

The Green Economy in Poland - Institutional approach to the production of clean, Green Energy

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Abstract

Purpose of the study: The article will address topics directly and indirectly related to the decarbonization process started as part of the transformation of the energy system, with a strong emphasis on the role of institutions managing and supervising this process. The aim will be to answer the question: can the use of modern renewable energy sources for effects with the framework of the government's short-term policy?

Methodology: In the article was used a literature review, which was mentioned in the references. "Desk research" is the method that was used to analyze.

Main Findings: The Polish Economy is still one of the most energy-intensive economies in the European Union, hence increasing the share of energy from renewable sources may contribute to reducing an environmental pollution in our country. At this point, it is worth emphasizing that the level of air pollution by particulate matter in Polish cities is still one of the highest in the European Union. In order to eliminate barriers to the Development of the included in the title: green energy, many institutions should be involved in the process to manage, advise or support the process (from a legislation part also).

Applications of the study: The article's content can be useful for a wide group of recipients interested in the subject under research. Besides, this research is expected to be applied in Jan Kochanowski University during practical meetings with students.

Novelty/Originality of the study: The subject of energy system transformation has been widely discussed for many months. Particularly noteworthy is the social aspect - mentioned in the discussion - which is based on enabling citizens to take advantage of the opportunities offered by the clean energy transition and helping to cope with the problems. And here, the author of the article wants to join the discussion. In his opinion, the integration of the analyzed area is not possible without the support and involvement of the whole society, but above all, without institutional support. Sustainable management of natural resources is also becoming an urgent issue. This is primarily about managing air quality, including in the energy production process, which is crucial for the socio-economic stability of the Polish.

INTRODUCTION

The term Green Economy is inclusive. This discussion can be defined as a low-carbon, resource-efficient and socially inclusive Economy. All activities should be geared towards reducing carbon emissions and ecosystem pollution and increasing energy and resource efficiency within its framework. The role of the green Economy is to ensure sustainable consumption, production, and resource efficiency for sustainable Development. Within its framework, sustainable consumption and production aim to improve production processes and practices to reduce resource consumption. Furthermore, these improvements are expected to generate less waste and decrease emissions.

In this article, we will narrow the analysis accordingly, pointing out the specifics and selected elements of only one market described within the green economy framework. It is about the energy market, where the methods of energy production significantly impact the environment, according to the given definition of the Green Economy. In doing so, special consideration must be given to air quality, which depends mainly on the right choice of energy production process. The author devotes particular attention in the text not so much to the discussion of the problem of environmental pollution itself (including, among other things, CO₂ emissions) but to the issue of how institutions approach the production of clean, green energy.

It is not revealing to say that in the 21st century, access to electricity determines the standard of living and affects energy security in every country. It is, therefore – economically speaking – about the ability to meet the quantitative and qualitative demand for energy at the lowest possible price and with a clean environment. More and more new energy sources must be involved in making this possible. The reason is simple. Given the depletion of discovered and available conventional energy sources, i.e., fossil fuels, on the one hand (here the decarbonization process is essential), it is necessary, on the other hand, to produce energy using wind, solar, ocean tides and currents, hydropower, river droplets or biomass (including crop hay and firewood). Therefore, with the increase in energy demand, and taking into account

the progress of civilization and the progressive degradation of the environment, it should be clearly emphasized that renewable energy sources (RES) (so-called "green energy") are becoming the most desirable direction under current socio-economic conditions.

As the introduction states, the author decided that the article will address topics directly and indirectly related to the decarbonization process that started as part of the transformation of the energy system, with a strong emphasis on the role of institutions managing and supervising this process.

Research question

The research aim will be to answer the question: Can modern renewable energy sources use affect the framework of the government's short-term policy?

LITERATURE REVIEW

The Development of civilization in the 20th and 21st centuries, often described as dynamic, is resulting in increased electricity demand. However, its increased production, linked to traditional energy sources (i.e. coal, natural gas or oil), increases environmental pollution. In addition, it causes the depletion of said natural resources. In the face of political developments and problems with importing raw materials into the most deficit areas, a predatory energy policy is emerging that threatens future energy security. More beneficial in such a situation seems to be the increased use of renewable energy sources as part of the so-called green Economy ([Wojcik, 2013, pp. 353-365, Karmowska&Barczak, 2014](#)).

Work on creating a green economy can take place within several areas. Firstly, steps should be taken to strengthen interest in it, starting with small regions and extending to national coverage. The next step is to find the right technology and then the source of funding. As 'green investments' are costly, to be feasible, they should be supported through targeted public spending, policy reforms and changes in taxation and regulation. Support for countries working on the transition to a green economy is also required. At the European Union level, regulations have also emerged to implement climate and energy policy. In 2014, the European Council, as part of the fight against climate change, approved four targets (with a 2030 perspective) for the entire E.U. These were revised in 2018 and 2020 to take the following shape:

1. Reduce greenhouse gas (GHG) emissions by at least 55% compared to 1990 emissions;
2. At least 32% share of renewable sources in gross final energy consumption;
3. A 32.5% increase in energy efficiency;
4. Completion of the E.U. internal energy market (here, Poland's energy policy until 2040 is included).

From a historical perspective, the first universal and legally binding global climate agreement, referred to as the 'Paris Agreement on Climate Change' (COP21), was signed on April 22, 2016, and ratified by the European Union on October 5, 2016. Three years later, a further package of regulations was completed. It was called "*Clean Energy for All Europeans*". It was intended to contribute to implementing the energy union and constructing a single E.U. energy market. However, it was already noted at the time that civil society actors interested in implementing climate protection measures were facing obstacles. It was emphasized that, above all, political decisions fail to recognize the enormous potential of civil society for climate protection ([Wüstenhagen, Wolsink & Bürer, 2007, pp. 2683-2691](#)). In the Opinion of the European Economic and Social Committee, it was revealed that policymakers take too little interest in what climate strategies civil society actors want to implement, their needs, and what support they need. In addition, the regulations themselves systemically prevent civil society action on climate (Opinion of the European Committee). The most important conclusion is that climate change policy cannot or should not just be imposed from above.

Moreover, it has been emphasized that it will only be successful if it is based on the broad acceptance and active cooperation of most businesses, local governments and citizens ([Całus, Sołtysik & Michalski, 2021, pp.83-102](#)). It must therefore be implemented primarily from the bottom up. But on the other hand, climate change is a transboundary problem. It cannot, therefore, be solved by national or local action alone. Therefore, the European Union's competence to respond to climate change derives from Article 191 of the Treaty on the Functioning of the European Union.

According to information included in the Annex to the Regulation of the European Parliament and the Council on annual binding greenhouse gas emission reductions by Member States from 2021 to 2030 for a sustainable energy union and to meet their commitments under the Paris Agreement, and amending Regulation No 525/2013 of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information relevant to climate change, Poland is required to reduce its greenhouse gas emissions by 7% ([European Commission, 2019](#)). It should be noted here that the transition to a low-carbon economy reduces the number of jobs in traditional markets (linked to fossil fuels, particularly in energy-intensive sectors). At the same time, new jobs are being created (related to renewable energy sources, energy efficiency and electrification of vehicle transport). Between 2008 and 2014 alone, the volume of employment in the renewable energy sector in the E.U. increased by 0 70%. A further 900,000 jobs are expected to be created by 2030 ([European Commission, 2019](#)). Given this, it is essential to anticipate and mitigate the social impact of this process in individual regions and socio-economic sectors (including through the European Structural and Investment Funds). In addition, as jobs grow in numbers, there should be more institutional

arrangements in place to support the new direction of change, as well as new financial resources dedicated solely to this purpose.

METHODOLOGY

The following research methods were used to achieve the objective set out in the executive summary: compilation of literature items (after a prior search and selection of the most relevant items from the point of view of achieving the objective), and legal acts and available reports related to the green economy, analysis of statistical data on energy security and climate change (including greenhouse gas emissions).

The research was conducted in three stages. The project provides an extensive literature review concerning issues related to a green economy. Only those that were compatible with the issue under analysis (with a particular focus on energy market developments) were selected from these. The energy market in question was then outlined, with a focus on the institution's approach to clean, green energy production. At the same time, the time horizon of the analysis was defined, assuming the moment of signing of the Paris Agreement on climate change as the starting point. A historical perspective is also briefly recalled to introduce the issue.

The next stage was a brief comparison of the adopted strategy for the transition to the green Economy in Poland, an E.U. member, and the situation in a country that is not subject to E.U. regulations (neither as a member nor as a candidate). In this case, the RSA was chosen. The statistics presented in the article, therefore, cover the current energy policies of Poland and South Africa, together with a forecast up to 2040. That's why, in the next part, the author makes a comparison of energy policies in the two countries mentioned above (RSA and Poland) with different geopolitical and economic circumstances that have adopted the same objective (even though only one of them is a member of the E.U.). The stated aim is to move towards a socially inclusive green economy (this is about combining economic development, social progress and environmental protection). The analysis will identify similarities, and differences in the implementation of the 'green growth vision' in the two, pretty different countries.

As a criterion for the selection of the case study, the issue of political, and demographic differences between the identified countries, which, as trading partners, have adopted the same vision of green Development (even though its implementation involves different conditions), was adopted.

FINDINGS / RESULTS

The demand for energy, both in Poland and worldwide, is increasing with the progress of civilization, combined with the phenomenon of depletion of energy resources (mainly fossil fuels) on the one hand and environmental pollution on the other ([Bp p.l.c. Energy Outlook, 2020](#)). According to the European Funds for Infrastructure, Climate, Environment 2021-2027 (pl. FEnIKS) program, investments in energy infrastructure are expected to improve the quality and operational security of electricity grids and the Development of smart gas grids and their increased importance in a modern, green energy system ([Całus, Sołtysik & Michalski, 2021, p. 83](#)).

Poland's National Energy and Climate Plan 2021-2030 ([2019](#)), which is in line with E.U. perspectives, estimates that there will be around 300 locally sustainable energy areas in Poland in 2030. The use of solar energy from photovoltaic sources will reach economic and technical maturity after 2022. It follows that the closed-loop Economy is a fundamental element of the energetics of the future ([Sołtysik & Wróbel, 2021](#)). Still, public acceptance of new technologies is expected to be crucial to the shift in energy policy towards renewable energy sources.

In South Africa (population 59 million, area: 1,219.912 km²), similar to Poland (38 million inhabitants, area: 311,895 km²), we can find at least a few general policy documents from which the position of the authorities there on the issue in question is apparent. The following documents have been developed for the transition to sustainable Development in South Africa: The National Development Plan (NDP) – which adopts an average annual growth rate of 5.4 percent until 2030; the Innovation Plan, and the National Sustainable Development Strategy or Action Plan (NSSD). The assumptions of all of them imply that a green industrial transformation is advisable. However, they do not represent a strategically coherent green vision for industry development. They still mainly see the green Economy as a sector that does not fit the accepted transformation model. The National Planning Commission (NPC) has begun the process of developing pathways to 2050 for South Africa, which can provide a platform for setting the country's vision for green industrial Development ([Gaylor & Chigumira, 2020, p. 8](#)). Institutions interested in the new trend include the Forum of South African Directors-General, the cluster: Economic Sectors, Employment and Infrastructure Development (ESEID), ministerial political and technical structures, and the Intergovernmental Committee on Climate Change. It is worth noting that South Africa has planned an increase in R&D spending of 1.5 percent of GDP by 2019, i.e. even before the Development of the National Plan in Poland.

In contrast, the green investments of so-called "Green R&D", which was defined at 17%-20% of total expenditure, grew steadily annually, by 4.3%-4.8% in real terms until late 2016/early 2017. A bottleneck in the Development of the Green Economy in South Africa has certainly been the difficulty in obtaining licences for some of the technological solutions (including ISO 14001 for environmental management systems, and ISO 50001 for energy management). A carbon tax on greenhouse gas emissions was also introduced there in June 2019 ([Green Economy Policy review, pp. 8-12](#)).

The main reasons for South Africa's sustained low GDP growth¹, according to economic experts, which translates into a green investment, include political uncertainty, low business confidence in public administration; the slow pace of infrastructure projects; low level of competition in many sectors of the Economy; still unsatisfactory employer-employee relations; inefficiency, debt and too slow pace of ownership and structural transformation of state-owned companies, especially the energy monopoly ESKOM. Add to this the lack of a coherent industrial policy; the low efficiency of the central administration; controversial business legislation; an unsatisfactory business environment (bureaucracy and over-regulation of business); a "tight" budget (including lower-than-planned budget revenues), and a growing public debt and budget deficit. For example, in 2019, the budget deficit in South Africa was around 4.5 percent of GDP ([Polska w RPA](#)), while in Poland it was at 0.7 per cent of GDP at the time.

In South Africa in 2019 and 2020, as in Poland, there has been a worsening of power outages, despite it being a country rich in mineral resources (including hard coal, but also: platinum, gold, ferrochrome and iron ore). This had a negative impact not only on the production processes of companies but also on the public's perception of the government. The coronavirus pandemic, as in Poland, also had its negative effects there. It has caused many jobs to be lost and many entrepreneurs to go out of business. Thus, it can be concluded that South Africa, despite moving towards a green economy, remains highly unsustainable. Targeting a socially inclusive green economy is a huge change, requiring a new development model. The key to effectiveness, however, is the industrial policy pursued. It, therefore, seems necessary to refine national policy documents on renewable energy, energy efficiency, "green" buildings and even waste management or sustainable transport. Although South Africa is the E.U.'s largest trading partner in Africa, EU regulations "mobilizing" member countries to switch to green energy do not apply to it.

DISCUSSION / ANALYSIS

In Poland, the construction of a low-carbon energy system is being carried out following the assumptions of the document entitled "Polish Energy Policy until 2040" ([PEP2040](#)). It sets the framework for the energy transition in Poland. The PEP2040 contributes to the implementation of the Paris Agreement concluded in December 2015 at the already-referred 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21), taking into account the need to achieve the transition in an equitable and solidarity-based manner. As stated in the document itself, PEP2040 is a national contribution to the implementation of the E.U.'s climate and energy policy. It takes into account the scale of the challenges in adapting the national Economy to E.U. regulatory considerations related to the 2030 climate and energy targets, the European Green Deal, the COVID pandemic recovery plan and the pursuit of climate neutrality in line with national capabilities, as a contribution to the Paris Agreement.

The low-carbon energy transition envisaged in PEP2040 will, by design, initiate broader modernization changes across the Economy, guaranteeing energy security, ensuring fair cost sharing and protecting the most vulnerable social groups. On the formal side, PEP2040 is one of nine integrated sectoral strategies stemming from the Strategy for Responsible Development. The PEP2040 assumptions are consistent with the [National Energy and Climate Plan for 2021-2030](#). It includes a description of the state and conditions of the energy sector. This was followed by the identification of the three pillars of PEP2040, on which the eight PEP2040 specific objectives were based, together with the actions necessary for their implementation and the strategic projects. A territorial snapshot is presented, and sources of funding for PEP2040 are indicated.

As can be seen from the data presented in Figures 1 and 2, and the data included in the available reports from the Ministry of Climate and Environment, a regular decrease in greenhouse gas emissions is projected in the following years. Noteworthy is the marked decline planned for 2035 and 2040. As a result, the emissions analyzed are expected to reach approximately 271 million tonnes of CO₂eq in 2040 (with LULUCF₂). This represents a reduction of approximately 33% over the period 2005-2040. Relative to 1990, the reduction in CO₂eq emissions across the country's Economy, *ceteris paribus*, will be 29% for 2030 and 43% for 2040, respectively.

It can therefore be concluded that Poland's energy policy is currently determined by two strategic framework documents. These are the aforementioned *Polish Energy Policy until 2040* ([PEP2040](#)) and *the Strategy for Responsible Development until 2020 – with an Outlook to 2030* (adopted in 2017, in short: the Strategy or SRD). However, there are many more institutions involved in the works aimed at lowering emissions. This is evidenced, for example, by the list of contributors during the consultation on the project called "National Energy and Climate Plan 2021-2030". Then, in 2019, many governmental and non-governmental institutions sent their comments. Suffice it to mention here: the Ministry of Investment and Development, the Ministry of the Environment, the Ministry of Maritime Affairs and Inland Navigation, the Ministry of Infrastructure, the Ministry of Family, Labour and Social Policy, the Ministry of National Defence and offices such as the Energy Regulatory Authority, the General Directorate of Environmental Protection. All the major state-owned companies in the energy sector (including PGE S.A., Energa S.A., Tauron Polska Energia, Enea S.A., LOTOS S.A., PKN ORLEN). There were also transmission system operators (i.e. PSE.S.A., PERN S.A., Gaz-System

¹The RSA's GDP growth rate for 2018- 2021, in percentage terms, was respectively: 0.8%, 0.15%, -6.96%, 4.91%.

²The LULUCF sector is related to land use, land use change and forestry. Includes management of soil, trees, plants, biomass, and wood. A special feature of the designated sector is that it not only generates greenhouse gas emissions, but can also absorb CO₂ from the atmosphere. Indeed, each Member State should maintain a balance between the total amount of emissions from the sector and the CO₂ absorption generated by it (in line with the Land Use, Land Use Change and Forestry Regulation (EU) 2018/841).

S.A.), industry associations (e.g. the Polish Electricity Committee, the Polish Society for Transmission and Distribution of Electricity, the Polish Power Plants Economic Society, the Lewiatan Confederation of Employers, the Society for Energy Trading, the Polish Nucleonic Society, the Polish Society of Professional Heat and Power Plants, the Society for the Development of Small Hydroelectric Power Plants), non-governmental organizations (e.g. WWF Poland, the Client Earth Foundation – Lawyers for the Earth, the Renewable Energy Association – SEO, the Energy Forum, the INSPRO Institute for Civil Affairs), the self-governmental sector (e.g. Marshal Offices of the Voivodeships - Kujawsko-Pomorskie, Podlaskie, Pomorskie, Warmińsko-Mazurskie, Małopolskie, Podkarpackie, Łódzkie, Zachodniopomorskie, Union of Voivodeships, Silesian Union of Municipalities and Poviats) and individuals who were and still are interested in the topic ([Ministry of State Assets, 2019](#)). It is worth emphasizing here that such a high level of interest in adopting a proper strategy, especially in the sphere of sustainable resource management and curbing further environmental pollution, should be perceived as positive.

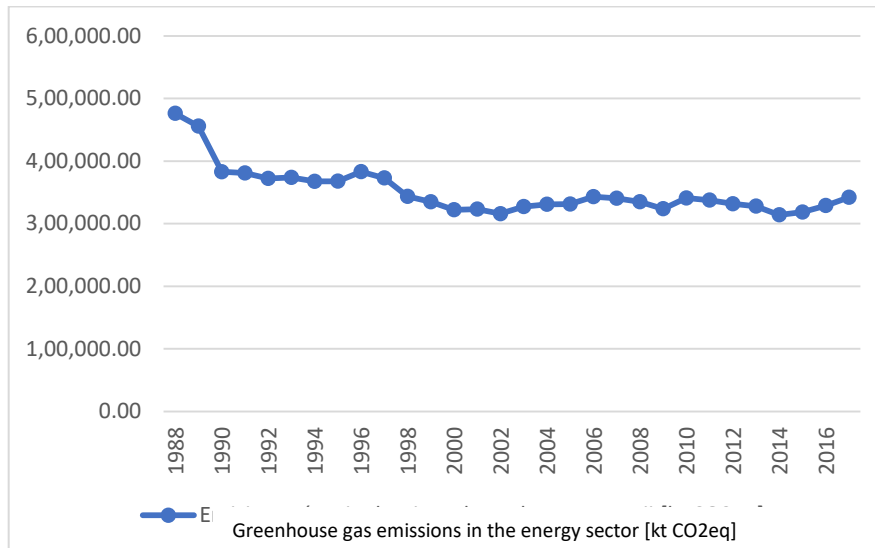


Figure 1: Greenhouse gas emissions in the energy sector in 1988 – 2016 [kt CO2eq]

Source: Own study based on ([Energy Outlook, 2020](#)).

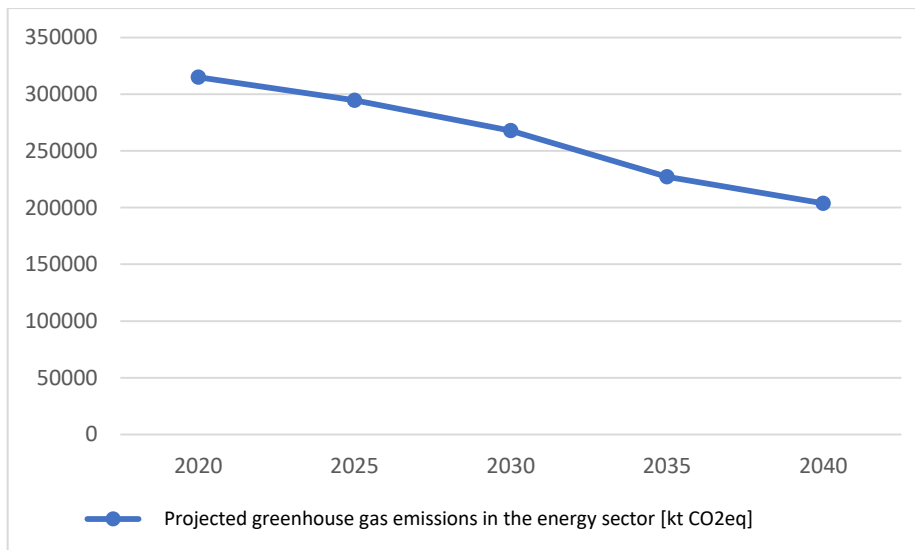


Figure 2: Projected greenhouse gas emissions in the energy sector after 2020 [kt CO2eq]

Source: Own study based on ([Energy Outlook, 2020](#)).

The adopted National Plan was finally developed considering the conclusions of the inter-ministerial agreement and public consultations. It also captures the conclusions of the referenced regional consultation and the European Commission's Recommendation C(2019) 4421 of June 18, 2019. This means that the 2030 targets it declares are a national contribution to the E.U. climate and energy targets mentioned in Section 2, i.e. for reducing greenhouse gas emissions, developing renewable energy sources and improving energy efficiency. Their implementation envisaged for the following years, because of the new problems arising, requires constant monitoring of the whole process and adjustment of those assumptions, the implementation of which will not be possible in the current geopolitical conditions. Of particular note here is the direction from which the imports of the main fuels and energy carriers analyzed are planned. For example, the main source of electricity imports between 2020 and 2040 for the country is expected to be:

Sweden and Germany. Of the other energy carriers, it is noteworthy that the national plan envisaged only one supplier of coal and oil – i.e. Russia – while the only country from which biofuels would be imported was Germany (Scenariusz PEK p. 66). It should come as no surprise, therefore, that in 2022, for extra-economic reasons, there was a need to develop an alternative to the import route so planned. The acceleration of work on the planned construction of nuclear power plants is also justified in the context of energy security analysis.

CONCLUSION

Sustainable Development is supposed to contribute to solving the main problems of modern economies. Given the challenges they face, the Development of renewable energy, implemented within the framework of the Green Deal and the new energy policy, seems to be an important element. Thus, the institutions responsible for its implementation should take into account two areas of sustainability implementation: it is about production and consumption. Achieving the stated goals of a sustainable green economy, however, will only be possible if natural resources are used rationally and energy is used efficiently. In addition, improving economic competitiveness would be desirable, as would desirable measures to reduce poverty (including energy poverty). These are not measures that can produce measurable results in the short term. Therefore, the government's long-term policy aimed at removing barriers in Poland should be implemented by the adopted national plan, compatible with regulations in force throughout the E.U.

Since, as emphasized, among other things, by M. Czarnecka (2018, pp. 4-11), electricity is a factor facilitating the functioning of consumers in society (it creates appropriate conditions for work, Development and rest), the need to strengthen energy security and the necessary improvement of energy efficiency throughout the Economy should not be forgotten in the accepted time perspective. Given this, as part of a sustainable policy (the so-called "green deal" or "green economy"), air quality is expected to improve and overall access to clean energy is expected to increase. The national plan adopted in Poland, and the new climate and energy policy framework included in it are in line with the assumptions of the E.U. as a whole. The Polish Economy is still one of the most energy-intensive economies in the European Union, hence the conclusion that improving energy efficiency and increasing the share of energy from renewable sources can contribute to reducing the environmental pollution in our country. Achieving the 2030 reduction target for greenhouse gas emissions will only be possible, according to the author, if Poland is granted additional, targeted E.U. funding (which countries such as South Africa cannot count on). At this point, it is worth emphasizing that the level of particulate air pollution in Polish cities is still one of the highest in the European Union. To address the barriers to Development included in the title: green energy, further institutions of a managerial, advisory or supportive nature should be involved in their decommissioning.

LIMITATION AND STUDY FORWARD

The limitation of this work is only a theoretical exploration of the issues mentioned above, concerning only a part of the Economy: the energy market. The analysis regarding institutional solutions in Poland and the state and prospects of the green economy is presented very briefly ("Manuscript preparation guidelines" limitations). Therefore, the research on the institutional conditions of the green Economy or the energy market was conducted briefly. Extending the research to practical aspects can be considered the right direction of research in the future.

CONFLICT OF INTEREST AND ETHICAL STANDARDS

The author states that there was no conflict of interest in any area during the whole paper writing and publication process.

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