



ANALYSIS OF THE POWER INDUSTRY AND IMPLEMENTATION OF CLIMATE POLICIES IN POLAND



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Introduction

Nowadays, climate policies are among the major challenges of the modern world. It is not only about actions related to environmental protection, this is a comprehensive strategy which involves all sectors of economies and is aimed at fighting the global warming. Taking a range of parallel actions on the global, national and local levels is necessary for achievement of actual impact and stopping temperature growth before it reaches levels having adverse effect on the entire ecosystem. As the average temperature grows, signs of climate change become more and more prominent and dangerous, in their economic, environmental, social and political aspects.

In recent years issues related to climate change and adverse effects of this process have been discussed and analysed in the world. In 2015, almost 200 countries resolved to conclude a global agreement (Paris Agreement) aimed at fighting the global warming. This is a difficult challenge for Poland, whose power sector is based mainly on coal. The mining industry has very strong support and receives funding from the Polish government, making it harder to strive to achieve climate- and energy-related objectives set by the European Union.

The present report describes the current situation of the Polish power industry, as well as subsidies and grants applied to particular types of sources of energy. Further, the text explores climate and energy policies implemented by Poland recently, as well as the state's plans concerning climate objectives of the European Union in the perspective of years 2020, 2030 and 2050.

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1. Characteristics of the Polish power industry

Power industry in Poland is based mainly on combustion of coal and lignite. Polish mining dates probably back to the 17th century when the first open-pit mine was operating in Murcki. The first deep mines were established almost one hundred years later - in 1755. Thus, coal was the major natural resource in Poland for many years.

Coal and lignite are treated in Poland as the basic strategic resources. Their share in production of electricity in 2017 was 79,5% (133.4 TWh) – 48,2% for coal and 31.3% for lignite¹. Electricity is generated mainly by thermal power plants using coal. There are also small reserves of oil, as well as natural gas. However, they don't have significant impact on electricity production in Poland. The share of renewable sources of energy has exceeded 14% (data for 2017)².

Hard coal

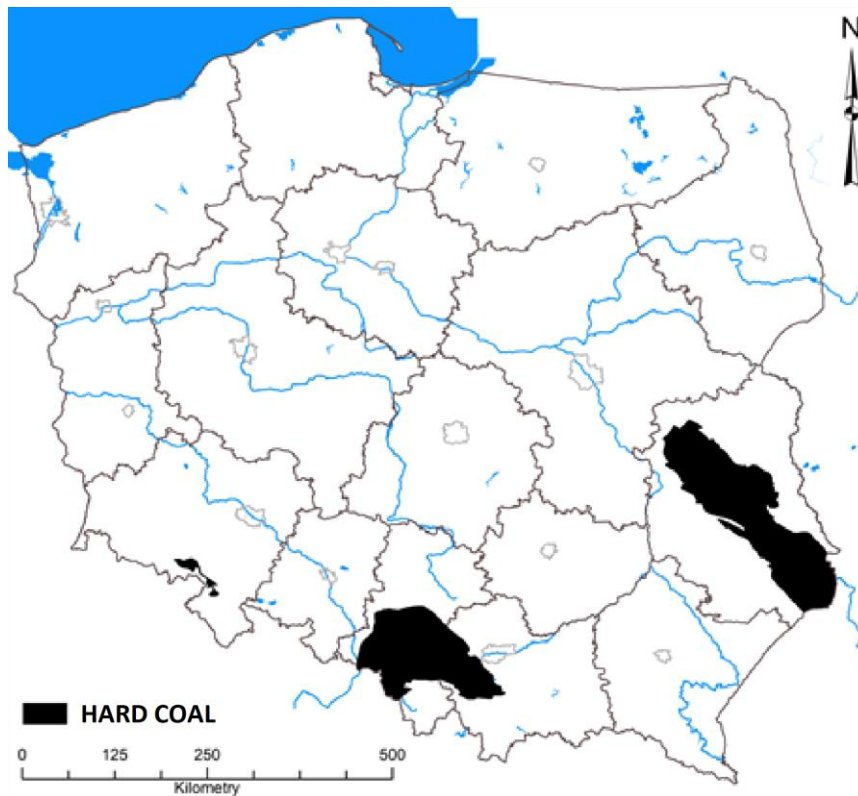
Coal can be found in three regions of Poland: Silesian region, Lower Silesia and Lubelskie voivodeship. Documented balancing resources were 60,496 million tons in 2017, and industrial resources – 3,200.87 million tons³. In 2000 mining was entirely terminated in Lower Silesian Coal District due to difficult geological and mining conditions, and in Lubelskie Coal District there is only one operating mine which excavates coal - Bogdanka. The most important source of coal is Upper Silesian Coal District, which accounts for over 90% of the extracted coal. In Poland there are 157 documented coal deposits, however only 46 of them are exploited⁴. Currently throughout Poland there are 12 coal power plants; two units are currently under construction in Opole power plant, one more in Turów power plant and another in Jaworzno power plant. There are also plans for a new power plant, Ostrołęka C, designed as the last coal power plant to be built in Poland.

¹ The Supreme Audit Office (NIK), *Zielona energia dostała zadyszki (Green Energy was given a shortness of breath)*, 2018: <https://www.nik.gov.pl/aktualnosci/zielona-energia-dostala-zadyszki.html>

² Central Statistical Office (GUS), *Energia ze źródeł odnawialnych w 2017r. (Energy from renewable sources in 2017)*, 2018: <http://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/energia-ze-zrodel-odnawialnych-w-2017-roku,10,1.html>

³ Polish Geological Survey, *Bilans zasobów złóż kopalin w Polsce (Balance of resources deposits in Poland)*, 2018: http://geoportal.pgi.gov.pl/css/surowce/images/2017/pdf/bilans_2017.pdf

⁴ Polish Geological Institute - National Research Institute (PGI-NRI), *Geneza, występowanie, zasoby i złoża węgla kamiennego w Polsce oraz na świecie (Genesis, occurrence, resources and deposits of hard coal in Poland and in the world)*: <https://www.pgi.gov.pl/psg-1/psg-2/informacja-i-szkolenia/wiadomosci-surowcowe/10416-geneza-wystepowanie-zasoby-i-zloza-wegla-kamiennego-w-polsce.html>



Map 1. Hard coal sources in Poland⁵

Frequently it is argued that Polish coal resources will suffice for at least 200 years. This opinion, however, is based only on the quantity of coal in deposits in the territory of Poland, without considering economic, environmental or social criteria. In Poland only 39% of coal resources are of economic significance, only 13.7% are operative resources, profitable for mining. Some experts claim that operative resources in Poland may suffice for maximum 21 years⁶. Around 2030 Polish coal mining will be able to extract no more than 47 million tons of the raw material and import of coal for energy will exceed local mining output.

Lignite

Balancing resources of lignite in Poland are large, accounting for 23,385.06 million tons, with only 1,276.41 million tons used, which corresponds to 5.46% of total geological balancing resources (as on the end of 2017)⁷. Ninety-one deposits have been identified in central and western Poland and the largest lignite district is situated in Bełchatów - almost 21% of electricity in Poland is supplied by the power plant located there (installed capacity of 5,298 MW). Bełchatów power plant has a share of almost 68% in the national electricity production from lignite⁸. Other deposits where lignite is mined are Turoszów Districts and Major Poland

⁵ sources: Wikipedia

https://pl.wikipedia.org/wiki/Plik:PL_w%C4%99giel_kamienny_z%C5%82o%C5%BCa.png

⁶ Heinrich Böll Foundation, *Polska. Nie tak łatwo określić zasoby (Poland. It's not easy to identify resources)*, 2016 <https://pl.boell.org/pl/2016/06/20/polska-nie-tak-latwo-okreslic-zasoby>

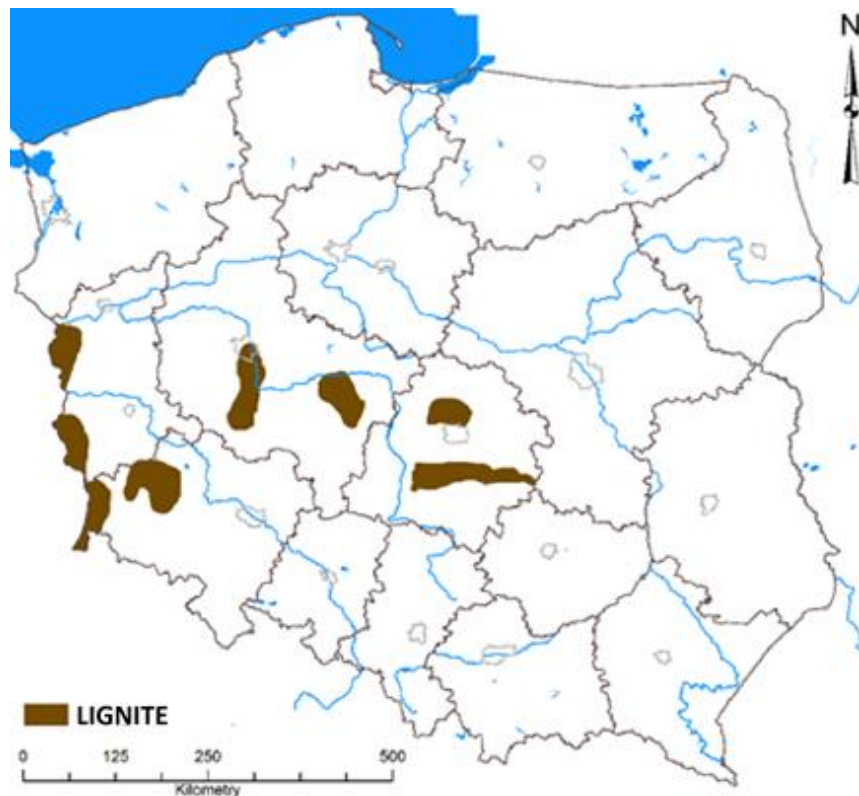
⁷ Polish Geological Survey, *Bilans zasobów złóż kopalin w Polsce (Balance of resources deposits in Poland)*, 2018: http://geoportal.pgi.gov.pl/css/surowce/images/2017/pdf/bilans_2017.pdf

⁸ data from the official website of Polska Grupa Energetyczna (PGE)

<https://pgegiel.pl/Nasze-oddzialy/Elektrownie/Elektrownia-Belchatow>

District - region of Konin and Turek. There are currently five functioning lignite power plants in Poland - Bełchatów, Turów, Pątnów I and II, Konin - and five open-pit mines.

- KWB Adamów S.A. – operating open-pit mines: Adamów and Koźmin. Exploitation of Bogdałów and Władysławów open pits was terminated.
- At Lignite Mine Bełchatów - mining operations are performed at Bełchatów Field and Szczerców Field.
- At Lignite Mine Konin the following open pits are used: Józwin IIB, Drzewce and Tomisławice. Lignite mining was terminated at 9 open pits.
- Lignite Mine Turów
- Lignite Mine Sieniawa - one of the longest-known and longest-used deposits of lignite in Poland.



Map 2. Lignite sources in Poland⁹

Some Polish power companies - Polska Grupa Energetyczna (PGE) and ZE PAK apply for concessions for new lignite open-pit mines. This concerns Lubuskie voivodeship - open pits Gubin-Brody, open pit Złoczew near Łódź, open pits Ościsłowo, Piaski and Dęby Szlacheckie close to Konin (eastern part of Greater Poland region), as well as Poniec-Krobia-Oczkowice deposits in southern Major Poland. PGE also plans to expand Turów open pit in Lower Silesia. PGE and ZE PAK organise strong lobbying operations in all regions, trying to convince local communities that the investments are necessary. However, referenda were held in many communes with majority of inhabitants opposing to establishment of new open-pit lignite

⁹ sources: Wikipedia

https://commons.wikimedia.org/wiki/File:PL_w%C4%99giel_brunatny_z%C5%82o%C5%BCa.png

mines in the communes (Gubin, Brody, Babiak, Lubin, Ścinawa, Kunice, Ruja). Unfortunately, the Polish government support the plans to explore new deposits of lignite. Lignite is perceived as the cheapest raw material in the power industry. However, the price of lignite does not account for external costs (health costs, environmental costs – contamination of ecosystems, economic loss in yield of forests, agriculture, degraded soil etc.) According to reports of the European Environment Agency, Polish power plants emit the most CO₂ and other contaminations, they also have the highest external costs as compared to other power plants in Europe. Bełchatów Power Plant is the largest single emitter of CO₂ in the European Union and its annual external costs related to health and other areas, account to approximately 2 billion euro. It is estimated that emissions of the Polish coal power plants contribute to as many as 5,400¹⁰ premature deaths in Poland per year.

Planning and constructing new mines and power plants generating electricity from coal and lignite means acting against the modern trends of energy transformation implemented by highly-developed European countries. The policies of the European Union related to climate and environment are aimed at reducing and in further perspective at elimination of coal-based power industry, which emits carbon dioxide, the main gas responsible for the greenhouse effect. In its power policies, the Union intends eventually to use energy obtained mainly from renewable sources and due to efficient energy use. Thus, one may indicate that the old, coal-based technologies applied in Poland cannot be reconciled with sustainable development and power-climate strategy of the European Union's policies. This form of natural resources management in Poland is also against the concept of intergenerational equity.

Renewable sources of energy

Although coal still plays an important role in Poland, renewable sources of energy have drawn increasing attention in recent years. By the end of September 2017, according to data collected by the Energy Regulatory Office, the installed capacity of renewable sources of energy reached 8 538,3 MW. The largest share came from wind power plants (68.4%), biomass sources (16%) and hydroelectric power stations (11.6 %) ¹¹. Unfortunately, still a large role in electricity production is played by generally criticised co-combustion of biomass in big coal power plants. This solution is classified as a renewable source of energy, although it does not establish any renewable capacity. Basically, it supports coal corporations with a system of subsidies.

It's been several years now that the number of renewable sources of energy in Poland has been growing, mainly through windmills and photovoltaic cells, while the capacity of water, biogas and biomass remain on a similar level.

¹⁰ portal *Węgiel Zabija (Coal Kills)*, Greenpeace
http://greenpeace.pl/wegiel_zabija/

¹¹ economy portal WNP.PL, *Moc instalacji OZE w Polsce to 8 538,3 MW (The power of RES installations in Poland is 8 538,3 MW)*, 2018: https://energetyka.wnp.pl/moc-instalacji-oze-w-polsce-to-8-538-3-mw,314675_1_0_0.html

Unfortunately, stagnation has been observed in Poland in the renewable sources of energy sector, due mainly to instability of the applicable legal provisions. The wind energy sector recorded only 46.2 MW of new green capacity in the entire first half of 2018. In 2015 the increase amounted to 941.4 MW, and in 2016 - 1,445.5 MW, while in 2017 - 122.8 MW¹².

2. Impact of subsidies in the power industry

The report titled "The hidden bill for coal"¹³, developed in 2017 by WiseEuropa, analyses the size of support obtained in Poland in recent years by coal and lignite mining as well as renewable sources of energy. Its authors forecast that if the Polish government continues its current energy policies, then coal mining and coal power industry may obtain over 150 billion PLN of support until 2030. Between 2017 and 2030, the average annual cost will reach 11 billion PLN. The report analyses various areas of support, e.g. restructuring of coal mining, subsidies supporting social insurance, pensions and disability pays in the mining industry, free allocations of emission allowances within the European Union Emission Trading System, green certificates, grants from the EU funds, discounts for prosumers, as well as many other areas.

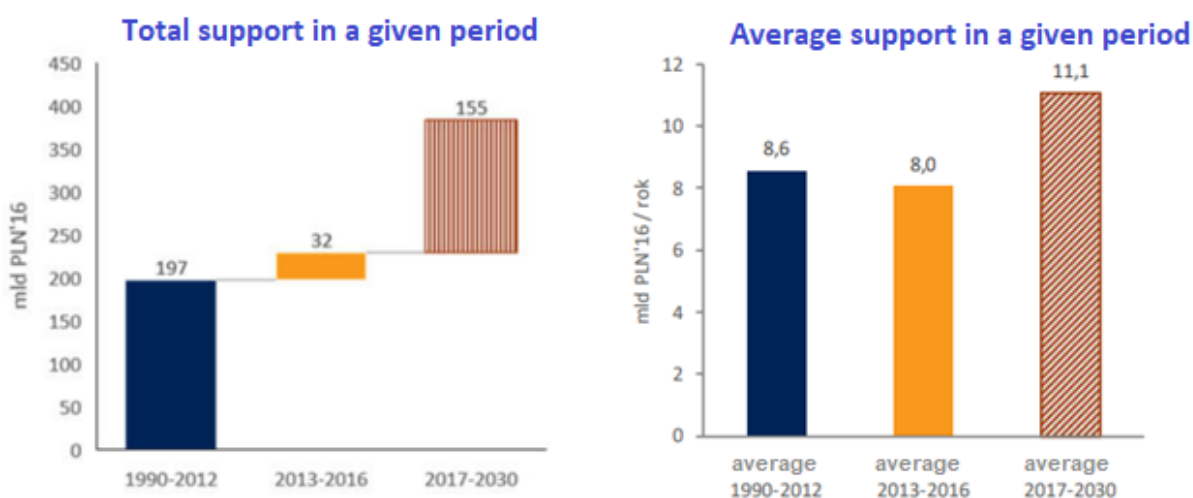


Figure 1. Support for coal mining and coal power industry (excluding external costs) in 1990-2016 and potential support in 2017-2030, PLN (fixed prices of 2016)¹⁴

¹² Gazeta Wyborcza, *Gospodarze szczytu klimatycznego robią wszystko wbrew zaleceniom (The hosts of the climate summit do everything against recommendations)*, 2018: <http://wyborcza.pl/7,155287,24078718,gospodarze-szczytu-klimatycznego-robia-wszystko-wbrew-zaleceniom.html>

¹³ WiseEuropa, *Ukryty rachunek za węgiel 2017 (A hidden bill for coal 2017)*, 2017 <http://wise-europa.eu/wp-content/uploads/2017/09/UKRYTY-RACHUNEK-raport-internet.pdf>

¹⁴ sources: WiseEuropa, *Ukryty rachunek za węgiel 2017 (A hidden bill for coal 2017)*, 2017 <http://wise-europa.eu/wp-content/uploads/2017/09/UKRYTY-RACHUNEK-raport-internet.pdf>

According to the authors' estimations, in 2016, the support for the coal industry in Poland reached 9.2 billion PLN, while from 1990 until 2016 it was almost 230 billion PLN (8.3 billion PLN annually). However, the quoted amounts do not include external costs involved in the impact on human health, natural environment etc. In 2016 only, the external costs amounted to as much as 31 billion PLN. Meanwhile, divided proportionally, the annual cost of support for the coal industry in 2016 was 239 PLN per citizen (1,045 PLN, if external costs are included), with 187 through public funding, and 53 PLN in payments for energy consumption.

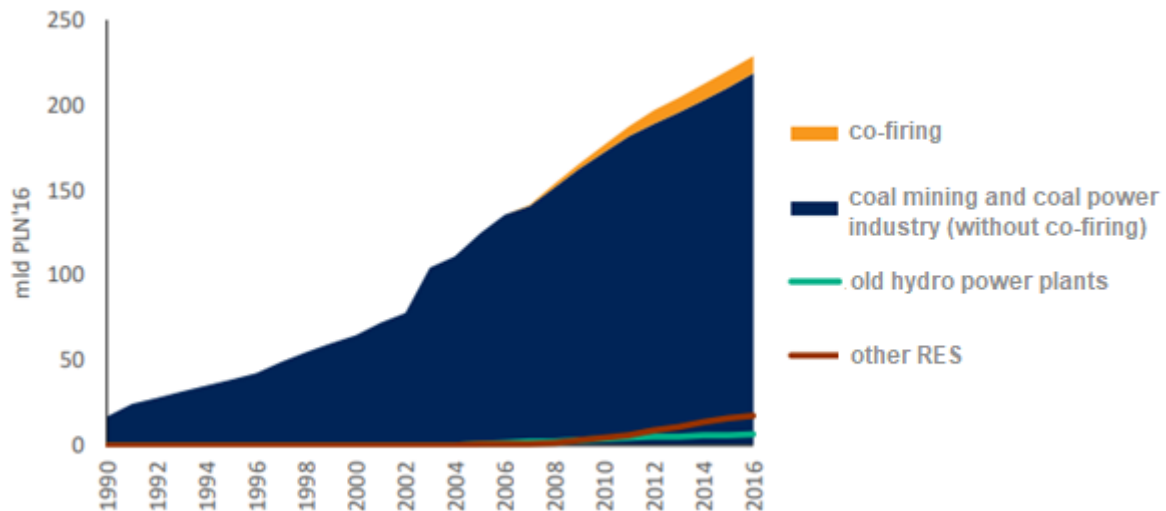


Figure 2. Cumulative support for coal mining and coal electric energy and renewable energy industries in 1990-2016, billion PLN¹⁵

Throughout the entire analysed period (1990-2016), the renewable energy industry received much lower funding than the coal industry. Support for renewable sources of energy (excluding old water power plants and co-combustion) - was more than ten times lower in the same period (17 billion PLN) than in the case of the coal industry (230 billion PLN), and in the last years (2013–2016) - almost three times lower (9 billion PLN). In 2016 the proportional cost of subsidies for renewable sources of energy per citizen was only slightly above 40 PLN, almost entirely funded by consumers of power in their bills. In contrast to aid granted to coal mining and coal energy industry, subsidies for renewable sources of energy are transparent.

Majority of support for the coal industry is currently funded by state-owned companies involved in saving unprofitable coal companies. As it is hard to predict, how long the state will support the coal industry, such involvement is even more risky. In future, the most important source of support for coal energy industry will be the capacity market (the Act on the Capacity Market came to force in January 2018). The capacity market is a mechanism of rewarding production capacity, allowing power plants to get paid for available capacity. This

¹⁵ sources: WiseEuropa, *Ukryty rachunek za węgiel 2017 (A hidden bill for coal 2017)*, 2017 <http://wise-europa.eu/wp-content/uploads/2017/09/UKRYTY-RACHUNEK-raport-internet.pdf>

will enable funding of investments in modernisation and expansion of capacity designed to ensure Poland's energy security. In practice, however, the capacity market will ensure financial support mainly for coal power plants. The estimated funding the coal industry may obtain through this mechanism, is 38 billion PLN until 2030¹⁶. The final shape of the capacity market will be determined by the "Winter Package", introducing regulations concerning capacity mechanisms (within the electric energy regulation) after 2020.

Another important factor to affect the coal energy industry in Poland in future will be the derogation mechanism within the European Union Emission Trading System. The total value of emission allowances until 2030 may amount to about 70 billion PLN¹⁷. Within the EU's pool of free emission allowances for 2013-2019 (estimated value of 12 billion euro), a majority (60%) was allocated to Poland, with 82% assigned to fossil fuel projects and only 8.5% to renewable sources of energy (almost exclusively related to co-combustion of coal and biomass)¹⁸. The new EU-ETS directive is key for Poland. It was approved by the European Parliament and the Council of the European Union in 2018 and it concerns the system's functioning in 2021-2030. The directive still needs executive acts on the European level and implementation into the Polish law. The new system will provide for faster reduction of the number of free allowances and it is meant to enhance further reduction of emissions of greenhouse gases and implementation of the Paris Agreement.

3. Poland's policy vs. climate and power policies of the European Union - analysis of the recent years

The European Union's environment and climate policies provide for reduction and eventually total elimination of CO₂ emissions. About 80% of the Polish power industry relies on coal and therefore the EU's policy poses a serious challenge for Poland, especially in the economic aspect. Unfortunately, Poland still perceives climate policies as a threat to its economic growth. Politicians and people involved in the coal industry consider mainly costs, ignoring the fact that the renewable energy industry, energy efficiency or clean transport make part of high-added-value industry.

Poland in the context of the European Union's climate policies

Climate policies in Poland date back to 1991, when the Sejm approved a resolution on environmental policies, citing sustainable development as the most important goal and providing that *ecological criteria should be ranked in economic policies as equal to economic*

¹⁶ WiseEuropa, *Ukryty rachunek za węgiel 2017 (A hidden bill for coal 2017)*, 2017
<http://wise-europa.eu/wp-content/uploads/2017/09/UKRYTY-RACHUNEK-raport-internet.pdf>

¹⁷ WiseEuropa, *Ukryty rachunek za węgiel 2017 (A hidden bill for coal 2017)*, 2017
<http://wise-europa.eu/wp-content/uploads/2017/09/UKRYTY-RACHUNEK-raport-internet.pdf>

¹⁸ Polska Zielona Sieć (Polish Green Network) *Najbardziej szkodliwe subsydia do paliw kopalnych (The most harmful subsidies for fossil fuels)*, 2017: <http://zielonasiec.pl/2017/05/22/najbardziej-szkodliwe-subsydia-do-paliw-kopalnych/>

*criteria*¹⁹. In 1997 the Polish authorities approved international obligations, by ratifying the United Nations Framework Convention on Climate Change and Kyoto Protocol. The objective of the Protocol was to reduce emissions of greenhouse gases in 2008-2012 by 5% as compared to the level recorded in 1990. Poland agreed then to reduce emissions by 6% as compared to 1988 (baseline for former socialist states). The changed structure of the Polish economy during transformation led to reduction of gas emissions by 33% even in 1988–2001 and thus Poland achieved its reduction goal.

The Treaty was in force from 16 February 2005 and it expired on 31 December 2012. By so-called Doha amendment, the European Union prolonged its obligations arising from the Treaty until 2020. Its main mechanism relied on the climate and power package providing for reduction of CO₂ emissions by 20% until 2020. The Doha amendment is designed to ensure continuity of the international cooperation on climate change until provisions of the Paris Agreement come to force. In 2015 President Andrzej Duda vetoed the act of ratification of Doha amendment, arguing that preparation of this document was not preceded by sufficiently detailed analysis of its legal and economic consequences. However, finally on 1 June 2018 the President ratified the amendment and Poland joined the international obligation to reduce CO₂ by 20% as the last member of the European Union.

Unfortunately, many actions by the Polish government are inconsistent with the climate and energy policies of the European Union. For three years Poland vetoed the Energy Roadmap 2050 (energy road map plan of the European Union), aimed at reducing greenhouse gases by 40% until 2030, by 60% until 2050 and by 80%-95% in 2050 as compared to 1990. Only in autumn 2014 did the government agree to sign objectives of the European Union's climate policies in exchange for financial support for transformation of the Polish power industry.

Paris Agreement

The Paris climate agreement, the first universal and legally binding international arrangement concerning climate, was approved in December 2015 by 195 countries. The agreement defined a global action plan aimed at limiting the global warming to values much below 2°C (as compared to the industrial era and striving to reduce the temperature growth to 1.5°C).

Poland ratified the Agreement in 2016 and it came to force in the same year (after the required ratification by at least 55 states responsible for at least 55% of global emissions of greenhouse gases). The then Minister of Environment, Jan Szyszko claimed that "*Poland has rich resources of coal and lignite. The Paris agreement guarantees that we will be able to use the resources. We will reduce emissions by such means as application of the latest technologies at construction of new power units. On the other hand, we will use the natural process of CO₂ absorption by forests*"²⁰. The ministry and foresters explain that correct forest

¹⁹ Resolution of the Sejm of the Republic of Poland of May 10, 1991, on environmental policy: <http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WMP19910180118>

²⁰ Ministry of the Environment, *Porozumienie Paryskie ratyfikowane przez Polskę (Paris Agreement ratified by*

management (including planting specific species of trees or supplementing new trees in existing forests) will allow for capturing of large quantities of CO₂.

Provisions of the Paris Agreement do not determine methods of emissions reduction, so increased absorption by forests may be a good solution, but undoubtedly it is a response to only a part of the problem - taking into account the expected scale of absorption: about 32 million tons of CO₂ per year, this is only 8% of Poland's emission of greenhouse gases today. Therefore, these actions will not suffice for Poland to meet its international obligations concerning reduction of emissions of greenhouse gases. Absorption of CO₂ must be supplemented by significant reduction of emissions and a comprehensive programme of low-carbon economy. Out of the top ten most contaminating power plants in Europe, two are located in Poland, including Bełchatów on the first place. The other is Kozienice. In order to achieve the objectives of the Paris Agreement, it is necessary to phase out combustion of both coal and lignite, shifting to green, non-emission or low-carbon technologies.

4. Poland's plans with respect to climate policies

Currently Poland does not have an updated climate policy. According to binding legal provisions, the country's energy policy should be updated every 4 years. However, the latest document was approved by the government in 2009 and it was "Energy policy of Poland until 2030", providing that the share of renewable sources of energy in the total consumption in Poland should increase to 15% in 2020 and to 20% in 2030²¹. The document misses also a consistent strategy of expanding the energy system, with relevant indication of sources, scale or duration of their use. It doesn't take into account the European Union's provisions on climate and energy policy, either. Currently, the Ministry of Energy is working on the new, updated document: "Poland's energy policies until 2050".

No later than in early 2019, the government should also approve the new "State Environmental Policy" (PEP). PEP is designed to replace the now binding strategy "Energy Security and Environment - perspective until 2020" (BEiŚ). Unfortunately, the current draft of PEP contains no data on solar or wind-related renewable sources of energy. Meanwhile, the draft PEP treats establishment of forest carbon farms and CO₂ storage through development of wood construction as the major direction of climate protection in Poland. The final version of the document will be available soon.

Poland), 2016: <https://www.mos.gov.pl/aktualnosci/szczegoly/news/porozumienie-paryskie-ratyfikowane-przez-polske/>

²¹ Ministry of Economy, *Polityka energetyczna Polski do 2030 (Polish Energy Policy until 2030)*, 2009 <http://www.pigeor.pl/media/js/kcfinder/upload/files/Polityka-energetyczna-Polski-do-2030r.pdf>

Climate and energy policy 2020

In 2008 the European Union approved a climate and energy package, providing for reduction of CO₂ emissions until 2020 by 20% (as compared to 1990), improved efficiency of energy use by 20% (as compared to 2020 forecasts) and increased share of consumption of renewable sources of energy up to 20%. Poland has defined slightly lower requirements concerning renewable sources of energy: their share should increase to 15% (10% in transport fuels sector). As far as efficient energy use is concerned, the objective for Poland is defined as reduction of primary energy consumption by 13.6 Mtoe²², which involves more efficient energy use in the context of economic growth. If the current trends in improvement of efficient energy use are maintained, probably it will be possible to achieve the objective set by the European Union for 2020. Upon signing the Doha Amendment in 2018, Poland also agreed to reduce CO₂ emissions by 20%. Analyses by the National Centre for Emissions Management (KOBiZE) show that the objective will be met.

Unfortunately, Poland may face problems in meeting the EU objective concerning renewable sources of energy (15% in the final gross energy consumption in 2020). According to the Central Statistical Office (GUS), in 2017 the share of renewable sources of energy in gross energy consumption was 11%, which was 0.32% lower than in 2016 (11.3%). For the last two years, the share of RES in the final energy consumption has been decreasing - in 2013-2015 it reached 11.4%, 11.5% and 11.7% respectively.

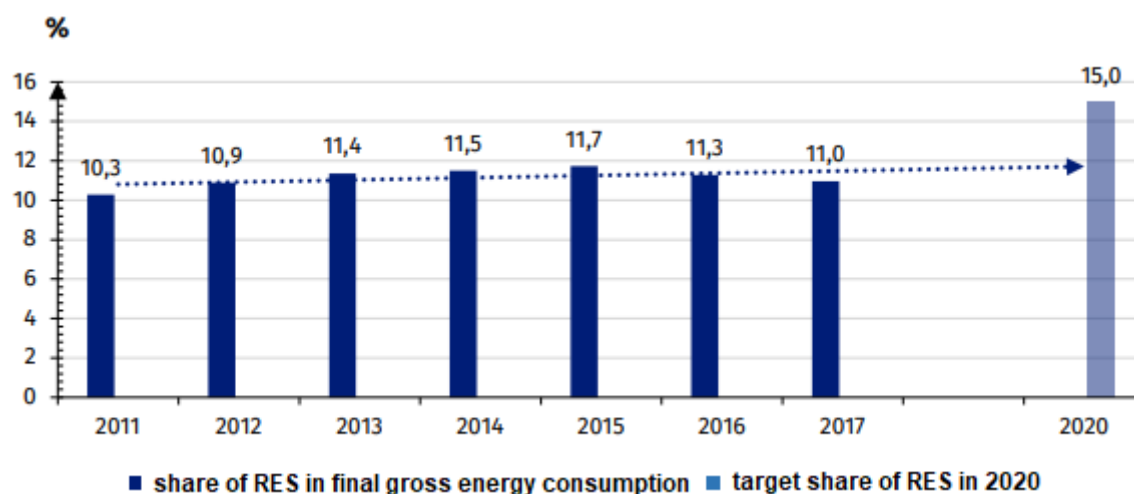


Figure 3. Share of energy from renewable sources in the final gross energy consumption²³

In 2017, the share of RES in transport increased by 0.28% compared to 2016 (4.2% compared to 3.9%), however, Poland is still far from achieving the 10% target²⁴. It is highly probable

²² Ministry of Energy, *Krajowy Plan Działań dotyczący efektywności energetycznej dla Polski 2017 (National Action Plan on energy efficiency for Poland 2017)*, 2017

https://ec.europa.eu/energy/sites/ener/files/documents/pl_neeap_2017_pl.pdf

²³ sources: Central Statistical Office (GUS), *Energia ze źródeł odnawialnych w 2017 r. (Energy from sources renewed in 2017)*, 2018: <http://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/energia-ze-zrodel-odnawialnych-w-2017-roku,10,1.html>

²⁴ Central Statistical Office (GUS), *Energia ze źródeł odnawialnych w 2017 r. (Energy from sources renewed in 2017)*, 2018: <http://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/energia-ze-zrodel-odnawialnych-w-2017-roku,10,1.html>

that Poland will fail to achieve the set share of renewable sources of energy in the gross energy consumption. An alternative to failure to meet the objective is purchasing “virtual” green energy from a European Union state which has surplus of green energy. According to the Supreme Audit Office (NIK), the cost of such an operation may amount to 8 billion PLN²⁵.

Climate and energy policy 2030

In 2014 the European Union approved framework climate and energy policy until 2030, based on the climate and energy package until 2020. The document sets such objectives as reduction of CO₂ emissions by at least 40% as compared to 1990, ensuring 27% share of energy from renewable sources in the total energy consumption and increase of efficient energy use by at least 27% (compared to forecasts).

However, in 2018 the European Parliament adopted new objectives, increasing the share of energy from renewable sources up to 32% and improvement of efficient energy use up to 32.5%. Initially the European Parliament intended to increase the share of renewable sources of energy up to 35%, but some countries, including Poland, objected to this ambitious plan. Eventually, 32% was accepted as an objective (with an obligation of regular control of implementation and an option to increase the share) and the share of renewable energy in transport of 14%. The role of prosumers and use of PV installations of capacity below 25 kW should increase, too. The Polish Electricity Association (PKEE) assessed the objective concerning renewable sources of energy until 2030 as “*very ambitious*” goal which may compromise energy security or stability of economies characterised by “*lower development potential of such sources*”²⁶. PKEE expressed a positive opinion on the option of no national objectives related to renewable sources of energy (with only an overall objective on the level of the European Union). Poland and other member states will soon have to implement in their legal systems the new elements of the EU directive concerning the share of renewable sources of energy until 2030.

The objectives of climate and energy policies have been set for the entire European Union, providing for different limits for particular member states. Implementation of the provisions is designed to support accomplishment of goals defined in the Paris Agreement. The first progress review and potentially a revision of the mechanisms should take place no later than in 2023.

Each member state will develop specific mechanisms, depending on its wealth and capacity to act to protect the environment. The European Parliament will approve individual objectives for reduction of CO₂ emissions for particular states. The objective proposed for Poland

²⁵ The Supreme Audit Office (NIK), *Zielona energia dostała zadyszki (Green energy got a shortness of breath)*, 2018: <https://www.nik.gov.pl/aktualnosci/zielona-energia-dostala-zadyszki.html>

²⁶ Polish Electricity Committee, position on the outcome of negotiations on the shape of the Directive on the promotion of energy from renewable sources, 2018: <https://www.pkee.pl/stanowisko-polskiego-komitetu-energii-elektrycznej-w-sprawie-wyniku-negocjacji-dotyczacych-kszaltu-dyrektywy-w-sprawie-promowania-energii-z/>

(emissions reduction by 7% as compared to 2005) is one of the lowest targets in the European Union. There is also a special solution for states of lower wealth and development level: a right until 2030 to grant power plants with free allowances to emit CO₂ and to use assets from the special reserve established with 2% of emission allowances, designed to modernise power industry, among other goals. Division of the targeted emission reduction between sectors covered by the emissions trading system and outside the ETS is another important issue from the Polish perspective. In the case of sectors covered by the ETS, the reduction on the EU level should reach 43%, while in sectors outside the ETS – 30% (as compared to 2005). According to the draft State Environmental Policy, until 2030 Poland intends to reduce emissions of greenhouse gases by 23% as compared to 1990. However, this is not enough to meet obligations arising from the Paris Agreement and to fulfil provisions of the European Union's climate policy.

It may be difficult for Poland to meet the objectives of the climate and energy policies until 2030, considering the Polish government's strong support for mining. According to the Deputy Minister of Energy, Grzegorz Tobiszewski, the share of coal and lignite in Poland's energy mix will decrease until 2030 by only about 20% – down to 60%²⁷. The overall volume of coal used in the power industry will not change, while lignite will be mined until 2040 at least. However, the declarations concerning lignite are based on the assumption that at the end of 2018 or in early 2019, the open-pit mine in Złoczew will be opened, and the open-pit mine Ościsłowo will follow soon. Both projects are still uncertain in view of strong opposition of the local inhabitants and NGOs.

Until the end of 2019 Poland and other member states should provide the European Union with national plans concerning implementation of 2030 obligations undertaken by the European Union. The countries should also develop long-term strategies of low-carbon economy for at least 30 years. These strategies should be consistent with objectives of the Paris Agreement, too.

Objectives for 2050

In 2018 the Intergovernmental Panel on Climate Change (IPCC) published a special report on consequences of and increase of the average global temperature by 1.5°C as compared to the pre-industrial epoch and emission scenarios that would allow maintenance of this level of the global warming. The report shows that temperature increase by 2°C – the value indicated in the Paris Agreement as fairly safe for the humanity - will bring consequences much more disastrous than it was previously thought. Global warming by 2°C will have such a strong impact on the climate that we won't be able to stop its tragic consequences and some species won't adapt to the new reality and weather conditions²⁸. The only solution is to keep the

²⁷ Polish Press Agency (PAP), *Tobiszewski: do 2030 r. nie zmieni się wolumen węgla dla polskiej energetyki (Tobiszewski: until 2030, the volume of coal for the Polish power industry will not change)*, 2018 <https://www.pap.pl/aktualnosci/news%2C1414731%2Ctobiszewski-do-2030-r-nie-zmieni-sie-wolumen-wegla-dla-polskiej-energetyki.html>

²⁸ Intergovernmental Panel on Climate Change (IPCC), *Global warming of 1,5°C*, 2018

global warming below 1.5°C. Therefore, in 2050 globally we should achieve the “net zero point” with the humanity capturing the same quantity of CO₂ from the atmosphere as it will produce. Until 2030 we must reduce the global level of greenhouse gases emissions by a half (as compared to 2010). Nowadays, the member states of the European Union have accepted a reduction by 40%, but works are undertaken to increase the objective.

Coal combustion is one of the main sources of CO₂ emissions, so the objective of “net zero emissions” can be achieved only if consumption of coal is reduced by 60% until 2030 (as compared to 2010), and entirely eliminated until 2050.

Recommendations of reduction of greenhouse gases based on the IPCC report are stricter than the objectives defined by the European Commission within its low-carbon economy strategy until 2050, which refers to reduction of greenhouse gases emissions by 80% (as compared to 1990). The IPCC report and resulting recommendations will be crucial at decision-making by negotiators at the climate summit (COP24) in Katowice.

Climate summit in Katowice (COP24)

The most important global forum devoted to climate policies, to be held in December 2018 in Poland (in Katowice) is planned to approve a complete package to implement the Paris Agreement. The document will be the first agreement in history to establish a binding obligation for all states in the world to act for environmental protection. The conclusions of COP24 in Katowice will present the contribution of member states of the European Union to reduction of greenhouse gases emissions until 2020 and plans for coming years.

To reduce emissions of greenhouse gases, all countries should strive to phase out coal power plants, to develop renewable sources of energy, to protect forests and to reduce CO₂ emissions in different sectors. However, this may be difficult for Poland, as development of renewable sources of energy has come to a standstill, and Polish energy producers plan to build a new coal power plant Ostrołęka C. It is highly probable, that Poland will present its own arguments instead of supporting actions to stop climate change. The government claims that member states should be allowed freedom to select methods of carbon dioxide emissions reduction and way to use natural resources - in Poland the main role would be played by planted coal forests.

So far, the European Union's declaration on reduction of greenhouse gases emissions by 40% until 2030 is not sufficient to implement provisions of the Paris Agreement and the EU will probably strive to increase the objective. However, Poland doesn't want to agree to the negotiating mandate aimed at total decarbonisation until 2050.

5. Conclusions

Climate change is a difficult and controversial subject, however, in recent year most states have realised that this is a problem that has to be faced and counteracted. Stopping the global warming involves huge costs, but it should be remembered that the costs will still be lower than those related to consequences of the climate change. On one hand, Poland spends large amounts on subsidies and grants to the coal sector, reaching 230 billion PLN since 1990 (the amount may increase by further 150 billion PLN until 2030), and on the other hand even now it bears huge costs of climate change – economic, environmental and social costs. Floods, hurricanes, forest fires, droughts and related losses in agriculture, spread of new infections, as well as health deterioration due to extreme temperatures - these are only some of the consequences of global warming which can be felt today and which will be even more dangerous in future.

Most countries in the world realise that climate protection cannot be reconciled with continued combustion of coal and other fossil fuels. Unfortunately, all scenarios of economic development in Poland, prepared by different governments, provide for further coal mining for many years. Any ambitious and sustainable concept of climate policies of the European Union and objectives concerning CO₂ reduction, development of renewable sources of energy and efficient energy use until 2020, 2030 and 2050 are perceived as adverse for Poland by a majority of Polish politicians. However, being a member state of the European Union, Poland has to fulfill its international obligations, those arising from climate and energy packages, as well as the Paris Agreement. In its energy policies, the Polish government should consider, above all, phasing out of the old and unprofitable coal power plants and their replacement with new renewable sources of energy, and actions to promote efficient use of energy. The broad programme of energy transformation can be only supplemented by the programme of remove CO₂ from the atmosphere through forest carbon farms etc., as promoted strongly by the government.

Development of renewable sources of energy may ensure economic profits, health improvement and new jobs. Therefore, the Polish government should introduce changes to its climate and energy policies, shifting from coal combustion to development of more environment- and society-friendly technologies. A majority of Polish people would like to generate more energy from renewable sources of energy and to improve air quality in Poland. As Pope Francis argues, “Climate change is a problem which can no longer be left to a future generation”.