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ENERGY TRANSITION AS A CATALYST FOR SDGs: LESSON FROM GERMAN'S RENEWABLE SHIFT FOR EUROPEAN SECURITY AND SUSTAINABILITY

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Abstract. ***The global pursuit of the Sustainable Development Goals (SDGs) – particularly SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action) – has gained urgency amid geopolitical conflicts and energy market disruptions. This paper investigates how Germany's accelerated renewable energy transition (Energiewende) serves as a strategic model for achieving energy security while advancing broader sustainability objectives in Europe.***

The study focuses on german die Ampelkoalition's tenure (SPD-Greens-FDP coalition), analysing their policy frameworks, technological investments, and socio-economic outcomes in driving the energy transition. Key initiatives include renewable energy reforms, measures to accelerate wind and solar expansion and innovative approaches to balancing energy security with climate goals during the energy crisis triggered by Russia's invasion of Ukraine. The paper examines both achievements and challenges faced by the coalition, including tensions between rapid decarbonization goals and energy affordability concerns.

Special attention is given to the interplay between renewable energy expansion, industrial decarbonization, and social equity – factors critical for a just transition. The findings contribute to ongoing debates on sustainable development by demonstrating how national energy transitions under specific political configurations can simultaneously enhance security, reduce emissions, and foster innovation – ultimately supporting the integrated implementation of the SDGs in a geopolitically uncertain world. The German case under die Ampelkoalition's offers particularly relevant insights for European countries navigating similar sustainability and security challenges.

Key words: *Energiewende (energy transition), sustainable development goals (SDGs), renewable energy sources (RES).*

Introduction

In this article two main topic will be raised – energy transition (including renewable energy sources) and sustainable development goals. Both important issues will be analysed on an example of Germany and theirs approach to the topic. The 2030 Agenda for Sustainable Development includes 17 Goals Sustainable Development Goals (SDGs) and 169 targets. Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development involves harmoniously combining economic growth and environmental protection, considering the planet's limited resources. In practice, this also means taking into account political, social, and cultural contexts, as well as the interests of social groups and movements (Drosik, Heidrich, Ratajczak, 2022, p. 10-11).

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The idea of sustainable development encompasses three dimensions: environmental, economic and social. The first dimension, related to ecology, focuses on setting limits on human activity in the context of the regenerative capacity of the natural system. The economic dimension focuses on meeting current needs while caring for the resources necessary for the well-being of all generations. The social dimension concerns solving the most important social problems (Nakonieczna-Bartosiewicz, 2022, p. 19). The approach to sustainable development must be interdisciplinary and comprehensive. Combining environmental, economic and social dimensions allows for more effective implementation of systemic changes that are necessary for a sustainable future. It is important to take each of these dimensions into account and remember that they should function together.

A very important document in the context of sustainable development is the 2030 Agenda for Sustainable Development. This document is a continuation of the earlier Millennium Development Goals of 2000, which were set to be achieved within 15 years. They represented a global mobilisation in the fight against poverty, based on the commitment of world leaders. According to a 2015 report, the Millennium Development Goals led to the emergence of a very strong movement against poverty (United Nations, 2015, p. 3). The Sustainable Development Goals have introduced a broader and more up-to-date approach to contemporary challenges and problems. The issue is very complex and is evolving dynamically along with new initiatives implemented by countries as part of the implementation of Agenda 2030. It was adopted in 2015, and all 193 UN member states have committed to its' implementation. These goals primarily concern ensuring a dignified life, peace and economic progress for all people in the world, while caring for the natural environment and combating climate change. Agenda 2030 consists of 17 Sustainable Development Goals (SDGs) and 169 related tasks (United Nations 2015, p. 1). In this article 2 of 17 goals will be analysed – SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action). The goals are particularly important in german policy, since the country invests a lot to energy transition and actions regarding climate. Nevertheless, it is impossible not to mention general European Union's approach regarding climate policy, since each member of the organisation should follow the general rules and this applies to Germany. The evolution of EU climate policy began as early as the 1980s, followed by a gradual strengthening of policy frameworks between 2000 and 2010. This process reached another milestone with the announcement of the European Green Deal in 2019. The EU is widely regarded as a global leader in climate policy, owing to its advanced legal frameworks and regulations. Over time, the EU has introduced an increasing number of climate policy instruments, with notable progress in both the diversity of policy tools and the integration of climate policy (CPI – Climate Policy Integration). This integration mechanism has expanded beyond emission-specific sectors to include indirectly related and supportive policies, demonstrating parallel progress in both areas. However, despite these advances, the path to climate neutrality by 2050 remains a significant challenge. Climate policy must maintain flexibility to adapt to dynamic socio-economic conditions.

Another important issue regarding this article concerns energy transition. In Germany there is a programme called *Energiewende*. The energy transition programme was initiated in 2011. However, before delving into its specifics, it is crucial to examine the

context and key factors that contributed to its emergence. Nuclear energy was introduced in the Federal Republic of Germany in 1955, with the first power plant becoming operational in 1961. Over the next two decades, the technology rapidly expanded, resulting in over 30 nuclear plants. Despite initial enthusiasm, opposition soon emerged, with critics emphasizing nuclear power's environmental hazards and raising concerns about radioactive waste disposal. The anti-nuclear movement gained traction in the 1980s, leading to the formation of the Green Party. Public resistance intensified significantly after the Chernobyl disaster in 1986. In 2000, the German government signed an agreement with energy companies to gradually phase out nuclear power. The Fukushima disaster in 2011 further accelerated this shift, sparking widespread public discontent and demands to abandon nuclear energy entirely. Consequently, all parties in the *Bundestag* passed legislation mandating the shutdown of all operational reactors by the end of 2022 (Kędzierski, 2023). Thus, *Energiewende* represents a fundamental transformation of the energy sector, often described as a groundbreaking shift toward renewable energy sources. To understand the programme's framework, it is essential to analyse the key policy document *Deutschlands Energiewende – Ein Gemeinschaftswerk für die Zukunft* (Germany's Energy Transition: A Collective Project for the Future). The document outlines Germany's objectives to shape its' energy policy in a way that ensures reliable supply, environmental sustainability, and affordability through competitive pricing. It asserts that Germany's long-term security rests on three pillars of sustainable development: environmental protection, social equity, and economic stability. By establishing this integrated approach, the *Energiewende* aims to create a resilient energy system that serves as a foundation for Germany's international competitiveness, employment, prosperity, and social cohesion (Ethik-Kommission Sichere Energieversorgung, 2011, p. 17-18).

Energiewende before 2021

As mentioned in introduction, the energy transition programme in Germany was initiated in 2011. It has been evolving ever since. It is important to underline the most important principles of the *Energiewende* programme:

(i) **Nuclear phase-out** – the plan assumed full discontinuation within a decade. Nuclear plants were to operate only until their capacity could be replaced by lower-risk energy sources. Decommissioning priorities were based on remaining risk levels and each plant's role in regional power grids (Ethik-Kommission Sichere Energieversorgung, 2011, p. 10-12).

(ii) **Energy transition oversight** – the Ethics Commission proposed a monitoring process to control the nuclear phase-out. Plants would be retired only when replaced by safer alternatives, with annual progress assessments of replacement technologies (Ethik-Kommission Sichere Energieversorgung, 2011, p. 14-16).

(iii) **Energy efficiency and lifestyle changes** – solutions such as building thermal insulation were disscused, they could significantly reduce energy consumption. It was emphasized that active public participation and engagement were crucial, through measures like smart energy meters that would help conserve electricity and facilitate decisions about replacing energy-intensive appliances (e.g., refrigerators) with more efficient models. A solution called "smart grid" was suggested.

This could involve innovative devices, heating and cooling systems, or energy storage in refrigeration units. A systemic approach would be innovative, combining energy management with significant decentralization of decision-making. Lifestyle changes would involve building modernization, equipping structures with better insulation, modern heating systems, and renewable energy sources. The introduction of new construction standards in 2010 led to a reduction of CO_2 emissions by one million tons, which at the time accounted for less than 1% of total private household emissions but demonstrated significant potential for growth. Examples of new construction included plus-energy and zero-energy houses. Furthermore, insulation materials, photovoltaics, and energy-efficient lighting would play crucial roles (Ethik-Kommission Sichere Energieversorgung, 2011, p. 65-74).

(iv) **Renewable energy expansion** – renewable energy sources (RES) became extremely important for the energy transition. In Germany, they played a key role, particularly wind, solar, geothermal, and biomass energy. Solar energy (specifically photovoltaics) offered numerous opportunities for cooperation with countries in Southern Europe and Africa, which would contribute to the development of the energy sector and provide economic growth opportunities for the southern continent. It was also expected that once photovoltaics achieved grid parity (the point where the cost of energy from PV installations equals the price of energy purchased from the grid), another wave of technological development would follow. Traditional PV installations would be integrated with smart grids, enabling autonomous energy consumption based on demand, storage of surplus energy, and management of energy supply to the grid. Additionally, photovoltaics was expected to enable more efficient use of electricity through decentralized charging of electric vehicles (Ethik-Kommission Sichere Energieversorgung, 2011, p. 74-79).

(v) **Energy supply security** – to achieve energy supply security, available energy capacity had to exceed peak demand while maintaining safety reserves. The Federal Network Agency stated that closing the seven oldest nuclear plants did not threaten energy security, but further plant closures would require additional generating capacity to maintain a safety buffer. To achieve climate-neutral energy production, it was necessary to increase renewable energy capacity and modernize and expand industrial grids (Ethik-Kommission Sichere Energieversorgung, 2011, p. 50-53).

(vi) **Public and democratic engagement** – to involve society in energy transition matters, the National Energy Transition Forum (*Nationales Forum Energiewende*) would organize public debates on the subject. The meetings would be open and transparent, allowing for argument exchanges, proposal submissions, and the use of citizen dialogues for discussion and collaboration. The Forum would serve as an "ideas marketplace" for the energy transition, where concepts and strategies would be analysed (Ethik-Kommission Sichere Energieversorgung, 2011, p. 63-64).

(vii) **Research and innovation support** – scientific research and testing of alternative energy technologies and solutions in renewable energy, grid management, and

energy efficiency improvements were essential for the energy transition. Energy and climate research needed to be linked to the development of new technologies and stem from a systemic approach to sustainable development. Cooperation with scientific institutions, such as the Leopoldina Academy (established by the Federal Ministry of Education and Research), which studied the consequences of phasing out nuclear energy for science, would also be important (Ethik-Kommission Sichere Energieversorgung, 2011, p. 93-95).

(viii) **International leadership** – Germany sought to position itself as a leader in energy transition for Europe and the world. The German energy transition model served as an example for countries like China and the United States, while German companies benefited from growing global demand for energy technologies and grid infrastructure. The nuclear phase-out plan assumed a 20% increase in energy efficiency by 2020, with nuclear energy being replaced by renewables. Regarding coal, the world's primary energy source, Germany took responsibility for developing cleaner coal combustion technologies and planned to initiate international research on industrial CO_2 utilization. Furthermore, Directive 2009/71/EURATOM on radiation protection was issued. EU member states were required to adapt their laws to this directive, with Germany overseeing the implementation process to ensure maximum effectiveness (Ethik-Kommission Sichere Energieversorgung, 2011, p. 106-110).

The described principles were listed in the document: *Deutschlands Energiewende – Ein Gemeinschaftswerk für die Zukunft* in 2011. The primary focus shifted away from nuclear power plants and transitioned to renewable energy sources. The programme aims to ensure secure, environmentally friendly and competitively priced energy supplies based on the principles of environmental protection, social justice and economic stability. Solutions such as building insulation, smart energy management and the introduction of new building standards have been proposed. It's crucial to underline, that energy security is linked to the availability of energy at affordable prices, which is very problematic for Germany, as it is an energy importer. However, investment and development in renewable energy sources helps to reduce this dependence on others, increasing energy security and avoiding dependence on energy-exporting countries. In Germany, around 380,000 people currently work in the renewable energy sector, and the German Renewable Energy Federation estimates that this number will rise to 500,000 by 2020. There are also almost one million jobs in the environmental technology sector (wastewater treatment, recycling). Medium-sized companies benefit most from the growing demand for energy-efficient products and applications. More than half of the sales revenue of these companies comes from environmentally friendly goods. One of the key issues in climate transformation is coal, with Germany being the world's largest consumer of lignite, producing 183 million tons of it in 2013. In 2015, Germany agreed to close its large lignite-fired power plants before 2020, aiming to reduce CO_2 emissions by 11 million tons annually and meet its commitment to a 40% reduction in greenhouse gas emissions by 2020. While Germany decided to close all hard coal mines by 2018, it continues to import around 90% of its hard coal, primarily from Russia. An alternative to coal is renewable energy, where Germany's potential is more noticeable in wind en-

ergy than photovoltaics; the north-west of the country is a suitable area for onshore and offshore wind turbines. Germany has invested the most in the EU in photovoltaics and wind energy, becoming the European leader in wind energy by 2014 and ranking third globally. German wind energy companies like Enercon and Siemens specialize in various installations, production, and maintenance. In solar energy, Germany is considered a world leader and a significant exporter, renowned for its high-quality crystalline and thin-film panels, advanced inverters, and its role in setting international quality standards, although Chinese companies lead the global sector. Biomass is another important renewable source, primarily used as wood, with the German government promoting biomass boilers; German companies have developed highly efficient technologies and are world leaders in biogas production and recovery, exporting about 45% of their production in 2013. Local companies benefit from the *Energiewende* program, supporting the economy, and German firms play a significant role in the renewable energy market, with the export of wind and solar technology being a substantial part of total German exports. However, even before *die Ampelkoalition* government, challenges were evident (Pelegry et. al., 2016, p. 146).

The 2019 *Klimapaket* (Climate Package), which included a CO_2 price for transport and heating, was criticized by environmentalists as insufficient and by businesses as harmful to the economy; government studies showed it would not achieve the required emission reductions. Another crucial step was the coal phase-out (*Kohleausstieg*), committing to close all coal-fired power plants by 2038. Critics emphasize that the pace is too slow, and decisions like launching a new coal power plant undermine climate efforts, with concerns that phasing out coal and nuclear energy could lead to an energy deficit filled by natural gas imports. On the other hand, the energy transition has successes: the share of renewables in Germany's energy mix exceeded 35% in 2020, ahead of schedule, with a target of 65% by 2030. Nevertheless, Germany failed to meet several *Energiewende* goals: primary energy consumption was reduced by only 10% by 2020 instead of the targeted 20%, and the target of a 40% reduction in CO_2 emissions by 2020 was not met, raising doubts about achieving a 55% reduction by 2030. The transport sector is particularly problematic, with forecasts indicating a shortfall of around 3.5 million electric vehicles compared to the 10 million targets for 2030. Social acceptance for the *Energiewende* remains high, but Germans increasingly complain about its costs and slow pace of implementation; in 2018, 66% of citizens rated the progress of the transition as "bad" or "very bad." Looking to the future, Germany pins great hopes on its hydrogen strategy, planning to use "green" hydrogen produced from renewable sources as an alternative for industry and transport, with plans to import it from North Africa. However, without further development of renewables and energy storage, this strategy may not yield the expected results (Gustafson, Heering, 2021, p. 47-61). In conclusion, the german energy transformation involves many positive changes but also faces serious challenges: the costs are high, CO_2 emission reduction is insufficient, and energy supply problems could lead to greater dependence on natural gas. The government must find a way to accelerate the development of renewables, increase energy efficiency, and transform the transport and building sectors to meet climate goals in the coming decades.

Energiewende after 2021

The realisation of *Energiewende* programme was particularly enhanced during *die Ampelkoaliton's* administration. The main goals regarding energy transition and Sustainable Development Goals described in coalition's agreement (*Koalitionsvertrag*) were:

(i) Establishment of the European Green Hydrogen Alliance and implementation of IPCEI Hydrogen.

(ii) Production of approx. 15 million electric cars; vehicles should be CO_2-neutral and powered by synthetic fuels.

(iii) Ultimately, all roofs should be used for solar energy production, achieving approx. 200 GW of installed photovoltaic capacity, increasing wind power capacity to 30 GW by 2030, developing a strategy for sustainable biomass use, striving for a uniform hydrogen certification system, and expanding energy infrastructure.

(iv) Implementing Agenda 2030, sustainable development goals, the Paris Agreement, using the G7 presidency to establish climate partnerships (SPD, Bündnis 90/Die Grünen, & FDP, 2021, p. 21-45).

It is advisable to begin deliberations with one of the ideas, which were written in *Energiewende* programme, already in 2011 – nuclear phase-out. It was the government of *die Ampelkoalition*, that has successfully completed this mission in 2023. Nuclear energy had already raised doubts and concerns in the 1970s, when some began to consider it very dangerous for the environment. Of course, the phase-out of these power plants will have consequences. In the short term, the shutdown of power units with a total capacity of 4.3 GW will force an increase in energy production, mainly in coal and gas-fired power plants, which supplement the growing share of renewable energy sources in the system. Furthermore, the role of natural gas will begin to grow; the phase-out of nuclear and the long-term plan to phase out coal means that the energy sector will have to rely on gas-fired units. Unfortunately, this may lead to an increase in greenhouse gas emissions, even though they are somewhat more environmentally friendly. It is also estimated that due to the abandonment of nuclear power plants, Germany will have to import energy from other countries, which may also come from nuclear units. Another negative effect of this decision is the increase in wholesale electricity prices – obtaining it from coal and gas units will be more expensive (Kędzierski, 2023). The assessment of whether the shutdown was justified remains divided; there are supporters of this solution, but there are also many opponents. They believe that the consequences of closing nuclear power plants will be higher energy costs and the need to use other sources, such as natural gas, which contradicts the idea of caring for the climate, as it may be associated with increased greenhouse gas emissions.

Another article assessed that the Federal Republic of Germany lost approximately 332 billion euros due to the abandonment of nuclear power, and it also slowed down the country's decarbonization process. Further studies estimated that if Germany had not abandoned nuclear energy, it could have saved around 600 billion euros, thereby achieving better results in reducing CO_2 emissions. Many people question this decision, and the possibility of a return to nuclear power is being considered. Following the closure of the last nuclear power plant, it can be assumed that the direction of Germany's climate policy will take on a completely new dimension. However, the decision was highly con-

troversial, and its' implementation occurred at an exceptionally difficult time – during the Russian-Ukrainian war, when Germany had to become independent from Russian gas imports. The resulting higher energy costs and the shift, for example, to natural gas, which may lead to increased greenhouse gas emissions, are particularly called into question (Piwowarski, 2025). The approach towards the Russian invasion and implications, that follow it, will be discussed later.

To analyse what the government of *die Ampelkoalition* has done regarding renewable energy sources, it is important to look at data presented by *Deutsches Institut für Wirtschaftsforschung* (DIW) – German Institute for Economic Research. In 2021, a working group on sustainable development was established at the institute, consisting of several DIW researchers and non-researchers from various areas of responsibility. The main goal of the working group is to achieve CO_2 neutrality. To achieve this goal, conscious, sustainable and efficient activities are to be promoted in all areas of the institute (Deutsches Institut für Wirtschaftsforschung). The main goals regarding renewable energy sources and theirs' gross share in energy consumption were analysed by DIW. An assessment of *die Ampelkoalition* government's performance shows a mixed record in meeting its specific 2024 numerical targets for renewable energy. The most outstanding success was in photovoltaics (PV), where installed capacity significantly exceeded the 2024 target, surging by approximately two-thirds during the coalition's term. This boom was largely driven by small-scale rooftop installations, fuelled by their growing profitability and falling module prices. Government initiatives like the "*Solarpaket*" facilitated this growth by streamlining regulations for various types of solar installations. However, this rapid expansion has created new challenges for the grid, including periods of negative electricity prices during peak production and a lack of remote control over these distributed systems (Guéret, et. al. 2025, p. 87-90).

Progress in onshore and offshore wind energy was more modest, achieving roughly half of the ambitious 2024 targets. The primary obstacle was lengthy planning and permitting processes. In response, the government implemented crucial administrative simplifications, designated new areas for development, and increased auction volumes, which led to a significant number of new projects being approved by the end of 2024. The development of heat pumps has been too slow to meet the 2030 goal. Installation rates in 2024 not only fell short of annual targets but were also lower than the previous year, with fossil fuel heating systems still vastly outnumbering new heat pump installations. This slowdown is partly attributed to public uncertainty caused by debates surrounding the Building Energy Act (GEG), though the government introduced financial support and simplified rules to counter this. The most significant shortfall is in green hydrogen production via electrolysis. This sector is the least developed, with only about 1% of the massive 2030 target capacity realized. While many hydrogen projects have been announced, most are still in their early stages, despite government strategies to support infrastructure, import, and industrial application (Guéret, et. al. 2025, p. 91-93). The progress of the *Energiewende* program varied significantly across different renewable energy sources. The expansion of renewable energy sources (primarily wind and solar power) and the development of the electrical grid were accelerated. The issue of the heating system and the creation of infrastructure for importing liquefied natural gas (LNG)

were also significant. The high electricity prices and the lack of technological openness in the *Energiewende* program are assessed negatively (Polansky, 2025). In summary, *die Ampelkoalition* fulfilled part of its' stated objectives, as demonstrated by developing and investing in renewable energy sources, which are intended to form the foundation of Germany's climate future. The closure of nuclear power plants sparked considerable controversy, as it is currently associated with enormous costs and rising fees for society. There are even suggestions that some of these plants may be reopened. Not every goal set by the government is backed by a concrete action plan, such as the phase-out of coal. Some changes gained momentum not only through the ambitious targets outlined in the coalition agreement but also due to the war in Ukraine, which made the German government aware of the need to achieve independence from Russia. It is possible that some of the proposed solutions may be less well-thought-out in the long-term perspective. An effective transformation should, above all, be based on a long-term strategy.

Energy security regarding Russian invasion and realisation of SDGs by Germany

It is important to address, that the situation related to the energy transition and security has been strongly influenced by Russia's invasion of Ukraine. This war started on February 24, 2022, and was termed a *Zeitenwende* – a turning point or a change of an era. The event had a lasting impact on the global order, significantly altering the socio-economic situation of the European Union and the Federal Republic of Germany. Above all, the Russian attack on Ukraine was described as a drastic violation of the European security order and a symbol of the failure of the specific tradition of *Ostpolitik* (Buras, Warsaw 2023, p. 7). Furthermore, this conflict influenced geopolitics, geostrategy, and geo-economics across the entire Eurasian region and even globally. Particular attention was drawn to the issue of energy security in the context of the functioning of national and EU economies. It highlighted the EU's dependence on imports of external energy sources, primarily energy raw materials, and especially natural gas. This event became a catalyst for the redefinition of EU energy policy, initiating a process of diversifying sources and achieving independence from the Russian Federation. Energy security, as one of the five pillars of the EU's energy policy, plays a fundamental role in ensuring the stability and reliability of energy supplies. Issues related to the stability of the energy system are closely linked to the goals of climate policy due to so-called "green" factors and the Union's commitments to long-term energy and climate objectives. The Russian invasion of Ukraine implied significant changes in the energy sector, and European Union leaders had to reorient actions related to energy strategy. One such solution was intended to be the REPowerEU plan of March 8, 2022, on which the European Commission worked. Its main goal was to achieve independence from Russian fossil fuels (oil, natural gas, and coal) as quickly as possible. This implied a rapid transition to so-called "clean energy," i.e., renewable energy sources (RES) – solar and wind power, heat pumps – and increasing their share from 32% to 45%. There was also talk of diversifying supplies to replace Russian gas by reducing its consumption and demand, aiming to protect against higher energy prices. A year into the war, in 2023, the European Union established a strategic partnership with Ukraine regarding synthetic gases, including biomethane and hydrogen (Konopelko, 2024, p. 131-137).

According to the Eurobarometer Flash 506 survey, 85% of respondents from the EU believe that it is necessary to become independent from Russian gas and oil as soon as possible. It was also emphasized that investments in renewable energy are crucial. The social pressure resulting from the external conflict between the Russian Federation and Ukraine contributes to strengthening and accelerating the EU's climate policy. As a result, a significant acceleration of the energy transition and the achievement of renewable energy targets is assumed – increasing the target from 40% to 45% by 2030. Photovoltaics is to be implemented the fastest – the plan assumes the installation of new panels with a capacity of 600 GW by 2030. "The REPowerEU" plan is based on the implementation of the objectives of the "Fit for 55 package", while maintaining the reduction of greenhouse gas emissions by 55% by 2030 and achieving climate neutrality by 2050, as assumed in the "European Green Deal". The Russian attack on Ukraine necessitated a faster reduction in the import of fossil fuels. This will require investment in infrastructure, including the power grid, hydrogen network, and gas grid. However, during the transition period, it is possible to extend the use of coal, nuclear energy, and gas resources to ensure energy security (Komisja Europejska, 2022, p. 2-7).

It is also worth analysing the impact of the Russian-Ukrainian war on the Federal Republic of Germany. A significant problem was Germany's energy dependence on the Russian Federation. Furthermore, the war weakened Germany's position on the European and international stage, and the policy pursued by Germany towards Russia collapsed, weakening its role as a leader (Buras, 2023, p. 7-8). Germany is highly dependent on foreign demand, which also means the country is vulnerable to external crises. Russia began to exploit energy relations and the dependence of the European Union and Germany, including by manipulating gas transmissions via Nord Stream 1. Since the beginning of 2023, the Federal Republic of Germany has stopped importing any energy raw materials from Russia, even though in the previous year dependence on Russian fossil fuels was very high – natural gas 55%, oil and petroleum products – 37%, coal – 57%. This decision was motivated by the EU embargo on coal and oil imports and the interruption of gas supplies by Russia due to the damage to the Nord Stream 2 pipeline. Germany has faced a very difficult situation when Gazprom repeatedly interrupted supplies, aiming to exert pressure on society and the government. *Die Ampelkoalition* government began to act to prevent a catastrophe in the energy sector – among other things, they nationalized Gazprom Germania – new name Sefe, which gave the state control over gas infrastructure. They also nationalized Uniper, which was the largest gas importer in Germany and was on the verge of bankruptcy. The construction of LNG terminals was also started to enable the import of liquefied gas, and a budget was allocated for the development of hydrogen production. These changes in the energy sector led various industrial sectors to mobilize and reduce gas consumption or switch to other energy sources by 14% – compared to 2021. As a result of this crisis, trade with Russia collapsed – German exports to Russia decreased by 60%, and imports from Russia fell by 53% (due to sanctions and the halt in raw material supplies). Many German companies completely left the Russian market, including major ones such as Siemens, Deutsche Telekom, and Deutsche Bank. The crisis forced a redefinition of energy policy in Germany, where renewables became the foundation of the new strategy, replacing the previous dependence on raw material

imports (Buras, 2023, p. 9-51). Energy policy can no longer be divorced from geopolitics. The war proved that reliance on an adversarial supplier is a critical national security risk. The EU's and Germany's energy strategies were fundamentally reshaped not by a new climate agreement, but by a geopolitical catastrophe. This redefines energy security from mere "reliability of supply" to "sovereignty of supply".

Finally, the analysis concludes by assessing Germany's implementation of the pivotal Sustainable Development Goals, SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action). Germany's voluntary report from 2021 will serve as a strategic document presenting the implementation of the Sustainable Development Goals. SDG 7 (Clean and affordable energy) plays a key role, as a secure, environmentally friendly and affordable energy supply is the foundation of social and economic development. The way energy is produced and consumed has an impact on the implementation of the SDGs. Nevertheless, it is worth mentioning the initiatives and principles related to the implementation of this goal:

(i) **Decarbonisation of energy systems by renewable energy sources (RES)** as part of efforts to achieve greenhouse gas neutrality by 2045. The German government has set a target for the share of electricity from renewable sources to be at least 35% by 2020 and 65% by 2030. Climate neutrality is to be achieved by 2045.

(ii) **The German *Energiewende* (energy transition)** programme sets out a long-term framework for a sustainable energy policy. The targets for the share of renewable energy sources have been revised slightly to 30% by 2030, 45% by 2040 and 60% by 2050. Meanwhile, coal-fired power generation is to be phased out completely by 2038.

(iii) **Germany is an active participant in the dialogue on energy policy through various organisations**, including the EU, G7/G20, IRENA, IEA, SEforALL, ISA (International Solar Alliance) and Powering Past Coal Alliance. Key German initiatives include energy partnerships with strategic countries, support for green hydrogen, and technical and financial assistance programmes in 70 partner countries. An Energy Research Programme has also been established, focusing on innovation, digitalisation and social cooperation (The Federal Government, 2021, p. 62-65).

The next SDG 13 (Climate Action) is related to climate change, which can cause damage to societies, nature and the economy. The need to take effective and rapid action to, among other things, reduce emissions that cause climate change has been emphasised. The German government's policy goal of reducing greenhouse gas emissions in Germany by 40% in 2020 compared to 1990 has been achieved, and as mentioned earlier, it is assumed that carbon neutrality will be achieved by 2045. Examples of the implementation of this goal:

(i) **The 2050 Climate Action Plan** sets out the necessary measures to achieve climate targets in all areas of activity. The plan is reviewed and updated as part of discussions between the government and the public.

(ii) **The Coal Phase-out Act (*Kohleausstiegsgesetz*)** concerns the gradual reduction of coal-fired power generation, with the principle of a complete phase-out by 2038.

(iii) **Forschungsfabrik Batterie (Battery Research Factory)** promotes the development of new battery technologies, which are to be key technologies in the field of e-mobility (The Federal Government, 2021, p. 96-98).

Germany's pursuit of SDGs 7 and 13 is a testament to a whole-of-society project driven by clear long-term vision. Its integrated policy framework and international engagement set a global benchmark. However, its experience also serves as a crucial lesson for other nations: the greatest challenges are no longer setting targets, but navigating the political, economic, and social complexities of their implementation at the necessary speed and scale. Germany's ultimate success will be determined not by its' goals, but by its ability to overcome these final, formidable implementation barriers.

Conclusion

Germany's *Energiewende*, particularly its' accelerated phase under *die Ampelkoalition* government following the Russian invasion of Ukraine, offers Europe a powerful lesson: the energy transition is no longer a singularly environmental or climate project but a fundamental prerequisite for security and geopolitical sovereignty. This paper has demonstrated that the pursuit of Sustainable Development Goals (SDGs), specifically SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action), can act as a potent catalyst for a broader national and continental strategy, transforming a vulnerability into a strength. The analysis reveals a clear evolution in Germany's approach. Initially conceived as a domestic environmental mission post-Fukushima, the *Energiewende* was radically repurposed by the geopolitical Zeitenwende of 2022. *Die Ampelkoalition* government, building on over a decade of policy development, was forced to execute a dramatic strategic pivot. Its' implementation – speeding up renewable permits through the *Osterpaket* and *Solarpaket,* nationalizing critical energy assets like Uniper and Sefe, and rapidly building LNG infrastructure – was not merely about climate protection. It was an emergency response to an existential threat to Germany's industrial model and national security, proving that energy sovereignty is inseparable from national security. The Russian weaponization of energy exports laid bare the fatal flaw in Europe's old security paradigm: dependence on authoritarian regimes for critical resources. In response, Germany's frantic shift away from Russian oil, coal, and gas, while temporarily reliant on transitional solutions, unequivocally accelerated the decarbonization agenda. This crisis-driven momentum allowed the government to raise targets, mobilize unprecedented investment, and garner public support for a faster rollout of wind, solar, and green hydrogen infrastructure. Thus, the pursuit of energy security (a core element of SDG 7) became the primary driver for achieving climate action (SDG 13), demonstrating their intrinsic synergy.

German lesson also comes with a warning. The path is fraught with challenges: bureaucratic inertia in permitting, the social dimensions of a just transition, and the need for massive grid modernization and energy storage solutions. The initial delay in phasing out coal and the ongoing struggles with onshore wind expansion highlight that setting targets is only the first step; implementation is the real battle. In final analysis, Germany's journey underscores that the energy transition is the great project of the 21st century. It is not a niche environmental concern but the central arena where economic competitive-

ness, geopolitical independence, and ecological survival are decided. By leveraging the SDGs as a guiding framework, Germany has demonstrated that a renewable shift is the most profound investment a modern state can make in its own security and sustainable future. For Europe, embracing this integrated model is not a choice but a strategic necessity to navigate the precarious landscape of the new global order.

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