



*– EXTRACT FROM DRAFT –*

**ENERGY POLICY OF POLAND  
UNTIL 2040  
(EPP2040)**

Ministry of Energy

Warsaw 2018

*The Energy Policy of Poland until 2040* (EPP2040) is a response to the key challenges faced by the Polish energy sector in the nearest decades and sets the strategic directions for the energy sector, taking into account the actions that need to be delivered in the medium-term.

At the same time, EPP2040 is one of the nine integrated sectoral strategies following from the *Strategy for Responsible Development*. EPP is consistent with EU's strategic documents. *The National Action Plan for Energy and Climate for 2021-2030* will be consistent with EPP2040.

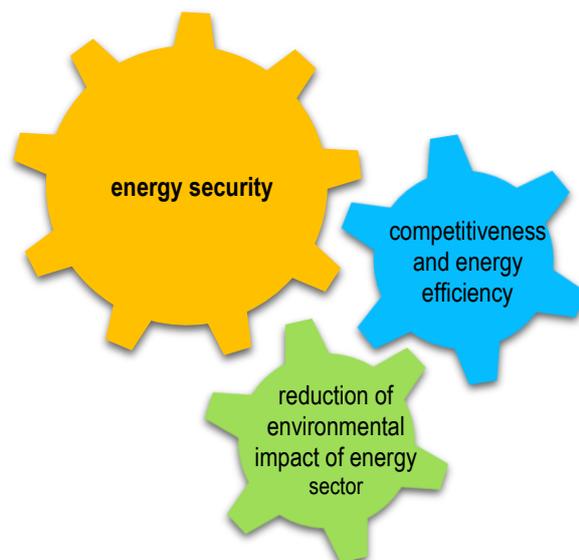
The energy policy of the state is defined by the Minister of Energy pursuant to Articles 12, 13-15 of the Energy Law, and is implemented by a range of actors, including the Minister of Energy and the Council of Ministers.

The document contains a **description of the conditions and determinants** of the Polish energy sector, the **objectives of the energy policy**, and the strategic directions and actions to be pursued for the policy to achieve its objectives.

The strategic directions are defined for a 20-year horizon, but to make them more realistic, some of them are set for a perspective of several or more than a dozen years. The tasks defined are implementative in nature and may be subject to dynamic changes due to the changing environment. The policy lines and thematic areas are presented in the table at this document. Figures 1-3 present the forecast structure of the coverage of demand for capacity and electricity production and the expected drop in CO<sub>2</sub> emissions by the electric power sector as a result of the implementation of EPP2040.

## Objectives and indicators

The objective of the Polish energy policy is to provide **energy security\***, while ensuring **competitiveness of the economy\*\***, energy efficiency and **reduction of the environmental impact of the energy sector**, and with optimum use of Poland's own energy resources



**The following indicators are to be used as the overall measure of the achievement of EPP2040:**

- ✓ 60% share of coal in the generation of electricity in 2030
- ✓ 21% RES in gross final energy consumption in 2030
- ✓ introduction of nuclear energy in 2033
- ✓ improvement in energy-efficiency by 23% by 2030 relative to the 2007 forecasts
- ✓ reducing CO<sub>2</sub> emissions by 30% by 2030 (in relation to 1990)

\* Pursuant to the Energy Law, energy security means the coverage current and future needs of fuel and energy in a technically and economically viable manner, subject to applicable environmental requirements. This means the need to ensure that the supply of fuels, and generation, transmission and distribution are guaranteed.

\*\* Energy cost is hidden in any activity and product produced by the economy, and consequently the prices of energy translate into the competitiveness of the economy as a whole.

## EPP2040 Strategic Directions

EPP2040 will be delivered by pursuit of 8 strategic directions, which are subdivided into actions. The policy directions and actions comprise the full energy supply chain – from energy sources, through energy generation and supply (transmission and distribution), to the ways energy is used. Each of the eight strategic directions works towards achievement of the three components of the EPP objective.

### Strategic direction 1. Optimal use of domestic energy resources

Poland is capable of covering the demand for coal and biomass with domestic sources, which are, however, not sufficient to satisfy the demand for natural gas and oil. Bearing in mind the finite nature of fossil fuels, as well as economic and environmental considerations, rational use of resources is of key importance.

The demand for **hard coal** will be covered domestically, and the import–export relation will have a supplementary nature. To make the above possible, it is necessary, above all, to ensure profitability for the sector and rational exploitation, use and distribution of fossil fuels. Importantly, innovations in coal mining and use must be put in place to improve the competitiveness of Polish coal compared to that from imports and other fuels, as well as to reduce its negative impact on the environment. For social and environmental reasons, restructuring in post-mining areas will be continued, mainly for industrial purposes.

The demand for **lignite** will be covered by domestic supply, at short distances from the locations where it is used. The exploitation of new deposits will depend on the development of innovative methods for using coal due to its high emissivity, which is likely to affect the possibilities of using it in the energy sector and growingly reduces its competitiveness as a result of it being burdened with ever greater costs of the EU's climate policy.

The demand for **natural gas and oil** will be mainly covered by imports, with actions to be pursued to ensure real diversification of the directions and sources of supply. In parallel, domestic deposits will continue to be prospected for (also using non-conventional methods) to replace the supply from depleted deposits. Some of the demand for oil will be reduced by the growing importance of biofuels and alternative fuels (e.g. electricity, LNG, CNG, hydrogen).

The demand for **renewable resources (biomass)** will be covered at the closest possible distance from the generation locality. Efforts will be taken to increase the role of waste-based biomass so as not to create competition with the use by the food sector. The potential of non-agricultural waste should also be used.

### Strategic direction 2. Development of the power capacity and transmission infrastructure

The balance of energy-mix must ensure that the supply of electricity is stable and system is flexible, and that Poland complies with its international obligations. It must also be resilient when confronted with energy market disturbances and changes, and respond to worldwide trends. At the same time, only efficient and sufficiently robust infrastructure will ensure security of supply.

Poland aims to cover **its demand for capacity with domestic resources**. The national deposits of coal will be the key element of Poland's energy security and the foundation of the energy mix. The increase in demand will be covered by sources other than conventional coal-based capacities. **The use of coal** by the energy sector will remain stable, but the share of coal in the structure of energy consumption will be declining (to approx. 60% in electricity production in 2030) on account of the increase in energy consumption. Given the targeted share of RES in EU's final energy consumption (32%), the importance of **renewable energy sources** will be growing – their share in domestic electricity consumption may be approx. 27%. The achievement of the share of RES in electricity generation will be mainly based on photovoltaics (from 2022) and offshore wind power plant (after 2025), with the latter having the greatest prospects for development given the prevailing economic and technical conditions. In order for the above level of RES, **energy storage technologies** will need to be developed and **gas units** as regulatory capacities. In order to **reduce emissions** from the energy sector, low-efficient units will be modernized and/or decommissioned, and replaced gradually with more efficient plants (including cogeneration installations). The emission reduction efforts will be mainly based on **nuclear energy**, which is to be introduced in 2033. By 2043, 6 nuclear units with a total capacity of 6-9 GW will be commissioned, which means that in 2035, the share of this technology in energy generation may represent approx. 10%.

Grid infrastructure development will involve extension of the **domestic transmission grid** under seven investment programmes, which will also contribute to streamlining cross-border flow of energy. The quality of supply to final consumers does not only depend on the density of the grid, but also requires moving medium-voltage power lines underground (Poland will work towards achieving the UE average in terms of the indicators of the duration and frequency of power outages). In order to improve efficiency of operation in emergency situations, a digital communications systems between distribution system operators will be

put in place, and infrastructure will be equipped with control appliance. In addition, **smart grids** will be deployed to integrate the activities and behaviours of all entities and users connected to such grids.

**Strategic direction 3.  
Diversification of natural gas  
and oil supply and network  
infrastructure development**

The strong dependence of Poland on the supply of **natural gas** from a single direction requires diversification activities. The **Northern Gate** will be build, which will consist of the Norwegian Corridor (Norway-Denmark-Poland connection) and development of the LNG terminal. This will also involve development of interconnectors with neighbouring countries. In order to exploit the natural gas imports opportunities and for more efficient infrastructure emplacement (liquidated the so-called 'white spots'), Poland will develop the domestic transmission and distribution system and the storage infrastructure.

Poland is dependent of external supply of **crude oil** to an even greater extent, therefore there is a need for ensuring suitable conditions for receiving this energy source and efficient domestic infrastructure. In order to ensure real diversification, delivery by sea will need to be increased, which will be made by the development of the Pomeranian Crude Oil Pipeline, and oil and liquid fuel storage facilities. The delivery of petroleum products will require a suitably developed infrastructure of pipelines, especially in southern Poland.

**Strategic direction 4.  
Development of energy  
markets**

The **electricity market** is undergoing a transformation and responding to challenges and development opportunities, i.e. creation of a single energy market or the willingness of consumers to participate in the market. In order the electricity market to evolve, there is a need for strengthening the position of consumers. This requires clarifying the terms of general distribution contracts, improving the information policy and allowing consumers to participate in the market, as well as promoting aggregation services. In order to protect the competitiveness of Polish energy-intensive companies, mechanisms will be put in place to reduce excessive burdens on this group of actors. Bearing in mind the effects of the intra-day differences in the demand for electricity, actions will be pursued to "flatten" the daily demand curve, which will be supported, inter alia, by the development of electrical mobility. For local balancing there is a need to marketise system services and boosting the competitiveness of distribution companies.

The liberalisation of the market for natural gas needs to be finished as soon as possible, which means that the application of tariffs to the last group of customers (namely households), will need to be discontinued. Another task is to enhance the position of Poland on the European market, which will be aided by the establishment of a regional hub for the transmission and trade in gas in Poland – for this purpose further development of the service and trading potential will be needed. Market growth can also be achieved by the penetration of new segments – ranging from more in-depth gasification of the country to the use of gas in back-up units for RES.

The **market for petroleum products** is relatively stable, even though it is bound to transform in the years to come. There is a need to put the ownership structure of the fuel market segment into order so that petroleum companies focus on production and trade of fuels, and so that the state exercises control over key infrastructure for fuel security. The market must respond to the growing use of petrochemical products in the economy, as a result of which the production capacities in the area of *inter alia* olefins, phenols. In addition, some of the demand for petroleum products will be covered by increased consumption of biocomponents (8.5% share in the consumption of fuels in transport in 2020), and alternative fuels (LNG, CNG, hydrogen, synthetic fuels) and **development of e-mobility** (1 million electric vehicles in 2025).

**Strategic direction 5.  
Launch of nuclear energy**

The first nuclear unit (with the capacity of approx.. 1-1.5 GW) will be launched in 2033, and the next five, every two years (by 2043). The time schedule result from the expected growing demand for electricity and changes in National Power System due to decommissioning old units. Nuclear power plants ensure **stable energy generation with zero emissions of air pollutants**. At the same time, it is possible to **diversify the energy generation structure at a reasonable cost and with acceptable energy prices for consumers**. Current technologies (III and III+ generation) and stringent world nuclear safety standards ensure **safety of nuclear power plant operation** and waste storage. A significant part of the nuclear project can be implemented with the participation of Polish enterprises.

The launch of nuclear energy requires prior legislative changes to streamline project implementation as well as completion of the work on the financing model. Once tests are completed, the location of the first nuclear unit (Żarnowiec or Kopalino) will be selected, then successive locations will be selected and a new landfill for low- and medium-level waste will be started. Technology and the general building contractor will also be selected. Technical support for nuclear oversight will be provided.

### Strategic direction 6. Development of renewable energy sources

The increasing role of renewable energy sources results from the need to diversify the energy mix, the need to contribute to the EU-wide RES target in final energy consumption (32%), but also from the global trends in RES development with falling technological costs. Poland declares reaching a **21% share of renewable energy in the final energy consumption in 2030** (*in heating and cooling* – 1-1.3 percentage point y/y growth of RES share, *in transport* – 10% share in 2020 and 14% in 2030, *in the electricity production* – increasing role of RES; projected share of 27%). A significant portion of the RES generation capacity is installed in sources dependent on atmospheric conditions, which negatively affects the National Power System operation. At the same time, these sources provide high unit cost effectiveness. Bearing in mind the expected technological development, a special role in reaching the RES target will be played by **offshore wind farms**, as well as **photovoltaics** whose work is correlated with summer peaks of demand for electricity.

In order to use the RES potential in a manner which is safe for the system, **energy clusters and energy cooperatives** will be created, which should ensure balancing at the local level, by linking various technologies to energy storage capacities. Individual use of renewable energy sources should also be accompanied by energy storage.

**RES support mechanisms** will promote solutions ensuring maximum availability, with relatively the lowest cost of energy generation and satisfying local energy needs.

### Strategic direction 7. Development of heating and cogeneration

Coverage of heating demand takes place at the local level, therefore, it is extremely important to ensure **energy planning at the level of municipalities** and regions - this is crucial for a rational energy economy, as well as for reducing emissions associated with heat generation. A useful tool will also be a nationwide heating map, which will facilitate planning and investments.

In areas where there are technical conditions to supply heat from an energy-efficient heating system, **customers should use district heat first**, unless they use a greener solution. To increase the use of district heat, the current connection obligation will be extended to all centralized district heating systems for all buildings. At the same time, a new market model will be developed, so that heat prices would be acceptable to customers, and would cover justified costs with a return on invested capital. The **technical development of district heating** is of key importance; this will be related to development of cogeneration, power plant conversion to heating plants, increased use of renewable energy and waste in system heating, modernization and expansion of the heat and cooling distribution system, and promotion of heat storage and smart grids.

To **meet individual heating needs**, sources with the lowest possible emissions should be promoted (gas, non-combustible renewables, heat pumps, electric heating, low-emission solid fuels), while gradually moving away from solid fuels. At the same time, it is necessary to increase the monitoring of emissions in detached houses.

### Strategic direction 8. Improving energy efficiency

Energy efficiency means lower energy costs. It involves implementation of new technologies and a growth of innovation in the economy, making it more attractive and competitive. The EU-wide target for 2030 is 32.5%, and Poland declares a **23% energy savings** compared to the forecast from 2007. The potential for improving energy efficiency is present almost in the entire economy, but not every energy efficiency improvement project is rational, therefore, savings need to be compared to inputs.

Increased efficiency of the economy will be achieved by requiring a group of entities to improve energy efficiency or to purchase energy efficiency certificates, but also through the use of legal and financial incentives for pro-efficiency actions. Raising awareness of rational energy consumption is also of great importance.

Inefficient energy use is strongly associated with the problem of **low air quality** (combustion of low-quality coal and waste in households, improper service of installations, transport emissions). The main tool to combat the problem is a widespread thermomodernisation of residential buildings and ensuring efficient and sustainable access to heat. Implementation of e-mobility and a number of measures planned for the development of the alternative fuels market will also have the effect of reducing transport emissions.

<p><b>1. Optimal use of own energy resources</b></p>	<p>rational use of energy resources</p>	<p><b>hard coal:</b></p> <ul style="list-style-type: none"> <li>- sector profitability</li> <li>- rational exploitation, use and distribution</li> <li>- innovations in extraction and use</li> </ul> <p><b>lignite:</b></p> <ul style="list-style-type: none"> <li>- rational exploitation of deposits</li> <li>- innovations in use</li> </ul> <p><b>natural gas:</b></p> <ul style="list-style-type: none"> <li>- prospecting (including by unconventional methods) and supplementing the domestic supply with diversified supplies</li> </ul> <p><b>crude oil:</b></p> <ul style="list-style-type: none"> <li>- prospecting and supplementing the domestic supply with diversified supplies</li> </ul> <p><b>biomass and non-agricultural waste:</b></p> <ul style="list-style-type: none"> <li>- rational own use</li> </ul>
<p><b>2. Development of the electricity generation and transmission infrastructure</b></p>	<p>covering the demand for electricity</p>	<p><b>power capacity:</b></p> <ul style="list-style-type: none"> <li>- ability to cover demand with domestic capacity (in a stable, flexible, sustainable manner)</li> <li>- increased demand covered by other than conventional coal capacities</li> <li>- coal - 60% share in production in 2030</li> <li>- nuclear power - 6-9 GW in 2043.</li> <li>- RES - increase in use</li> <li>- natural gas – mainly as regulatory capacity</li> </ul> <p><b>transmission infrastructure:</b></p> <ul style="list-style-type: none"> <li>- expansion of the transmission and distribution grids</li> <li>- secure cross-border connections</li> <li>- higher quality of energy distribution</li> <li>- effective measures in emergencies</li> <li>- development of energy storage</li> <li>- development of smart grids</li> </ul>
<p><b>3. Diversification of gas and oil supply and network infrastructure development</b></p>	<p>covering the demand for natural gas and liquid fuels</p>	<p><b>natural gas:</b></p> <ul style="list-style-type: none"> <li>- ability to receive supplies (<i>Baltic Pipe, LNG terminal</i>)</li> <li>- efficient cross-border connections</li> <li>- development of gas transmission, distribution and storage infrastructure</li> </ul> <p><b>oil and liquid fuels:</b></p> <ul style="list-style-type: none"> <li>- development of oil and liquid fuel transmission and storage infrastructure</li> </ul>
<p><b>4. Development of energy markets</b></p>	<p>fully competitive market for electricity, natural gas and liquid fuels</p>	<p><b>electricity:</b></p> <ul style="list-style-type: none"> <li>- strengthening the consumer's position (including smart meters)</li> <li>- protecting competitiveness of the energy-intensive industry</li> <li>- flattening the demand curve for electricity</li> <li>- implementation of e-mobility</li> <li>- marketing of system services</li> <li>- reform of electricity trade</li> </ul> <p><b>natural gas:</b></p> <ul style="list-style-type: none"> <li>- market liberalization</li> <li>- strengthening Poland's position in the European gas market (regional trade centre)</li> <li>- new gas use segments</li> </ul> <p><b>petroleum products:</b></p> <ul style="list-style-type: none"> <li>- alignment of roles</li> <li>- increasing the role of non-traditional fuels (biocomponents, alternative fuels, electromobility)</li> </ul>
<p><b>5. Launch of nuclear energy</b></p>	<p>lowering emissions of the energy sector and safety of system operation</p>	<ul style="list-style-type: none"> <li>- commissioning of the first nuclear unit with a capacity of 1-1.5 GW by 2033 and the next five, by 2043 (in total, around 6-9 GW)</li> <li>- ensuring formal, legal and financial conditions for the construction and operation of nuclear energy</li> <li>- development of human resources</li> <li>- effective nuclear regulatory system</li> <li>- ensuring a landfill for low- and medium-level waste</li> </ul>
<p><b>6. Development of renewable energy sources</b></p>	<p>lowering emissions of the energy sector and diversification of energy generation</p>	<ul style="list-style-type: none"> <li>- 21% RES in final gross energy consumption in 2030.</li> <li>- in heating and cooling - 1-1.3 pp. annual consumption increase</li> <li>- in electricity generation - maintain growth, implement offshore wind energy</li> <li>- in transport - 10% RES in 2020 and 14% in 2030.</li> <li>- conditional development of redispatchable RES</li> <li>- ability to balance RES (storage, energy clusters, regulatory sources)</li> <li>- support for RES development (while ensuring network safety)</li> </ul>
<p><b>7. Development of heating and cogeneration</b></p>	<p>universal access to heating and low-emission heat generation nationwide</p>	<ul style="list-style-type: none"> <li>- active energy planning in regions</li> <li>- heating map construction</li> </ul> <p><b>district heating:</b></p> <ul style="list-style-type: none"> <li>- competitiveness vs. individual sources</li> <li>- increased use of high-performance CHP</li> <li>- use of renewable energy and waste</li> <li>- extension of heat and cooling supply systems</li> <li>- use of heat storage</li> <li>- obligation to connect customers to the district heating</li> </ul> <p><b>individual heating:</b></p> <ul style="list-style-type: none"> <li>- increasing the use of non-solid fuels - gas, non-combustible RES, electricity</li> <li>- effective monitoring of pollutant emissions</li> <li>- limiting the use of solid fuels</li> </ul>
<p><b>8. Improving energy efficiency of the economy</b></p>	<p>increasing competitiveness of the economy</p>	<ul style="list-style-type: none"> <li>- 23% energy savings vs. 2030 forecasts</li> <li>- legal and financial incentives for pro-efficiency actions</li> <li>- exemplary role of public sector entities</li> <li>- improving environmental awareness</li> <li>- intensive thermomodernisation of housing</li> <li>- improving air quality</li> <li>- reduction of energy poverty</li> </ul>

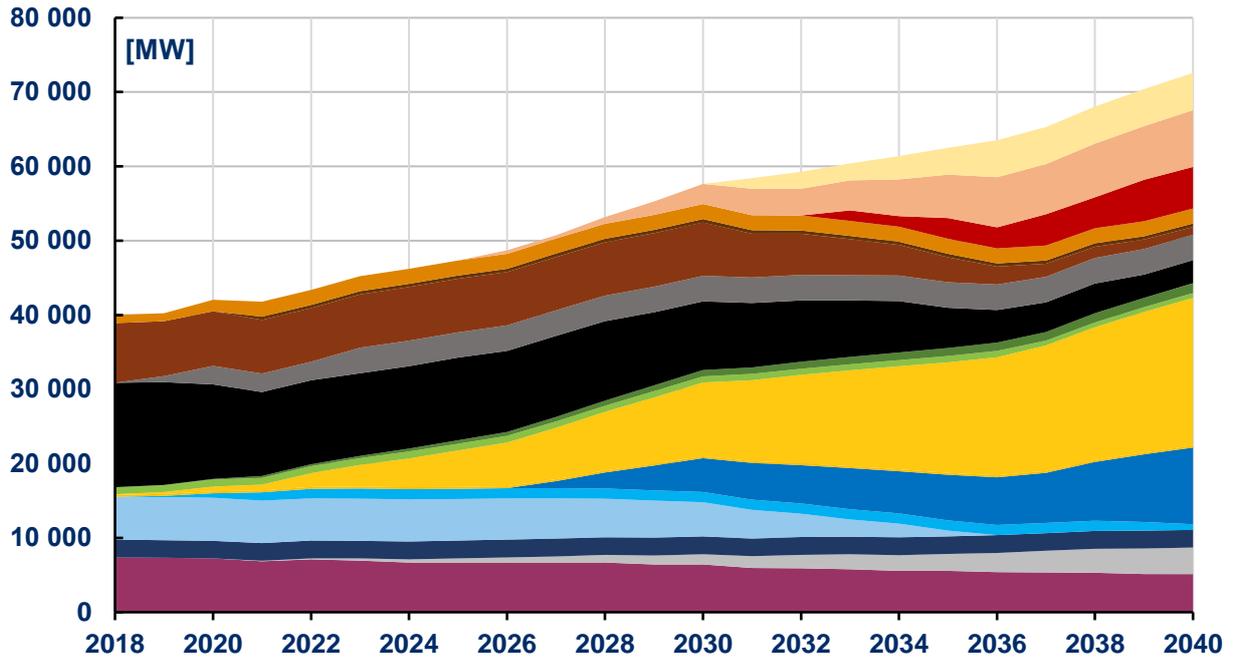


Figure 1. Installed net capacity by technology until 2040

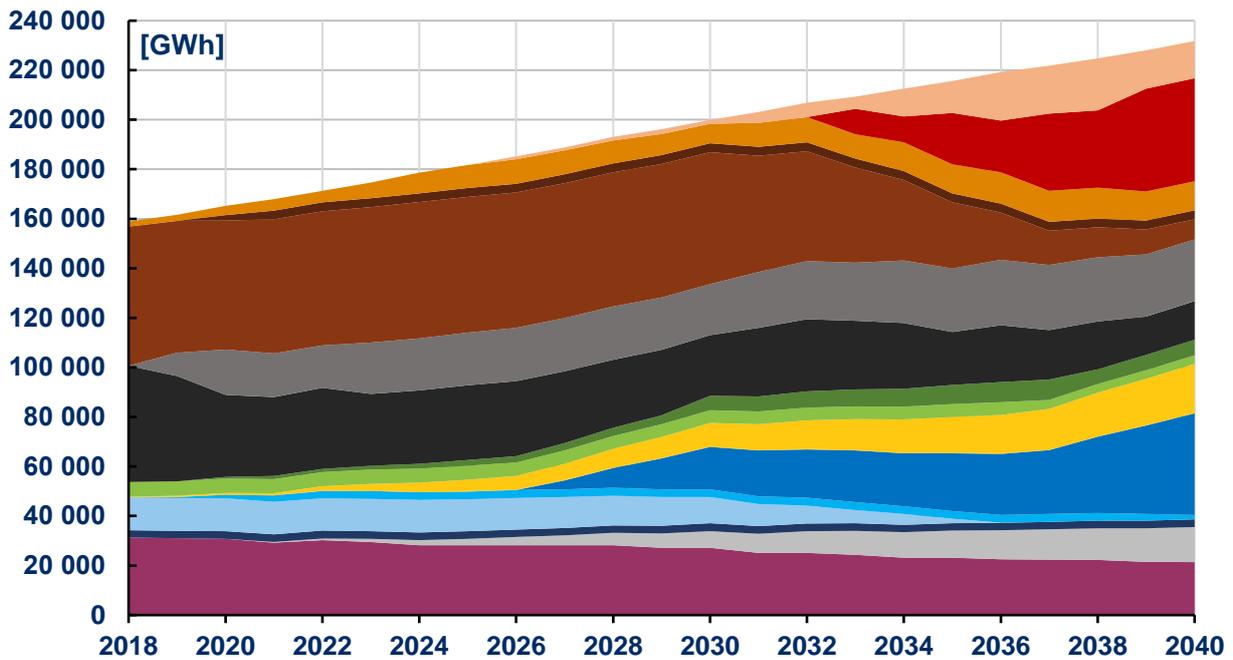


Figure 2. Electricity generation by technology until 2040

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|--|--|
| <span style="color: yellow;">■</span> new diesel engines or simple cycle gas turbines                                    | <span style="color: green;">■</span> biogas power plants   |
| <span style="color: orange;">■</span> new combined cycle gas turbines  | <span style="color: lightgreen;">■</span> biomass power plants                                   |
| <span style="color: red;">■</span> new nuclear units   | <span style="color: yellow;">■</span> photovoltaic power plants                                  |
| <span style="color: gold;">■</span> combined cycle gas turbines: Płock, Żerań, Stalowa Wola, Włocławek                   | <span style="color: blue;">■</span> offshore wind power plants                                   |
| <span style="color: brown;">■</span> lignite power plants – under construction (Turów)                                   | <span style="color: cyan;">■</span> new wind power plants – as part of the RES auction in 2018   |
| <span style="color: darkred;">■</span> lignite power plants – existing   | <span style="color: lightblue;">■</span> onshore wind power plants – existing                    |
| <span style="color: grey;">■</span> hard coal power plants – planned and under construction (Jaworzno, Opole, Ostrołęka) | <span style="color: darkblue;">■</span> hydropower plants  |
| <span style="color: black;">■</span> coal power plants – existing  | <span style="color: lightgrey;">■</span> new combined heat and power plants and condensing units |
|  | <span style="color: maroon;">■</span> CHP plants   |

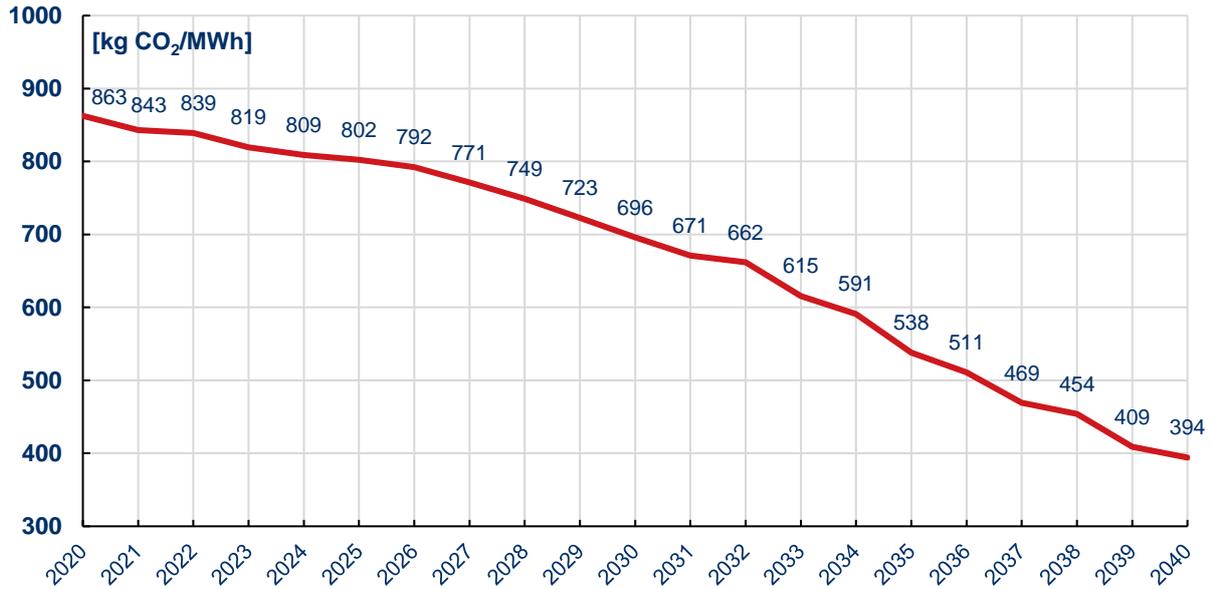


Figure 3. Forecast of average net emission in the power and CHP sector [kg CO<sub>2</sub>/MWh]

The above figures are extracts from the *Conclusions from projections for the electricity sector* – the document is an attachment to EPP2040.

The presented energy mix was prepared using a specialized energy planning tool. The model selects generation sources according to cost efficiency, but also ensures security and reliability of energy supply. This means that even if renewable energy technology are significantly cheaper than other available ones, the model would not choose it as the only one, since the condition of energy supply security would not be met. In such a situation, a reserve source must be assured.

The model takes into account political decisions, but in analytical assumptions, these are cut-off values – for example, the necessity to meet EU’s commitments regarding the share of renewable energy in the energy mix was enforced, and the Ostrołęka Power Plant is the last new coal-fired power plant, apart from cogeneration and other technologies with emissions below 450 kg CO<sub>2</sub>/MWh. Assumptions for the model introduce the possibility and not the necessity to build a nuclear power plant. Therefore, its presence in the energy mix is economically justified.