Polish Electricity Association

The contribution of the Polish energy sector to the implementation of global climate policy

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This booklet was prepared by PKEE in cooperation with Ernst & Young Business Advisory.

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Introduction

In recent decades, climate change has become an important topic of international discussion. The adoption of the United Nations Framework Convention on Climate Change – UNFCCC in 1992 was a key event in terms of climate protection, which aims to reduce the negative anthropogenic impact on the climate.

As part of the implementation of global climate policy, international commitments are made to reduce the emissions and to reduce the increase in average temperature compared to the pre-industrial level. One of the important elements of the climate policy are periodically organized Conferences of Parties to the Convention, where further commitments and directions of changes to climate policy are made, and the achieved progress in its implementation is assessed. Poland actively participates in the implementation of the global climate policy and for the third time organizes the Climate Summit.

One of the areas of economy which has a direct impact on climate change is the energy sector in which intensive efforts to protect the climate are implemented. Awareness of this relationship, the concern for human health, the need for sustainable development and minimization of the sector impact on the environment, are motivating factors for energy companies to introduce environmentally friendly modernizations and to seek innovative solutions for more effective climate protection.

This booklet summarizes key aspects of the Polish energy sector in the context of reducing the sector's environmental impact and presents synthetic information about sector's activities in the context of global and EU policy, which are compared with activities of selected European Union countries.

Summary

1

Poland is an active party to the UN Climate Convention. It implements commitments to reduce CO_2 emissions and supports processes of global and international agreements. For the third time, Poland organizes the Conference of the Parties to the Convention - the first UNFCC Climate Summit in Poland was held in 2008 in Poznań, the second in 2013 in Warsaw.

2

In Poland, since 1990, CO_2 emissions have been reduced by around 30%, and the energy sector has the largest share in this reduction. The sector is aware of the challenges of climate protection and is diligently preparing for the further implementation of reduction targets in a way that ensures the balance in needs of those involved or affected by transformation.

3

Since the beginning of the 1990s, the Polish energy sector is constantly transforming, striving to minimize its impact on the environment. The high share of coal in the structure of electricity and heat generation results in significantly higher costs of transition towards a low-emission economy as compared to other EU countries where the generation structure has been developed in a sustainable manner. In response to these challenges, energy sector is seeking for additional ways to reduce expenditure and to improve efficiency through the development of innovative technologies. Implementation of a deep transformation of the sector will be a big challenge in the economic and social dimensions, which is why it is important to conduct it in a reasonable and sustainable manner.

4

The implementation of climate targets for 2030 (at least 40% reduction of CO_2 emissions) will require significant efforts with estimated expenditures of over 70 EURbn, with a majority share of investments in the generation sector. It is necessary to seek cost reduction through innovation and investment. Bearing in mind the significance of the issue, Poland aims to actively participate in the formulation of a long-term strategy for the global climate policy, which should allow the implementation of pro-climate measures taking into account global reduction potential in the next decades.

1 GLOBAL AND EU CLIMATE PROTECTION GOALS

The main goal of the global and EU climate policy under the United Nations Framework Convention on Climate Change - UNFCCC is to stabilize the concentration of greenhouse gases in the atmosphere at a level that guarantees no negative anthropogenic impact on the climate.

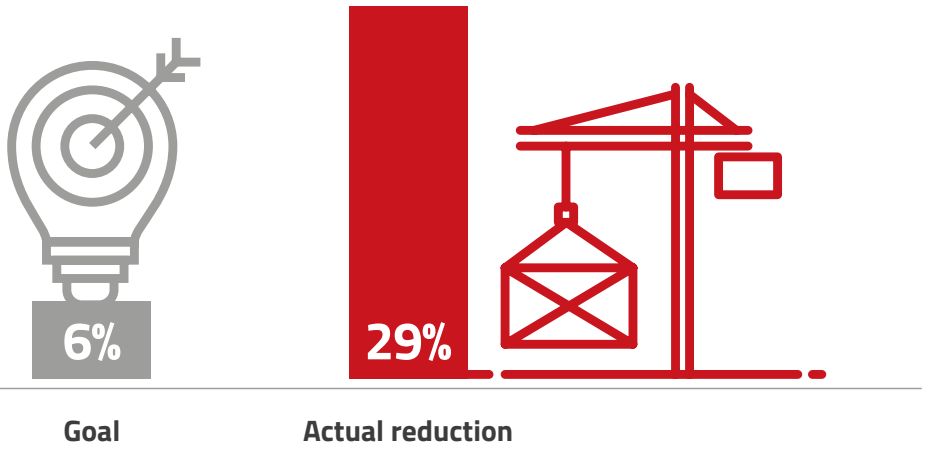
Countries - Parties to the Convention are obliged to take measures to protect the climate, and at the annual COP Conferences assess the effectiveness of their activities. At the COP Conference in 1997, under the Kyoto Protocol, developed countries committed to reduce CO_2 emissions by 5 - 8% by 2012 compared to the base year of 1990.

Poland committed to reduce CO_2 emissions by 6%, and the actual reduction reached 29% level

At the COP Conference in Paris in 2015, the Parties to the Convention accepted a commitment to take measures to limit the average global temperature increase well below 2°C, striving to achieve the maximum temperature increase of 1.5°C. The adoption of rules package ensuring the implementation of Paris obligations (the so-called Paris Rulebook) is planned as one of the main goals of the Climate Summit meeting in Katowice.

The European Union is an important contributor to the implementation of global climate policy and strives to be a leader in efforts to protect the climate. In 2007, the EU adopted the energy and climate policy with targets for 2020, referred to as '3 x 20': 20% reduction of CO_2 emissions, 20% share of energy from renewable sources and 20% improvement in energy efficiency.

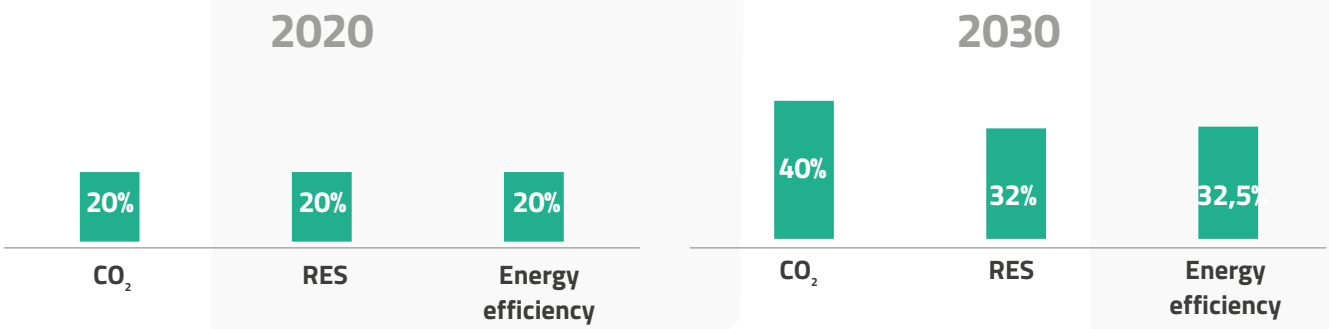
Reduction of GHG emission resulting from Kyoto Protocol - example of Poland



The support mechanism for RES in the form of an auction system stimulate the construction of new generating units, national and local initiatives support thermal modernization that improves energy efficiency and modernizations along with the construction of new high-efficiency units reduce CO_2 emissions.

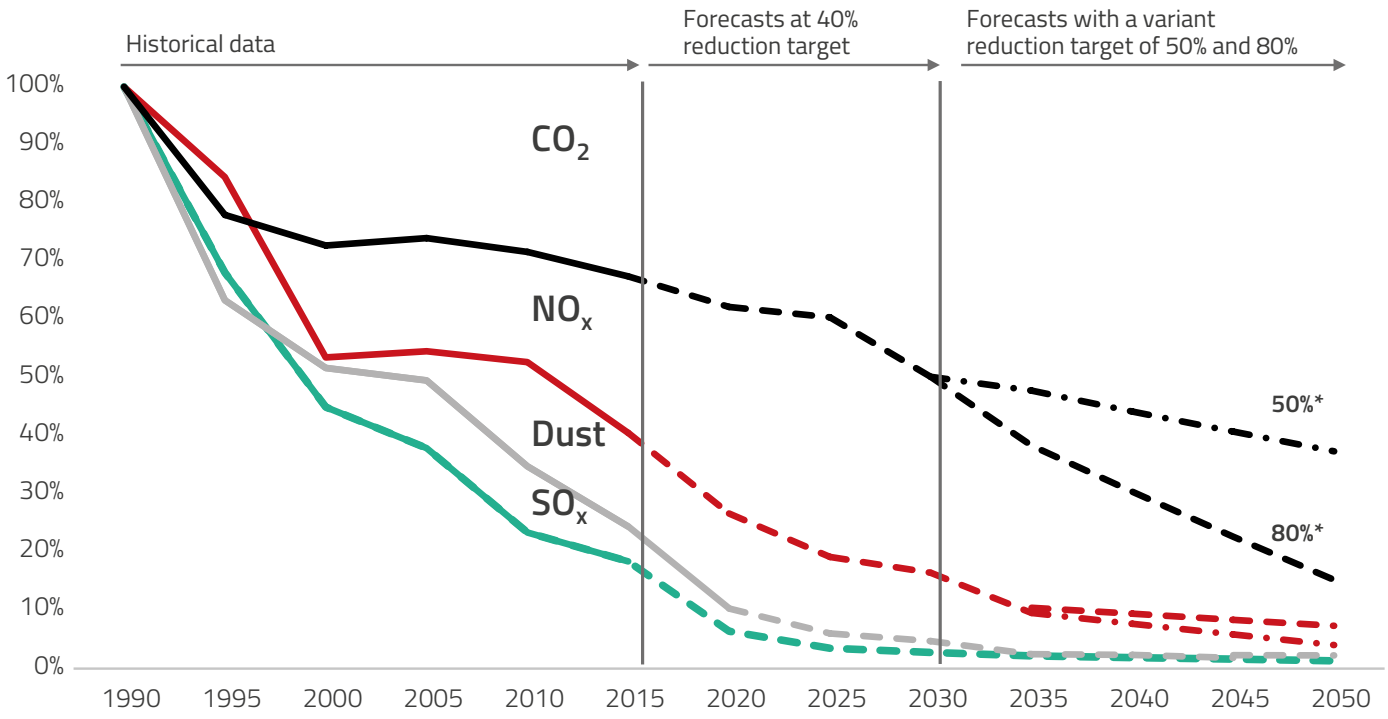
In 2014, the EU adopted the energy and climate policy for 2020-2030 with the objectives for 2030 in the form of 40% reduction of CO_2, at least 27% share of energy from renewable sources and at least 27% improvement in energy efficiency.

In June 2018, the European Parliament, the European Commission and the Council of the European Union agreed to increase the RES target to 32%, and the efficiency target to 32.5%. Revision of the RES targets and energy efficiency is planned to be conducted in 2023, and the national targets should be developed within the framework of the so-called integrated national energy and climate plans, developed by individual Member States.



2 CONTRIBUTION OF THE POLISH ENERGY SECTOR TO CLIMATE AND ENVIRONMENTAL PROTECTION

CO_2 and pollution emission levels in electricity and heat generation in Poland in relation to 1990 with a forecast up to 2050 in scenarios of 50% and 80% reduction of CO_2 emissions in comparison with 2005 [%]



Source: Own study based on National Centre for Emission Management and Balancing data
* 40%, 50% and 80% refer to the reduction of CO_2 emissions in 2050 compared to 2005.

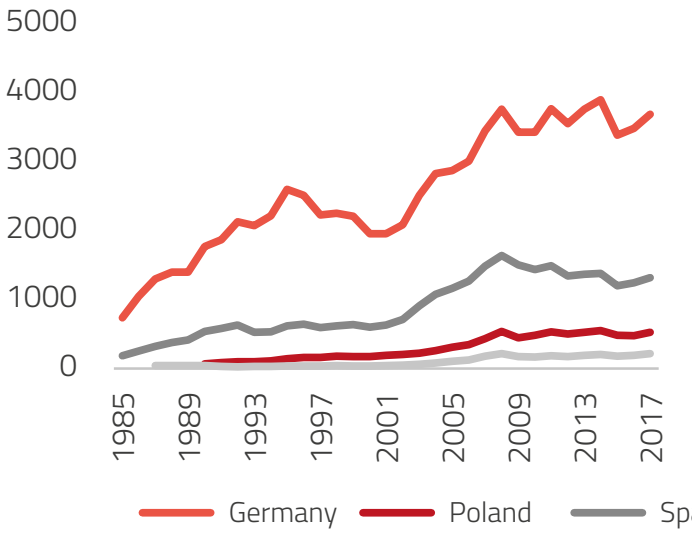
Polish energy sector has been undergoing a transformation for thirty years now. Organizational structures have changed to more effective, market conditions in the sector have been implemented, significant modernizations have been carried out and generation technologies have changed to be more environmentally friendly. As a result, the costs of electricity and heat generation were reduced and CO_2 and pollutant emissions significantly declined.

The energy sector has had a key impact on the implementation of Polish climate objectives resulting from the Kyoto Protocol.

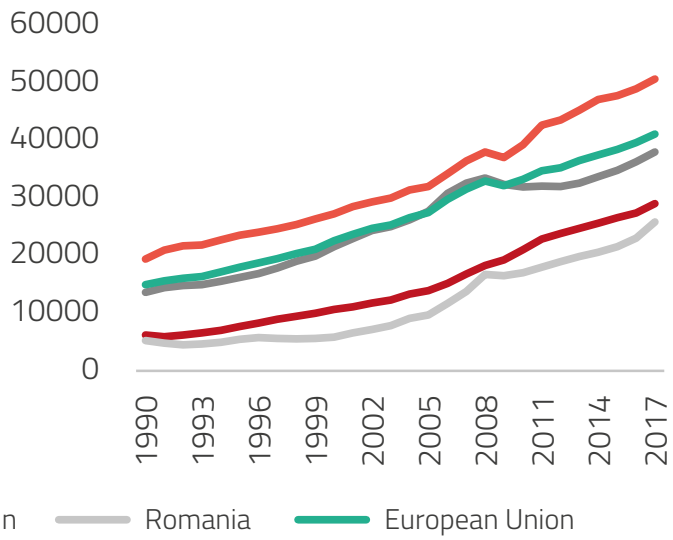
Effects of further actions will depend on the pace of economic development and the final reduction targets for the next decades. In following years, the energy sector will still have a key role in achieving reduction targets. The sector is aware of the challenges it faces and is diligently preparing for the further implementation of the transformation in a way that ensures the balance of interests of those involved or affected by transformation.

3 POLISH ECONOMY COMPARED TO THE ECONOMIES OF SELECTED EUROPEAN UNION COUNTRIES

Economic development - GDP [USDbn]



Development level - GDP per capita
[USD per capita incl. purchasing power parity]



Source: Own study based on data from the World Bank

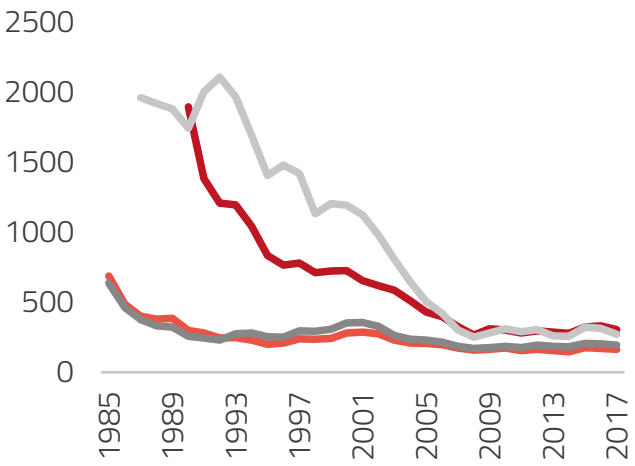
Historical conditions did not allow for rapid economic development of countries which were under the influence of the former Soviet Union, including Poland and Romania. It was only after 1989 that these countries had the opportunity to change the socio-political system and to reform the economy towards a free market. After joining the EU, Poland and Romania entered a period of dynamic development but the global financial crisis that began in 2007 had slowed down the growth.

Poland's path to achieve the EU average growth level will require stable and long-term development with the continuous elimination of historical and geopolitical barriers, as well as access to diversified and affordable electricity supply covering growing demand.

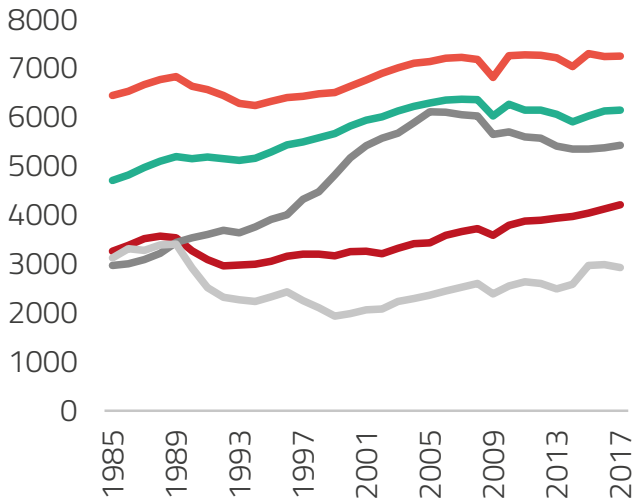
In the context of further development of the Polish economy and climate policy goals, the continuation of the transformation of the energy sector will be a challenge both in the economic and social dimensions.

4 ELECTRICITY INTENSITY AND CONSUMPTION

Electricity intensity of GDP [kWh / 1000 USD]



Electricity consumption per capita [kWh per capita]

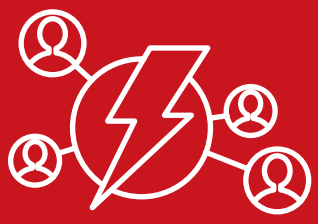


Source: Own study based on data from the World Bank

Taking into account historical data on the electricity intensity level in the selected countries, data concerning Poland and Romania is worth noting.

A significant, almost five-fold decrease in the level of electricity consumption in GDP is a reflection of the scale of changes made in the Polish and Romanian economy. Both countries have significantly transformed their economies towards increased efficiency, yet their economy is more than 1/3 more electricity intensive than, for example, German and Spanish economy. This shows that the Polish and Romanian economies still have significant potential for energy efficiency improvement.

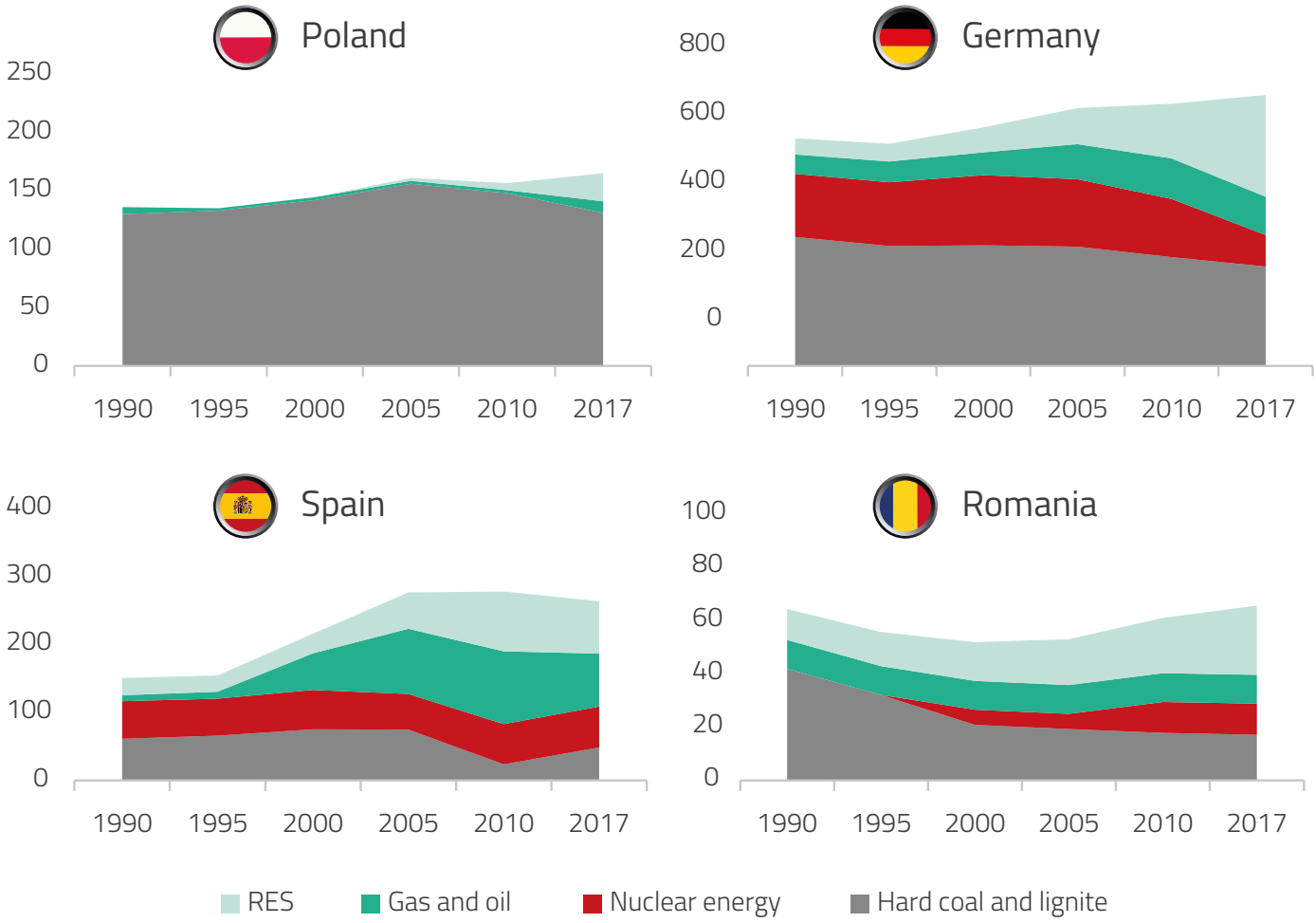
Electricity consumption per capita in Poland is far below the EU average.



It is expected that in the perspective of 20-30 years, the Polish economy should reach the average EU level by increasing the share of electricity consumption in final gross energy consumption due to the growing demand for electricity as a result of the ongoing electrification of the transport and communal sector with simultaneous necessary CO_2 emission reductions.

5 HISTORICAL STRUCTURE OF ELECTRICITY GENERATION

Structure of electricity generation in selected countries [TWh]

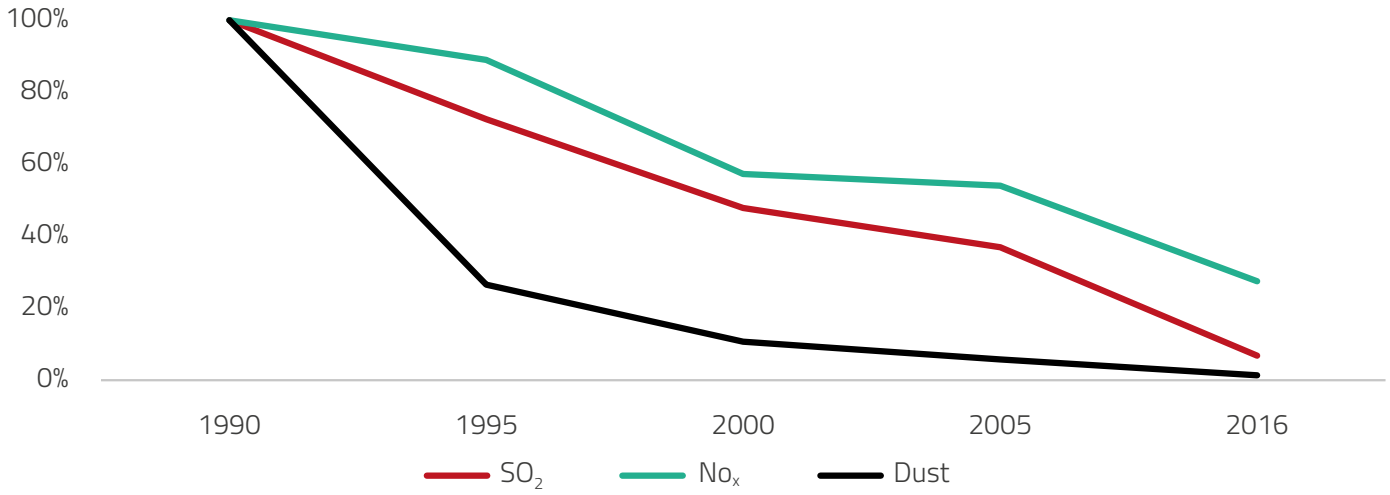


Source: Own study based on national data

Structure of electricity generation in Poland differs significantly from the structure of other analysed countries. Change of the so-called energy mix as part of the implementation of the climate policy will require significantly greater effort in Poland as compared to other countries, especially taking into account growing prices of CO_2 emission allowances and increasing energy demand. In this context, the reduction targets and the period of their achievement for individual countries should take into account the current generation base and production structure as well as the potential determined by the economic development.

6 CLEAN AIR – ENVIRONMENTAL PROTECTION

Reduction of electricity generation emissions [%]



Źródło: Own study based on National Centre for Emission Management and Balancing data

The Polish energy sector is implementing further measures to reduce the level of pollutant emissions leading to air quality improvement, which have a significant impact on human health and the comfort of living.

Current problems resulting from low air quality due to the so-called 'low emissions' are caused almost entirely by local emission sources in transport and domestic heating segments. Over the last twenty years, energy sector in Poland has significantly reduced the impact of its activities on the environment and air quality through the implementation of a number of modernization investments. As a result, it should be recognized that current share of energy sector in air pollution is negligible.

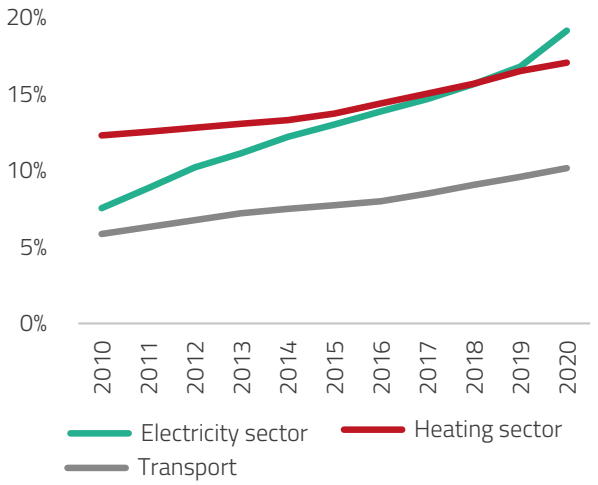
At the same time, the energy sector has been working on the reduction of the problem and the consequences of 'low emissions' through the development of district heating systems, supplied by effective combined heat and power plants, allowing simultaneous generation of electricity and heat in installations that meet strict EU standards for air pollution emissions. Efforts are also being made to promote the development of district heating by extending and modernizing heating networks.

As a result, it should be recognized that current share of energy sector in air pollution is negligible.

In recent years, significant efforts have been made in Poland to electrify transport, in particular in urban areas. Networks for charging electric vehicles are being designed and number of pilot projects are being conducted. Simultaneously programs related to the thermal modernization of buildings and the replacement of old heat sources are carried out, use of heat pumps is promoted and standards for the quality of fuels used in municipal and public buildings are introduced, all of which should improve the quality of local air as well as reduce CO_2 emission.

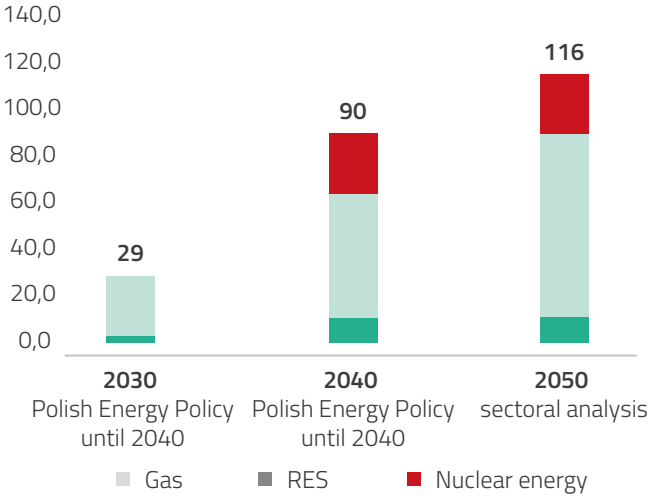
7 CLIMATE CHALLENGES OF THE POLISH ENERGY SECTOR

Share of renewable energy according to National Renewable Energy Action Plan



Źródło: Own study based on NREAP

Required capital expenditures in electricity and heat generation for the reduction of CO_2 emissions by 2050 [EURbn]



Source: Own study based on the draft Polish Energy Policy until 2040 and sectoral analysis

In the perspective of 2050, the biggest share of necessary expenditures in energy sector in relation to climate policy will be linked to the change of electricity generation structure through the construction of new renewable energy sources and possibly - a nuclear power plant. The need to cover the growing demand for electricity will also have a significant share.

As part of the implementation of the climate policy, pursuant to Polish National Renewable Energy Action Plan, Poland is committed to achieve 15% share of energy from renewable sources in 2020. This goal has been translated into targets for three main sectors with a different individual levels calculated on the basis of actual potential and required costs. For the electricity sector, the target was set at 19.1%, for the heating sector at 17.1%, and for transport at the level of 10.1%.

It is assumed that the national RES target for 2030 will be significantly higher than the target for 2020, and the contribution of the electricity and heating sector in achieving this objective will be dominant. The draft of the Polish Energy Policy up to 2040 assumes the RES target for 2030 at the level of 21% with the share of the electricity sector at the level of 27%.

As part of the implementation of the climate policy, pursuant to Polish National Renewable Energy Action Plan, Poland is committed to achieve 15% share of energy from renewable sources in 2020.

The draft Polish Energy Policy until 2040 assumes the RES target for 2030 at the level of 21%.

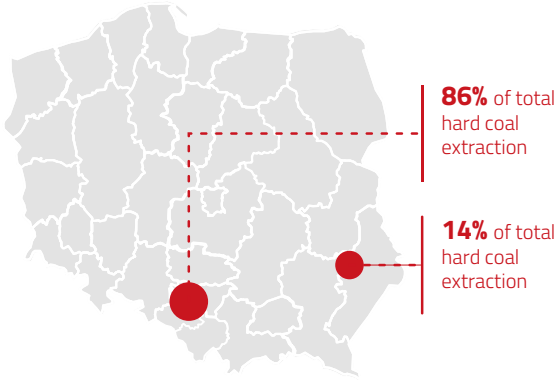
8 SOCIAL CONDITIONS

The change in the sector's structure will require the implementation of public aid dedicated for regions that are highly related to the mining sector.

In response, social issues were raised both in the Paris Agreement and the 'Just Transition' initiative. The 'Just Transition' initiative is focused on the transformation in the mining sector. Its overarching goal is global assistance directed to mining-based regions in their transition to a sustainable economy, in creation of convenient jobs for employees leaving mining industry and preventing climate change. Formulated guidelines aim at setting out the direction for countries through appropriate definition, implementation and supervision of all the activities carried out on a path to sustainable economy. Transition to a low-carbon and climate-friendly economy maximizes benefits resulting from climate-oriented actions and minimizes difficulties for employees and local communities.

Additionally, a special platform 'Coal Regions in Transition' was lunched, which aims to mitigate social problems resulting from limiting coal mining, with current pilot projects carried out in three regions: Silesia, Trencin and Western Greece.

Distribution of hard coal extraction in Poland

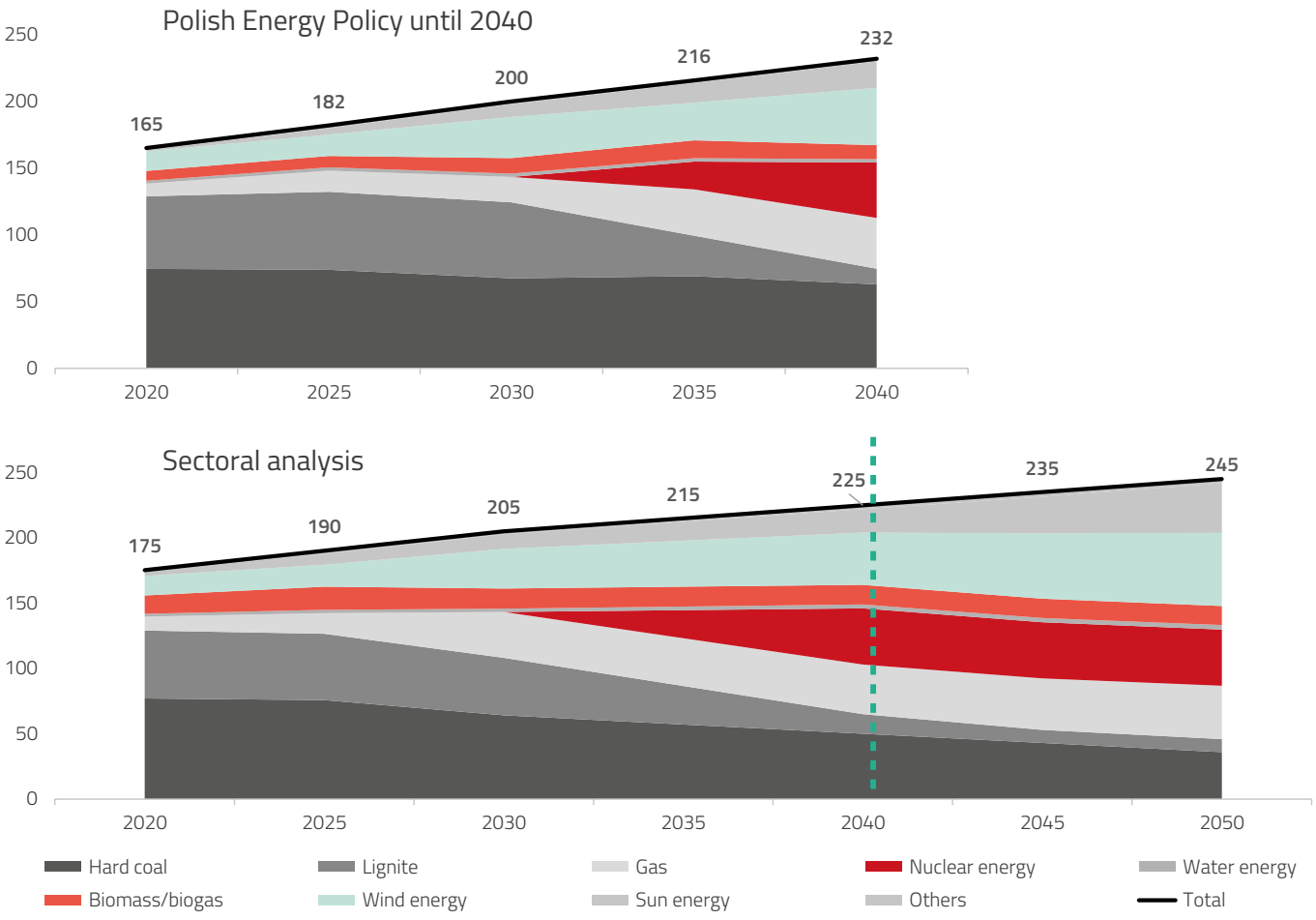


Source: Own study

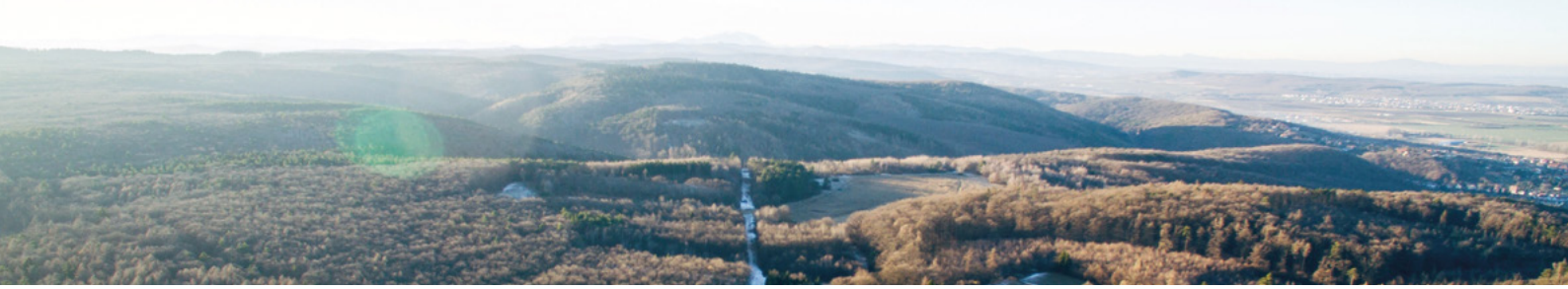
The Coal Regions in Transition platform aims to support regions dependent on coal mining in identifying, developing and implementing projects that can contribute to sustainable stimulation in economic and technological transformation. The platform provides the opportunity for dialogue at the national, regional and local level with representatives of the European Union by identifying a possible policy framework and the direction of transformation by developing a long-term strategy to accelerate the transition to clean energy sources.

9 2050 PERSPECTIVE

Electricity production up to 2050 [TWh]



Source: Based on the draft of Polish Energy Policy up to 2040 and sectoral analysis



Forecasts of electricity consumption and changes in the production structure as part of sectoral analysis from 2017 are very similar to the forecasts included in the draft of Polish Energy Policy up to 2040.

Changes in the structure of electricity generation in the following decades will lead to a significant technological diversification of the sector. These changes will result from the need to reduce the emission of carbon sources and the need to increase the share of RES.

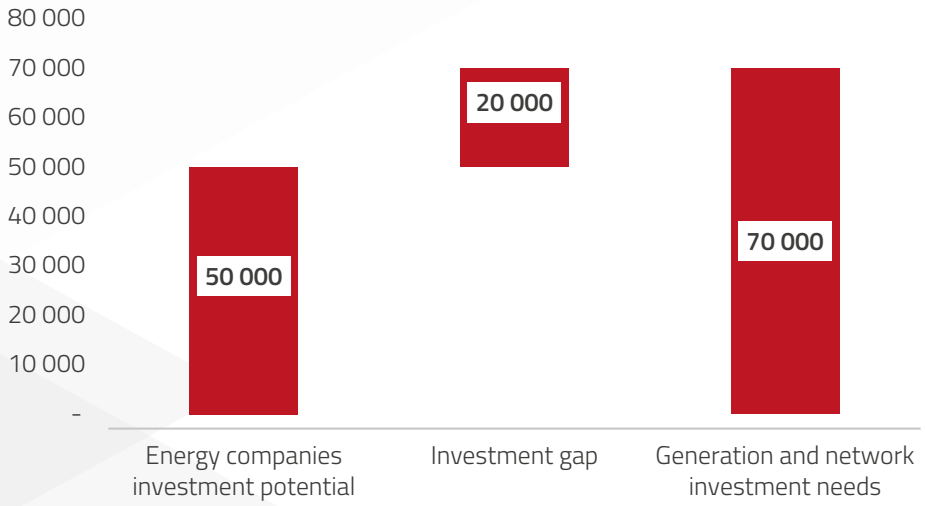
When comparing Poland's situation to selected countries, it should be stated that coal will continue to contribute to generation sector to some extent. This is primarily caused by the need to ensure a stable reserve capacity for renewable energy sources, which will probably also be reflected in the generation structure of Germany and Romania. In Spain, a similar role will be taken by stable sources of hydro power plants, which do not have such high potential in Poland.

Nevertheless, the reduction targets will force Poland to develop low-emission technologies, and due to the lack of significant domestic gas resources, these reductions will have to be achieved primarily through the development of RES and the reduction in the share of coal units.

Regardless of the reduction target, the need to rebuild the structure of the sector with limited resources requires searching for additional ways to reduce expenditure and to improve efficiency. This may be achieved through the implementation of innovative initiatives in the field of renewable energy, energy storage, low-emission technologies and distributed generation. Key energy companies in Poland are aware of challenges and potential opportunities arising from continuous development of innovations.

10 FINANCING ENERGY TRANSITION

Estimation of investment gap for energy transition in 2018-2030 [EURm]



Source: EY study based on Transmission System Operator data and energy companies financial statements

Estimated investment potential of energy companies in Poland taking into account the introduction of a capacity market and limited dividend policy in comparison to the investment needs of the sector (assuming 40% CO_2 emission reduction target in 2030), indicates that the gap can reach at least 20 EURbn. This gap will have to be covered by investors from outside of the sector and through support from aid funds, including support from European Union funds.

At the same time, Polish energy sector will maintain the efforts to reduce energy and power shortages by innovative solution, investment process optimization and investment risk reduction, which may result in the reduction of necessary spending or generation of additional investment capacity.

In this context, effective planning and a reliable approach of the sector to the problem of energy transformation is crucial, as the implementation of such broad measures will require significant efforts which will have a long-term impact both on the sector and the entire economy.

The implementation of such broad measures will require significant efforts which will have a long-term impact both on the sector and the entire economy

This booklet has been prepared by the Polish Electricity Association in connection with the 24th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change - COP24 in Katowice on 3-14 December 2018 as part of more detailed analysis of the Polish sector and its role in the implementation of climate policy. Full version of the report is available at **www.pkee.pl**

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