologies, rules and practices, is a powerful mechanism for influencing its members. It would not be an exaggeration to say that were it not for their membership in EU structures, many countries would not be sufficiently determined to substitute energy and energy technologies. Despite various internal and external conflicts, the European Union retains great potential in: (1) the mobilization of tangible and intangible resources to achieve decarbonization and low-carbon goals, (2) identification of new tangible and intangible resources and their mobilization to achieve decarbonization and low-carbon goals, (3) stabilization of asymmetrical or symmetrical relations between social or political actors in the implementation of energy policy and energy transition. This is confirmed by the implementation of successive energy packages (1996–1998, 2003, 2009, 2014, 2019, and 2021).

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Summary

The subject of the research problem addressed in the article concerns the importance of institutional and legal (or, more broadly, political) factors of energy transition in the European Union. Following Aleh Cherp and his team, political factors are understood as state objectives, political interests and institutional capabilities and factors of other types. All of them, as a whole, enter into a relationship with other factors, such as socio-technical and techno-economic ones. Referring to F. W. Geels, the European Union can be defined as a kind of socio-technical regime (energy regime), responsive to internal or external threats or adverse events. The main purpose of the analysis is to present the relationship between the institutional and legal, socio-technical, and techno-economic factors. In order to specify the research problem, the research question has been posed of the extent to which institutional and legal factors affect energy transition in

the European Union. To answer this question, the analysis relies on the theoretical aspects of energy transition studies, the institutional and legal approach and secondary statistical data.

Key words: energy policy, institutionalization of energy policy, energy transition, energy transformation, European Union

Czynniki instytucjonalno-prawne transformacji energetycznej w Unii Europejskiej

Streszczenie

Zakres przedmiotowy problemu badawczego tekstu dotyczy znaczenia czynników instytucjonalno-prawnych, szerzej ujmowanych jako polityczne, transformacji energetycznej w Unii Europejskiej. Przez „czynniki polityczne” rozumie się – za A. Cherpem i zespołem – cele państwowe, interesy polityczne oraz możliwości instytucjonalne i czynniki innego typu. Wszystkie one, jako całość, pozostają w relacji z innymi, do których należy zaliczyć: społeczno-techniczne i techniczno-ekonomiczne. Z kolei za F. W. Geelsem Unię Europejską można określić mianem swoistego reżimu społeczno-technologicznego (reżimu energetycznego), responsywnego wobec wewnętrznych lub zewnętrznych zagrożeń albo zdarzeń niepożądanych. Głównym celem analizy jest prezentacja relacji, jaka występuje między czynnikami: instytucjonalno-prawnym i społeczno-technologicznym oraz techniczno-ekonomicznym. W celu uszczegółowienia zakresu przedmiotowego problemu badawczego w tekście wskazano następujące pytanie badawcze: „W jakim stopniu czynniki instytucjonalno-prawne wpływają na transformację energetyczną w Unii Europejskiej?”. Aby odpowiedzieć na to pytanie, analizę w tekście oparto na teoretycznych aspektach studiów nad transformacją energetyczną, ujęciu instytucjonalno-prawnym oraz wtórnych danych statystycznych.

Słowa kluczowe: polityka energetyczna, instytucjonalizacja polityki energetycznej, transformacja energetyczna, tranzycja energetyczna, Unia Europejska

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