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Editorial

Energy Transition in the Context of Society, Environment, and Economy

The need to reduce greenhouse gas emissions is essential for ensuring a balanced ecosystem and reducing negative effects of the climate crisis. The energy transition aimed at reducing greenhouse gas emissions is becoming a necessity, but also a challenge of the modern world. Although they did not bring any significant breakthrough, the Kyoto conferences in 1997 and the Paris Agreement ratified in 2016 both emphasised the concern of numerous countries about the climate and set the course for economic and social changes.

By shaping their energy and climate policies, the European Union's Member States are moving towards a low-emission or even a zero-emission economy, i.e. towards the green economy. This aspiration requires the undertaking of major initiatives. The European Union has set climate and energy policy targets to be achieved by 2020, as well as targets for the following decades up to 2030 and 2050. These primarily relate to the development of renewable energy sources (RES) and taking action towards the decarbonisation of countries, thus introducing changes in the construction of the electricity system in all the Member States. Hence, the transformation of the electricity sector is one of their greatest challenges. In the European Union, energy transformation is reflected in a number of initiatives, which include the commitment of the countries which has been expressed in the Europe 2020 strategy and now in the *Fit for 55* package.

The most significant policy instrument of the EU is the introduction of the CO2 emissions trading scheme. In the first three phases, the need to purchase emissions was extended mostly to electricity generating companies, and the greatest progress was achieved in these sectors (Papież et al., 2021). Emissions reductions in individual countries are derived from a number of specific circumstances, such as the fossil fuels resources (Papież et al., 2018) or conditions for wind or solar power (Papież et al., 2019). As part of the *Fit for 55* package, it is planned to extend the trading of emissions from households and individual transport. The pressure to reduce greenhouse gas emissions is becoming a major political, economic, technological, and social challenge for the countries within the European Union.

Poland has also joined the group of countries which are undertaking initiatives supporting the implementation of the climate neutrality concept. One of them is the resolution on the "Energy Policy of Poland until 2040" plan, approved by the Council of Ministers on 2nd February, 2021. This document specifies Poland's strategy for energy transition related to the energy sector, as well as for meeting

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economic needs that stem from the weakening of the economy due to the COVID-19 pandemic.

In Poland, emission reductions will consist in the further substitution of coal in the energy mix. The launch of nuclear power plants is planned within the next two decades, but temporary reductions in emissions will be a result of replacing coal with natural gas. At the same time, it is extremely important to take into account the regionalisation of the natural gas market, which is conditioned by the gas transmission infrastructure.

The issue of the existence of long-term equilibrium between the European and the American markets is addressed by Katarzyna Bech-Wysocka in her article titled "Understanding the Dynamics of the Prices of Natural Gas as an Important Step in Energy Transition". The VECM model constructed in the author's study proves the existence of long-term relations between the American and the European markets, which indicates significant links despite the lack of common infrastructure. Furthermore, the study shows that shocks from the European market transmit to the USA.

The social impact of the energy transition can be felt by poorer groups of society. In Poland, for example, changing energy sources means switching from cheap coal to more expensive gas. Therefore, if the change of sources is not combined with an improvement in the energy efficiency of buildings, households bear higher costs, which can result in an increase in the extent and depth of energy poverty (Karpinska & Śmiech, 2021). The issues of measuring energy poverty are taken up by Lilia Karpinska in the article titled "Faces of Poverty: Who Are the Energy Poor in Poland?" This study reveals a difference in the scope of energy poverty, which results from the use of alternative poverty measures. It also provides the profiles of energy-poor households, which potentially allows a more effective planning of social policies to cushion the negative social consequences of energy transition.

Another issue related to energy transition is the creation of a common electricity market in the European Union's countries. Energy integration is necessary, because it creates the conditions for building solutions which support energy security and the reliability of the electricity system (including supply) throughout Europe. In crisis situations involving interruptions in energy supply, a common energy market will make it possible to import electricity from other countries. An example of such an action includes the failure of the Polish power plant in Bełchatów (17th May, 2021), in which 10 out of 11 power units were switched off as well as, in order to avoid blackout, energy was imported to Poland mainly from Germany and Sweden. Magdalena Sikorska addresses the issue of creating an integrated electricity market in her study titled "The Integration of the Polish Electricity Market in the Period 2015–2021". Using a qualitative method, the author presents the changes taking place in the energy policy of the European Union and Poland with regard to the creation of a common electricity market. In particular, she analyses the balance of actual cross-border synchronous and asynchronous flows between Poland and the neighbouring countries. The author concludes that the degree of integration of the Polish energy sector with the European energy market increases with the introduction of new electricity market regulations in the European Union. These results can be important for policymakers, as they indicate that the European Union's energy policy influences the degree of integration of the energy sector, including the Polish one.

"The Development of Biogas Production in the Context of Energy Transition: The Case of Poland", which is an article by Paulina Szterlik, can be a voice in the discussion on what the new energy system in Poland should look like in the next 20 years. The author focuses on the question whether the energy system in Poland should be highly concentrated or dispersed, or whether Poland should choose an in-between solution. Using heuristic techniques of data analysis and the SWOT analysis, the author examines

the chances for further development of biogas production, which is one of the types of RES, despite the current changes in Polish programmes. The author concludes that biogas production can be beneficial to local economic growth, environmental awareness, and social welfare. She also indicates that there is a strong need to break down barriers to a further development of biogas production. Biogas production can help meet national and international targets for a just energy transition, developing low-carbon economies and coping with modern economic trends. It also highlights the importance of biogas in the energy transition in Poland while taking into account the "Energy Policy of Poland until 2040" plan.

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