

THE ROLE OF MODERN TECHNOLOGIES IN IMPLEMENTING THE EUROPEAN GREEN DEAL STRATEGY

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Abstract

The European Green Deal is an attempt to transform the European Union's economy in order to achieve climate neutrality by 2050. This is to counteract undesirable climate change and environmental degradation. In this context, an interesting question is the role of new technologies in the implementation of the European Green Deal. In order to be able to answer this research question, this study is divided into few parts. The first one is an introduction to the analysed issues. The second part presents the basic assumptions of the European Green Deal. The third part presents how new technologies can help in the implementation of European Green Deal strategy. The study ends with a summary containing the conclusions of the conducted research.

Keywords: European Green Deal, New Technologies, European Union.

Introduction

In December 2019, the President of the European Commission, Ursula von der Leyen, presented a new strategy for the development of Europe known as the European Green Deal. This is a political initiative to achieve climate neutrality by the European economy by 2050. This means that in 2050, CO₂ emissions in Europe cannot be higher than the amount of CO₂ that will be absorbed, for example by forests or captured and stored underground.¹ At the same time, an increase in the already ambitious targets to reduce greenhouse gas emissions in the atmosphere by 60% by 2030 is being considered. The Green Deal also aims to increase resource efficiency, reduce pollution levels and protect biodiversity on the continent while ensuring social justice. Unlike other EU development strategies or energy strategies, or even the earlier climate targets, the European Green Deal is characterised by a comprehensive and holistic approach². According to the accompanying roadmap, a new legal framework and guidelines for implementation are to be put in place following a review and adaptation of European legislation.

¹ Bolesta, K., Korolec, M., Climate policy as an independent element of the European Union's foreign policy: conclusions for Poland, "Sprawy Międzynarodowe", No. 1, 2020, p. 53.

² Nowak, Z., Europejski Zielony Ład – na drodze do neutralności klimatycznej UE, „Biuletyn PISM”, No. 66, 2021.

Realising the European Green Deal in practice will mean that by 2050 almost all sectors of the economy will have to be decarbonised. All scenarios leading to climate neutrality assume a complete phase-out of coal. The share of renewables will have to increase significantly. Climate neutrality will require large amounts of investment in renewables or technologies to pull CO₂ out of the atmosphere. Far-reaching changes will also be needed in all sectors of the EU economy and in the lifestyles of Europeans, from consumption habits and forms of leisure to the organisation of business and industry. The dominant argument in the public debate on how to combat climate change is the need to economise and to modify current models of consumption. And although this argument is correct and justified, economic theory has known for years that human needs are unlimited and grow with consumption. In addition, the model of capitalist economy prevailing in all the countries of the European Union is based on continuous growth, and therefore one of the key factors which can lead to the implementation of the principles of the European Green Deal is the widespread use of innovation and technology in industry, agriculture and environmental protection. Based on this thesis a research question arises about the role of modern technologies in the implementation of the European Green Deal strategy. An attempt to answer this question will be made in this paper.

1. Background, substance and objectives of the European Green Deal

One of the greatest challenges facing the European economy and politics is to minimise the negative impact of economic processes on climate change by achieving climate neutrality for the EU over the next three decades. This is a huge challenge requiring both a comprehensive strategy and adequate financial resources. According to the objectives adopted by the European Commission, implementation of the European Green Deal will require a rethinking of policy objectives for clean energy supply throughout the economy, in industry, production and consumption, large-scale infrastructure, transport, food and agriculture, construction, taxation and social benefits. The areas requiring the largest changes will be the protection and restoration of natural ecosystems, the sustainable use of resources and the protection of human health. It is in these areas that transformation can bring the greatest benefits to the EU's economy, society and environment³. The necessary digital and technological transformation through increased innovation is also an important element in the implementation of the European Green Deal.

Climate neutrality is to apply to the entire European economy. The European Green Deal is also a plan for the transition to a clean, closed-loop economy, in which pollution will be reduced and biodiversity maintained. An important aspect is social issues - a just transition and a commitment to leave no one behind. The European Green Deal goes well beyond economics, demonstrating a new socially and environmentally sustainable vision for the development of European Union member states.⁴

The energy transition is proceeding at an unprecedented pace. Global electricity production from photovoltaic installations increased by 1630% between 2010 and 2018, from onshore wind turbines by 272%⁵. On the one hand, this is the result of thousands of investment decisions made by investors and

³Communication from the Commission. The European Green Deal, Brussels, 11.12.2019, <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN> [L.s.06.06.2021].

⁴ Gawlikowska-Fyk, A., Polska w Zielonym Ładzie – korzyści, możliwości i ocena SWOT, „Opinie i ekspertyzy OE-307”, Chancellery of the Senate, Warsaw 2020, p. 4.

⁵International Energy Agency, <https://www.iea.org/data-and-statistics/data-browser/?country=WORLD&fuel=Energy%20transition%20indicators&indicator=ETISharesInPowerGen> [L.s.06.02.2022].

companies around the world resulting in the diversification of energy sources and the development of the renewable energy sources (RES) market, on the other hand it is the result of the efforts of countries, governments and international organisations to increase climate ambition. The last major international agreement signed by the world's largest emitters - the so-called Paris Agreement - was signed in 2015. The European Union, as well as Poland, are its signatories.

The countries which have signed the Paris Agreement have committed themselves to limiting the increase in global temperature to well below 2°C above pre-industrial levels and to making efforts to limit this increase to 1.5°C. The European Union wants to be a global leader in the area of climate neutrality and the development of RES, which is to be an opportunity not only to combat climate change, but also to accelerate the modernisation of economies and infrastructure, and economic development. The 3x20 objective formulated by the EU, i.e. increasing by 20% the amount of energy obtained from RES by 2020, improving energy efficiency by 20% and reducing CO₂ emissions by 20%, is a prelude to combating climate change.⁶ The next step is to achieve climate neutrality in 2050 which is to be achieved by pursuing a European Green Deal strategy. Its aim is "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".⁷

Implementation of the European Green Deal is to be based on the following strategic elements: energy efficiency, renewable energy sources, clean mobility, competitive industry and the closed-loop economy, development of infrastructure and interconnection between countries, development of the bioeconomy and CO₂ sinks, and CO₂ capture and storage. The European Green Deal, as another tool to achieve the EU's objectives, sets the goal of reducing CO₂ emissions by at least 55% by 2030 compared to 1990 levels⁸. This is linked to the revision and extension of the CO₂ emissions trading scheme (ETS) and the increase in allowance prices.⁹

The European Green Deal also promises to review EU industrial policy and develop commercial applications for breakthrough technologies by 2030. Key areas include:

- clean hydrogen,
- fuel cells and alternative fuels,
- energy storage,
- carbon capture, storage and utilisation.

The European Green Deal also identifies digital technologies, digitalisation, recycling, building renovation, multimodal transport, sustainable food as important tools for achieving its goals. It also refers to the concept of sustainable development, outlining the actions and targets the EU will focus on in the coming years. Businesses, in planning their future activities, are forced to take into account aspects such as:

- ecodesign, which includes the reduction of plastics and the use of recycled materials,
- prevention of waste, including packaging waste,

⁶ Marszałuk, P., Markowski, M., Europejski Zielony Ład – geneza, wprowadzenie i planowane rezultaty, <https://crido.pl/blog-business/europejski-zielony-lad-geneza-wprowadzenie-i-planowane-rezultaty/>, 2.02.2021 [L.s.06.02.2022].

⁷ Communication on The European Green Deal COM (2019) 640 final link: https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0016.02/DOC_1&format=PDF, [L.s.06.02.2022].

⁸ The European Council endorsed this objective in its conclusions of 10-11 December 2020.

⁹ Marszałuk, P., Markowski, M., Europejski Zielony.

- Extended Producer Responsibility (EPR),
- emphasis on decarbonisation and certificates for CO₂ removal,
- non-financial data reporting,
- Green Public Procurement (GPP).

The European Union's climate ambitions will directly affect the activities of many businesses. Increasing the CO₂ emission reduction target and achieving climate neutrality will affect the coal-dependent energy sector the most, causing, among other things, an increase in the price of electricity. This will translate into increased costs for every business and consumer. This process can already be seen in many member states. At the same time, the profitability of industrial production will decrease for those using fossil fuels who are obliged to purchase emission rights.

The European Green Deal is not just about threats, but above all a strong stimulus for economic development. The EU's long-term budget for 2021-2027 of EUR 1,074.3 billion is designed to support the goals set. Together with the EU's €750 billion Next Generation EU recovery facility, the Union will gain €1.8 trillion in resources over the coming years. In line with the conclusions of the European Council of December 2020, which set the direction of EU policies including climate change, at least 30% of total Multiannual Financial Framework expenditure is to be allocated to climate projects, and at least 37% of the Next Generation EU funds to be allocated according to a given National Recovery Plan should be used to support the ecological transition.¹⁰

2. Impact of modern technologies on the implementation of the European Green Deal strategy

The experience of the COVID-19 pandemic demonstrated, on the one hand, the high degree of vulnerability and susceptibility of the global economy to unpredictable and sudden events and, on the other hand, unprecedentedly highlighted the potential in the constantly developing new technologies and how quickly these technologies could be effectively adapted to the needs of the new reality. The digitisation of economic transactions, the development of technologies based on artificial intelligence, or the development of applied biotechnology are just a few examples of how modern technologies have made it possible to combat pandemics effectively. Innovative technologies are undeniably a tool that can help to meet global challenges such as ever-increasing greenhouse gas emissions and the accompanying climate change, the need to reduce the carbon footprint or the production of ecological, readily available food.

Transport, agriculture, construction, finance, the clothing industry, electronics and plastics are just some examples of sectors of the EU economy that are to undergo changes in order to achieve climate neutrality by 2050. Innovation and new technologies are to be the key tools for these changes and the objectives behind them. The European Commission's communication points out, among other things, that "new technologies, sustainable solutions and disruptive innovation are critical to achieve the objectives of the European Green Deal. To keep its competitive advantage in clean technologies, the EU needs to increase significantly the large-scale deployment and demonstration of new technologies across sectors and across the single market, building new innovative value chains".¹¹ Importantly, in the context of the level and

¹⁰ Ibid.

¹¹ See: <https://eur-lex.europa.eu/legal-content/EN-PL/TXT/?uri=CELEX:52019DC0640&from=EN>, [L.s.06.02.2022].

sophistication of development of so-called green technologies to date, Europe is entering this project from a position of global leadership, or at least one of them.

New technologies, such as the Internet of Things, 3D/4D printing, augmented reality/mixed reality/virtual reality (AR/MR/VR), cyber-physical systems (CPS), robotics, novel human-machine interfaces (HMI), artificial intelligence (AI), big data techniques, machine learning (ML), deep learning (DL), 5G/6G connectivity or blockchain, oriented towards sustainability goals, will bring a wide range of breakthroughs in many fields.¹² Green technologies in a broad sense, which are understood as all technologies whose use is less harmful to the environment than their alternatives, can also help achieve the objectives of the European Green Deal. They include techniques and processes for pollution control, products and services that pollute less and use fewer resources, and ways of using resources more efficiently. These technologies are used in economic activities, often resulting in cost reductions and, by reducing the use of energy and raw materials, in improved competitiveness, while producing fewer emissions, pollutants and waste. These potential benefits can also have great significance for the development of individual countries. Appropriate technology transfer can give the right solutions to meet their need for rapid economic growth without causing increased pressure on the local or global environment.

Environmental technologies make it possible to minimise the emission of pollutants and to use natural resources efficiently. They are not only production technologies, but entire technological systems, production processes, products, service, equipment and organisational procedures and management. Actions for environmental technologies, leading to the full use of the potential of ecological innovations, are an important element in strengthening both the environmental protection policy and the state innovation policy. Their aim is to effectively use the potential of technologies to meet environmental challenges while maintaining economic growth and improving competitiveness.

One of the major elements of European Union energy policy is the area of broadly understood customer protection. It boils down, among other things, to measures in the area of ensuring transparency of contractual terms and conditions, protection of vulnerable customers, transparency of dispute settlement mechanisms, freedom of access to the grid and the right to reliable information. At the same time, Community policy promotes market mechanisms which guarantee the protection of the rights of small and vulnerable consumers, the transparency of information regarding the sources of primary energy used to generate electricity, and the assessment of their impact on the environment. The need to build knowledge and awareness among electricity consumers about the structure of the fuels they consume was identified and parameterised a dozen or so years ago in the Directive.¹³ The legislation introduced focused on the need for obliged entities to report data on, among other things, the environmental impact of electricity generation sold in the previous calendar year, in terms of carbon dioxide, sulphur dioxide, nitrogen oxides, dust and radioactive waste emissions.

One of the technologies that can effectively support the achievement of the European Green Deal objectives is the distributed blockchain technology. From the perspective of the subject discussed in this study, the possibility of using blockchain technology in the process of unambiguous marking of energy, i.e. assigning it unchangeable attributes of origin and parameters affecting the environment, seems to be particularly

¹² Fraga-Lamas, P., & Fernández-Caramés, T. M. (2020). Leveraging Blockchain for Sustainability and Open Innovation: A Cyber-Resilient Approach toward EU Green Deal and UN Sustainable Development Goals. In C. Thomas, P. Fraga-Lamas, & T. M. Fernández-Caramés (Eds.), *Computer Security Threats*. IntechOpen. <https://doi.org/10.5772/intechopen.92371>.

¹³ Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC, Official Journal of the EU 15.07.2003, L 176/37.

important. The most important element requiring change would be the need to record emission and environmental indicators in real time and to link this information with the recording of electricity generation by metering and billing devices. This mechanism would have to cover all generation sources, taking into account the different specific emissions characteristics of coal, gas and renewable energy sources. Blockchain technology can also improve the functioning of food supply chains, particularly in those areas relating to agri-food traceability, origin, safety and quality.¹⁴ This is in line with the European Green Deal strategy 'Farm to Fork'. This strategy aims to help the EU achieve climate neutrality by 2050 by shifting the current EU food system to a sustainable model. First experiences and pilot projects show that blockchain has indeed a strong potential to increase transparency in the functioning of food chains.¹⁵ It can, on the one hand, provide a secure and tamper-proof information trail on the origin of products and food quality certificates and, on the other hand, guarantee the actors involved an immutable record of all completed transactions. These benefits are increasingly convincing companies in the agri-food sector and high-tech companies to implement joint, innovative projects on the basis of blockchain.¹⁶

Conclusion

Globalisation processes and the development of economies at the cost of environmental degradation are forcing countries, economic entities and also ordinary citizens to become more active in protecting the natural environment. In limiting the pressure of economic growth and intensifying protection of increasingly endangered natural resources, it is essential to develop clean technologies and ecological innovations. New technologies, including green technologies, contribute significantly to increasing competitiveness and creating new jobs. In the face of contemporary challenges of globalisation, ecological innovations play an extremely important, double role. Firstly, being modern solutions of product, process or organizational nature, they contribute to the development of innovative economic entities. They make it possible to lower production costs, increase competitive advantage on the market or enter new sales markets. This, in turn, is a unique opportunity to create new jobs and reduce the level of unemployment. Secondly, by having a positive impact on the endangered natural environment, they influence the reduction of negative impacts on it or the achievement of greater efficiency in the use of increasingly scarce resources, including energy.

The enormous potential and opportunities arising from real, properly planned and effectively implemented investments in new technologies have long been recognised by European Union institutions. The most recent, comprehensive programme are the assumptions of the so-called European Green Deal. The key tools for these changes and the objectives behind them are to be innovation and new technologies. In the opinion of the European Commission, new technologies and innovation are key to achieving the objectives of the European Green Deal. To maintain its competitive advantage in clean technologies, the EU must

¹⁴ Smit H.: Blockchain: The trigger for disruption in the food value chain. [on line]. RaboResearch. Food & Agribusiness 2017. http://www.tenenga.it/wp-content/uploads/Rabobank_Blockchain_The_Trigger_for_Disruption_in_the_Food_Value_Chain_Smit_Dec2017.pdf [L.s.06.02.2022].

¹⁵ Ge L., Brewster Ch., Spek J., Smeenk A., Top J.: Blockchain for Agriculture and Food. Findings from the Pilot Study. Wageningen Economic Research, The Hague 2017.

¹⁶ Galvin D.: IBM and Walmart: Blockchain for food safety. [on line]. IBM Corporation 2017., [https://www-01.ibm.com/events/wwe/grp/grp308.nsf/vLookupPDFs/6%20Using%20Blockchain%20for%20Food%20Safe%20/\\$file/6%20Using%20Blockchain%20for%20Food%20Safe%20.pdf](https://www-01.ibm.com/events/wwe/grp/grp308.nsf/vLookupPDFs/6%20Using%20Blockchain%20for%20Food%20Safe%20/$file/6%20Using%20Blockchain%20for%20Food%20Safe%20.pdf) [L.s.06.02.2022].

significantly increase the large-scale deployment of new technologies in different sectors and across the single market, creating new innovative value chains.

The European Commission has presented a long list of actions which it intends to take in the coming months in order to increase the competitiveness of the EU economy and entrepreneurs from member states based on the so-called green economy. These actions include, among others, a number of incentives and facilitations in access to the system of intellectual property rights and their effective enforcement.

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