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MINISTERSTWO ENERGII

National Energy and Climate Plan for the years 2021-2030

Objectives and targets, and policies and measures

DRAFT – v. 3.1 of 4 January 2019

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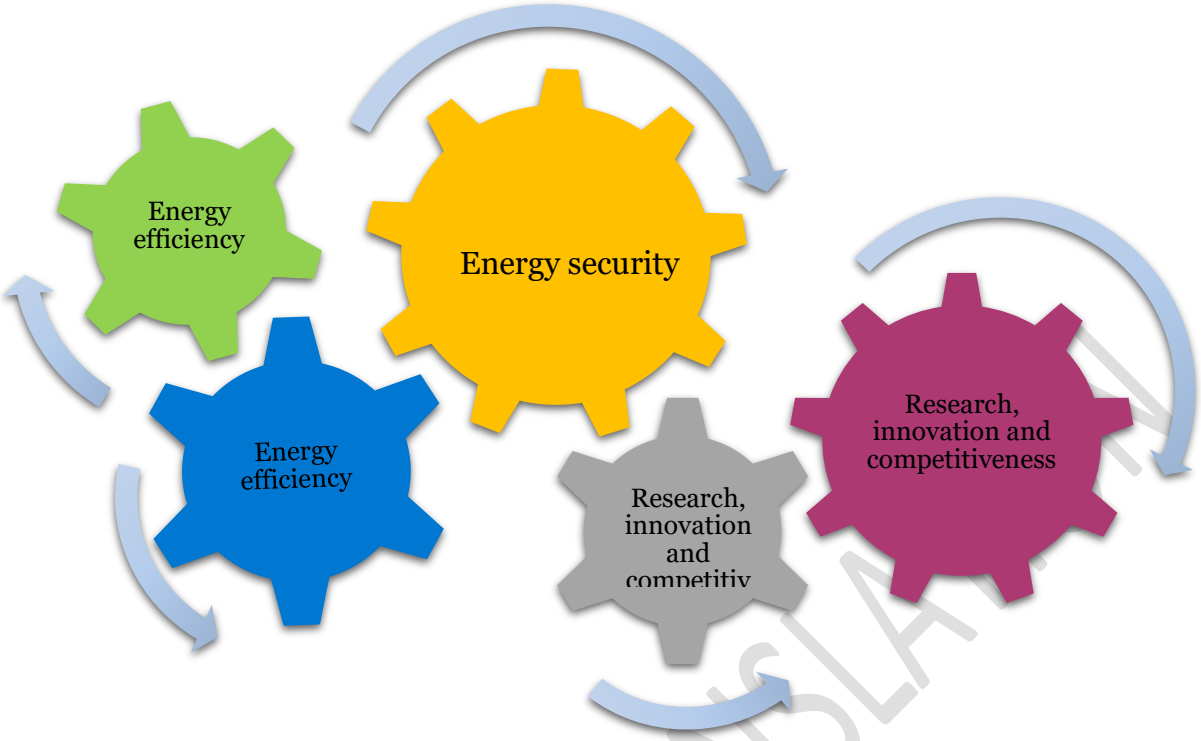
1. OVERVIEW AND THE PROCESS OF DEVELOPING THE NATIONAL ENERGY AND CLIMATE PLAN 2021-2030

This document along with appendices has been developed in fulfilment of the obligation set out in Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council and will be submitted to the European Commission in connection with Article 9 of the aforementioned regulation.

The final version of the National Plan will be prepared taking into account the conclusions derived from national arrangements and consultations, the updates - currently in the process of being agreed - of the national sector development strategies outlined in the Strategy for Responsible Development 2020 (with an outlook to 2030), as well as regional consultations and possible recommendations of the European Commission. In connection with Article 3 of the aforementioned European Union regulation, the final version of the National Plan will be submitted to the European Commission by 31 December 2019.

This draft National Plan is an effect of the work of the inter-ministerial working team coordinated by the Ministry of Energy. It was composed of the representatives of: the Ministry of the Environment, the Ministry of Finance, the Ministry of Enterprise and Technology, the Ministry of Investment and Development, the Ministry of Foreign Affairs, the Ministry of Agriculture and Rural Development, the Ministry of Science and Higher Education, the Ministry of Infrastructure, the Ministry of the Maritime Economy and Inland Waterways, the Ministry of Family, Labour and Social Policy, the Government Plenipotentiary for Strategic Energy Infrastructure, as well as the Energy Regulatory Office (Urząd Regulacji Energetyki - URE), the Central Statistical Office (Główny Urząd Statystyczny - GUS), the National Centre for Emissions Management (Krajowy Ośrodek Bilansowania i Zarządzania Emisjami - KOBiZE).

The document presents an integrated approach to the implementation of the five dimensions of the Energy Union and constitutes Section A. (Part 2. National objectives and targets; Part 3. Policies and measures relating to the five dimensions of the Energy Union) of the National Energy and Climate Plan template.



1.1. National and EU energy system and policy context of the national plan

The Polish energy system is among the largest in the European Union. It is one of the top ten systems in terms of the main macro energy indicators. This corresponds to the potential of the Polish economy which is the eighth economy in the European Union in terms of the GDP (EUR 424.6 billion in constant prices in 2016), as well as in terms of population (37.95 million - 2016).

The energy sector generates approximately 8 % of the gross value added of the Polish GDP (including 4.1 % in the energy sector alone and 4.2 % in related sectors), with the employment of approximately 600 000 people.

With respect to the dynamics of changes in the sector in 2016, the industry sub-category Generation and supply of electricity, gas, DHW and water steam recorded a 3.7 % growth compared with the previous year.

Historically, a phenomenon consisting in the increasing GDP dynamics and the emission of greenhouse gases becoming uncorrelated has been observed in Poland over the last three decades (1988-2016). The increment in the GDP value does not lead to an increase in emission levels, which is shown in the figure below.

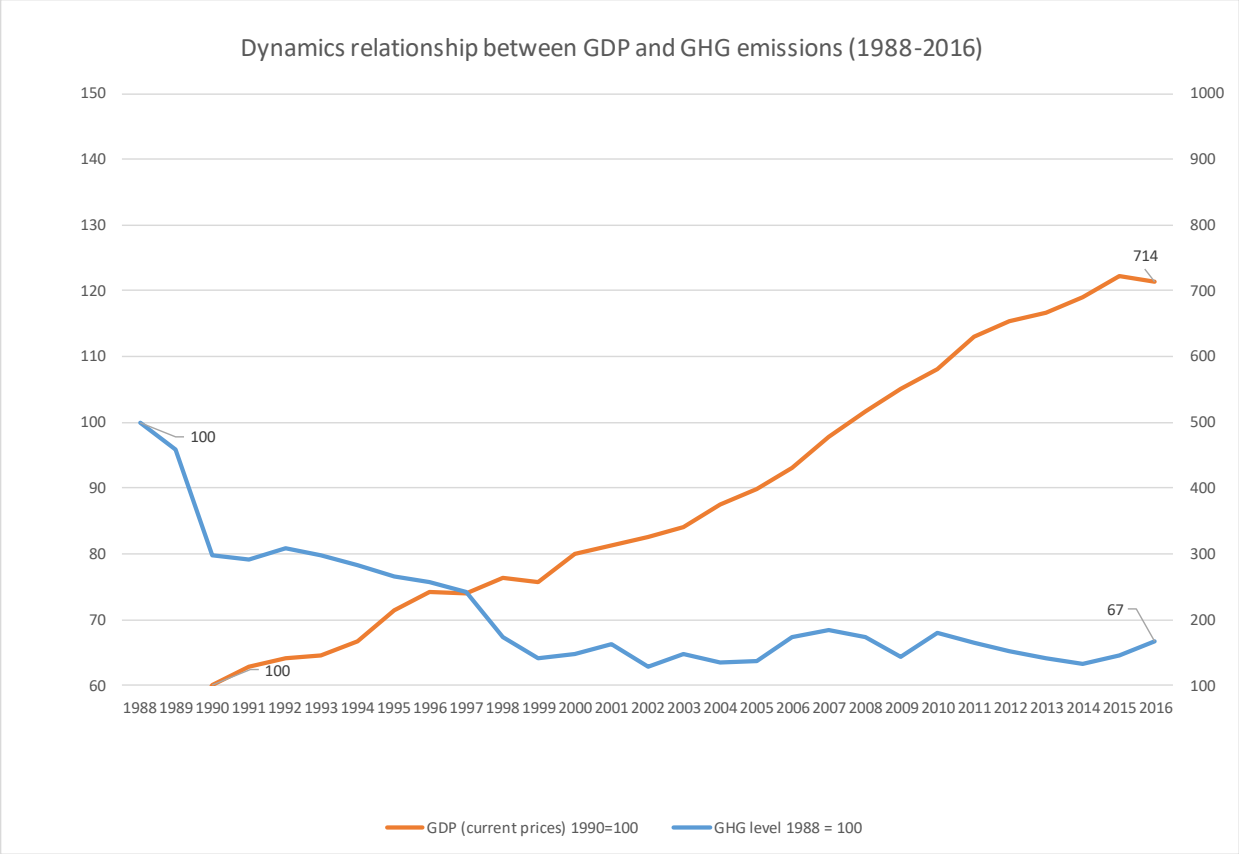


Figure 1. Relationship between GDP and emissions and greenhouse gas emissions (1988-2016)

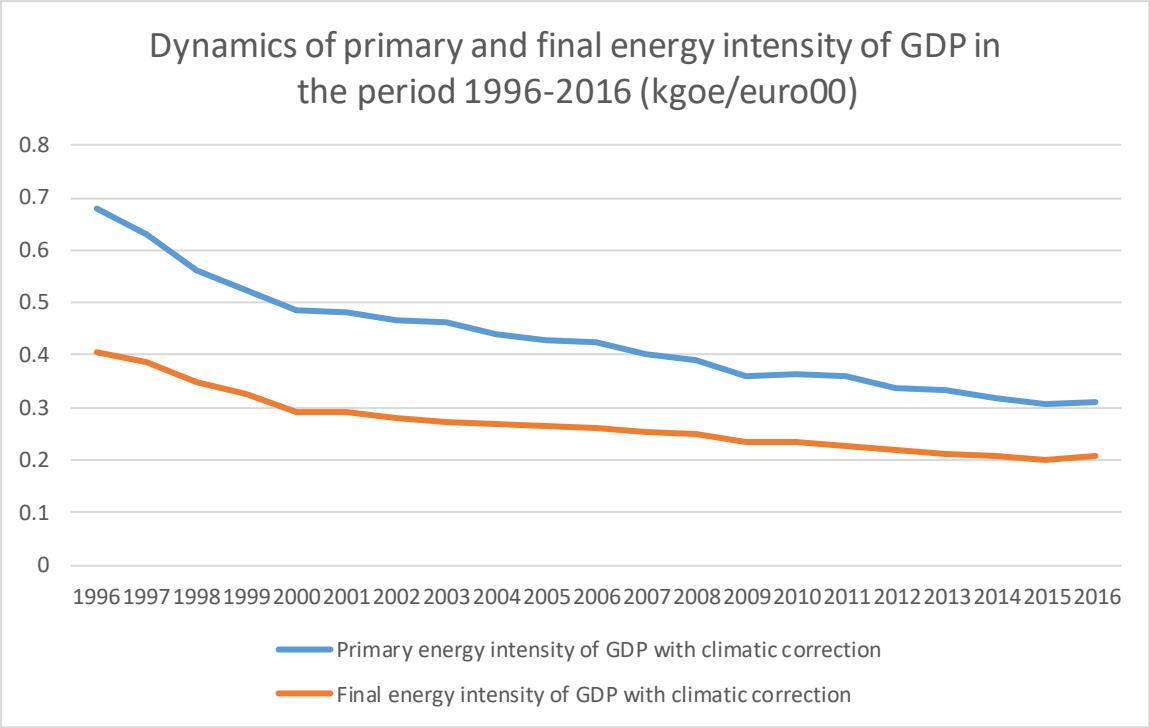


Figure 2. Dynamics of primary and final energy intensity of GDP

The production volume in the Polish electricity sector in 2017 was 170.5 TWh, with domestic electricity consumption reaching 168.1 TWh (which means that 1.4 % of the demand was covered by imports). The figure below shows the production structure by carriers.

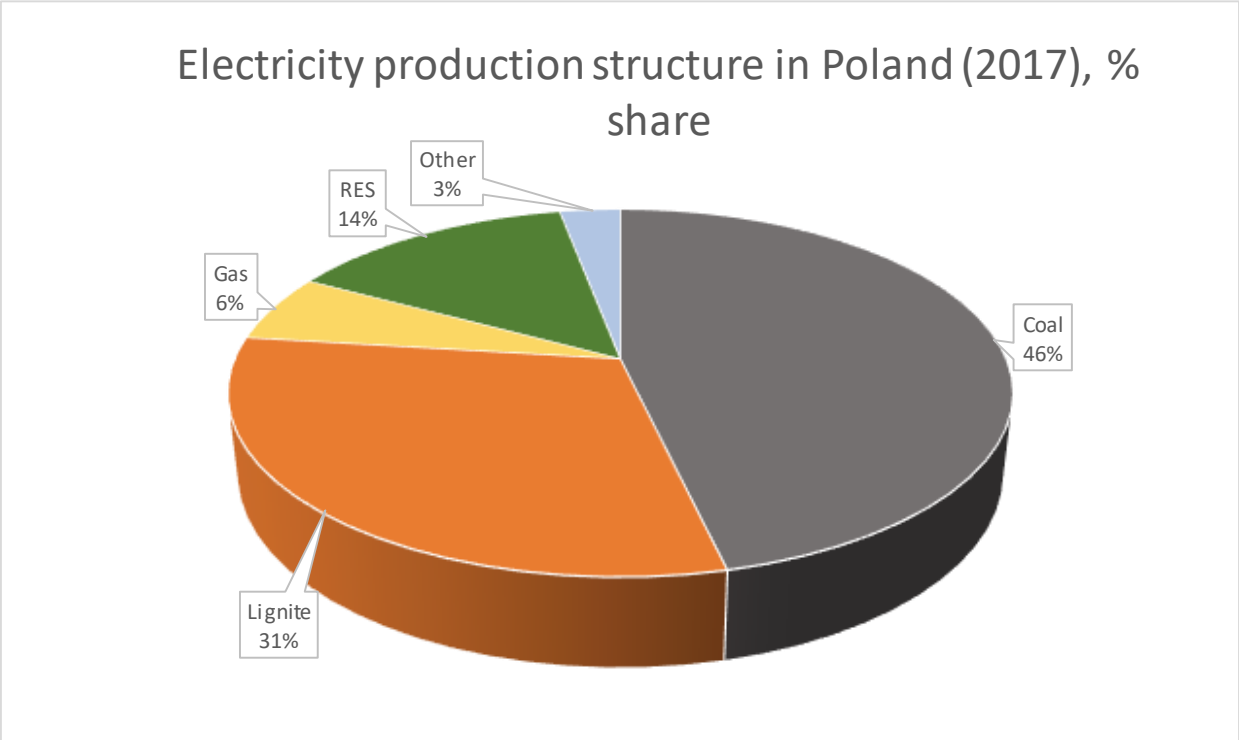


Figure 3. Electricity production structure by carriers in 2017

The above data shows that electricity production is based on coal and that coal ensures Poland an appropriate level of energy security and production stability. The coal mining sector in Poland (lignite and coal) also plays a very important social role. In 2016, the coal mining industry in Poland employed, in aggregate, 113 500 people, of which 23 500 were employed in lignite mining and 90 000 in coal mining.

The transformation of the domestic electricity sector results in an increase in the share of RES in electricity generation, which reached ca. 14 % in 2017. The installed capacity in RES-based generation has increased to a level of ca. 8.5 GW (with the total installed capacity in the National Power System reaching ca. 43 GW in 2017). The share of RES in the gross final energy consumption was ca. 11.3 % in 2016, with the national target for 2020 being 15 %.

Figure 4. below presents progress in implementing the national RES targets at the levels of particular Member States. The attainment of these targets constitutes a challenge for a number of countries, even those following the most ambitious climate and energy policies, such as Germany, France, Belgium, the Netherlands or the United Kingdom. Only 12 out of 28 EU countries have already achieved their national targets concerning the share of renewable energy sources in the gross final energy consumption set for 2020.

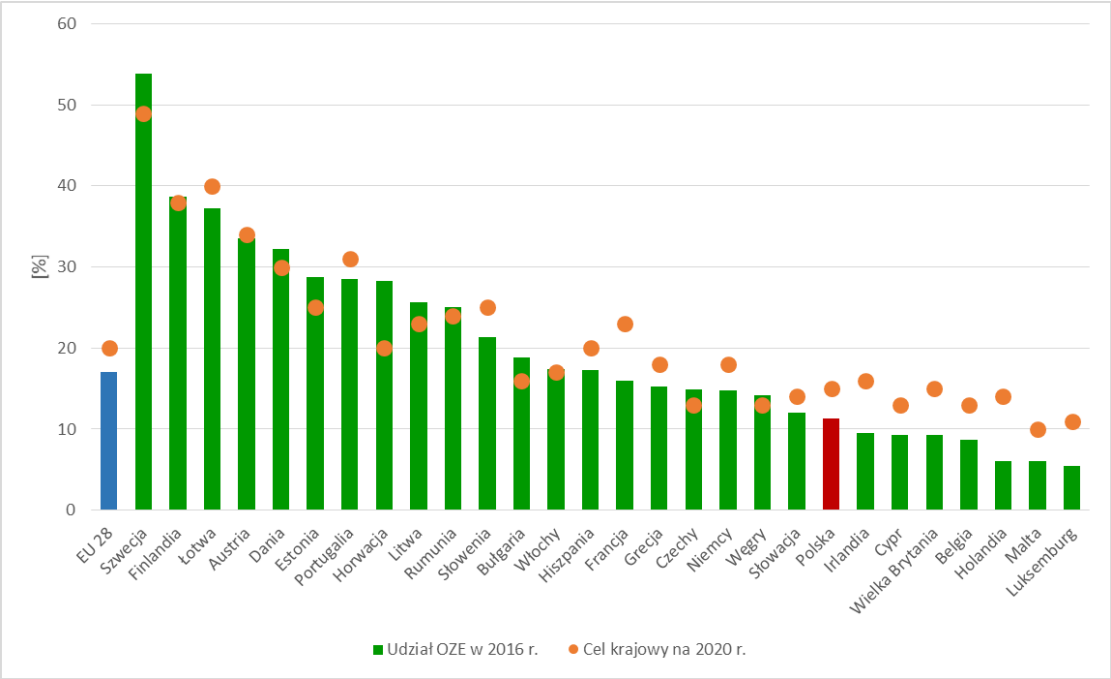


Figure 4. Progress in implementing RES targets for 2020 in individual EU countries

Udział OZE w 2016 r.	RES share in 2016
Cel krajowy na 2020 r.	2020 national target:
EU 28	EU 28
Szwecja	Sweden
Finlandia	Finland
Łotwa	Latvia
Austria	Austria
Dania	Denmark
Estonia	Estonia
Portugalia	Portugal
Chorwacja	Croatia
Litwa	Lithuania
Rumunia	Romania
Słowenia	Slovenia
Bułgaria	Bulgaria
Włochy	Italy
Hiszpania	Spain
Francja	France
Grecja	Greece
Czechy	Czech Republic
Niemcy	Germany
Węgry	Hungary
Słowacja	Slovakia
Polska	Poland
Irlandia	Ireland
Cypr	Cyprus
Wielka Brytania	United Kingdom
Belgia	Belgium
Holandia	Netherlands
Malta	Malta
Luksemburg	Luxembourg

In the context of the structure of electricity production, of which coal remains an important component, as well as bearing in mind the transformational nature of the occurring changes, the relationship between emissions from the electricity sector and the dynamics of electricity production, as shown in Figure 5, should be pointed out.

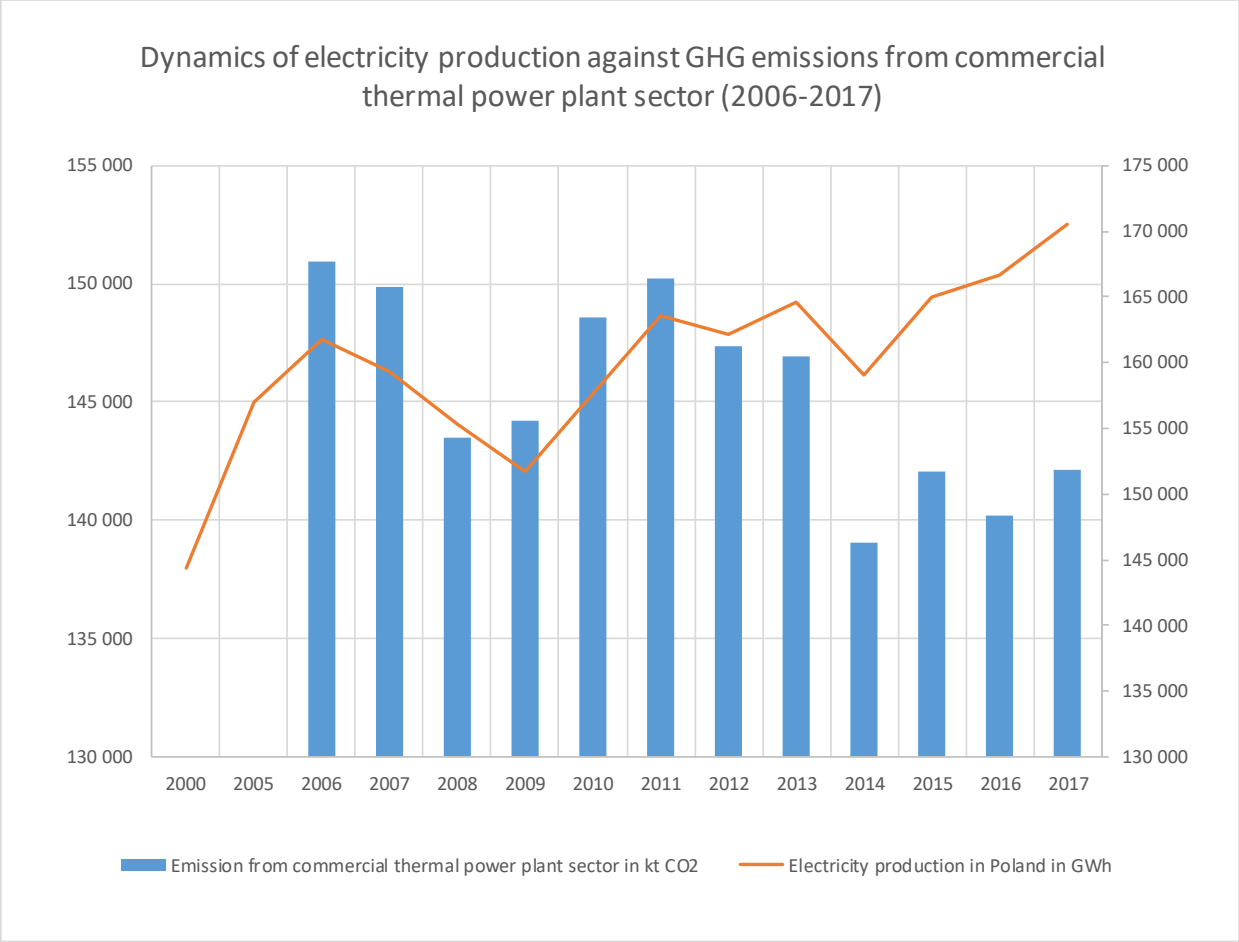


Figure 5. Dynamics of electricity production against CO_2 emissions

The data shows that an upward trend in electricity production continuing in Poland has not resulted in a growth in CO_2 emissions in this sector since 2011. On the contrary, emissions from this sector were reduced by approximately 5 % in the years 2011-2017.

In connection with the large share of domestic energy-producing raw materials in the national energy balance, Poland is among the most energy-independent EU countries. The energy dependence indicator for Poland was 30 % in 2016, with the EU average being 54 %.

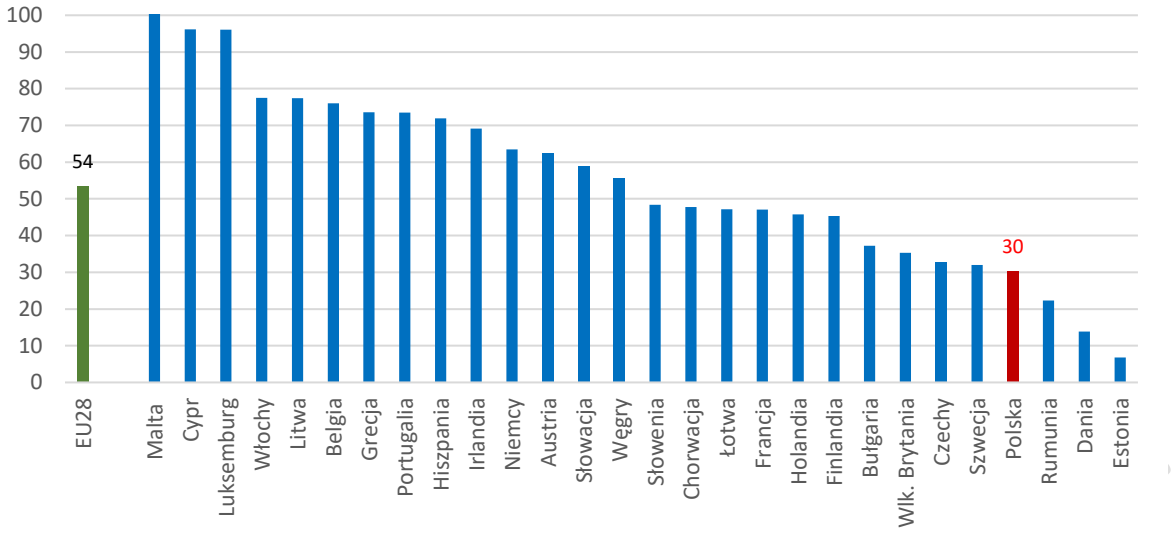


Figure 6. Energy dependence indicators in the EU in 2016, Eurostat

EU 28	EU 28
Malta	Malta
Cypr	Cyprus
Luksemburg	Luxembourg
Włochy	Italy
Litwa	Lithuania
Belgia	Belgium
Grecja	Greece
Portugalia	Portugal
Hiszpania	Spain
Irlandia	Ireland
Niemcy	Germany
Austria	Austria
Słowacja	Slovakia
Węgry	Hungary
Słowenia	Slovenia
Chorwacja	Croatia
Łotwa	Latvia
Francja	France
Holandia	Netherlands
Finlandia	Finland
Bułgaria	Bulgaria
Wlk. Brytania	United Kingdom
Czechy	Czech Republic
Szwecja	Sweden
Polska	Poland
Rumunia	Romania
Dania	Denmark
Estonia	Estonia

At present, there are two strategic framework documents determining the state energy policy. They are: The Energy Policy for Poland, which is currently being updated (the draft Energy Policy for Poland 2040, hereinafter: EPP2040 is under public consultations now) and the Strategy for Responsible Development 2020 – with an outlook to 2030 (adopted in 2017).

The main objective of the energy policy is energy security while ensuring the competitiveness of the economy and energy efficiency, reducing the impact of the energy sector on the environment and making the optimum use of own energy resources. The EPP2040 envisages eight strategic directions, namely: (1) making the optimum use of own energy resources, (2) expanding electricity-production and network infrastructure, (3) diversifying natural gas and oil supplies and expanding network infrastructure, (4) developing energy markets, (5) implementing nuclear power projects, (6) developing renewable energy resources, (7) developing the heating and cogeneration sector, (8) improving energy efficiency.

With respect to the structure of energy carriers, the leading role of coal is planned to be maintained, but the percentage share of this fuel in the electricity generation structure will decrease gradually, down to ca. 60 % in 2030, due to the forecast growth in energy demand. The above-described trend will maintain in the following decade, i.e. until 2040. At the same time, Poland will place emphasis on diversifying energy carriers by successively increasing the share of RES (the role of which in electricity generation will grow mainly due to two technologies, namely wind power technology and photovoltaics) and by including nuclear power in the energy balance starting from 2033.

The latter of the aforementioned documents, i.e. the Strategy for Responsible Development, is a more general document. According to the provisions of the Strategy, the main mission of the energy sector is to safeguard stable energy supplies to the economy, institutions and citizens, adapted to their needs as much as possible and at a price acceptable from the economic point of view. In the general sense the Strategy, according to its provisions, should be implemented by effectively using available raw materials and increasing the effectiveness of cooperation between the energy generation and supply sector and the representatives of consumers. At the operating level, it is proposed that energy storage technologies be developed, along with the introduction of smart energy networks, the development of electromobility and the introduction energy-saving and high-efficiency technologies. The strategy also includes projects aimed at supporting its implementation, which are being prepared to be carried out, namely: the capacity market, gas hub, the development of electromobility, support for geothermal energy and hydropower projects, as well as systemic coal sector restructuring.

The provisions of the aforementioned national documents are consistent with the energy policy principles formulated by the European Union. They include enhancing energy security, improving energy efficiency, building a stable and efficient internal market, reducing carbon emissions, increasing renewable energy generation and developing innovation in the energy sector.

The strategic directions of development introduced successively to date from the beginning of the current decade, along with the policy targets in the 2030 time horizon, are materialising in the form of the now emerging Energy Union. It combines the approach applied to date with a new one, which is to determine the EU energy policy until 2030 and for subsequent decades. The Energy Union contributes to integrating measures and subjecting them to uniform management, evaluation and assessment methods.

1.2. Current climate and energy policies and measures across five dimensions of the Energy Union.

Poland conducts an active climate and energy policy and undertakes measures across all the dimensions of the Energy Union.

The priority area within the framework of the five dimensions of the Energy Union – from the perspective of the Polish raison d'etat and the country's stable development – is **energy security.** Energy security must be analysed in two main areas i.e. electricity generation and gas and crude oil supply. In the former area, Poland undertakes measures to ensure the stability and continuity of electricity generation – based on domestic energy carriers – in order to satisfy internal demand. They include regulatory measures and measures relating to investments in generation, transmission and distribution infrastructure. Among measures supporting energy security, the introduction of the capacity market should be mentioned, which is to guarantee funding for the maintenance of additional capacity at times of increased demand and in peak periods (winter-summer) and secure intermittent energy sources (RES). This mechanism will enhance the stability of the entire electricity system. Additionally, activities are carried out to support the development of high-efficiency cogeneration and renewable energy sources, as well as to implement nuclear energy projects. Investments in these technologies with a view to restoring and increasing capacity in the electricity system guarantee that energy security will be achieved consistently with the horizontal targets of the Polish energy sector, i.e. reduction in the emission of pollutants from the electricity sector, the enhancement of energy efficiency and the improvement of the competitiveness of the economy. Additionally, an element necessary to safeguard the security of supplies is the modernisation and expansion of electricity transmission and distribution infrastructure. The attainment of the above targets will make it possible to evacuate power from existing generation sources and to interconnect new capacity, to improve the certainty of supplies to consumers, to create safe working conditions for RES, to ensure the possibility of reducing unscheduled power flows from the electricity systems of neighbouring countries and thus also to increase international power exchange capabilities, and to implement a uniform electricity market throughout the EU.

With respect to the gas market, the issues of security of supplies are regulated in legislative terms by the provisions of the Energy Law, which is successively adjusted to ensure further diversification of gas sources. The latest regulation supporting this direction is that known as the Governance Regulation[1] (in force since 10 May 2017). It defines the maximum share of natural gas to be imported by an energy company from a single source in a given calendar year. This share may be 70 % until 2022, but must not exceed 33 % from 2023 onwards. In order to build an internal EU market, supplies carried out within the EU are excluded from these regulations. At the same time, infrastructure projects enhancing energy security are implemented. Efforts to enhance energy security include the intensification of mining by Polish gas companies in foreign gas fields – which increases own production, as well as a strategic project concerning the construction of the North-South Corridor, the expansion of the LNG terminal in Świnoujście and the expansion of cross-border interconnections with Slovakia, Lithuania, the Czech Republic and Ukraine. The aforementioned projects will enable the establishment of a gas transmission and trading hub for Central and Eastern Europe and the Baltic states in Poland. Further diversification projects will successively be added to these measures.

The diversification of the structure of the Polish energy balance while increasing the role of low- and zero-emission and high-efficiency technologies and solutions in all economy sectors will help to achieve positive results as part of the **Dimension Decarbonisation**. With respect to the

2020 reduction targets, the Effort Sharing Decision has defined a 'positive target' for Poland, as part of which sectors which are not covered by the ETS may increase their emissions by 15 % as compared with 2005. At present, Poland is on a path to attain this target. In the above context, an ambitious challenge will be the attainment of the 2030 national reduction target in non-ETS sectors, which has been defined at the level of -7 % in the Effort Sharing Regulation published in 2018.

The generation of renewable energy constitutes an important element of measures aimed at decarbonisation, as well as at energy diversification and the satisfaction of increasing energy demand. It is a manifestation of care for the natural environment and an answer to the need to promote sustainable development as well as to strengthen regions and local communities in the European Union. The task of the green energy sub-sector is to support the energy security of the country. It should not imply, either, an excessive exploitation of the state budgetary resources in isolation from real benefits for the society and the economy and the entire energy system. Poland supports the development of renewable energy – defined precisely in such a manner – by undertaking a number of specific measures. These measures are implemented on the basis of the Act on renewable energy sources of 2015 which has been amended successively (2016, 2017). The act envisages a number of solutions aimed at creating a stable environment for the growth of production in the renewable energy sector. They are: energy clusters, an auction system for most of the currently prevailing RES technologies, temporary solutions concerning the green certificate system, net-metering for self-consumers and also the whole range of rules and conditions for conducting activity in the field of generation of electricity, agricultural biogas, heat and bioliquids, as well as instruments intended to support them in a systemic fashion. Additionally, the Polish Government strongly focuses on the development of cluster initiatives – which is reflected in the provisions of the act – designed as a technologically neutral tool intended to be applied in each local community which, by self-organising, has an opportunity to safeguard energy independence within the region where cooperation is developed. The main value of this type of socialisation of renewable energy sources is the fact that it contributes to the development of specific regions and local economies. This is achieved through the utilisation of resources available locally in the form of energy substrates, energy carriers and human and financial capital, and leads to their most effective use possible. At the same time, as a result of measures in the form of regulatory facilitations, as well as the allocation of additional funding – the number of emerging clusters is growing successively. Ultimately, the energy cluster formula is to be the basic form of developing renewable energy sources in the sector of medium-sized and partly large installations (selected technologies).

Another important element of the Energy Union is the area of **energy efficiency**. The most important legislative act in this area in Poland is the Act on energy efficiency of 2016, under which entities are obliged to implement projects increasing energy efficiency (or to purchase white certificates in a limited portion). The act covers both the private and public sectors and imposes saving obligations on all entities. It enumerates efficiency improving measures that might be used by public sector entities, which includes a solution in the form of the conclusion of an energy performance contract. According to the provisions of the act, the private sector and – within its framework – large companies are obliged to conduct energy audits at four years' intervals. The system incorporates legislative provisions approved at the EU level into the Polish legal regime. Its main task is to bring about the attainment of the 2020 efficiency target. It is set at the level of 13.6 Mtoe in 2020 – as compared with the reference value for Poland calculated on the basis of the baseline scenario. The target translates, in absolute terms, into primary consumption at a level of 96.4 Mtoe and the final consumption reaching 71.6 Mtoe in 2020. The role of a horizontal review of the status of the undertaken energy efficiency actions and measures, taking into account the already achieved effects, is performed by the National Action Plan (four editions). Its function is to provide information and to structure measures

undertaken by Poland to improve energy efficiency. The National Action Plan is replaced by this National Energy and Climate Plan starting from 2019.

An important energy efficiency project for the next years in Poland is the programme of building a smart electricity grid. It encompasses works on organisational and legal solutions which will enable the application of new technologies such as the introduction of smart metering. Only then it will be possible to implement electricity demand management mechanisms and, as a result, to use electricity in a more sustainable manner. This will be possible by making up for the gap in knowledge about measures and preferences that exists between energy consumers and its producers and suppliers.

Another dimension of the Energy Union in which measures are undertaken is the **Internal energy market.** The EU internal energy market area requires two lines of action as well as synchronisation. This implies undertaking measures ensuring energy sufficiency as well as expanding and intensifying cooperation as part of the pan-European system. The transmission infrastructure area in the Polish energy system is the responsibility of PSE S.A., due to which it is its activity that determines, to a large extent, the security of the entire energy system of Poland. The investment plans of the Polish transmission system operator are defined in short-, medium- and long-term perspectives. They have been formulated in several documents, including: Annual Tangible Investment Plan (IP) – one year's perspective; Contemplated Investment Plan (CIP) – five years' time horizon, Transmission Grid Development Plan (TGDP) – ten years' time horizon of the plan; Forecast concerning the security status of energy supplies – prepared for fifteen years. The document covering five years' time horizon plans for the years 2017-2021 (CIP) envisages 126 contemplated investment projects with a value of PLN 7.5 billion. As a result, 2700 km of 400 kV lines will be built, and 1500 km of 220 kV lines will be modernised. One of the targets of the five years' plan (CIP), in addition to the planned internal investments, is the expansion of cross-border interconnections aimed at developing a community electricity market. In the 2030 perspective, the improvement of flow in the synchronous mode covering Germany, the Czech Republic and Slovakia, and the full synchronisation of the transmission systems of the Baltic states will be particularly important. The incorporation and synchronisation of the energy systems of affiliated states, which are on the track to build closer relations with the EU, should be within the area of interest of the Members States building the Energy Union. Poland follows specific action lines in relation to neighbouring states. Poland is also active in the field of regulations concerning the establishment of internal energy and gas markets. The Energy Regulatory Office (URE), the Polish energy market regulator, participates in the works of the European Agency for the Cooperation of Energy Regulators – ACER, whereas the transmission system operator, Polskie Sieci Elektroenergetyczne (PSE S.A.), actively participates in the works of ENTSO-e. Immediately after the establishment of the ACER, i.e. in 2011, the Target Model for the market (electricity) was proposed as a result of the works of this assembly. Poland has been included in the implementation processes of this model. At present, cooperation is coordinated at the regional level and then a project covering the entire EU is to be launched. By virtue of a decision of the ACER, a central macro-region has been created for coordinating cooperation for the implementation of the market model adopted in 2011. At present, Poland belongs to the recently expanded CORE area affiliating energy systems of thirteen centrally located European countries, participating on a solidary basis in activities aimed at establishing a common energy market.

The area of **innovation in the energy sector** is an issue whose importance is being strengthened successively. The energy sector sees an ever increasing need for developing a new approach, the most important tools of which will be new technologies and process innovations. Poland's policy in the field of innovation sets priority on the implementation of innovations. State budgetary means are used in combination with European funds and energy companies' own funds. The pro-innovation activity of energy companies is a trend that supports the innovation-oriented approach. An ever increasing

tendency is developing in Poland – supported by the state's activity – consisting in offering incubation schemes to start-up businesses which create ideas and develop their activity in the energy sector. Leading Polish energy companies have established their own acceleration centres for newly set-up companies (incubators) as well as joint venture companies. The newly established entities include: PGE Ventures (a company set up by PGE S.A), InnVento – a technology incubator (an entity set up by PGNIG S.A.), Tauron Magenta (established by Tauron S.A), Enea Innovation (a venture capital company set up by Enea S.A), ORLEN Innowacje&Startupy (a platform and incubator of ORLEN). The activity of Polish energy companies in the area of incubation and acceleration of new projects, as well as the visible role of the state in stimulating R&D activities in the energy sector, is expected to result in a growing level of innovation of the Polish energy sector over the next few years.

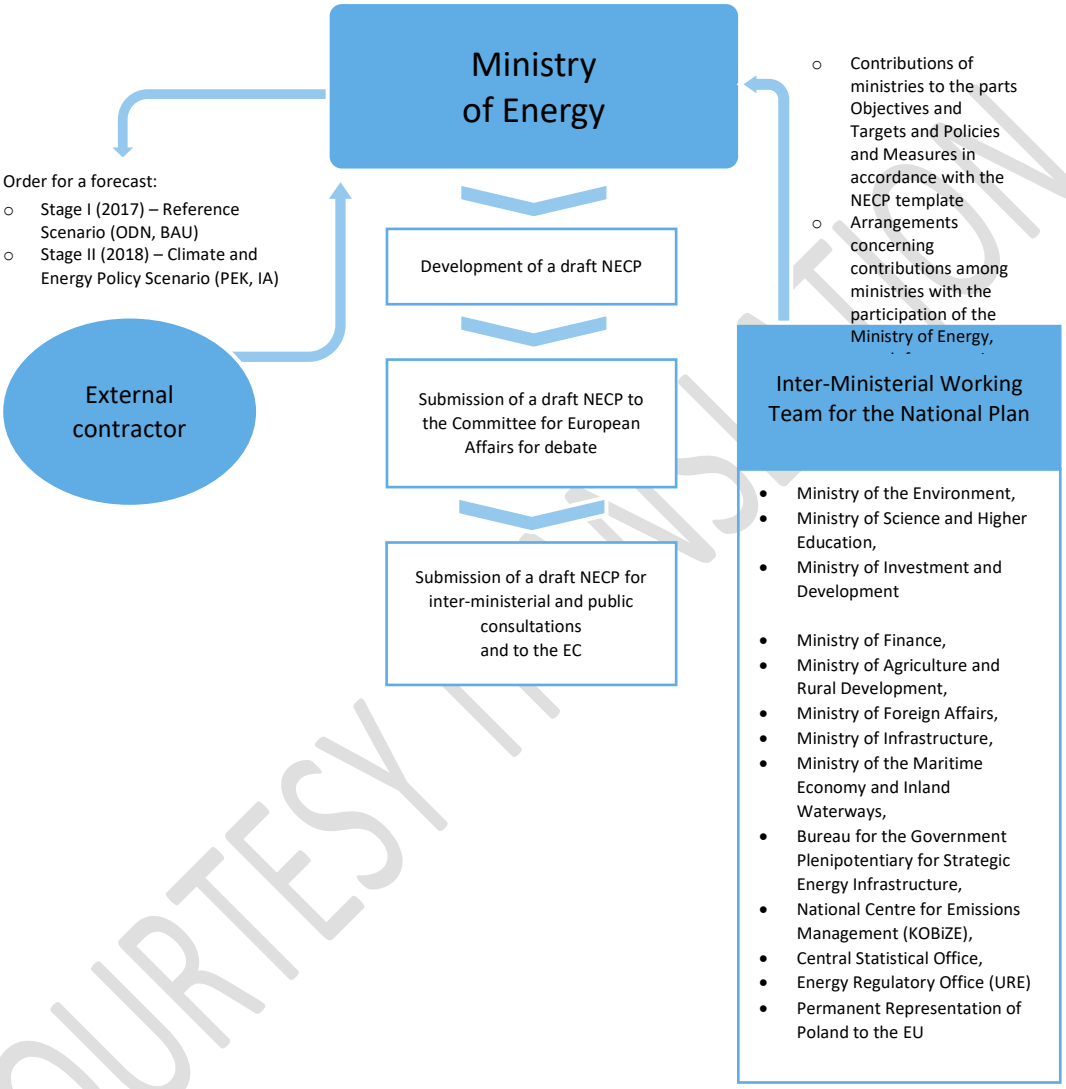
The flagship project in the field of innovative solutions which are strongly related to the energy sector is the electromobility development project. It is being developed with a strong participation of the state – in the regulatory and funding areas – but it is to become reality through intense cooperation with energy companies, transport sector companies and other players representing the private sector. At present, the direction for the electromobility project is set in the document Strategy for Responsible Development, which is followed by the more detailed Electromobility Development Plan 'Energy for the Future'. Subsequently, at the execution level, the project is implemented by the Act on electromobility and alternative fuels adopted in November 2017, as well as by a number of supporting legislative acts. The objective of the project is to create conditions for the development of electromobility. This is to be achieved through: support for the expansion of the basic infrastructure network and the system of incentives encouraging potential buyers to purchase electric vehicles, and for the development of industry towards the use of vehicles with alternative drives. The effect of the project in 2020 is to be 50 000 electric vehicles and 6 000 charging points and additionally 400 rapid charging points. In the 2025 perspective, an effect of the programme will be approximately a million electric-drive vehicles. The programme also envisages an increase in the number of LNG or CNG fuelled vehicles, including the construction of four installations for gas bunkering for vessels on the Polish coast. An additional intended positive effect having impact on the Polish electricity system is to be the stabilisation of the electricity grid. Using this grid for charging so many vehicles will contribute to the flattening of the electricity demand curve and as a result to demand stabilisation, which will be a beneficial effect taking into account the performance characteristics of basic generation units in the Polish energy system. The above-described programme is one of the main strategic development programmes aimed at improving the innovation of the energy and transport sector, changing it to stimulate more sustainable development of the country and joining the world's leader states in the field of electromobility.

1.3. Administrative structure of implementing national energy and climate policies

The National Energy and Climate Plan presents directions which are consistent with and complementary in relation to the horizontal development strategy for the country, i.e. the Strategy for Responsible Development and its integrated sector strategies which are currently being updated, in particular with the Energy Policy for Poland 2040 project, the State Environmental Policy 2030 project, the Sustainable Transport Development Strategy 2030.

The responsibility for implementing measures aimed at meeting the targets set in the National Plan rests on a number of public administration entities, depending on their scope of competence, as well as – at the operating level - on private entities.

The graph below shows the structure of entities engaged in the preparation of the draft NECP along with the chart showing the process of developing it to date.



2. NATIONAL OBJECTIVES AND TARGETS

2.1. Dimension Decarbonisation

2.1.1. Greenhouse gas emissions and removals

a)	Member State's binding national 2030 target for greenhouse gas emissions in the non-ETS-sectors, the annual binding national limits in accordance with Regulation (EC) 2018/842 and the commitments under Regulation (EC) 2018/841.[23]	**1.** Non-ETS (greenhouse gas emissions from the non-ETS sectors): **On the basis of Regulation (EC) 2018/842, the greenhouse gas emission reduction target in the non-ETS sectors has been set at a level of -7 % in 2030 as compared with its level in 2005.** The annual national limits will be determined once implementing acts relating to Regulation (EC) 2018/842 have been issued. The non-EU ETS sectors (mainly transport, agriculture, municipal and household sector, waste management, as well as non-ETS industrial emissions) are a source of ca. 50 % of the total greenhouse gas (GHG) emissions in Poland. For 2020, the Climate and Energy Package has set, among other things, the EU 20 % GHG emission reduction target (compared with 1990), including the target for the non-ETS sectors at a level of -10 % as compared with 2005. The ESD (Effort Sharing Decision, or the non-ETS Decision) has set national targets for Member States for 2020, as their contributions to the EU-wide ambition. According to the aforementioned regulation, Poland may increase emissions in non-ETS sectors up to +14 % until 2020 as compared with 2005. Along with adopting the EU 2030 Climate and Energy Policy framework, the GHG emission reduction target has been set at a level of 40 % as compared with 1990, with the target for the non-ETS sectors being set at 30 % as compared with its level in 2005. The ESR[4] sets the 2030 reduction target for Poland at a level of -7 % as compared with the level of emissions in non-ETS sectors in 2005. **In view of the fact that Poland may increase emissions in non-ETS sectors until 2020, the proposed 2030 target at a level of -7 % should be regarded as an ambitious commitment.**
		2. Share of the LULUCF sector in meeting the 2030 reduction targets in the EU.

		The LULUCF Regulation sets out the accounting rules (the rules for generating carbon credits to be possibly used to account for national emissions of greenhouse gases in the non-ETS sector) based on the net balances of emissions and removals of greenhouse gases for utilised forest land, cropland, grassland and afforested and deforested land from 2021 to 2030. In the LULUCF Regulation, the Member States have been proposed the maximum values of the generated credits (accounting allocations) from the managed forest land category. **These allocations have been limited to 3.5 % of the national emission of a given Member State in the base year.** As part of the mechanism of credit generation the reference levels must be taken into account as the minimum removal value for managed forest land. Reaching these minimum values will be a condition for generating credits, if any. The reference levels will be set on the basis of the forest stock development scenarios worked out in reliance on the effect of forest practices - observed in the period 2000-2009, which are being developed at the national level (a draft National Forestry Accounting Plan subject to consultations). The LULUCF Regulation has also introduced a mechanism for **compensating possible emissions from managed forest land in case the country does not reach a removal value equivalent to the reference level.** Nevertheless, its operation has been based only on a single limited parameter, namely the afforestation rate of the Member State (the average afforestation rate for the reference period 2000-2009). **Poland has been allocated a compensation limit for 10 years (2021-2030) amounting to -22.5 million tonnes of CO_2equivalent (this is the total maximum limit that can be used over a period of 10 years).** For cropland and grassland, the proposed base level for accounting purposes is the average value from the years 2005-2009. On average, it will total **ca. 1500 kt of CO_2equivalent for the entire accounting period** – this is a preliminary value (consistent with the National Inventory Reports submitted to the UNFCCC Secretariat). Only the accounts of afforesting/deforesting balances and harvested wood products (with the exclusion of paper) will not be limited, whether by the allocation or by the reference level.

b)	If applicable, other national objectives and targets consistent with existing long-term low emission strategies. If applicable, other objectives and targets, including sector targets and adaptation goals.	**1.** Reduction of the negative impact of transport on the environment: – **indirect target – by 2025, reduction of CO_2 emission in passenger cars and light duty trucks by 15 % as compared with 2021;** – **main target – by 2030, reduction of CO_2 emission in passenger cars and light duty trucks by 30 % as compared with 2021.** These targets strengthen pressure to move away from vehicles with conventional combustion engines and to switch to clean vehicles (and to minimise the effects of the development of the transport sector on the environment, including among other things to slow down the increase in greenhouse gas emissions. The task consisting in reducing emissions in the transport sector will be even more challenging given the fact that further significant growth in transport volumes, especially freight transport, is envisaged both in Poland and throughout the EU as an unavoidable effect of continued economic development. The expected emission reduction will require both the optimisation of transport needs, and the use of the potential of the transport system and an increase in the use of alternative fuels.
		2. Improvement of the quality of life of the residents of the Republic of Poland, in particular the protection of their health and living conditions, having regard to the protection of the environment, while following sustainable development principles through: achieving, as soon as reasonably practicable, the permissible and target substance levels defined in Directives 2008/50/EC and 2004/107/EC, and maintaining them in the areas in which they have been met, and in the case of PM2.5, also the exposure concentration limit and the National Exposure Reduction Target, achieving, by 2030, the levels of substance concentrations in the air as specified by the WHO and meeting new requirements under legal regulations proposed in EU laws.
		3. Adaptation to climate changes by ensuring sustainable development and the effective operation of the economy and society in climate change conditions through:

		– increasing the afforestation rate of the country to 31 %; – reaching the rate of the residents of municipalities for which a strategic adaptation document has been adopted at a level of 40 %; – increasing the capacity of small-scale water retention structures; – increasing the degree of reduction of the annual rainwater or snowmelt water outflow in open or closed rainwater drainage systems designated to discharge precipitation water within the administrative territories of towns or cities; – increasing the share of the area covered by zoning plans in force in the country's land survey area (i.e. the area calculated on the basis of the national register of boundaries and territorial subdivisions).
		4. Reduction of the share of coal and lignite in electricity production to 60 % in 2030 and a further decreasing trend until 2040 At present, the share of coal and lignite in electricity generation is ca. 77 %. The share of coal-fired generation units will decrease systematically as a result of the forecast increase in the domestic electricity demand due to economic development, the decommissioning of old and worn-out conventional generation units which do not meet the environmental requirements in terms of pollution emissions, the implementation of high-efficiency technologies, the dynamic development of renewable energy sources and the implementation of nuclear power projects from 2033 onwards. As an effect of changes in the electricity generation sector, CO_2 emissions will decrease.

2.1.2. Renewable energy (2030 Framework target)		
a)	Planned share of renewable energy in gross final energy consumption in 2030 as a contribution to the binding EU target being at least 32 % in 2030.	As part of meeting the EU-wide 2030 target, Poland declares to achieve a **21 % share of RES in gross final energy consumption** (aggregate consumption in the electricity sector, heating and cooling sector, as well as for transport purposes) by 2030, which depends on the competitiveness of these sources and their position in and usefulness for the system. The scale of use of RES will largely depend on technological progress – both in the area of the currently known methods of energy generation and entirely new technologies, but also in the area of energy storage technologies. The share of RES **in the heating and cooling sector is estimated to increase by 1-1.3 percentage points on a yearly average by 2030.** In transport, a 10 % share of renewable energy is envisaged to be reached in 2020, with a 14 % share to be reached by 2030. The share of RES in net electricity generation is expected to grow to ca. 27 % by 2030. On the basis of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of renewable energy, Poland has been obliged to achieve a minimum 15 % share of renewable energy in gross final energy consumption by 2020. In 2017, the share of renewable energy in gross final energy consumption in Poland was 11 %. Having regard to the progress in the development of RES to date, the national commitment concerning 2030 should be regarded as ambitious.
b)	Linear trajectory of the share of renewable energy in gross final energy consumption in the period 2021-2030.	The aforementioned 21 % target concerning the share of RES in gross final energy consumption is expected to be met in the following indicative trajectory: a) ca. 15 % in 2022, b) ca. 17 % in 2025, c) ca. 19 % in 2027.

c)	Trajectories of the sectorial share of renewable energy in final energy consumption in the electricity, heating and cooling and transport sectors in the period 2021-2030.	Due to the detailed nature of the data, it has been included in the analytical material: Appendix 2 to the NECP - 'Assessment of the impact of planned policies and measures' (Chapter 5.1.2.2. Renewable energy).
d)	Trajectories by renewable energy technology that are projected to be used to achieve the overall and sectorial trajectories for renewable energy from 2021 to 2030, including expected total gross final energy consumption per technology and sector in Mtoe and total planned installed capacity (divided by new capacity and repowering) per technology and sector in MW.	
e)	Trajectories on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply, by feedstocks and origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its source and impact on the LULUCF sink	Due to the detailed nature of the data, it has been included in the analytical material: Appendix 2 to the NECP - 'Assessment of the impact of planned policies and measures' (Chapter 5.1.2.2. Renewable energy). **1.** In the case of forest biomass, the main sources for energy purposes are: round wood from forest and afforestation areas and wood processing industry by-products. Forest biomass accounts for ca. 20 % of the biomass used for energy purposes. In the context of accounting for and reporting greenhouse gas emissions from forest biomass used for energy purposes, it should be noted that it is taken into account when accounting for and reporting the balance of removals and emissions of those gases as part of the forest land category. Emissions relating to forest biomass used for energy purposes are reported and accounted for as an effect of forest land biomass loss. The increased use of forest biomass until 2030 will have impact on the accounting for and reporting of removals and emissions from the forest land category. At present, the scope of such impact cannot be determined, since not all accounting information concerning the LULUCF sector is available. **2.** <u>Potential of biomass used for energy purposes</u> Approximately 13 % of the[5] national biomass potential can be allocated for energy

		purposes without causing adverse effects in the form of soil degradation and a decrease in the supply of food while complying with the environmental protection requirements under the Common Agricultural Policy. The energy potential of agricultural biomass in Poland, which includes both special purpose crops and agricultural and agri-food-processing industry by-products, is ca. 900 PJ annually[6]. The most commonly available raw material to be used for energy purposes is straw. On average, the surplus of straw in Poland amounts to approximately 3.1 million tonnes, ranging from 2 to 4.5 million tonnes, depending on cereal yields in a given year[7]. Biomass stocks from energy crops are estimated to range from 120 000 to 130 000 tonnes of dry matter, and orchard wood stocks are estimated to amount to ca. 88 700 tonnes annually[8]. Along with the development of the agricultural biogas production sector, the importance of the use of agricultural by-products and agri-food industry residual products has been increasing. Their use in 2017 reached approximately 3.8 million tonnes. The energy potential of the agri-food processing industry as regards the production of agricultural biogas is estimated to exceed 7.8 billion m^3 annually.
f)	If applicable, other national trajectories and objectives, including long-term or sectorial ones (e.g. share of advanced biofuels, share of renewable energy in district heating, renewable energy use in buildings, renewable energy produced by cities, energy cooperatives and self-consumers)	**1.** <u>Increase in the use of advanced biofuels up to 0.1 % by energy content in 2020</u> According to the RED, Member States have been obliged to define the share of advanced biofuels (generated from the raw materials specified in Part A of Annex IX d to the Directive) for 2020. The recommended share of those biocomponents by energy content is to be 0.5 %. According to the analyses conducted, this target cannot be met in Poland due to limited access to ligno-cellulosic material and algae processing technologies and the limited supply of waste raw materials. In view of the above, the level of this obligation has been specified in the provisions of the Act on biocomponents and liquid biofuels as 0.1 %. At the same time, due to the need to promote this type of biocomponents, their share is expected to grow intensely in the period 2021-2030 – as required by RED II.

		2. <u>Increased dynamics of development of RES-based microgeneration units in the period 2020-2030</u> At the end of 2017, over 30 000 RES-based microgeneration units, with an aggregate installed capacity of over 160 MW, were interconnected to the five largest Distribution System Operators (DSO). Further development of RES-based microgeneration units (including primarily self-consumer generation units) constitutes a natural direction of development of the electricity sector ensuing from the changing legislative conditions (at the EU level) and decreasing technological costs. The dynamics of the development of RES-based microgeneration units are expected to increase throughout the 2020-2030 period.
g)	If applicable, other national trajectories and objectives, including long-term or sectorial ones (e.g. share of advanced biofuels, share of renewable energy in district heating, renewable energy use in buildings, renewable energy produced by cities, energy cooperatives and self-consumers)	**1.** <u>Increase in the use of advanced biofuels up to 0.1 % by energy content in 2020</u> According to the RED, Member States have been obliged to define the share of advanced biofuels (generated from the raw materials specified in Part A of Annex IX d to the Directive) for 2020. The recommended share of those biocomponents by energy content is to be 0.5 %. According to the analyses conducted, this target cannot be met in Poland due to limited access to ligno-cellulosic material and algae processing technologies and the limited supply of waste raw materials. In view of the above, the level of this obligation has been specified in the provisions of the Act on biocomponents and liquid biofuels as 0.1 %. At the same time, due to the need to promote this type of biocomponents, their share is expected to grow intensely in the period 2021-2030 – as required by RED II.

2.2. Dimension Energy efficiency		
a)	Indicative national energy efficiency contribution to achieving the Union's main energy efficiency target of 32.5 % in 2030 as referred to in Article 1(1) and Article 3(4) of Directive 2012/27/EU, based on either primary or final energy consumption, primary or final energy savings, or energy intensity; expressed in terms of the absolute level of primary energy consumption and final energy consumption in 2020 and 2030, with a linear trajectory for that contribution from 2021 onwards; including the underlying methodology and the conversion factors used	In its energy policy, Poland will continue to pursue directions contributing to an increase in the energy efficiency of the economy. On the basis of an analysis of the effects and impact on the GDP as well as potential for savings, Poland declares **the national 2030 energy efficiency target at 23 % with respect to the primary energy consumption** as forecast by PRIMES 2007. Poland will continue to follow the system of white certificates, setting out energy efficiency obligations, in the period 2021-2030. The values of the absolute level of primary energy consumption and final energy consumption in the years 2020 and 2030, along with the linear trajectory of this contribution, have been included in the analytical material 'Assessment of the impact of planned policies and measures'.
b)	Aggregate value of energy savings to be achieved in the period 2021-2030 in accordance with Article 7 of Directive 2012/27/EU concerning energy saving commitment.	The total required final energy saving in the period 2021-2030, calculated in accordance with the amended EED guidelines with the use of forecasts concerning the average annual final energy consumption from the period 2016-2018 will amount to ca. 31 ktoe. Having considered the deduction mechanism in the form of the effects of measures undertaken until 2020, the total final energy consumption saving in the period 2021-2030 may amount to ca. 20 ktoe.
c)	Indicative main milestones of the long-term strategy for the renovation of the national stock of residential and non-residential buildings (both public and private), the roadmap with domestically established measurable progress indicators, an evidence-based estimate of expected energy savings and wider benefits, and the contributions to the Union's energy efficiency targets pursuant to Directive 2012/27/EU in accordance with Article 2a of Directive 2010/31/EU.	Pursuant to Article 5 of Directive 2012/27/EU, 3 % of the total heated or cooled area in buildings owned by governmental institutions and occupied by such institutions should undergo renovation on an annual basis in order to meet at least the minimum energy performance requirements determined with the application of Directive 2010/31/EU. The report for 2017 shows savings at a level of 6 706.62 MWh, due to measures consisting in, among other things, improving parameters relating to the thermal transmittance of building envelopes, replacing window woodwork or lighting sources or providing employees with internal energy saving training.

		Poland has adopted an alternative solution according to which **the expected target energy saving value for the years 2021-2030, relating to undertaking measures aimed at improving the energy performance of buildings, should amount to 43 440.1 MWh.** **Residential building national stock long-term renovation targets:** – the share of thermally insulated residential buildings in the total housing stock will amount to 70 % in 2030 (as compared with 58.8 % in 2015), – the number of people living in sub-standard conditions due to overpopulation or the poor technical condition or absence of technical facilities will decrease to 3 300 000 in 2030 (from 5 360 000 in 2011).
d)	If applicable, other national targets, including long-term targets or strategies and sectorial targets. National targets in areas such as energy efficiency in the transport sector and with regard to heating and cooling.	**1.** Development of environment-friendly and efficient district heating systems In 2017, nearly 20 % of systems met the criterion of an energy-efficient district heating or cooling system. The number of energy-efficient district heating or cooling systems is expected to increase by 2030, due to: - converting power plants into heat and power plants; - increasing the use of RES in district heating; - increasing the use of waste for energy purposes; - modernising and expanding district heating systems and developing district heating-based cooling technologies; - promoting heat storage facilities and smart networks; - ensuring conditions for increasing the use of district heating, especially through: • extending the obligation to connect to an energy-efficient district heating system and implementing a mechanism for enforcing it, • changing the heat market model and tariff policy.

		2. <u>Development of heat production in cogeneration processes</u> Poland has potential for considerably increasing the production of heat in cogeneration processes by replacing heating boilers with cogeneration sources. Improving the use of potential for high-efficiency cogeneration will contribute to the further improvement of the efficient use of primary energy carriers, the reduction of CO_2 emissions and a decrease in raw-material intensity of the national economy.

2.3. Dimension Energy security

a)	National targets concerning greater diversification of energy sources and supplies from third countries which may contribute to reducing energy import dependency.	**1.** Implementing nuclear power projects in Poland **The first generation unit** (with a capacity of ca. 1-1.5 GW) **of the first nuclear power plant is expected to be commissioned in 2033.** A further five such units are planned **to be commissioned in the following years (by 2043).** The implementation of nuclear power projects will make it possible to meet the increasing electricity demand, will enhance the diversification of energy sources and will help to reduce national greenhouse gas emissions and dust and gas emissions. Nuclear power plants are a stable and reliable energy source and this is why they may be the basis for the operation of the electricity system.
b)	National objectives with regard to reducing energy import dependency from third countries.	**2.** Reduction of **the share of coal in electricity generation to 60 % in 2030** At present, the share of coal and lignite in electricity generation in Poland is ca. 77 %. Due to the decommissioning of worn out generation units, the need to meet strict environmental protection requirements as well as the worsening market situation, the share of coal in electricity generation will be decreasing systematically. In view of the fact that stable and reliable energy supplies contributing to energy security need to be guaranteed, as well as that it is appropriate to maintain a high level of energy independence – coal will remain the basic fuel in the electricity sector until 2030. In this respect, the optimisation of the production and use of this raw material must be ensured.
		3. Expansion of electricity generation capacity ensuring the coverage of power demand At present, the level of conventional generation capacity covers peak power demand. Due to the expected increase in demand for energy and power, in spite of the development of cross-border interconnections, generation and transmission infrastructure needs to be developed to safeguard electricity supplies to consumers.

		With respect to the development of electricity generation infrastructure until 2030, the share of RES is expected to increase from 14 % at present to ca. 27 %. Gas-based generation capacities will be developed in connection with the need to guarantee backup sources for weather-dependent RES. Projects involving investing in new coal-fired units carried out after 2025 will be based on cogeneration or another technology meeting the emission standard of 450 kg of CO_2 per MWh of generated energy. To meet the increasing demand, in a situation of significant decommissioning activities concerning electricity generation units, a capacity market has been implemented, constituting an investment incentive aimed at safeguarding the reliability of supplies. This mechanism will have key importance for the expansion of the current status of generation capacities, but other processes taking place in the market will also be important for the final balance.
		4. Diversification of crude oil supplies and expansion of oil and liquid fuel infrastructure Provision of existing crude oil and liquid fluid storage facilities, along with the accompanying infrastructure, with technical capacities for extruding raw material/fuels within the time limit enabling the raw material to be quickly supplied to the refinery and fuels to be delivered to the market Further diversification of crude oil import requires the expansion of the internal infrastructure so that the import of the raw material by sea may be increased. In the course of further development of the market, the possibility of increasing the level of storage and separation of various types of oil imported by sea and efficient and safe transmission within the country must be ensured. The main objective is to ensure uninterrupted crude oil supplies to Polish refineries and to supply liquid fuels to the market at a level ensuring its normal operation in a crisis situation. The growing importance of oil supplies by sea is of key significance for the diversification of raw material supplies to Polish refineries. For these reasons, the construction of the second leg of the Pomorski pipeline by 2025 is legitimate.

		The need to ensure reliable fuel supplies to the market requires the maintenance of appropriate crude oil and fuel storage capacities. In this context, appropriate framework must exist, guaranteeing optimum conditions for investing in storage infrastructure. With respect to the existing infrastructure, it must be guaranteed that all storage facilities operating in Poland have technical capacities enabling the quick delivery of raw material to refineries and the marketing of fuels. Such conditions are necessary to enable the efficient operation of the market and to ensure the full physical availability of stocks during crisis situations. The purpose of measures to be undertaken until 2030 is to ensure the continuity of fuel production by domestic refineries and uninterrupted supplies of fuels to the market should a crisis situation occur. In 2018, the physical availability of fuel stocks in storage facilities was 90 days for above-ground tanks and for underground tanks, and in the case of crude oil in above-ground tanks – it was 90 days and in underground tanks – 150 days. The physical availability of fuel stocks in 2024 in the case of above-ground tanks is planned to be 90 days, in the case of underground tanks – it is to be 90 days, in the case of above-ground crude oil tanks – it is to be 90 days and in the case of underground tanks – 90 days.
		5. Diversification of the sources and directions of natural gas supplies and the enhancement of the possibilities of gas supplies from directions alternative in relation to the eastern direction The directions and sources of gas supplies will be further diversified by carrying out two key projects - the construction of the Northern Gateway and the expansion of interconnections with neighbouring countries. This will enable the creation of conditions for establishing a gas transmission and trading hub in Poland for the countries of Central and Eastern Europe and Baltic states.
		6. Maintenance of the natural gas production level in Poland and attempts to increase it with the use of innovative hydrocarbon extraction methods In 2016, natural gas output in Poland was ca. 4.2 billion m^3 (converted to high-

		methane natural gas), whereas its output from mine demethylation and from offshore fields was 240 billion m^3 (converted to high-methane natural gas). As at the end of 2016, recoverable resources of developed natural gas fields amounted to 98.9 billion m^3, which accounts for 81 % of the total volume of recoverable resources. Industrial natural gas resources amounted to 52.3 billion m^3 in 2016. The main objective for 2030 in the segment is to maintain stable gas production, to continue exploration for new fields to replace depleted ones, as well as to increase output efficiency. In 2017, the output, converted to high-methane gas, was ca. 4 billion m^3 annually. The output is expected to remain at a similar level in 2030. Imports will continue to be the main method for meeting natural gas demand.
		7. Development of e-mobility and alternative fuels in transport Heavy dependency on imported crude oil supplies requires an active policy also in the field of the management of demand for oil-derived fuels. The basis for achieving the aforementioned objectives **is the promotion of alternative fuels in transport.** A support instrument in this respect is the Act on electromobility and alternative fuels. The act is aimed at stimulating **the development and electromobility and the use of other alternative fuels (natural gas in the form of LNG and CNG) in transport.** Dependency on crude oil imports will be reduced by increasing the use of cars driven by alternative fuels, including electric cars, and also by expanding infrastructure (including core networks) for charging electric cars and CNG/LNG refuelling in the transport sector. The following ambitious targets have been adopted for 2030 in relation to the expansion of alternative fuel infrastructure: – 6 000 normal power charging points for electric cars and 400 high power charging points in 32 selected agglomerations; – 70 compressed natural gas (CNG) refuelling stations in selected agglomerations, – 32 general access compressed natural gas (CNG) refuelling stations,

		four liquified natural gas (LNG) refuelling stations along the TEN-T core network and installations for bunkering vessels with LNG at the following ports: Gdańsk, Gdynia, Szczecin, Świnoujście.
		8. Maintenance of autonomy as regards electricity imports from third countries Independence from electricity imports from third countries is expected to be maintained until 2030. The National Power System (NPS) is interconnected by the following cross-border lines with third countries: – single-circuit 750 kV Rzeszów-Chmielnicka (Ukraine) line, (inactive since the 1980s); – single-circuit 220 kV Zamość-Dobrotwór (Ukraine) line; – double-circuit 110 kV Wólka Dobryńska-Brześć (Belarus) line (a local line out of operation); Electricity has been imported to Poland from third countries since 2011 only through the single 220 kV Zamość-Dobrotwór line, in volumes not exceeding 0.7 % of the country's peak power demand. This interconnection operates on market terms and access to transmission capacity is provided on the basis of monthly tender procedures.
c)	National objectives with regard to readiness to cope with constrained or interrupted supply of an energy source (including gas and electricity) and, where appropriate, a timeframe for when the objectives shall be met[9].	**1.** Diversification of natural gas supply sources and directions and improvement of the possibilities of gas supply from directions alternative to the eastern direction – objectives defined in 2.3. a) item 5. Pursuant to the implemented national regulations, until 2022 the share of natural gas imported by energy companies from a single source in a given calendar year may reach a maximum of 70 %. From 2023 onwards, this share may not exceed 33 %.
		2. Maintenance of the natural gas production level in the territory of Poland and attempts to increase it with the use of innovative hydrocarbon extraction methods –

		objectives defined in 2.3. a) item 6.
		3. Maintenance, as far as necessary from the point of view of the energy security of Poland, of non-market-based measures within the meaning of Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 In the event of exceptionally high gas demand, significant supply disruption or other significant deterioration of the supply situation and in the event that all relevant market measures have been implemented but the supply of gas is insufficient to meet the remaining gas demand, non-market-based measures have to be additionally introduced with a view, in particular, to safeguarding supplies of gas to protected customers. Depending on the assessment of the situation and measures necessary to eliminate the effects of disruption of the supply, mandatory stocks may be released or restrictions on natural gas consumption may be imposed.
d)	National objectives with regard to deployment of domestic energy sources (notably renewable energy).	**1.** Enhancement of the possibilities of gas supply from directions alternative to the eastern direction and maintenance of the natural gas output level in the territory of Poland, and attempts to increase it with the use of innovative hydrocarbon extraction methods – objectives defined in 2.3. a) items 5 and 6.
		2. Development of energy sustainable areas at the local level Safeguarding energy security requires the diversification of sources, raw materials and energy generation and distribution methods. With respect to electricity – this requires energy sources balanced with demand to be developed on the basis of the national potential, with only partial back-up from cross-border interconnections. The appropriate selection of renewable and other energy generation sources as part of energy clusters, energy cooperatives etc., may locally ensure self-sufficiency and thus safeguard energy security. **It is expected that 300 energy sustainable areas will be created by 2030 at the**

		local level (energy clusters, energy cooperatives etc.).
		3. Inventory of the national uranium deposits (conventional and non-conventional), including the exploration of deposits and analyses of their recovery possibilities in technical and economic terms (i.e. whether and on what terms it would be viable) until 2030 The analyses conducted so far show that Poland does not have industrial quantities of uranium in conventional deposits, but there is unconventional deposit potential (e.g. in ashes, copper mining waste). Their exploitation requires a detailed inventory of conventional and unconventional deposits and technical and economic analyses of the possibilities of using them for national industry purposes, including nuclear energy generation, to be conducted. The appraisal of the size of potential uranium deposits, in particular unconventional, is planned to be conducted by 2030, along with the assessment of the possibilities of recovering uranium, including of using it commercially, for the production of nuclear fuel for Polish nuclear power plants.
		4. Maintenance of domestic coal production at a level enabling the satisfaction of the demand of the energy sector Domestic coal is the basic electricity, heat and coke production carrier. The Polish energy sector is based on coal, with the share of coal in electricity generation in Poland accounting for 77 % in 2017. The share of primary coal-derived energy consumption in primary energy consumption amounts to ca. 39 %. For the above reasons coal will continue to determine the nature of the broadly understood energy market in Poland for many years to come. This is why the utmost possible level of the rationality of recovery and use of this raw material needs to be guaranteed to ensure reliable coal supplies for the purposes of the energy, heat and coke markets. At the same time, the sector should also ensure supplies to the small- and individual-consumer market, including through created distribution networks, with the product range and quality offer to be characterised by a growth in the

		production and supply of higher value-added types of coal, i.e. medium-sized and coarse coal and qualified low-carbon fuels. **Demand for coal will be met using domestic resources whereas imported raw material will be treated as supplementary.** The planned measures are directed towards ensuring the cost-effectiveness of the coal mining sector, the rational management of opened deposits, rational raw material distribution, the use or sale of mining by-products (methane, hydrogen, minerals), and innovative methods of mining and using the raw material.

2.4. Dimension Internal energy market

2.4.1. Electricity interconnectivity (2030 Framework target)

a)	The level of electricity interconnectivity that the Member State aims for in 2030 in relation to the October 2014 European Council objective.	<u>Increasing the availability of current cross-border interconnections and cross-border capacity</u> The operation of the Polish electricity system is adversely affected by the phenomenon known as loop flows. For this reason, even if cross-border interconnections exist physically, they are often not available to market participants for trading purposes or access to them is considerably constrained. The cross-border interconnection capacity among Member States should be increased primarily by the optimum use of the existing interconnections and eliminating barriers blocking access to the grid to market participants, including by eliminating bottlenecks in national systems, i.e. by: • changing the principles of providing access to transmission capacities between EU Member States, • constructing missing lines within national systems, • optimising the methods of providing market participants with access to those capacities (the introduction of the FBA), • installing phase shifters or other devices optimising transmission where necessary. Until 2030, the capacity of the existing cross-border interconnections of Poland is planned to be increased due to the implementation of projects located in the Poland-Lithuania and Poland-Germany corridors, as well as the introduction of the FBA methodology in the CORE region as a mandatory methodology. Additionally, the limitation of loop flows will result in the improvement of the availability of the current cross-border interconnections. The following actions should have a positive effects: practical separation of the AT/DE/LU bidding zone (since October 2018), investments in internal transmission networks as part of those zones and the implementation of the ACER decision of 17 November 2016 regarding

		the establishment of capacity calculation regions (CCR). It should be adopted that the cross-border interconnection capacity between Poland and EU states will be increased as part of the aforementioned measures. In the context of meeting the 15 % target by 2030, when undertaking initiatives concerning the intensification of network investments, it should be noted that such investments must be justifiable from the economic and technical points of view, i.e. they should use their potential in the optimum way and should constitute an element enabling the development of electricity market and in no way should constitute just an excessive cost burden on consumers. The government of the Republic of Poland strongly supports efforts to create a competitive electricity market within the European Union. It cannot be forgotten, however, that the implementation of one of the pillars of the Energy Union must be accompanied by the maintenance of the highest level of energy security and the ensuring of the effective use of electricity infrastructure in the European Union.
2.4.2. Energy transmission infrastructure		
a)	Key national objectives for electricity and gas transmission infrastructure that are necessary for the achievement of objectives and targets under any of the dimensions referred to in the Energy Union strategy.	**1.** <u>The key national objectives concerning electricity transmission infrastructure are as follows:</u> – to safeguard the security of electricity supplies – understood as the capacity of the electricity system to ensure the security of operation of the electricity grid and to balance electricity supply with demand; – to ensure the long-term capacity of the electricity system with a view to meeting reasonable transmission needs relating to domestic and cross-border trading in electricity, including the needs relating to the expansion of the transmission network, and, where appropriate, the expansion of interconnections with other electricity grids. To achieve the aforementioned objectives, the Transmission System Operator (TSO)10 is to create a backbone network which is necessary for the National Power System (NPS) to be operated correctly, and at the same time to ensure:

		– consumer supply reliability, including in large urban agglomerations, by meeting the n-1 supply reliability criteria and network operation quality parameters; – power interconnection and its evacuation from existing generation sources and sources under construction, including RES; – fulfilment of the requirements concerning the capacity for power exchange with neighbouring countries set out in laws. The backbone network enables flexible adaptation to various scenarios of operation of the NPS, even if the role of transmission network is limited to a booking function the only purpose of which is to guarantee the security of operation of the system. *Polskie Sieci Elektroenergetyczne S.A.* (PSE) is planning to develop its transmission network to meet the increasing demand, energy market requirements and the NPS users' needs. The development of extra high voltage (EHV) networks will contribute to: – achieving national strategic objectives defined in the energy policy; – integrating the market, inter alia through the development of cross-border interconnections and the reduction of bottlenecks in energy infrastructure; – safeguarding the security of supply, inter alia through interoperability, appropriate connections and secure and reliable system operation; – ensuring sufficient transmission capacity on the basis of the power and electricity demand of particular NPS areas forecast until 2025; – interconnecting, and evacuating power from, new generation sources based on conventional technologies for which interconnection conditions have been issued and/or interconnection agreements have been concluded; – ensuring transmission capacity for interconnecting and evacuating power installed in wind power plants at a level enabling the required RES share ratios in the national energy balance to be met; – reducing unscheduled power flows; – increasing the reliability of supply to major receiving hubs; – increasing the ability to exchange capacity with other systems operating

		synchronically; – strengthening the role of the transmission system in the NPS through the expansion of the 400 kV network and partial and gradual assumption of transmission functions from the 110 kV distribution network; – increasing voltage control capability; – creating conditions for the safe operation of the NPS while ensuring the cooperation of energy sources with diverse generation technologies and various performance characteristics; – increasing the operation flexibility of the transmission system enabling the shut-down of important network elements for maintenance and renovation or overhaul purposes, where the shut-down of such elements is difficult given the present form and load of the network; – improving the efficiency of electricity use; – creating a platform for further network expansion (potential development directions).
		2. Construction, expansion and modernisation of an internal gas transmission network The obligation to develop a transmission system ensues from the need to ensure the long-term capability of the gas system to satisfy reasonable gaseous fuel transmission needs in domestic and cross-border trading by expanding this system and, where applicable, by expanding interconnections with other gas systems. The length of the transmission network, which in 2017 was 11 744 km, does not enable free gas distribution in all directions, as there are bottlenecks in the network. The expansion of the national transmission network helps to construct an integrated and competitive gas market in Central and Eastern Europe. By making use of the geographical location of Poland, the national transmission system may play a new transit role, constituting a regional gas distribution hub. Additional 2000 km of transmission networks are planned to be delivered for operation in 2030 (above the status as in 2016).

		3. Integration of the national natural gas transmission system with the systems of the Central and Eastern Europe states and the Baltic Sea region At present, Poland is not sufficiently integrated with neighbouring states in terms of the gas transmission system. The sources and directions of gas supply to Poland are planned to be diversified by 2030, which is to be accompanied by increasing export potential due to the existence of two-way cross-border interconnections with Denmark, Slovakia, Lithuania and the Czech Republic. As at the end of 2017, there are no cross-border high-capacity interconnections with Lithuania, the Czech Republic or Slovakia. Such cross-border interconnections are expected to be put in operation by 2030.
b)	Where applicable, main infrastructure projects envisaged other than Projects of Common Interest (PCIs)11	**1.** Implementation of a two-way Poland-Ukraine gas interconnection Ensuring an export route for gas from Poland Initial value (2017): preparatory work. Target value (2030): operational interconnection.
2.4.3. Market integration		
a)	National objectives related to other aspects of the internal energy market such as market integration and coupling, including a timeframe for when the objectives shall be met	Market integration and coupling is a process which, by definition, engages a greater number of entities. The implementation of measures in the aforementioned area will depend on other entities engaged in the process, e.g. entities from the region. The integration of electricity systems requires transmission capacities to be designated and made available in a coordinated manner for trading purposes, having regard to technical power transmission capabilities in the interconnected systems, as well as the safety and reliability standards concerning system operation to be satisfied. The FBA (flow-based approach)[12] methodology needs to be implemented along with coordinated capacity allocation covering the Continental Europe countries. Having regard to the above-described limitations, Poland will carry out its

		commitments under the adopted and implemented network codes and guidelines. Furthermore, Poland will conduct additional actions to roll-out intraday market coupling mechanisms and mechanisms relating to electricity system balancing: – With respect to the prices of electricity of the day-ahead and intraday markets, bid and price limits other than currently applied in the process of uniform, European day-ahead and intraday market coupling will cease to apply in Poland starting from 1 July 2018. The foregoing will not affect the application of the minimum and maximum prices pursuant to Article 41(1) and Article 54(1) of Regulation 2015/1222. – With respect to price limits in the balancing market, from 1 January 2019 onwards they will be set at a level no lower than the level determined for the intraday market. The foregoing will not affect the technical price limits in the balancing market, to be applied, if necessary, pursuant to Article 30(2) of the Electricity Balancing Guideline. – Starting from 1 January 2021, prices in the balancing market will be set as the marginal price defined in Article 30(1)(a) of the Electricity Balancing Guideline. The foregoing will not affect the possibility of differentiating prices in the Polish market zone depending on the location, by applying a solution based on the full transmission network model in the pricing process. If technical price limits are applied in the balancing market, they will take into account the minimum and maximum prices pursuant to Article 30(2) of the Electricity Balancing Guideline. On 28 June 2018, on the sidelines of the European Council, an agreement on the synchronisation of the Baltic states (BS) with the electricity system of the Continental Europe was signed by the Prime Ministers of Poland and the Baltic states and the President of the European Commission in the form of a Political Road Map. With reference to crisis situations relating to a considerable increase in power demand in January 2017, accompanied by generation capacity losses in certain European regions (low temperature periods), the Government of the

		Republic of Poland stresses that is it legitimate for responsibility and decision-making powers concerning long-term generation capacities to be left to individual states.
b)	National objectives with regard to ensuring electricity system adequacy, as well as the flexibility of the energy system with regard to renewable energy production, including a timeframe for when the objectives shall be met	**1.** Flexibility of the energy system with regard to renewable energy production The low flexibility of the Polish energy market (on the demand and supply sides) is due primarily to the fact that in practice there are no regulating reserve sources in it (except for pumped-storage power plants) which would be capable of dynamically change the production level, depending on the electricity demand level. Most energy generated in Poland is derived from coal, but at the same time priority in access to the grid is given to renewable energy sources. Given an increase in generation from wind farms, full responsibility for balancing variable wind energy generation rests on coal-fired power plants. In such a situation, coal-fired power plants must operate at a load close to technical minimum levels or even shut down units and then immediately switch to operating at full capacity, for which in fact they are not technically designed. On top of all this, energy demand is becoming more and more variable, reaching record levels especially in largest agglomerations in peak periods. The improvement of flexibility is a priority which must be seen from the perspective of the entire chain, starting from generation sources, through transmission, distribution, energy market, to energy consumers and the entire demand side. **The flexibility of system operation is expected to improve by 2030, so that it can respond adequately to changing electricity demand levels and the increased share of uncontrollable energy sources.**
		2. Development and use of offshore wind energy potential in Poland in the 2030 perspective. The potential for the wind offshore sector in Poland in the Baltic Sea offers realistic opportunities for its development and use after 2025. To make it possible to evacuate full capacity generated by the wind offshore sector,

		the transmission network needs to be modernised and expanded, which is required in addition to providing electricity grid elements necessary to apply voltage and for interconnection purposes. Such modernisation/expansion of the transmission network has already been envisaged by PSE S.A. in the Transmission Grid Development Plan and scheduled for carrying out. The issue of **ensuring the adequacy of the electricity system and the flexibility of the energy system with regard to renewable energy production in the context of market integration is a process which, by definition, engages a larger number of entities. Therefore, it is not relevant to set national objectives in this respect.** The reason for this is that their achievement will depend on other entities engaged in the process. At present, the development of the renewable energy sector, in particular the wind offshore sector, is part of the planned deployment of renewable energy sources in Poland. The existing potential for the offshore wind sector in the Baltic Sea, in connection with the need to ensure adequate storage and transmission capacities for energy generated by it, does not provide an opportunity for developing and using this technology until 2025, i.e. in particular until around 2030 or even later. Until then, the expansion of individual local RES must be correlated with the repowering of traditional generation capacities and the modernisation of energy infrastructure enabling the transmission of energy generated by the offshore sector in Poland to end consumers. The anticipated effect in the 2030 perspective will be ca. 5GW of capacity installed in offshore wind farms, whereas in 2040 this effect will be the full utilisation of the potential of the Baltic Sea by installing ca. 10 GW of capacity using the aforementioned technology.
c)	National objectives to protect energy consumers and improve the competitiveness of the retail energy sector.	**1.** <u>Enhancing consumer knowledge and encouraging consumers to play a more active role in the energy market</u>

		Measures to enhance end consumer knowledge are planned to be continued in the period 2021-2030, which concerns especially their knowledge of: – consumer rights (relating to the conclusion of contracts, supplier switching, alternative dispute resolution methods), – an active role in the energy market (self-consumer, use of aggregation services, smart meters, dynamic price contracts).
		2. Gas market liberalisation – tariff deregulation in the gas trading sector A number of measures have been undertaken in recent years to stimulate the development of competition in the Polish natural gas market. By virtue of an amendment to the Energy Law of 26 July 2013, a gas exchange obligation has been introduced to enable the creation of a liquid, wholesale natural gas market in Poland and to make the consumer's right to switch suppliers a reality. The President of the Energy Regulatory Office (URE), by issuing individual decisions, has released entities which have filed appropriate applications from the obligation to submit tariffs for approval with respect to natural gas trading: at a commodity exchange, in a wholesale gas market and in LNG and CNG form, and the sale of natural gas to gas system operators in order for them to carry out their duties. As a result of a further amendment to the Energy Law, gas prices for trading companies were deregulated in December 2016 with respect to the sale: in a wholesale market, at a virtual point (including at a commodity exchange), of compressed natural gas (CNG) and liquid natural gas (LNG), and by tender procedure, auction or public procurement. On 1 October 2017 prices for all remaining consumers, except for household consumers, were deregulated. Natural gas prices for household consumers will be regulated by the President of the Cabinet until 1 January 2024. **The deregulation of natural gas prices for particular consumer groups will enable a far-reaching liberalisation of the gas market and the development of competition in the gas trading sector.**

		3. <u>Development of a competitive gas market in Poland</u> The number of instances of supplier switching is a simple and reliable measure of the development of a competitive gas market. Pursuant to the TPA (Third Party Access) principle, regulated in Article 4(2) of the Energy Law, end consumers may use the local provider's network on an individual basis to supply gas or energy purchased from any supplier. Several important factors affect the freedom of choice of the supplier, e.g.: the degree of awareness of customers and their motivation behind supplier switching, as well as facility to switch suppliers or the number of competitive offers available on the market. Only a few instances of supplier switching were recorded in 2011, in 2012 their number increased to 210, in 2013 to 429, in 2014 to 7 007, in 2015 to 30 749, in 2016 to 78 437, and the number of such instances recorded from the time this phenomenon started to be monitored to the end of 2017 amounted to 163 698. **The number of instances of natural gas supplier switching is expected to rise in connection with the development of the retail gas market.** According to the information provided by the President of the Energy Regulatory Office, the level of the natural gas supplier switching indicator among consumers reached 66 889 in 2017. The number of instances of natural gas supplier switching is expected to reach 150 000 by 2030.
2.4.4. Energy poverty		
a)	National objectives with regard to energy poverty including a timeframe for when the objectives shall be met.	**1.** <u>Reduction of energy poverty having regard to the protection of vulnerable social groups</u> A comprehensive state policy oriented towards the solution of the problem of energy poverty is planned to be developed. An effect of the proposed comprehensive public policy will be the reduction of energy poverty and the enhancement of the protection of vulnerable consumers.

		2. <u>Protection of vulnerable gaseous fuel consumers by granting a fixed allowance for the purchase of fuel</u> To protect the poorest, the group of vulnerable gaseous fuel consumers has been defined in an amendment to the Energy Law of 26 July 2013 (Journal of Laws of 2013, item 984) and the system of support for this group has been regulated. The number of vulnerable gaseous fuel consumers is expected to fall by 2030.

2.5. Dimension Research, innovation and competitiveness		
a)	National objectives and funding targets for public and, where available, private research and innovation relating to the Energy Union, including, where appropriate, a timeframe for when the objectives are to be met.	**1.** Reduction of the civilisation gap between Poland and highly developed economies and improvement of the quality of life of Polish people, as well as the fulfilment of the development aspirations of the present and future generations consistently with the sustainable development principle **Increase in expenditure on research and development activities in Poland to 1.7 % of the GDP in 2020 and 2.5 % of the GDP in 2030** National objectives and budgetary funding targets for research and innovation, including with regard to the Energy Union, are carried out within the framework of the state science, technology and innovation policy. The objectives and targets of this policy have been defined in the strategic direction guidelines for research and development formulated in the National Research Programme (NRP) adopted by the Cabinet. The main criteria applied in the NRP to choose strategic directions for research and development include the long-term needs of the economy, the high level of research in national centres – the competitiveness at the global level, the micro-, small- and medium-sized-scale development of business sectors based on new Polish technologies or the priority directions in research development defined in European research programmes and strategies (e.g. the SET-Plan and Horizon 2020 which constitutes the main source of funding for the measures defined in the SET-Plan and the EU energy and climate policy). **Strategic directions for research and development work** defined in the NRP are as follows: 1. New energy technologies, 2. Diseases of affluence, new medicines and regenerative medicine, 3. Advanced information, telecommunications and mechatronic technologies, 4. Modern materials technologies, 5. Natural environment, agriculture and forestry, 6. Social and economic development of Poland in the conditions of increasingly

		global markets, 7. State security and defence. The broadly understood energy and climate problems referred to in the NRP, including low-carbon technologies, covered by the research, innovation and competitiveness pillar pursuant to the Regulation on the Governance of the Energy Union, are included in as many as three out of the aforementioned seven strategic research and development directions, namely: *(1.)* New energy technologies, (4.) Modern materials technologies, (5.) Natural environment, agriculture and forestry. As noted in the description of strategic direction 1. New energy technologies, research conducted in this area should support the implementation of the Polish energy policy and the targets of the energy and climate policy of the European Union, as well as the implementation of the National Low-Carbon Economy Programme which is being formulated. The timeframe for the strategic research and development directions and strategic research programmes are defined in a manner ensuring the stability of the research conducted. They should be modified, though, as the conditions, tasks and needs of the economy and the public change. Strategic directions for research and development are to be implemented for 10-15 years, and strategic research programmes for 3-7 years, taking into account realistic funding levels. The foundations for the achievement of an objective defined in such a manner include, to an equal extent: an increase in expenditure on research and development activities in Poland **(from 0.75 % of the GDP in 2011 to 1.7 % of the GDP in 2020 and 2.5 % of the GDP in 2030)** and the determination of new rules for using this expenditure, better suited for present conditions. This will lead to, among other things, the enhancement of the level and efficiency of science in Poland, understood as the delivery of research results and products of considerable cognitive quality and high social, economic and technological usefulness. The aggregate effect of measures in all the NRP areas **is the enhancement of innovation of the economy and an increase in the significance and competitiveness of Polish**

		science internationally. The implementation of the NRP helps to enhance the effects of research in new technological solutions, the number of patents and the development of innovative economy. The achievement of the aforementioned objective requires the concentrated efforts of the scientific community and financial expenditures from the state budget on a limited number of singled out priority areas. The aforementioned national strategic research and innovation directions and priorities and objectives concerning energy and climate as part of the new state science policy will be updated primarily on the basis of the Energy Policy for Poland (document under preparation) which elaborates on the provisions and premises included in the Strategy for Responsible Development and other strategic documents relating to the energy policy of the country. The B+R+I objectives for the energy sector will be consistent with the new energy policy of the country and will help to implement it.
b)	If appropriate, national objectives including long-term targets (2050) for the deployment of low-carbon technologies, including for decarbonising energy- and carbon-intensive industrial sectors and, if applicable, for related carbon transport and storage infrastructure.	**2.** <u>Directions for development of energy innovations:</u> 1) The improvement of competitiveness of the Polish energy sector through: – continuous enhancement of technological advancement and the quality of operation; – implementation of competitive organisational and business models; – optimisation of capital use. 2) The maximisation of gains for the Polish economy derived from changes in the energy sector through: – use of innovations in the energy sector for industrial development, – decrease in energy and raw material consumption per unit, – support for building close relations between business entities and public institutions and the science sector. At the end of May 2017, a document on innovations in the energy sector was adopted, entitled Directions for Development of Energy Innovations. The document covers energy innovations both from the perspective of technologies, processes and

		funding sources and models, and from the perspective of the implementation of new solutions, and contains a list of indicators relating to innovations and the development of new business models. Cooperation has been established with energy sector entities with a view to engaging this sector in innovation projects, and with organisations supporting the development of research, innovations and project implementation. Projects implementing the Directions for Development of Energy Innovations concern the following areas: integrated and interconnected energy system assigning a central role to energy users, efficient and flexible energy generation and the use of raw materials combining the reduction of impact on the environment with energy security, diversification of energy generation and use technologies, green and energy-efficient city.
		3. Acceleration of energy sale in such areas as: air protection, RES, energy saving, water and waste water management, waste management and the protection of biodiversity by Polish companies in international markets An increase in the sale of technologies by Polish companies in international markets will be supported by specialised training addressed to business entities, missions abroad with the participation of the representatives of the Ministry of the Environment, the Government of the Republic of Poland or the President of the Republic of Poland, and the participation of business entities in international events, fairs, exhibitions. This form of assistance enables Polish companies to increase technology sales in international markets with relatively low financial expenditures. At present, the GreenEvo programme is planned to be implemented in the period 2018-2020. The GreenEvo - Green Technology Accelerator project, further editions of which are being prepared and which supports the transfer and promotion of innovative Polish green technologies in Poland and abroad in compliance with the State aid rules, in

		such areas as: air protection, RES, energy saving, water and waste water management, waste management and the protection of biodiversity. It is planned that Polish environmental technologies will continue to be supported after 2020 through the implementation of programmes and policies enabling their promotion in Poland and abroad. Given the envisaged implementation of the programme in the years 2018, 2019 and 2020, the objectives will not be finally formulated until the end of 2020.
		4. Determination of the potential of forest areas for carbon dioxide sinking and the launching of research aimed at developing better methods of carbon dioxide balance calculation A research project is envisaged to be funded as part of the Forest Carbon Farms (FCF) pilot project, concerning the verification of the mitigation capabilities of forest areas as a result of undertaking additional measures in these areas. A number of researchers representing leading universities and research institutions in Poland, forming several task teams, are engaged in the FCF project. The expected effect of those works will be the adaptation of the forest ecosystem carbon balance model to Polish conditions in order to determine accumulated carbon resources in all forest layers. At present, Poland will use the globally recognised Canadian CBM CFS3 model. The objective of the aforementioned project is to be the development of carbon dioxide balance calculation methods, e.g. for reporting purposes, and the determination of the possibilities for applying additional economic measures to improve the balance of greenhouse gas on forest land. An effect of carrying out the research project will be the creation of detailed forest development models for conditions prevailing in Poland, enabling changes in the carbon balance for forest ecosystems in Poland to be estimated more precisely.
b)	Where applicable, national objectives with regard to competitiveness.	The enhancement of the competitiveness of the economy through: – innovations, export and increase in the value of capital made available for funding investments in the business sector (specific objective I SOR),

		– more complete use of social and territorial resources (specific objective II SOR) and – projects improving the effectiveness of generally available state institutions whose purpose is to support business entities and people (specific objective III SOR). Based on experience, it is envisaged that, in the period 2021-2030, the main competitiveness-oriented activities will focus around investing in areas ensuring an increase in the value added of the economy and its competitiveness in foreign markets. The basic element will be support instruments addressed to business entities with the aim of undertaking and developing (continuing) B+R+I activities, owing to which business entities will improve their competitiveness, especially in areas constituting economic priorities, including: – high-efficiency, low-carbon and integrated energy generation, storage, transmission and distribution systems; – smart and energy-efficient building technologies; – environment-friendly transport solutions; – minimisation of waste generation, including waste unfit for processing, and the use of waste for materials production and energy generation purposes (recycling and other forms of recovery). There are plans to use research and development support instruments leading to innovations in environmental and low-carbon technologies and in technologies enabling effective (economical) waste management. The GDP per capita measured in purchasing power parities is expected to reach ca. 75-78 % of the EU average (the current level is 69 %) in 2020, and in 2030 after new competitive factors have been activated, it will reach the EU average.

3. POLICIES AND MEASURES

3.1. Dimension Decarbonisation

3.1.1. GHG emissions and removals (for the plan covering the period from 2021 to 2030, the 2030 Framework target).

a)	Policies and measures to achieve the target set under Regulation [ESR] as referred to in 2.1.1 and policies and measures to comply with Regulation [LULUCF], covering all key emitting sectors and sectors for the enhancement of removals, with an outlook to the long-term vision and goal to become a low-carbon economy with a 50 years perspective and achieving a balance between emissions and removals in accordance with the Paris Agreement	**1. Meeting the non-ETS (ESR) 2030 reduction target.** Poland has considerably reduced total GHG emissions as compared with 1988. It should be noted that a profound reduction took place before 2005: from 1988 to 2005, the decrease reached ca. 30 %, and from 1990 to 2005 it amounted to ca. 15 %. Since 2005, the trend in total GHG emissions, ranging at a level of ca. 400 million tonnes of CO_2equivalent, may generally be regarded as stable, with some fluctuations in individual years. Given the above-described trends, the reduction of GHG emissions in the non-ETS sectors covered by the ESR by -7 % by 2030 as compared with 2005 will be an ambitious challenge for Poland. An analysis of the current 2030 GHG emission forecast shows that aggregate emissions in those sectors will decrease, but the rate of such changes may not be sufficient to meet the commitments. The following sectors have the largest shares in the GHG emission structure in Poland in the non-ETS sectors: households, i.e. municipal and household sector (ca. 30 %), transport sector (ca. 27 %), agricultural sector (ca. 15 %). From the point of view of meeting the ESR target, the sectors of key importance for the level of GHG emissions will be sectors in which an increase in emissions is forecast, i.e. transport, agricultural and industrial sector not covered by the EU ETS (accounting for ca. 8 % of GHG emissions in the non-ETS sectors). The emission trends in these sectors, as well as the actual emission levels in the period 2021-2030, will determine the final total emission level in the non-ETS area. It should be concluded on the basis of the current GHG emission projections that transport emissions will continue to rise in the period 2021-2030 (a trend that has maintained since 2005). The same trend is expected for non-ETS agricultural and industrial emissions, although at a much lower level. Thus, taking into account the share in emissions as well as a significant upward trend, it is primarily the volume of emissions from the transport sector that will be of key importance for meeting the non-ETS reduction target in 2030.

		Since 1990 the EU has managed to reduce its total CO_2 emissions by 23 %, mainly due to reductions in Central and Eastern Europe countries. At the same time, CO_2 emissions from car transport have increased by 20 %. GHG emissions from the transport sector in Poland decreased from ca. 48.8 million tonnes of CO_2equivalent in 2011 to ca. 44.1 million tonnes of CO_2equivalent in 2013, to grow again to ca. 52.8 million tonnes of CO_2equivalent in 2016, and constitute ca. 13 % of the total domestic emission (in the EU emissions from the transport sector account for as much as 25 % of the total emissions on average). Road vehicles, in particular passenger and light commercial vehicles, are responsible for the largest share (ca. 97 %) in the transport sector emissions in Poland. The introduction of new CO_2 emission standards will help manufacturers to implement innovative solutions and to deliver low-carbon vehicles to the market. It is also aimed at: • encouraging car manufacturers to provide customers with electric and hybrid cars emitting smaller quantities of CO_2; • gradually departing from the production of vehicles running on traditional fuels; • creating a modern, sustainable European economy; • ensuring cleaner air in European cities and better integration of renewable energy sources with the existing and future energy systems. Generally, the reduction target will be pursued based on the existing and new policies and measures in particular sectors not covered by the system of trading in GHG emission allowances, including those discussed in further points of Chapter 3.1.1. If necessary, Poland intends to apply flexibility mechanisms provided for in the ESR to account for GHG emissions in the period 2021-2030, namely: – LULUCF flexibility (Article 7) – the ESR takes into account flexibility between the ESR and the LULUCF area, which enables the use of a certain pool of units deriving from removals in LULUCF to cover ESR emissions. Pursuant to Annex III to the ESR, the maximum volume of this pool for Poland for the entire 2021-2030 period is 21.7 million tonnes of CO_2 equivalent. Units generated by the LULUCF sector will be used to account for meeting the ESR target in the period 2021-2030, having regard to the aforementioned limit and the rules defined in the LULUCF Regulation. The

		assessment of the importance of this sector in the final accounting for meeting the ESR target will be possible after the reference levels have been defined for particular categories of the LULUCF sector, determining, among other things, the possibility of applying removals for the purposes of the ESR target. Nevertheless, the LULUCF sector will not be able to contribute more than 21.7 million tonnes of CO_2 equivalent, and credits generated by it may be used after the requirements under both the LULUCF Regulations and ESR have been met. At present, the 'National Forestry Accounting Plan' is being prepared; – **adjustment – an additional pool of AEA units (Article 10(2)) – Article 10(2)** provides for an adjustment for Poland which will constitute a certain additional pool of units increasing the annual limit on a one-off basis, to be added in the first year of the commitment period. The value for Poland envisaged in Annex IV to the Regulation is 7 456 340 tonnes of CO_2 equivalent; – **banking, borrowing and transferring AEA units (Article 5)** – as in the 2013-2020 commitment period, Member States may bank the unused part of their AEA limits to subsequent years of the commitment period, borrow a part of their AEA limits from following years or buy AEA units from other Member States. The transfer of units among states may be linked to the implementation of GHG emission reduction projects. If necessary, Poland intends to take advantage of the above-described possibility of having flexible access and of using its own AEA units, as well as of buying accounting units from other Member States; – **security reserve (Article 11)** – should the remaining flexibilities turn out to be insufficient to cover an AEA shortfall in the period 2026-2030, Poland is planning to use an additional pool of units, taken from the security reserve, at the end of the commitment period (in 2032).The maximum total pool for all Member States that meet specific conditions is 105 million tonnes of CO_2 equivalent. The detailed approach to the method of meeting the reduction target in the non-ETS sectors will be outlined in the National Allowance Management Strategy prepared by the Minister for the Environment and agreed with and approved by the Cabinet on the basis of Article 21d of

		the Act on the management of greenhouse gas and other substance emissions. The purpose of this strategy is to determine the objectives and guidelines for accounting for emissions in the non-ETS area, taking into account the actual and forecast GHG emissions and the market situation (the supply of and demand for AEA units). **At present, the reduction effort necessary to meet the 2030 non-ETS reduction target cannot be defined in a precise manner, as the key EU implementing legislation (including input data for calculations), which would precisely define the value of the reference point (the emission level in 2005) or emission allowances (allocations of AEA units) for particulars years in the period 2021-2030, are not available yet. It is expected, however, that meeting the 2030 target will require a greater effort than meeting the 2020 target.**
		2. Information on the Transport Development Strategy 2020 (with an outlook to 2030) and a draft Sustainable Transport Development Strategy 2030 is included under 3.1.3. d)
		3. CO2 emission reduction in the electricity sector by: – **replacing low-efficiency coal-fired power plants by new high-efficiency plants meeting strict environmental standards concerning pollution emissions;** – **increasing the use of renewable energy sources and developing reserve gas sources in connection with it;** – **implementing nuclear power projects;** – **increasing energy efficiency.** The energy sector (in the inventory referred to as Energy industries) accounted for ca. 50.4 % of CO_2[13] emissions in 2016. Thus, it is a sector with a major share in the greenhouse gas emissions. Therefore, even minor emission percentage changes in it result in major changes in the volume of emissions in CO_2 tonnes and tonnes of CO_2 equivalent. The draft Energy Policy for Poland 2040 of November 2018 provides for an evolution of the electricity generation sector towards a lower-carbon sector, at a rate guaranteeing energy security and without jeopardising the competitiveness of the economy. The share of RES in electricity generation is expected to rise from the current 14 % to ca. 27 % in 2030 and the further development of the aforementioned sector is expected over the next decade. An increase in the use of RES, the decommissioning of worn out, low-efficiency coal-fired units

		which do not meet the emission requirements (under the BAT Conclusions), as well as the implementation of nuclear power projects, will result in the average CO2 emission level per unit of generated electricity (kg of CO_2/MWh) being reduced by ca. 20 % by 2030 and by ca. 50 % by 2040 as compared with the present status. A major part of the energy sector is covered by the EU ETS, which – by limiting the volume of emissions at the EU level and assessing the EUR value of each tonne of CO_2, indirectly contributes to a systematic change in the fuel structure and the level of technologies used to generate energy in the EU and nationally. It should be stressed, though, that the EU ETS itself by definition does not set national reduction targets in relation to greenhouse gas emissions. It nevertheless does result in the need to undertake additional measures to support emission reduction at the level of individual Member States.
		4. Launching mitigation measures by testing the possibilities of increasing capabilities for carbon retention in forest ecosystem elements with the use of methods consisting in expanding applied technologies and the scope of breeding and management works for all ownership type forests For this purpose, measures forming part of the Forest Carbon Farm pilot project carried out by the 'State Forests' National Forest Holding will be undertaken. The Forest Carbon Farm project envisages an attempt to achieve an increased carbon dioxide removal by forest areas through additional forest management activities to be carried out within its impact area. As part of the works already conducted in the initial period the scale and location of activities have been established and first forestry works have been started. Based on inventory data concerning the committed forest area of the FCF project, the expected effect, i.e. the volume of additional carbon dioxide accumulation, has been modelled. The pilot part of the Project will cover 10 years (2017-2026) and the effect and durability modelling period is expected to take 30 years. An effect of the Forest Carbon Farm project, which is important for enhancing the quality of the carbon balance inventory in forest ecosystems, is the improvement of the system for acquiring forest-related data for emission reporting and removal purposes, as envisaged in the project, by launching measures aimed at building a carbon removal model for forests in Central Europe conditions. The acquired data will also make it possible to consider additional measures to be implemented in the forest

		sector on a broader scale. In parallel, measures will be introduced to adapt to climate change by ensuring the sustainable development and effective operation of the economy and society in climate change conditions, designed to serve the following purposes: – to ensure good environmental status, to promote compact, multi-function spatial systems and polycentric urban structures; – to include an environment-friendly and low-carbon spatial development approach in spatial planning processes; – to develop transport in climate change conditions; – to ensure sustainable regional and local development having regard to climate change; – to effectively adapt to climate changes in rural areas; – to stimulate innovations facilitating adaptation to climate change; – to form social attitudes facilitating adaptation to climate change. The specified priority areas constitute an answer primarily to the occurring climate changes and their current and expected consequences for vulnerable sectors. The intensity of adaptation measures will depend on, among other things, the dynamics of climate change until 2030 and in subsequent decades. Furthermore, the low-carbon economy requires a spatial development approach that will ensure the efficient use of the site and infrastructure and the reduction of emissions from transport and individual heat sources, while following the idea of a compact and cost-efficient city in the spatial planning process. Works are conducted to develop an updated strategy for adaptation to climate change, setting out measures and targets beyond 2020 (Strategic Adaptation Plan - SPA2020). The works on this document are planned to be completed in 2019 or 2020. Currently, in addition to SPA2020, issues relating to adaptation to climate change are also included in the draft State Environmental Policy 2030, which was subject to public consultations at the end of 2018. Due to the absence of clear national or European indicators concerning adaptation measures, the expected effects of measures undertaken in the period 2021-2030 are of general and qualitative nature.

		5. Rationalisation of the use of fertilisers, including nitrogen fertilisers Issues relating to the storage and use of fertilisers containing nitrogen, including livestock manure, are regulated in the Act of 20 July 2017 – Water Law and the Cabinet Regulation of 5 June 2018 regarding the adoption of the 'Programme of measures aimed at reducing water pollution caused by nitrates from agricultural sources and preventing further pollution', known as the Nitrate Programme, issued on the basis of Article 106 of the Water Law. The Water Law stipulates in particular that a livestock manure dose used in a year for agricultural purposes may not contain more than 170 kg of nitrogen in a pure component per hectare of agricultural land. Additionally, in Chapter 1.5 of the aforementioned Cabinet Regulation, the obligation has been set out for a plan for nitrogen fertilisation to be developed by entities: – having a farm with an area of more than 100 ha of agricultural land, or – growing intensive crops on arable land in an area in excess of 50 ha, or – maintaining stocking density in excess of 60 livestock units (LU) on an annual average basis. All entities will thus be obliged to apply fertilisers in a rational fashion. The Nitrate Programme will require entities engaged in agricultural production to undertake investment activities that are necessary and at the same time long-term. Pursuant to the aforementioned Nitrate Programme, entities engaged in agricultural production and in the activities referred to in Article 102(1) of the Water Law are obliged to put the area or capacity of sites designated for storing natural fertilisers (livestock manure) in line with the requirements set out in the Programme, by: 1) 31 December 2021 – in the case of entities breeding animals in numbers exceeding 210 LU, including entities raising or breeding poultry in numbers exceeding 40 000 places or raising or breeding pigs in excess of 2 000 places for pigs with weight exceeding 30 kg or 750 places for breeding sows; 2) 31 December 2024 – in the case of entities engaged in raising or breeding livestock in numbers not exceeding 210 LU. To adapt to the new requirements farmers must ensure appropriate funds in their farm budgets. Additionally, funds must also be ensured in the state budget to support investment

		activities. The Water Law (amending Article 400a(1)(2a) of the Act of 27 April 2001 – Environmental Protection Law) has obliged environmental protection and water management funds to finance projects involving the implementation of a programme of measures aimed at reducing water pollution with nitrates from agricultural sources. In the justification of the act it is noted that projects involving the implementation of the Nitrate Programme will be funded with the use of repayable instruments, in compliance with State aid regulations. Additionally, some of the measures relating to the implementation of the Nitrate Programme may be funded from the Rural Development Programme 2014-2020, the 'Support for investments in agricultural holdings' sub-measure, as part of such operations as 'Investments aimed at protecting water against pollution caused by nitrates from agricultural sources'. Having regard to the presented conditions and the fact that the Nitrate Programme, pursuant to Article 102 of the Water Law, will be applied by all entities engaged in agricultural production, including special sections of agricultural production, and in activities as part of which livestock manure is stored, the following solutions have been applied: – the requirements applicable so far with respect to the storage of natural fertilisers have been transferred from the Act on fertilisers and fertilisation (i.e. 4 months' storage of natural liquid fertilisers) to the Nitrate Programme and have been set to apply from the effective date of that programme, – the gradual adaptation of farms to the requirements concerning appropriate facilities to store natural liquid fertilisers (with a leak-proof bottom and sides and covered) and places for storing natural solid fertilisers (a leak-proof bottom and sides), ensuring the storage of natural fertilisers (livestock manure) for 6 and 5 months, respectively, has been staggered over time. Measures in this respect will be continuous, covering the period 2021-2030.

		6. Measures to improve the quality of the air The improvement of the quality of the air is one of the priorities of the Government of the Republic of Poland. A number of measures have been undertaken in Poland to eliminate the phenomenon known as low-carbon emissions, both at the local and central government levels. First, the **National Air Protection Programme** [14]has been developed and adopted on 9 September 2015, the implementation of which is to enable the achievement, within a reasonably short period of time, of the admissible levels of particulate matter and other hazardous substances in the air, as set out in the applicable laws. Furthermore, it is worth stressing that to enhance the effectiveness of measures envisaged in air protection programmes and short-term action plans local governments have been provided with an additional tool as part of the amendment to the Environmental Protection Law (known as the Anti-Smog Act) of 10 September 2015 (Journal of Laws of 2015, item 1593). Pursuant to Article 96 of the Environmental Protection Law of 27 April 2001 (Journal of Laws of 2017, item 519, as amended) the provincial assembly may, by resolution, set out restrictions or prohibitions on the operation of installations in which fuels are combusted, in order to prevent an adverse impact on the environment. At the same time, such a resolution is to define the types or quality of fuels to be admitted for use or prohibited from being used. Due to the unsatisfying condition of the air in Poland, the Cabinet Economic Committee presented **recommendations for the Cabinet – the Clean Air Programme on 25 April 2017.** It should be emphasised that measures aimed at improving the quality of the air have also been envisaged in other documents of key importance for the development of Poland, including in the **Strategy for Responsible Development – the Clean Air project, the Electromobility Development Plan 'Energy for the Future', as well as in the draft Energy Policy for Poland 2040.** At present, the Regulation of 1 August 2017 on the requirements for solid fuel boilers (Journal of Laws, item 1690) is in force.(Journal of Laws, item 1690). The regulation obliges entities marketing solid fuel boilers with a rated thermal output of no more than 500 kW to comply with boiler design requirements ensuring the achievement of specific limit values of the emissions of carbon oxide, gaseous organic compounds and particular matter. Additionally, it bans the use of an emergency grate in boiler structures. It should be stressed that the Regulation of the Minister for Energy of 27 September 2018 regarding quality requirements for

		solid fuels has been issued. The improvement of the quality of the air is also to be achieved through measures relating to the development of district heating systems (in particular heating networks and energy-efficient heating systems based on cogeneration or RES or using waste heat from industrial plants). Additionally, one of the basic measures to improve the quality of the air will be the development of gas distribution to satisfy heating requirements. A pilot programme of **thermal upgrading and replacement of individual heating equipment for the poorest has been prepared under the name SMOG STOP** (Ministry of Enterprise and Technology). The programme was published on 22 February 2018. It is addressed to 23 towns ranked among the 50 most polluted towns in Europe presented by the World Health Organisation. Since the transport sector in large cities is the main cause of the fact that the permissible levels of nitrogen dioxide are exceeded, an expert opinion has been prepared in order to fulfil the duty set out in the National Air Protection Programme. The expert opinion is entitled *'Analysis of the possibilities of creating reduced transport emission zones in Poland'*. The results of the analysis are the basis for **defining eco- and cost-efficient solutions capable of effectively contributing to the reduction of transport emissions in a given area and will constitute justification for taking decisions to create reduced transport emission zones in Poland.** It should also be noted at this point that already now, in connection with the emission of transport pollutions, a municipal council may issue a resolution pursuant to Article 39 of the Act on electromobility and alternative fuels of 11 January 2018 (Journal of Laws of 2018, item 317) establishing a clean transport zone in a high-density housing development area where public buildings are concentrated, in order to prevent an adverse impact on the health of people and the environment. Access to such a zone for vehicles other than electric or hydrogen- or natural gas-fuelled vehicles is restricted. The problem of the inadequate quality of the air in cities is also caused by inappropriate spatial planning. In city centres, natural aeration corridors become blocked. Therefore, the issue of **reducing undesirable urban sprawl and green wedge blocking** has been signalled in the reform of the spatial planning system which is currently being prepared by a team of experts. The problem of inadequate spatial planning covers also the issues of the construction of transit

		routes in densely populated areas. Their location outside urban areas should be considered, along with the construction of by-pass roads taking traffic outside urban areas, the construction of inter-modal nodes and the expansion of environment-friendly transport networks (including a railway system).
b)	Regional cooperation in this area.	**1. Works concerning the international process of negotiation of the United Nations Framework Convention on Climate Change** Poland is a party to both the UN Convention on Climate Change, and the Kyoto Protocol and the Paris Agreement (PA), being international legal instruments obliging countries to reduce greenhouse gas emissions. Pursuant to the Paris Agreement, all parties are required to prepare, communicate and maintain, on a regular basis, nationally determined contributions to the achievement of the objectives of the Paris Agreement, as well as to take measures at the national level aimed at reducing emissions for the purpose of achieving the objectives of these contributions. Both the EU and Member States have fulfilled this obligation by submitting, in 2015, their intended Nationally Determined Contribution (NDC), which envisages, among other things, a EU declaration to carry out its internal commitments to reduce greenhouse gas emissions by at least 40 % from 2021 to 2030, as compared with 1990, throughout the EU. The Paris Agreement does not impose specific solutions which might affect the sovereign decisions of the parties to the Agreement, but aims at reducing CO_2 concentration in the atmosphere through both the reduction of emissions and an increase in their removal by forests and soil. Poland's accession to the PA implies its declaration of preparedness to undertake commitments in the form of further NDCs. They will not be legally binding, but in the case of Poland will be submitted as part of the common European Union's NDC the content of which will be based on the internal decisions of the EU and its Member States with respect to the EU future energy and climate policies (and thus the emission reduction targets binding under the EU internal laws, defined in such policies). The nationally determined contribution is expected to be achieved in accordance with the adopted guidelines.

c)	If applicable, without prejudice to the applicability of State aid rules, financing measures, including EU support and the use of EU funds, in this area at national level.	**1. Elimination of low-carbon emission** Efforts have been undertaken as part of decarbonising the economy to eliminate the low-carbon emission problem the source of which is mainly the household and municipal sector and transport. A comprehensive approach has been applied to improve the quality of the air by facilitating funding for investment projects consisting in: – constructing renewable energy generation installations or high-efficiency cogeneration installations; – applying one of the measures to improve the quality of the air; – promoting energy-efficiency in business entities and public and residential buildings; – improving the efficiency of heat supplies to consumers; – developing low-carbon transport. The aforementioned areas are planned to be supported also after 2020. Additionally, instruments supporting the reduction and then the elimination of low-carbon emissions are planned to be introduced in the following years, through the development of energy poverty reduction policies, connection to district heating networks having regard to the optimisation of expenditures, the development of the natural gas network infrastructure, the introduction of low-carbon zones (at present, clean transport zones have been introduced by the Act on electromobility and alternative fuels of 11 January 2018). The condition of the air has been unsatisfactory in Poland for many years. Nonetheless, a gradual although slow improvement in the quality of the air has been recorded in recent years. An important problem in Poland continues to be: in winter – excessive concentrations of PM10 and PM2.5 and benzo(a)pyrene, and in summer – excessive concentrations of tropospheric ozone. Furthermore, single instances of excessive concentrations of nitrogen dioxide can be observed[15], caused mainly by emissions relating to intense vehicle traffic in city centres and vehicle traffic on main roads located close to measuring stations. As a result of the conducted air protection policy, a considerable reduction in pollution emission into the environment has been recorded over the last thirty years, which includes a reduction in particulate matter emissions by more than 80 %, sulphur dioxide emissions by 70 % and nitrogen oxide emissions by 40 %.

		Nevertheless, according to the report entitled Air Quality Assessment for 2016[16], out of all 46 zones in Poland, excessive levels have been found in: 35 zones due to exceeding the permissible level of PM10, 18 zones due to exceeding the permissible levels of PM2.5. Additionally, the permissible nitrogen dioxide levels have been found to be exceeded in four zones and the target benzo(a)pyrene levels have been found to be exceeded in 43 zones. Analyses show that the responsibility for this state of affairs rests primarily on the household and municipal sector, transport and, to a minor extent, industry. The share of individual sectors varies in different regions of the country and depends on the degree of industrialisation of a given zone. Obsolete installations and equipment which do not meet the emission standards are used in combustion processes in the household and municipal sector, with waste or poor quality fuels, such as flotation sludge, coal dust or poor quality coal, being often used for combustion. These inappropriate practices are due to, among other reasons, the financial situation of people and their insufficient awareness of the impact of their conduct on the quality of the air and of related health effects. This is why the improvement of the quality of the air is one of the priorities for the Government of the Republic of Poland. The following effects are envisaged to be achieved (in 2023) as a result of carrying out investment projects directly related to the improvement of the quality of the air in the period 2014-2023: – decrease in greenhouse gas emissions (annually) – 875 007 tonnes of CO_2 annually; – additional capacity for generating renewable energy – 297 MW; – additional capacity for generating electricity and heat using high-efficiency cogeneration - 220 MW; – length of a newly built or modernised heating network - 1 180 km.
		2. Mechanisms envisaged in the new EU ETS Directive to be in force in the period 2021-2030 In the period 2021-2030, within the framework of the EU ETS mechanisms for the energy sector, Poland will have at least 411 million emission allowances (as part of derogation and the Modernisation Fund) which may be allocated for modernisation activities in the energy sector and for the improvement of energy efficiency. Under Article 10c of the ETS Directive (derogation), Poland may allocate free of charge at least

		276 million allowances to entities generating electricity. Additionally, the derogation quantity may be increased by approximately 100 million allowances unused under derogation in the current accounting period (2013-2020). Entities to which emission allowances will be allocated will have to assign their financial equivalent for investing in lower-carbon technologies, repowering of the existing sources, the development of RES or the development of transmission networks. As part of the Modernisation Fund, Poland will have funds from the sale of at least 135 million emission allowances. Funds from selling the aforementioned allowances may be allocated for: the development of RES, the improvement of energy efficiency, the storage of energy and modernisation of the energy sector towards low-carbon economy by, among other things, replacing high-carbon technologies and fuels or modernising transmission networks.
		3. Development of heating networks and co-financing of the connection of new consumers Having regard to the need to undertake multifaceted measures aimed at ensuring the quality of the air, the development of heating networks in urbanised areas leads, in a particular manner, to the improvement of the situation and a reduction in low-carbon emissions from inefficient local boilers. Financial support dedicated to the development of heating networks is intended to expand their coverage area and to connect new heat consumers. This measure is necessary to improve the quality of the air in Poland by eliminating individual sources of heat and replacing them with district heating. Consideration should be given (especially in the context of regional measures) to possible financial support for the modernisation of the internal infrastructure of buildings, necessary to receive heat supplied by district heating systems. A parallel measure necessary to increase the efficiency of the use of primary energy carriers, and thus to reduce CO_2 emissions from the district heating sector, is the reduction of distribution losses of heating networks. Funds assigned to this measure should be targeted on, among other things, the modernisation of heat distribution centres and on the replacement of heating pipes by pre-insulated pipes. Proposed form of financing: a grant or preferential lending.

		4. Support for the utilisation of coal-bed methane Ca. 80 % of coal resources in Poland constitute deposits classified as deposits containing methane, and the greenhouse effect of methane is 21 times greater than that of CO_2. Therefore, if appropriately included in the sector transformation process, methane may become an important raw material in the Polish energy mix, contributing to the energy security of the country and, at the same time, to a considerable reduction in greenhouse gas emissions. The use of methane for energy purposes is an example of an activity which is not only beneficial for the environment, but also brings economic gains (the calorific value of methane is more than double of the calorific value of coal) and social gains (improvement of the work safety of miners). The utilisation of methane is consistent with EU targets concerning the development towards circular economy, since at present a large portion of methane is treated as waste, whereas it can be used as fuel.
3.1.2. Renewable energy (2030 Framework target)		
a)	Policies and measures to achieve the national contribution to the binding EU-level 2030 target for renewable energy and trajectories as presented in 2.1.2 including sector- and technology-specific measures[17].	**Support for renewable energy** Pursuant to EU regulations concerning State aid for energy, support for renewable energy should be based on competitive systems, promoting the reduction of costs involved in meeting targets. In Poland, renewable energy sources in the electricity sector are supported with the use of an **auction system**, which should be regarded as the most effective solution from the economic point of view. Support granted on the basis of an auction offers permanent and stable conditions for investing in new RES installations. The adopted support system in the form of auctions enables aid to be addressed to selected areas and sectors and thus the energy mix to be optimised with regard to electricity. The auction system mechanisms make it possible to stimulate the development of areas with potential for the development of renewable energy sources based on economic, environmental and climate conditions, taking into account and having regard to energy security, technical criteria and the needs of local communities. **The mechanisms created to support and promote** energy generation from RES (until roughly

		2030) will further solutions: - ensuring **maximum availability** (high efficiency and utilisation rate, controllability, **the use of an energy storage facility**), with a relatively lowest energy generation cost; - satisfying **local energy requirements** (heat, electricity, transport), but also those relating to waste management (consistent with the waste management hierarchy) and the use of local potential. Support will be provided in the form depending on the type of source and its size, which can be broken down to the following forms: - **auctions** – designated for sources generating energy in a manner suitable for commercial purposes, i.e. ensuring availability and sufficiently high capacity. The choice of areas to be supported depends on preferences as to the stimulation of the development of RES areas, based on economic, environmental and social conditions and having regard to energy security; - **feed-in tariff system** and **feed-in premium system** – targeted on the lowest capacity sources and applied to manage energy which is not consumed by small producers; - **grants, repayable aid** – a mechanism depending on local needs, distributed in regions; - **guarantee of origin** – a voluntary support instrument – in the form of a certificate; demand for these instruments is generated by consumers who wish to be perceived as environment-friendly companies (e.g. electric car chargers); - **aid mechanisms targeted on special technologies** – a solution designated for sources for which there is no competition in the market, since they are a new technology (e.g. offshore wind energy generation), but their implementation is important for the country for various reasons. A stable and competitive RES support system will increase the share of renewable energy in the gross final energy consumption, without leading at the same time to a considerable increase in prices or serious disturbances in the operation of energy markets. The stabilisation of legal regulations and the consistent implementation of the long-term action plan covering support for individual sectors will contribute to the dynamic growth of new investments. The

		optimisation of the support system will enable the achievement of the 2030 target with the use of modern, distributed and cost-effective investments, increasing the security and flexibility of the Polish electricity system.
		Role of particular RES technologies in the energy mix broken down to controllable and non-controllable sources The role of non-controllable RES sources is expected to be as follows: - **on-shore wind energy generation** – the growth of the share of this technology in the energy balance is not expected to be as dynamic and in previous years. An important difficulty in using on-shore energy generation plants is the absence of correlation between the operation of plants and demand for energy and therefore the rate of their development should depend on costs and balancing possibilities. Another problem is the diversified level of acceptance of wind farms by local communities. To reduce potential conflicts, investors might create systems encouraging resident participation in the implementation of projects; - **off-shore wind energy generation** – an advantage of off-shore wind generation over the on-shore sector is the use of higher wind speeds and the possibility of greater capacity utilisation, with the lack of acceptance from the local community not being a factor either. To start investing in these capacities, works on strengthening the transmission network in the northern part of the country must be completed, so that power can be evacuated across the country. It is expected that the first off-shore wind farm will be included to the electricity balance after 2025. The Polish coastline offers a possibility of implementing further off-shore installations, but what is of key importance for investments is the possibility of balancing them in the NPS; **off-shore energy generation** – to start investing in these capacities, works on strengthening the transmission network in the northern part of the country must be completed, so that power can be evacuated across the country. An advantage of off-shore energy generation over the on-shore sector is higher wind speeds (low terrain roughness) and greater capacity utilisation possibilities, with the lack of acceptance of the local community not being a factor either. Wind power capacities of ca. 1 GW are expected to be created in the Baltic Sea by 2025. The Polish coastline offers a possibility of increasing off-shore installed capacities, but the possibility of balancing them

		in the NPS is of key importance for installation projects after 2025; - **solar energy generation** – the use of solar energy is an alternative for the use of post-industrial areas and poor-quality land. An asset of this technology is a positive interdependence between the intensity of insolation and the daily demand for electricity, and increased generation in summer correlated with cooling demand. Systems will be built in a distributed manner, but the importance of the total installed capacity for the NPS will be growing. Photovoltaic sources are expected to achieve economic and technical maturity after 2022; - **hydropower generation** – due to limited water resources potential, the potential for utilising flowing waters is not expected to grow considerably. The operation of run-of-river plants may be regulated, but to a limited extent. Pumped-storage hydropower plants are not regarded as RES plants, but are useful for the NSP for regulating reserve purposes. It is worth seeking new methods of using hydropower for regulating reserve purposes, also on a small scale[18].In a long-term perspective, the development of inland waterways and the revitalisation of dams may contribute to the development of hydropower generation. With respect to controllable sources, the use of following technologies is envisaged: - **geothermal power generation** – although at present its use is at a relatively low level, it is estimated to grow at a very fast rate. Major financial expenditures are required to determine geothermal potential, with the degree of certainty being very small, but the use of this type of energy may determine the development of a given region (e.g. recreation centres); - **heat pumps** – their use in households becomes more and more common. Their potential is assessed to be at a level similar to geothermal energy generation. Electricity is required for them to be used and therefore linking installations with another RES which generates electricity is a good solution; - **energy from biomass** (and waste-derived heat) – this source will be well suited for households and for cogeneration purposes; it has the largest potential for achieving the RES target in heat generation due to the availability of fuel and the technical and economic

		parameters of installations. Generation units working on biomass should be located close to where it is produced (rural areas, wood processing industry areas, or areas where municipal waste is produced) and where it is possible to maximise the use of primary energy contained in fuel, thus making it possible to minimise the environmental costs of transport. The use of biomass for energy purposes also contributes to better waste management; – **energy from biogas** – will be particularly useful in electricity and heat cogeneration. An asset is a possibility of storing energy in biogas, which may be used for regulating reserve purposes. From the point of view of the overall economy, biogas is additional value added, since it makes it possible to utilise particularly noxious waste (e.g. animal waste, landfill gases).
b)	Where relevant, specific measures for regional cooperation, as well as, as an option, the estimated excess production of energy from renewable sources which could be transferred to other Member States in order to achieve the national contribution and trajectories referred to in 2.1.2.	**Statistical transfer and the implementation of joint RES projects** Legal possibilities are in place in Poland for a statistical transfer to/from other EU Member States and for the implementation of joint energy projects. It is assumed that until 2030 Poland will rely on its own resources to fulfil the set target, taking into account the required levels of cooperation with other states. At the same no excess energy production from renewable sources is envisaged which could be transferred to other Member States in order for them to achieve their national contributions.
c)	Where relevant, specific measures on financial support, including EU support and the use of EU funds, for the promotion of the production and use of energy from renewable sources in the electricity, heating and cooling, and transport sectors.	**1. Support for the production of electricity and heat from renewable energy sources and for the production of biofuels** The funds allocated to support the production of electricity and heat from renewable sources as part of the Operational Programme Infrastructure and Environment 2014-2020 amount to EUR 150 million. The funds allocated as part of Regional Operational Programmes (ROP) amount to ca. EUR 890 million, which includes ca. EUR 50 million in the form of repayable instruments. Support for the production of biofuels is possible within the framework of seven ROPs, as part of measures dedicated to RES. In accordance with the 'n+3' rule, funds for the aforementioned purposes may be spent until 2023. Financial support for the area in question in the financial perspectives 2021-2027 and 2028-2034 is likely, but its amount and scope cannot be defined at the present stage. The scope of

		support for renewable energy sources is also envisaged by the National Environmental Protection Fund as part of national funds.
		2. Support for innovative solutions in the production of 2nd generation biocomponents and other renewable fuels An important element of measures relating to the implementation of the new Directive on the promotion of the use of energy from renewable sources (RED II) will be issues concerning the use of renewable biofuels and electricity in the transport sector, whose share in this sector in 2030 should reach 14 %. An increase in the commitment concerning the share of energy generated from RES in transport beyond the current commitments (10 % in 2020), combined with the restriction on the use of conventional biofuels generated from raw materials for feed production, shows there is a need for the development and application, to a much greater extent than so far, of new production technologies, which implies the need to construct plants based on new technologies. Otherwise, it will be necessary to purchase considerable quantities of such fuels from abroad. Given the fact that renewable fuels used in transport are more expensive than conventional (mineral) fuels, and the demand for them is regulated by law (a high regulatory risk) – these innovations are high risk innovations. Additionally, in the case of innovative technologies high investment costs must be incurred, which considerably reduces the cost-effectiveness of production. This is why support for this sector is legitimate. Proposed form of support: grants, subsidies, repayable instruments.
		3. Development of distributed energy generation The new Directive on the promotion of the use of energy from renewable sources (RED II) and the Market Directive introduce new obligations to increase the share of renewable energy: REC (Renewable Energy Communities) and EC (Energy Communities), which additionally emphasises the importance of energy sustainable areas, in particular **energy clusters and energy cooperatives.** The target balancing certainty in clusters should be high enough for the

		energy needs of those areas not to be included in the power reserve planned by the transmission system operator. Support for the development of distributed energy generation in energy clusters and energy cooperatives is particularly important from the point of view of the construction of generation sources, networks and control systems. It is estimated that ca. **300 energy sustainable areas will operate at the local level in Poland in 2030.** This task has been included in the Strategy for Responsible Development as one of the priorities in the energy area, and also in the draft Energy Policy for Poland 2040. Proposed form of financing: grants, repayable aid, guarantee funds.
		4. Development of renewable energy sources (RES) for stabilising unstable RES The new Directive on the promotion of the use of energy from renewable sources (RED II) introduces new obligations to increase the renewable energy share. A condition for the development of RES and for changes in the energy market is the development of storage technologies. A too high number of unstable renewable energy sources endangers the security of operation of RES and adversely affects rational energy pricing. Support for stable generation sources, which will enable the balancing of non-controllable RES, will be important. *Proposed form of financing:* grants, repayable aid, guarantee funds.
		5. Development of installations for generating heat from RES The new Directive on the promotion of the use of energy from renewable sources (RED II) introduces new obligations to increase the share of renewable energy in the heat generation sector. Heat generation, due to its local nature, will require funds to be invested at the local government level, which implies the need for the financing of the development of RES mainly by municipal utility companies whose financial condition does not always guarantee the availability of surplus funds for investment purposes. Proposed form of financing: grants, repayable instruments, guarantee funds.

		6. Development of off-shore energy generation The development of off-shore energy generation is one of the areas of activities relating to guaranteeing the energy security of the country (satisfaction of the increasing electricity demand) and a component of the fulfilment of the target concerning the share of RES in the gross final energy consumption in 2030. Support relating to the development of the off-shore energy generation sector is envisaged. Support in this area will also contribute to building regional cooperation in the Baltic Sea region.
d)	Specific measures to introduce one or more contact points, streamline administrative procedures, provide information and training, and facilitate the uptake of power purchase agreements.	**1. Obtaining the confirmation of qualifications/competences of persons operating in the commercial market** With respect to granting rights to renewable energy self-consumers, the Minister for Energy has issued a regulation which has created a possibility of obtaining the confirmation of qualifications/competences for persons operating in the commercial market. The provisions of the regulation have ensured the standardised assembly of microgeneration units, small installations or renewable energy installations with an aggregate installed thermal capacity not exceeding 600 kW and the impartial and independent conduct of procedure for accrediting entities providing training and certification for installers of a given type of installations. They have also ensured that certification procedure be properly documented and registered, and that documentation concerning certification procedure be kept. The implementing authority for the provisions of the regulation is the Office of Technical Inspection.
		2. Enhancing services provided to electricity producers to be covered by the auction system for renewable energy support The solutions adopted by the Energy Regulatory Office guarantee the provision of efficient and modern services to electricity producers to be covered by the auction system for renewable energy support – from pre-qualifications, through participation in an auction, to non-auction services relating to the fulfilment of reporting obligations. Solutions enabling the process to be handled in a swift and intuitive manner with the use of dedicated IT tools need to be maintained and developed.

		Enabling the target concerning the renewable energy share in the electricity generation sector to be achieved more efficiently, through effective services provided to entities applying for support, will make it possible to complete investment and construction processes more quickly.
e)	Assessment of the necessity to build new infrastructure for district heating and cooling produced from renewable energy sources.	The changing business environment and technological development constitute major challenges for the heating sector. Important issues to be regulated in the near future include: changing the heat market model and tariff policy, extending the obligation to connect consumers to an energy-efficient heating system and implementing a mechanism for enforcing it, developing network infrastructure, regulating district cooling, etc. The draft Energy Policy for Poland 2040 envisages the development of district heating as one of the strategic directions. Having regard to the above, measures will be undertaken to ensure conditions for the development of environment-friendly and efficient heating systems by providing financial, organisational and legal support, including by: – increasing the use of RES and waste in district heating; – modernising and expanding heating systems and developing technologies for the production of cooling from district heat; – promoting heat storage facilities and smart networks. A measure connected with the measure specified in 3.2.d in this respect.
f)	Where applicable, specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account: – biomass availability, including sustainable biomass: both domestic potential and imports from third countries; – other biomass uses by other sectors (agriculture and forest-based sectors); as well as measures for the sustainability of biomass production and use.	With respect to the promotion of the use of energy from biomass, especially new biomass mobilisation, Polish agriculture has considerable resources of biomass and agriculture and agri-food processing by-products which should be used for energy purposes (biogas production). The development of new technologies should take into account the needs of individual sectors, in particular the agri-food sector, for the supply of energy and the utilisation of the types of biomass being a by-product of food production. The method of utilising this type of biomass should contribute to the sustainable development of agriculture (preserving soil fertility – humus level, water resources management etc.). Changes in agricultural production constitute a long-term process and the introduction of new plant species takes time and requires the production profile to be changed. This often also implies the change of the entire machinery stock. Therefore, the proposed amendments to

		legal regulations supporting the use of agricultural biomass for energy purposes will allow for an appropriate adaptation period.
3.1.3. Other elements of the dimension		
a)	Where applicable, national policies and measures affecting the EU ETS sector and assessment of the complementarity and impacts on the EU ETS.	**Participation in the greenhouse gas emission allowance trading scheme – general information.** The emission allowance trading system (EU ETS) is a market-type system, aimed at reducing greenhouse gas emissions. Entities covered by the system account for the quantity of released greenhouse gases by balancing them with emission allowances. Installations eligible for the system are those belonging to specific sectors or meeting the defined threshold conditions set out in Directive 2003/87/EC. The number of installations covered by the scheme changes from one year to another (ca. 800 installations in Poland). The EU ETS itself by definition does not set national reduction targets, but introduces additional mechanisms resulting in emission reduction, operating at the level of individual Member States.
		The introduction of the following, from 2021, within the framework of the EU ETS: – **The Modernisation Fund,** – **The Innovation Fund and** – **the continuation of the currently applicable derogation system for the electricity generation sector (Article 10c of the EU ETS Directive).** At present, works are under way to define, at the national level, in the best possible way, the areas and methods for using compensation and innovation support mechanisms provided for in the EU ETS Directive. At the same time, measures to decarbonise the economy should be partly financed or co-financed from funds originating from emission allowance auctions (at least 50 % of

		revenues from the sale of allowances by auction should be used for at least one of the environmental purposes specified in Directive 2009/29/WE).
b)	Policies and measures to achieve other national targets, where applicable.	**1. Actions to adapt the water management sector to climate change** – Developing and implementing flood risk assessment methods for urban areas, with particular emphasis on flash flooding. – Improving the resistance of the flood risk management system to the effects of climate change, including by ensuring critical infrastructure. – Enhancing retention capacities and restoring aquatic habitats in watercourses. – Restoring and maintaining the good status of water, water ecosystems and water-dependent ecosystems.
		2. Measures to adapt the energy sector to climate change – Preparing the energy system to changed conditions, having regard to winter and summer peak energy demand periods. – Ensuring reserve energy and transmission sources where the use of primary sources is not possible. – Securing reserve cooling sources in commercial power plants. – Designing transmission networks, including underground and on-ground ones, having regard to extreme weather circumstances, in order to limit the risk of, among other things, snow and ice accumulation on them, overflows or damage caused by strong wind. – Supporting RES development, in particular the development of microgeneration units in agriculture.

		3. Measures to protect biodiversity and forest management in the context of climate change – Preparing nature preservation strategies or plans, or plans of nature preservation tasks having regard to changing climate conditions. – Developing programmes aimed at adapting the forest sector to climate change having regard to the conditions and needs of the industry, energy, agriculture and tourism and recreation sectors, regional development and biodiversity. – Increasing woodland area through artificial afforestation and natural succession, rationalising the use of land and reducing forest complex fragmentation. – Introducing ecosystem-based forestry principles to the economy, ensuring the dynamic protection of existing biodiversity, using both natural genetic processes (adaptation) and human activities aimed at preserving the existing biodiversity, focusing artificial selection also on adaptive traits enabling adaptation to changing climate conditions. – Continuing the implementation of and developing instruments for the protection of agricultural space, forest and high-productivity soil resources. – Diversifying forest stand, in particular during the change of its structure, in terms of: density, species composition (increasing the share of deciduous species), height and age structure and patch/mosaic structure. – Continuing the soil erosion protection programme, continuing and extending the programme for small-scale water retention and soil retention, particularly for forests and grassland. – Monitoring, controlling and counteracting the spread of alien species that endanger native species or natural habitats. – Monitoring forests in terms of tree response to climate change, among others, by phenological observations, changes in species range zones, especially in mountain areas. – Monitoring, in association with the natural dynamics of ecosystems, and conducting periodic assessment of natural areas under protection, and creating a data collection and processing system. – Enhancing forest fire protection by developing systems of monitoring fire risks and fire

		prevention infrastructure relating to the protection of forests.
		4. Measures to adapt rural areas to climate change – Developing monitoring systems and systems of early warning against possible effects of climate change for plant and livestock production. – Providing investment support for farms along with training and technology advisory services, taking into account issues concerning the adaptation of agricultural production to an increased climate risk and climate change prevention. – Improving the system of building up and managing food, seeds, and feed reserves in case of poor harvest. Rural areas, due to agricultural and forestry activities conducted in them, are particularly vulnerable to climate change. Adaptive measures must be undertaken both in the area of the protection of people in crisis situations along with necessary adaptive measures in agricultural and fishery production and forestry. Local risk monitoring and warning systems are expected to be established by 2030 and agricultural and fishing activities are expected to be adapted to climate change in organisational and technical terms within the same timeframe.
		5. Measures to develop transport in the conditions of climate change – Considering changed climate conditions in the process of designing and constructing transport infrastructure. – Establishing a permanent monitoring system or adapting the existing monitoring systems to the need to control construction and transport infrastructure elements

		vulnerable to climate change and establishing or adapting warning systems used by technical services. – Reviewing or creating measures and plans designed to maintain smooth traffic flow in transit routes or to change routes and apply substitute means of transport. Most elements of the transport system, especially infrastructure, are directly exposed to climate factors and operate in direct contact with atmospheric factors. The vulnerability of transport infrastructure to climate factors needs to be properly assessed in order to undertake effective adaptive and preventive measures, to be developed as a result of an analysis of climate and weather data and the impact of these factors on the condition of infrastructure. Design standards are expected to be developed and a transport route management system is expected to be implemented by 2030 having regard to climate change.
		6. Measures to ensure sustainable regional and local development having regard to climate change – Preparing a risk management strategy at the national, regional and local levels taking into account adaptive measures. – Implementing the local systems of monitoring and warning against, and responding to, extraordinary climate phenomena (e.g. absence of blockages in sewer systems and underground structure drainage systems, situations contributing to an increase in air or water pollution), in cities. – Preventing and reducing the effects of disasters and enhancing the effectiveness of response. – Considering the blue-green infrastructure concept and the system of aeration corridors (wedges) in zoning plans, and specifying permissible heat sources for heating buildings to increase the resilience and improve the operation of ecosystems. Revitalising natural environment, including by restoring greenery in degraded areas and original functions to water reservoirs, with particular emphasis on small-scale retention in cities. Replacing water-proof land surfaces with permeable surfaces. In the light of a number of measures relating directly or indirectly to adaptation, as specified in

		various strategic documents, appropriate monitoring, warning and response systems are needed in the context of regional and local development. At the same time, the vulnerability of cities to climate change is particularly important, and thus they should be given special significance and priority in the adaptation process. A system of monitoring of the state of the environment is planned to be implemented by 2030, along with an early warning and response system for cities and rural areas in the context of climate change. At the same time, works on urban spatial policy will be conducted, having regard to climate change aspects.
		7. Measures to stimulate innovations helping adaptation to climate change. Promoting innovative solutions in the area of adaptation to climate change. – Analysing the potential of the Polish economy to generate and implement innovative adaptation technologies. – Consolidating/creating new financing sources for innovative adaptation technologies, including research and implementation projects. – Creating an online platform providing information on Polish adaptation technologies. Works aimed at developing new, innovative organisational and technical solutions that support adaptation need to be undertaken. The primary objective is to stimulate innovative technologies and to introduce mechanisms enabling cooperation among institutions in situations of complex hazards relating to climate change. The existing sources of funding research on adaptation technologies also need to be readjusted and new ones need to be created, and the results of works must be published.
		8. Measures to encourage social attitudes facilitating adaptation to climate change – Educating people and enhancing their awareness of climate change and methods of minimising its effects, the impact of invasive alien species and the importance of the need to save resources. – Developing topics concerning adaptation to climate change in primary and intermediate level school curricula and extending programmes for upgrading

		qualifications for medical professionals by topics relating to climate-dependent and tropical diseases and diseases transmitted by vectors. – Organising training programmes concerning: climate change and methods for preventing and limiting its impact on people: living in areas under threat of floods, landslides and strong winds. – Organizing training programmes for farmers concerning climate change and methods for preventing and limiting its impact. – Involving local communities and local government administration authorities in activities preventing the impact of climate change. – Developing complex solutions concerning State aid granted to cover losses in case of natural disasters and insurance systems covering risks caused by climate change. Effective adaptation to climate change cannot be achieved without raising the awareness of hazards and challenges among institutions involved in the adaptation process and people to an appropriate level. In view of the above, educational measures must be implemented, both as part of formal education systems and broadly understood extra-formal education, helping to raise the social awareness of risks related to extreme phenomena and methods for limiting their impact. The primary objectives will also include enhancing the understanding of the impact of climate processes on social and economic life and ensuring appropriate protection to particularly vulnerable groups from the effects of adverse climate phenomena.
		9. Mitigation of climate change, adaptation to it and prevention of natural disaster risks by: – Creating a generally available online Base of knowledge about climate change and adaptation to its effect in the context of improving the resilience of the economy, environment and society to climate change, and preventing and minimising the effects of extraordinary hazards; – Developing climate adaptation plans in cities with population exceeding 100 000; – Developing and implementing plans of counteracting the effects of draught; – Reviewing and updating flood risk management plans; – Developing flood prevention infrastructure on the basis of high-efficiency and highly

		economically rational investments and appropriate spatial planning methods, including by constructing multi-function, functionally coherent small- and, in special cases, large-scale retention reservoirs as part of implementing flood-prevention projects; – Ensuring protection against flood from the Baltic Sea side by carrying out investment projects (e.g. artificial afforestation of coast zones, storm banks, seawalls and groynes, breakwater structures, underwater barriers) as well as monitoring the morphometric parameters of the sea coast and undertaking the artificial afforestation of beaches to restore a natural protection system; – Managing precipitation water in urbanised areas by using various retention forms and developing greenery infrastructure, – Implementing the strategic project Adaptation to Climate Change. Adaptive measures will consist in developing and implementing strategic/planning documents concerning water resource management, supporting the development and implementation of climate change adaptation plans for urbanised areas, constructing necessary flood prevention infrastructure and small-scale retention structures and implementing projects aimed at protecting the coastline. These measures will also be aimed at managing precipitation water in urbanised areas through various retention forms and the development of greenery infrastructure, the development of blue-green infrastructure in urbanised areas, the limitation of land occupation and soil sealing.
c)	Policies and measures to achieve low-emission mobility (including transport electrification)	**1. Development of energy efficient low-carbon transport** In addition to electromobility and the use of alternative fuels in transport, an improvement in the energy efficiency of transport and emission reduction has been planned through support for: – transport mode structure diversity and complementarity within the system of domestic and international transport links; – least polluting transport organisation solutions; – transport traffic demand management;

		– sustainable urban mobility; – implementation of modern transport technologies reducing the adverse impact of transport on the environment. The Transport Development Strategy 2020 (with an outlook to 2030) and the draft Sustainable Transport Development Strategy 2030 - subject to public consultations in Q4 of 2018 - set out a number of measures dedicated to the reduction of the adverse impact of transport on the environment, which may be grouped into the following intervention directions: • <u>organisational and system-oriented interventions, including:</u> – support for solutions leading to reducing the transport-intensity of the economy; – promotion of energy efficiency through the development of inter-modal transport of cargo, promotion of energy efficient means of transport resulting in, among other things, reducing the dependence of the transport sector on fuels derived from non-renewable energy sources; – support for environment-friendly transport (railway transport, sea transport and inland waterway transport) and commitment to create conditions helping to shift transport from roads to railway or inland waterway transport, in particular at a distance of more than 300 km, promotion of ecologically clean means of transport fuelled by alternative energy sources, resulting in, among other things, reducing pollution emissions; – reduction of transport congestion, in particular in urban areas, by: increasing the share of collective transport in passenger transport, integrating transport in cities (together with commuter transport from suburban zones), optimising and integrating city transport and regional passenger transport, promoting pedestrian traffic and cycling, organising and developing supply systems in cities and eliminating heavy freight traffic and bulk transport of hazardous cargo through intense-investment urban areas, facilitating even distribution of municipal transport services to reduce the peak-hour effect; – promotion of new forms of mobility through: access to travel information, integrated tariffs, delimitation of residential areas with limited access for cars, educational and information activities aimed at promoting sustainable transport, transport demand management through e.g. spatial planning and development, development of teleworking

		systems, broader use of video-conferences and carpooling solutions; – Delimitation of low-emission zones (LEZ), with a strict access and parking regime for combustion vehicles; – development of the system of fees and tariffs stimulating desirable transport trends, e.g. with regard to the limitation of pressure on the environment; • <u>investment interventions:</u> – modernisation and expansion of transport infrastructure (linear and nodal) meeting the EU and national environmental standards and requirements; – modernisation of rolling stock and vehicle fleet in all modes of transport (vehicles and other necessary devices and equipment) to put it in line with the EU and national environmental protection standards and requirements; – implementation of innovative transport management systems for particular transport modes and interoperative means of transport contributing to the optimisation of the traffic of means of transport and thus to a reduction in transport generated emissions; • <u>innovative and technical interventions, including:</u> – application of new technologies, procedures and systems improving the energy efficiency of transport and contributing to a reduction in pollution emissions to the environment – modernisation and provision of the internal interoperability of telematic systems supporting particular transport modes, such as: ITS (road transport), ERTMS (railway transport), SESAR (air transport), VTMS (maritime transport), RIS (inland waterway); – more common use of environment-friendly means of transport: 'clean' and energy-efficient cars and municipal vehicles (e.g. using fuel cells and hydrogen, or the following drives: electric, gas, hybrid, compressed air) – along with the establishment of a network of battery charge or replacement points and hydrogen refuelling stations throughout the country, environment-friendly low-noise and low-CO_2 emission airplanes, maritime vessels fuelled by compressed or liquid natural gas, new generation inland waterway vessels (including energy-efficient and low-carbon inland waterway container vessels).

		2. Construction and implementation of vessels using alternative fuels A significant part of inland waterway fleet on Polish rivers is formed by very obsolete machines which often do not meet ambitious combustion and emission standards specified for newer types of vessels. New, well defined financial incentives must appear in the Polish market in order to introduce new solutions based on alternative fuels in place of imported old and worn out vessels. Three self-propelled barges and three pusher vessels running on alternative fuels will be included in the vessel-owner transport system by 2030. This number will depend on, among other things, the number of vessel-owners which will be interested in the project and will demonstrate appropriate financial capability. The proposed objective is an alternative to steps currently taken by vessel-owners, consisting in importing worn out vessels from Western Europe (mainly Germany). The number of vessels to be introduced will also depend largely on financial incentives that might be proposed to entities purchasing new vessels. By 2030, the fleet emission factor will be reduced to 38.3 grammes of CO2 per tonne of transported goods per kilometer of route. Proposed measures: – introduction of financial incentives, – demand analysis for waterborne transport, – cooperation in the preparation of a prototype barge and pusher vessel by research and development units, – institutional support for the preparation of accompanying infrastructure (wharf equipment; charging and refuelling stations), – cooperation in the preparation of accompanying technologies for the use of barges by research and development units (e.g. methods of disposing of material excavated from places of rockfill accumulation in rivers – in the case of dredgers etc.), – institutional support for vessels manufactured in Poland.

		3. Development of alternative fuel infrastructure, enhancement of operation security, development of electromobility industry and improvement of the quality of the air and comfort of living The market of electric vehicles in Poland is at the stage of formation. To pass to the next stage of market development, conditions for changes will have to be created in a number of fields. The regulatory basis for this changes has been created by the Act on electromobility and alternative fuels of 11 January 2018, which provides for the construction of basic infrastructure for alternative fuels in urban agglomerations, in densely populated areas and along roads forming part of trans-European transport corridors. The act implements the European Directive on the deployment of alternative fuels infrastructure into Polish law. The expansion of the core network will enable the free movement of vehicles using alternative fuels – without the need to be concerned that recharging them will not be possible. The Act on electromobility also provides for the removal of the excise duty on electric and plug-in hybrid vehicles (PHEV), the exemption of such vehicles form parking fees as well as greater possibilities for depreciation charges for companies than in the case of combustion vehicles. In addition to financial benefits, the act envisages a package of solutions useful for drivers in their everyday lives. It is planned that the core network will comprise 6 000 normal power charging points and 400 high power charging points and 70 CNG refuelling points in 32 urban agglomerations and densely populated areas by 2020. Pilot programmes aimed at intensifying measures in the area of the construction of infrastructure and the development of electromobility industry will be implemented. Conditions and tools will be defined the implementation of which will make it possible to commence the strengthening of the Polish electromobility industry. Regulatory conditions for the development of electromobility were created in the period 2017-2018. It is envisaged that the prototypes of vehicles adapted to the needs of the Polish and European markets will be created and the production of short series of electric vehicles will be launched in the period 2019-2030. In the period 2019-2020, in connection with the implementation of the National Framework for the Development of Alternative Fuels Infrastructure, the core infrastructure will be constructed for charging electric vehicles in 32 cities and along TEN-T roads. In subsequent years, other measures will be proposed, such as further tools aimed at integrating electric vehicles with the network, and instruments for the development

		of the charging infrastructure will be indicated, which will accelerate the process of constructing it. A catalogue of good public communication practices in the area of electromobility will be created on the basis of the pilot projects launched. Issues relating to the sustainable use of transport will be included in the core curricula of school and early childhood education. It is expected that the aforementioned measures will contribute to changes in social awareness, which will lead to electromobility being seen as a necessary response to the challenges of the changing reality. Growing popularity of electric vehicles in households and public transport will result in clean transport becoming fashionable, which will stimulate demand. An additional factor will also be the constructed charging infrastructure. The network will be fully prepared to provide power to 1 million electric vehicles and will be adapted to the use of vehicles as the electricity system stabilisers. The administration sector will use electric vehicles in its fleet. Polish industry will produce subassemblies for electric vehicles, vehicles themselves and instrumentation and infrastructure necessary for the development of electromobility. The task of the Low-Carbon Transport Fund is to support the expansion of alternative fuels infrastructure and to build up a market for those fuels. Over the next 10 years, the Fund will have financial means of ca. PLN 6.7 billion. The following areas will be financed from the Fund in the period 2018-2027: 1) support for investments in the production of biocomponents, liquid biofuels or other renewable fuels; 2) support for the construction and expansion of infrastructure for the distribution or sale of compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, or hydrogen, or the construction or expansion of infrastructure for charging electric vehicles, used in transport; 3) assistance for the manufacturers of biocomponents or producers of biocomponents, liquid fuels, liquid biofuels, other renewable fuels, compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, used in transport; 4) support for: a) producers of means of transport running on electricity, compressed natural gas

		(CNG) or liquefied natural gas (LNG), including gas derived from biomethane, or hydrogen; b) Producers within the meaning of the provisions of the Act of 6 March 2018 – Business Enterprise Law (Journal of Laws, item 646) conducting activities in the field of production of subassemblies for means of transport, referred to under a; 5) support for collective public transport especially in urban agglomerations or health resorts, in areas in which nature preservation forms have been established in accordance with nature preservation regulations, using liquid biofuels, other renewable fuels, compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, hydrogen or electricity; 6) co-financing of harbour fees charged for mooring vessels fuelled with compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, or hydrogen, or running on electricity, at wharfs or marinas; 7) support for: a) research relating to the development of new types of biocomponents, liquid biofuels, other renewable fuels, or to the use of compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, or hydrogen, or electricity, used in transport, or to related design solutions, b) practical implementation of the results of the research referred to under a; 8) support for educational programmes promoting the use of liquid biofuels or other renewable fuels, compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, or hydrogen, or electricity, used in transport; 9) support for the purchase of new vehicles and vessels running on liquid biofuels, compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, or hydrogen, or running on electricity; 10) support for actions relating to an analysis and research of the market for biocomponents, liquid biofuels, compressed natural gas (CNG) or liquefied natural gas (LNG), including gas derived from biomethane, or hydrogen, or electricity, used in transport; 11) promotion of the production and use of biocomponents and liquid biofuels;

		12) and performance of other tasks specified in separate legislation. 13) The development of draft documents implies the need to eliminate legislative barriers, to create the market framework (e.g. to define a new vehicle charging service) and to develop alternative fuel infrastructure. Five benefit areas are envisaged – for drivers, for entities constructing infrastructure, for public transport, for innovative companies and for vehicle producers. It is forecast that, due to the introduction of new legal regulations dedicated to electromobility: – there will be 50 000 vehicles in the segment of electricity fuelled vehicles on roads in 32 selected agglomerations in 2020, and 6 000 normal power charging points and 400 high power charging points will be established; – in the segment of vehicles fuelled by natural gas in the form of CNG, there will be 3 000 vehicles on roads and 70 refuelling points will be created; – in 2025, at the national level: • there will be 1 million electric vehicles on roads in the segment of electricity-fuelled vehicles; • there will be 54 000 vehicles on roads in the segment of vehicles fuelled by natural gas in the form of CNG, and there will be 32 refuelling points along the basic TEN-T roads; • there will be 3 000 vehicles in the segment of LNG-fuelled vehicles, and 14 LNG refuelling points will be created along the basic TEN-T roads; • LNG bunkering installations for vessels will operate in the sea ports of: Gdańsk, Gdynia, Szczecin, Świnoujście; • there will be 3 000 electric buses in the collective transport segment at the national level in 2030. The aforementioned benefits and related instruments aimed at influencing the market will contribute both to the security of operation and to the development of electromobility industry, as well as to the improvement of the quality of the air and the comfort of life.

		4. Carbon-Free Public Transport Programme Public transport is an important segment of the development of transport using alternative fuels. At present, a growing number of local governments and bus transport companies in Poland introduce electric buses into their fleet or plan to do so in the near future. Electric buses are still a small part of municipal transport fleet in Poland. Public transport is a transport segment that may be used as a testing ground for a new technology and may be an element contributing to the development of electricity-based transport. Public transport is also an element of the strategy of switching the economy to alternative fuels, with fleet replacement projects constituting a perfect area for the development of new technologies and, consequently, of the entire economy. Local governments, when deciding to purchase electric buses, are guided mainly by the need to improve the quality of the air, the intention to reduce the noise level or the need to systematically raise the standards of passenger transport. The partial replacement of fleet with electric vehicles reflects commitment to modernisation, thus attracting investors and tourists. These objectives are consistent with the government Electromobility Development Plan for Poland, as well as with the EU Clean Mobility Package of 2017. Among the main barriers to transport electrification, the higher costs of purchase of electric vehicles should be mentioned, along with the lack of access to rapid charging infrastructure and the lengthy investment process. None of these barriers may be overcome without the commitment of public funds. Therefore, the Government is planning to provide financial support for investments aimed at expanding electric bus charging infrastructure, to be carried out by entities providing collective transport services. Support for zero- and low-carbon public transport is one of the priorities of the Polish Government listed in the Strategy for Responsible Development. This segment requires support in the form of public funding not only in the area of the construction of infrastructure for public transport, but also in the area of fleet replacement. The reduction of the emissions of pollutants and CO_2 in the public transport sector is linked to its development and, consequently, to at least partial departure from individual motor transport in urbanised areas. It may significantly contribute to the improvement of the air quality in Poland, the reduction of emissions, the achievement of climate targets and the protection of health and the natural environment. At the same time,

		there is a need for financial support for local government units in the field of public transport fleet replacement, which may be carried out only by co-financing the purchase of zero- and low-carbon vehicles, enabling not only the TCO (Total Cost of Ownership) of both means of transport to be brought to the same level, but primarily the difference in the purchase price, which is often decisive in the provision of public transport services, to be compensated for. The financing of the purchase of low-carbon buses and the construction of charging/refuelling infrastructure for these types of vehicles will be provided from, among others, the Low-Carbon Transport Fund. The Act on electromobility and alternative fuels of 11 January 2018 sets directions for transport development for the upcoming decades. It imposes a number of obligations and recommendations on local government units, which in many cases may be fulfilled with the use of methane fuel-based transport services. Among more important provisions in this respect is the provision stipulating that local government units in areas with more than 50 000 residents must procure, from 1 January 2025, the performance of public tasks from companies with at least a 30 % share of electric vehicles or natural gas-fuelled vehicles in the fleet in use. It is estimated that there will be 3 000 electric buses in the collective transport segment at the national level in 2030. With appropriate public support, electric buses in combination with electric cars brought into universal use as part of new business models (e.g. car-sharing) will become a response to residents' needs, such as a better quality of transport services, travelling time, availability or comfort. This will lead to improving the smooth flow of traffic in cities and the quality of the air. The improvement of the quality of the air will in turn, owing to the development of electromobility, contribute not only to the improvement of public health (lower healthcare costs), but also to the reduction of the pollution of the environment and of buildings.

3.2. Dimension Energy efficiency

Planned policies, measures and programmes to achieve the indicative national energy efficiency target for 2030 as well as other objectives presented in 2.2, including planned measures and instruments (also of financial nature) to promote the energy performance of buildings, in particular as regards the following:

a)	Energy efficiency obligation schemes and alternative measures in accordance with Articles 7a and 7b of Directive 2012/27/EU	**1. Operation of a mechanism stimulating pro-saving behaviour** A mechanism stimulating pro-saving behaviour is expected to be in place in the period 2021-2030. Its shape and form will depend on decisions concerning energy efficiency regulations, in particular in the context of the implementation of the new Energy Efficiency Directive adopted in 2018. At present, the main mechanism in place in Poland aimed at supporting energy efficiency is the system of energy efficiency certificates, known as 'white certificates'[19]. A statutory obligation has been imposed on energy companies selling electricity, heat or natural gas to end consumers, to carry out a project aimed at improving energy efficiency on the end-consumer side or to obtain certificates confirming specific quantities of final energy savings (white certificate) and submit them to the President of the Energy Regulatory Office (URE) for redemption. The obligation may be fulfilled, on a conditional basis, by paying a substitute fee. The proceeds from this fee are to be allocated to carry out projects aimed at improving energy efficiency on the end-consumer side, and the entity administering the proceeds from the fee is to provide the Minister for Energy with a report on the amount of funds allocated to carry out such projects and on the final energy savings achieved. An application for an energy efficiency certificate is to be filed with the President of URE along with an energy efficiency audit report in order to obtain white certificates. Property rights under white certificates are transferrable and are a commodity traded in at the Polish Power Exchange (Towarowa Giełda Energii S.A. - TGE). An energy certificate may be obtained for an action resulting in annual final energy saving of no less than 10 tonnes of oil equivalent (toe) or for a set of actions of the same type whose aggregate effect exceeds 10 toe. The white certificate scheme supports the implementation of investment projects such as: insulation of industrial plants; redevelopment or renovation of a

		building along with technical systems and equipment; modernisation or replacement of lighting systems, equipment and systems used in industrial processes or in energy, telecommunications or information technology processes, local heating networks and local heat sources.
b)	Long-term renovation strategy to support the renovation of the national stock of residential and commercial buildings (public and private)[20], including policies, measures and actions to stimulate cost-effective deep renovation and policies and actions to target the worst performing segments of the national building stock, in accordance with Article 2a of Directive 2010/31/EU.	**1. Improvement of housing conditions, technical condition of housing stock and enhancement of energy efficiency** This measure will comprise support for thermal upgrading and renovation investment projects, including broader ones undertaken as part of revitalisation of degraded areas. These instruments envisage in particular financial support for renovation and thermal upgrading investment projects, both using national and European Union funds, the implementation of instruments supporting the processes of revitalisation of degraded areas and a review of regulations concerning technical parameters affecting energy efficiency in residential buildings. <u>Residential building national stock long-term renovation targets:</u> – the share of thermo-insulated buildings in the aggregate housing stock will amount to 70 % in 2030 (as compared with 58.8 % in 2015), – the number of people living in sub-standard conditions due to overpopulation or the poor technical condition or absence of technical facilities will decrease to 3 300 000 in 2030 (from 5 360 000 in 2011). The residential building national stock long-term renovation targets have been specified by the Government of the Republic of Poland in the National Housing Plan.
		2. Promoting low-energy buildings, including at the design, construction and redevelopment stages, in a manner ensuring their energy efficiency, and the improvement of the availability of renewable energy in new and existing buildings The national plan to increase the number of low-energy buildings defines measures to be undertaken by the government administration authorities to promote low-energy buildings, including at the design, construction and redevelopment stages, in a manner ensuring their energy efficiency, and to improve the availability of renewable energy in new and existing

		buildings, as well as specifies the time schedule for achieving the set targets. Pursuant to Article 9(3)b of Directive 2010/31/EU, the National Plan sets out, among others, indirect targets aimed at improving the energy performance of new buildings for 2015, with an intention to prepare the attainment of objectives according to which: – all new buildings are to be nearly zero-energy buildings by 31 December 2020, and – new buildings occupied and owned by public authorities are to be nearly zero-energy buildings after 31 December 2018.
c)	Description of policy and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models[21]	**1.** The Act on energy efficiency of 20 May 2016 (Journal of Laws of 2016 item 831, amended) defines the energy efficiency duties of public sector units. Public sector units are to carry out their duties by applying at least one of the following measures to improve energy efficiency: – implementing and funding a project aimed at improving energy efficiency; – purchasing low-energy equipment or a low-energy system or vehicle with low operating costs; – replacing used equipment or a used system or vehicle [with their low-energy equivalents] or their modernisation; – implementing a thermal upgrading project within the meaning of the Act on supporting thermal upgrading and renovation of 21 November 2008 (Journal of Laws of 2014, item 712 and of 2016, item 615); – implementing the eco-management system referred to in Article 2(13) of the Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC (OJ EU L 342 22.12.2009, p. 1, as amended), confirmed by an entry in the EMAS register referred to in Article 5.1 of the Act on the national eco-management and audit scheme (EMAS) of 15 July 2011 (Journal of Laws item 1060).. Additionally, at the national government level – the minister responsible for energy, the minister responsible for transport and the minister responsible for construction, spatial planning and

		development and housing are to: 1) organise campaigns promoting the use of measures to improve energy efficiency, including the introduction of innovative technologies; 2) conduct information and educational campaigns concerning the available energy efficiency improvement measures. Furthermore, Article 7 of the Act on energy efficiency expressly allows energy efficiency contracting by public sector units. The act stipulates that an energy efficiency contract is a contract that specifies, in particular, possible energy savings to be achieved as a result of carrying out a project or projects of the same type aimed at improving energy efficiency with the use of an energy efficiency improvement measure, as well as defines the method of determining the fee, the amount of which is to depend on the energy savings achieved as a result of carrying out those projects.
d)	Other planned policies, measures and programmes to achieve the indicative national energy efficiency contribution targets for 2030 as well as other objectives presented in 2.2 (for example measures to promote the exemplary role of public buildings and energy-efficient public procurement, measures to promote energy audits and energy management systems[22], consumer information and training measures[23] and other measures to promote energy efficiency[24])	**1. Introduction of a new support mechanism for high-efficiency cogeneration and systemic change in the heating sector** At present, one of the instruments in place to develop electricity generation in high-efficiency cogeneration processes is a support scheme based on certificates of origin (until 2018). Works are carried out at present concerning the introduction of a new high-efficiency electricity cogeneration support mechanism which will enable both the stimulation of the construction of new cogeneration units and the maintenance of high-efficiency electricity cogeneration in existing units which would not be able to operate without support due to financing gap in operating costs. The new mechanism will be implemented from 2019. The support scheme will be active as long as there is a need for market intervention. In a longer time perspective, district heating should be generated only in CHPs. The expansion of the heating sector, and first of all the construction of energy-efficient heating systems, will be pursued primarily through the following measures: - Development of cogeneration; - Increase in the use of RES in district heating – this will be achieved mainly through the use of

		local renewable energy resources, such as biomass, biogas or geothermal energy, especially in clusters. The share of RES in heating and cooling should increase by 1-1.3 percentage points annually; - Increase in the use of waste in district heating (mainly in CHPs); - Conversion of power plants to heat and power plants; - Modernisation and expansion of the heating and cooling distribution systems – to reduce losses. Network heating may also be used to generate cooling, which is especially important in summer, as it allows electric power demand to be reduced and the potential of heat sources to be used to a greater extent. This solution is particularly attractive for newly constructed commercial buildings; - Promotion of heat storage facilities; - Promotion of smart networks.
		2. Promotion of the use of high-efficiency alternative energy and heat supply systems for buildings Pursuant to the Regulation of the Minister for Transport, Construction and Maritime Economy of 25 April 2012 regarding the detailed scope and form of a building permit design (Journal of Laws, item 462, as amended), the technical description of an architectural and construction design should contain an analysis of the possibilities of using high-efficiency alternative energy and heat supply systems. They include renewable energy-based decentralised energy supply systems, cogeneration, local or block heating or cooling, in particular if it is based, whether entirely or partly, on renewable energy sources, and heat pumps. The use of these systems should be considered at the stage of preparing a building permit design. The above-mentioned regulations are aimed at promoting alternative solutions where economically, technically and environmentally justified. The above requirement corresponds to the technical and construction requirements concerning the energy-saving qualities of newly designed buildings, specified in the Regulation of the Minister for Infrastructure of 12 April 2002 regarding the technical conditions to be met by

		buildings and their location (Journal of Laws of 2015, item 1422, as amended). The requirements have been formulated using the indicator specifying the annual calculated demand for non-renewable primary energy in a manner that should stimulate the use of renewable energy sources where technically justified. The aforementioned regulation and related National Plan aimed at increasing the number of low-energy buildings provide for a time schedule for meeting targets concerning the promotion of low-energy buildings, including at the design, construction and redevelopment stages, in a manner ensuring their energy efficiency and the improvement of the availability of renewable energy in new and existing buildings.
e)	Description of measures to utilise energy efficiency potentials of gas and electricity infrastructure[25].	**1. Development of smart electricity grids** In Q4 of 2018, the Ministry of Energy submitted a draft amendment to the Energy Law, introducing a smart metering system in Poland, for public consultations. The draft amendment provides for, among other things: – installing, by the end of 2026, remote reading meters for at least 80 % of end consumers connected to a distribution network with the rated voltage of no more than 1 kV, in accordance with a specified time schedule; – appointing a metering information operator (MIO); – settling the costs of electricity or distribution services on the basis of metering data received from the MIO; – making it possible to manage the work of household equipment operating as part of the Home Network Infrastructure (the Internet of things) and to meter electricity brought into the grid by self-consumers; – ensuring the standards of metering data protection against unauthorised access. Benefits deriving from the implementation of the system will include mainly: – a possibility of managing electricity consumption by controlling the system – connecting and disconnecting equipment depending on the time of day and year and the electricity price; – a possibility of using dynamic tariffs offered to consumers; – a possibility of settling consumer costs on the basis of actual consumption data within a

		time limit and for a settlement period convenient for the parties; – the improvement of the quality parameters of electricity supplied by the provider to the benefit of the consumer and a possibility of applying a discount on account of a failure to meet quality parameters and interruptions in electricity supply; – the simplification and shortening of the procedure of switching electricity suppliers; – an increase in the share of informed electricity consumers which will decrease the system balancing costs and contribute to the final cost of electricity supply; – a decrease in consumer service costs; – the enhancement of competitiveness in the electricity market; – the enabling of the development of distributed electricity sources; – the reduction of peak power demand due to demand side response possibilities; – the reduction of imbalance by decreasing the level of commercial losses (theft); – the reduction of the costs of analyses relating to the determination of the conditions for connection to the grid; – the improvement of the effectiveness of maintenance, renovation and modernisation works. Furthermore, an issue inseparably linked to the issue of the construction of a smart grid is the redevelopment of communication systems in the energy sector, covering, on the one hand, a modern special communication system enabling extraordinary situations to be handled effectively and, on the other hand, the creation of a framework for effective and direct communication of people and equipment in a smart grid and the implementation of the Internet of things solutions. The implementation of the Programme is directly related to measures undertaken as part of the Strategy for Responsible Development described under the 'Efficient State', the 'Energy for Development' task.
		2. Financial support for measures to improve energy efficiency in gas transmission and distribution and in underground gas storage facilities (UGSF) The following measures are envisaged:

		Gas transmission system: – modernisation of old and worn out gas transmission pipelines; – minimisation of gas losses; – pumping stations – application of energy recovery technologies and effective control of the operation of the transmission system. Gas distribution system: – expansion and modernisation of low- and high-pressure distribution pipelines; – minimisation of gas losses; – use of smart metering systems; – use of smart pressure regulators. Underground gas storage facilities: – installation of expanders in process systems; – energy recovery from exhaust gases. Use of underground gas storage facilities (UGSF) under the SMART GRID concept: – cooperation of the Storage System Operator (SSO) with the operators of other networks; – use of covern UGSF to store hydrogen obtained as a result of P2G processes. Gas infrastructure in mines: – use of expanders in process systems; – use of high-efficiency cogeneration facilities; – use of energy recovery technologies. SMART GRID concept for gas networks: – smart grid metering (SM) – cooperation with end consumers; – interoperability – cooperation with electricity systems; – use of the network for the transmission of unconventional gases; – management of energy efficiency at all stages of the investment process. Given the commitments made with regard to the European Union-wide 2030 targets for energy efficiency and the share of RES in the gross final energy consumption, the support for the

		above-described area must be maintained in the upcoming financial perspective, i.e. 2021-2027.
f)	Financing measures, including EU support and the use of EU funds, in the area at national level.	**1. Co-financing of energy efficiency measures in gas transmission and distribution and in underground gas storage facilities (UGSF)** Ca. EUR 1.4 billion have been allocated to support energy efficiency measures as part of the Operational Programme Infrastructure and Environment 2014-2020 (OPI&E), and ca. EUR 2 billion as part of the Regional Operational Programmes (ROP). As part of the aforementioned ROP amount, ca. EUR 320 million have been allocated in the form of repayable aid. The support concerns investments in such areas as energy efficiency in buildings, energy efficiency in companies, high-efficiency cogeneration and energy-efficient heating and cooling systems. In accordance with the 'n+3' rule, funds for the aforementioned purposes may be spent until 2023. As part of the Smart Growth Operational Programme 2014-2020 (SM OP), 150 smart and energy efficient construction projects have received PLN 677 million worth of support. Given the commitments made with regard to the European Union-wide 2030 targets for energy efficiency and the share of RES in the gross final energy consumption, the support for the above-described area must be maintained in the upcoming financial perspective, i.e. 2021-2027.
		2. Support for companies operating in the energy efficiency and RES fields, with priority being given to the suppliers of energy services (under the ESCO scheme) Directive 2012/27/EU on energy efficiency stipulates that a Member State is to support the energy services market and the access of small and medium-sized companies to this market, and also is to support the public sector in the acceptance of offers of energy services, in particular with regard to the modernisation of buildings. Despite the fact that the provisions of Directive 2012/27/EU have been incorporated into the Polish legislation, the energy services market still has not reached the mature stage and companies operating under the ESCO scheme find it difficult to operate in it. Therefore, measures will be undertaken in the period 2021-2030 to support also small and medium-sized sector companies, including start-up companies, especially those operating for the benefit of the public administration sector, be it government or local government administration authorities.

		3. Support for the development of energy management efficiency solutions by linking building energy management systems (BEMS) with the demand side response (DSR) tool The indicated solutions should contribute to the flattening of the energy demand curve and to more effective energy management, which will allow to provide consumers with access to energy without excessively expanding generation capacity or transmission or distribution networks. The above specified measures will have positive economic and environmental effects – by reducing the needs of end consumers a reduction throughout the energy chain will be possible, and thus emissions from the energy sector and the entire economy will decrease. It should be stressed that potential for linking BEMS with DSR is particularly high in the case of industrial consumers due to the characteristics of their consumption, high degree of predictability, the economies of scale owing to considerable volumes of consumed energy, as well as its importance for the system – ca. ¾ of energy is consumed by industrial consumers in Poland.
		4. Development of heat consumption rationalisation technology Heat consumption rationalisation technologies which may potentially be supported from public funds include the following: – insulation and dewatering of steam systems; – renewable energy sources, including geothermal systems, solar collectors, heat pumps, – thermal upgrading of industrial and office buildings; – recuperation and heat recovery from processes and devices; – modernisation of internal heating networks; – using energy from waste generated in industrial processes; – construction/modernisation of own (internal) energy sources, including high-efficiency cogeneration.

3.3. Dimension Energy security[26]		
a)	Policies and measures to achieve the objectives set out in 2.3[27]	**1. Implementation of the Energy Policy 2040 (Polityka energetyczna Polski do 2040 - PEP2040)** The objective of the energy policy outlined in the draft PEP2040 is energy security while ensuring the competitiveness of the economy, energy efficiency and the reduction of the impact of the energy sector on the environment, and the optimum use of own energy resources. Energy security is the priority component of the aforementioned objective. Actions carried out along eight strategic lines described in detail in the draft PEP2040 will lead to guaranteeing energy security of the country.
		2. Implementation of the Polish Nuclear Power Programme (Program polskiej energetyki jądrowej - PPEJ) The draft Energy Policy for Poland 2040 envisages the implementation of nuclear power projects. The first unit (with a capacity of ca. 1-1.5 GW) of the first nuclear power plant has been envisaged for 2033. Further five units are planned to be commissioned in subsequent years (by 2043). The installed capacity in nuclear power units is expected to reach ca. 6-9 GW by 2043. In the case of Poland, infrastructure necessary for the development and operation of the nuclear power sector (legal, organisational and institutional infrastructure, scientific and research backup facilities, personnel training systems) must be created in Poland in order for nuclear power projects to be implemented. An exhaustive diagnosis of individual issues relevant to the development of the nuclear power sector has been presented in the Polish Nuclear Power Programme (PPEJ), which will be updated soon. PPEJ is a strategic document which defines the objectives, stages (milestones) and tools (legal, organisational, financial) as well as entities implementing nuclear power projects in Poland. The milestones in the period 2021-2030 include: – selection of technologies by 2021; – commencement of the construction of the nuclear part (first nuclear concrete placement) by 2024.

		3. Implementation of the Programme for the Coal Mining Sector in Poland 2016-2030 The objective of the Programme for the Coal Mining Sector in Poland is to create conditions for helping to build a profitable, effective and modern coal mining sector in Poland, based on cooperation, knowledge and innovations, which, while operating in a friendly and predictable programme and legal environment, is to enable the effective use of resource, social and economic capital to safeguard Poland's high energy independence and to support the competitiveness of the national economy. The achievement of the objective defined in the above-described manner will contribute to the coal mining sector being strong value added. The following effects are expected: – meeting domestic demand for coal and guaranteeing necessary supplies of coal to the domestic market; – improving the working conditions of miners in underground workings and reducing the number of accidents at work; – supporting the competitiveness of the domestic energy, heat and coke markets, and thus the competitiveness of the national economy, through access to raw materials at rational and competitive energy carrier costs, acceptable from the point of view of environmental protection and the protection of production space in agriculture; – supporting the processes of the Polish economy switching to low-carbon economy through the improvement of the quality of produced raw materials and the development of the production of qualified low-carbon fuels.
		4. Implementation of the Programme for the Lignite Mining Sector in Poland Lignite resources in the currently exploited deposits enable the maintenance of a stable level of production and the work of production complexes no longer than until approximately 2030. The Programme for the Lignite Mining Sector in Poland sets investment directions. The exploitation of opened deposits will be completed. The Złoczew and Ościsłowo deposits are regarded as prospective. The development of new technologies will play the key role in developing new deposits. Innovations are to contribute to the implementation of low-carbon

		technologies and an alternative use of lignite. Gasified raw material (synthesis gas) is characterised by lower emissions and its use may be synchronised with demand. Syngas may be used to generate energy and heat, but also to produce synthetic petrol and many other chemical products.
		5. Monitoring the market in terms of compliance with the Cabinet Regulation of 24 April 2017 regarding the minimum diversification level of natural gas supplies from abroad. Pursuant to the provisions of the aforementioned regulation, the product to be diversified is imported gas, with diversification to be achieved with the use of the transmission infrastructure on interconnections with other states. This refers to gas imported to Poland from non-EU states and non-EFTA states, with supplies from non-EU states by land (with the use of gas pipeline networks) to be treated in aggregate. The application of such a structure is justified by the fact that, at present, all gas supplies through entry points from non-EU states are carried out from the East, in view of which they should be subject to the diversification obligation in aggregate. Also gas imported in any other form will be subject to diversification. This includes imported CNG and LNG, with the exclusion of gas imported through the LNG terminal in Świnoujście. The percentage thresholds specified in the aforementioned Cabinet Regulation take into account the long-term contractual commitments of the natural gas sector companies existing at the time of issuing the Regulation. Setting the threshold at the level of 33 % after 2022 is justified by corresponding regulations in other EU Member States and by the need to diversify the sources of natural gas supplies to Poland. The expected effect is primarily an increase in the level of the security of natural gas supplies and the enhancement of competition on the domestic natural gas market.
		6. Fulfilment of the duties relating to the security of natural gas supplies, specified in the Preventive Action Plan and the Emergency Plan (prepared by the Ministry of Energy in connection with the fulfilment of the obligations set out in EU regulations). The Preventive Action Plan contains proposals for measures which will contribute to the improvement of the energy security of Poland in the natural gas sector. The preventive measures

		specified in the aforementioned document are consistent with the recommendations of the International Energy Agency. Entities carrying out the measures specified in the Preventive Action Plan are obliged to submit quarterly reports to the Minister for Energy on carrying out measures aimed at improving the security of natural gas supplies. The reports include the time schedule of works, the expected deadline for completing the investment project, the risks for the implementation of the investment project identified by the entity responsible for carrying it out and its impact on the crisis scenarios identified in the Preventive Action Plan. Additionally, by 1 September, the transmission system operator, in consultation with entities transporting natural gas into the territory of Poland, is to prepare a report concerning the preparation of the gas system for the winter season, including an analysis of the coverage of the peak natural gas demand in non-fault conditions. The aforementioned measures are aimed at ensuring continuous and uninterrupted natural gas supplies to consumers.
		7. Co-ordination of the implementation of the North Gate concept, covering the construction of a direct connection between gas fields in the Norwegian Continental Shelf and the expansion (increasing offtake possibilities and regasification capacities) of the LNG terminal in Świnoujście Within the framework of measures relating to the diversification of natural gas supply directions and sources, the following projects are carried out: the construction of the Baltic Pipe and the expansion of the LNG terminal in Świnoujście. The following targets are expected to be achieved by 2030: – operating two-way connection between Poland, via Denmark, and the fields located in the Norwegian Continental Shelf, which will enable the import of ca. 10 billion m^3 of natural gas; – operating, expanded LNG terminal in Świnoujście, with regasification capacity from 7.5 to 10 billion m^3 annually, along with additional functions enabling vessel bunkering and LNG transloading to rail, vessels and tank trucks in increased quantities.

		8. Construction of a transmission system enabling natural gas supplies from the north, west and south, and the construction of system interconnections to meet the requirement to diversify supply sources The current possibilities of transmission infrastructure do not allow the full substitutability of natural gas supply sources should disruptions in its supplies occur. The investment will make it possible to increase natural gas supplies from new directions (LNG, Norwegian Continental Shelf, system interconnections). Expansion of interconnections with neighbouring countries along with the development of the national transmission network and the expansion of gas storage facilities is an element of the natural gas supply diversification strategy, which at the same time will create conditions for market development and the growth of the importance of Poland as a regional gas trading hub. Currently, apart from supplies to the LNG terminal, gas supplied to Poland includes mainly Russian gas brought via Belarus and Ukraine, as well as supplies from the territory of Germany and the Czech Republic. To increase import and export possibilities, Poland will aim at constructing or expanding interconnections with: - Slovakia – up to an import capacity of 5.7 billion m^3 and export capacity of 4.7 billion m^3 annually (by 2021); - Lithuania (GIPL) – up to an import capacity of 1.7 billion m^3 and export capacity of 2.4 billion m^3 annually (by 2021); - The Czech Republic (Stork II) – up to an import capacity of 6.5 billion m^3 and export capacity of 5 billion m^3 annually (by 2022); - Ukraine – up to import and export capacities of 5 billion m^3 annually (by 2020).
		9. Expansion of natural gas storage capacities as well as capacities for its offtake and injection to underground storage facilities (UGSF) in Poland In Poland, the overall capacity of underground storage facilities exceeds 3 billion m^3 with an offtake capacity below 50 million m^3/day. The total available active capacity of underground high-methane gas storage facilities in the 2017/2018 season is 2 985.4 million m^3. In addition to the aforementioned high-methane gas storage facilities, two high-nitrogen gas storage facilities managed by PGNiG S.A. are in operation, namely:

		– PMG Daszewo with a capacity of 40 million m^3; – PMG Bonikowo with a capacity of 200 million m^3. The high-nitrogen gas system is a closed system and the aforementioned high-nitrogen storage facilities are used to stabilise the production of this gas. It is appropriate to continue the construction of storage facilities as part of the UGSF Active Capacity Scheme, consisting in building the Kosakowo Covern Underground Storage Facility (CUGSF), the objective of which is to stabilise the supply of the Tricity-Koszalin region with gaseous fuels. Once completed the expansion process, the active capacity of the Kosakowo CUGSF will be at least 250 million m^3. The investment project is planned to be completed in 2021. At present, the active capacity of the Kosakowo CUGSF is 145.5 million m^3. Additionally, Operator Gazociągów Przesyłowych Gaz-System S.A. (OGP Gaz-system S.A.) is conducting analyses relating to a possibility of expanding its activities to the underground gas storage segment, in accordance with the company's strategy for the years 2016-2025. The baseline scenario is the construction of a storage facility in Damasławek in the Kujawsko-Pomorskie province, and the alternative scenario – in Białogard in the Pomorskie province. The expected effects of the measures by 2030 include, if sufficient internal and external funding is obtained, an increase in the capacity of gas storage facilities to 4 billion m^3 with a greater offtake capacity – up to 10 million m^3 per day. The implementation of the construction projects concerning new underground gas storage facilities and the expansion of existing ones will considerably contribute to the improvement of the country's energy security through an increase in storage capacities which may be used to maintain commercial stocks used for system balancing and in emergency.
		10. Implementation of investment plans and strategies of companies with State Treasury shareholding in accordance with the Policy of the Government of the Republic of Poland for Logistic Infrastructure in the Oil Sector The construction of the second leg of the Pomorski pipeline (Płock-Gdańsk) is an undertaking which is important and necessary to safeguard the energy security of the Republic of Poland. The currently used transmission infrastructure of the Pomeranian section, in spite of comprising a

		reversible-flow pipeline, constitutes a single artery only and is the weakest link of the crude oil pipeline transport system due to the fact that it is not substitutable by other logistic infrastructure. This is why it is appropriate and necessary to aim at creating redundancy infrastructure, which will constitute an additional security measure for crude oil transport in the Pomeranian section. A single pipeline makes it impossible to satisfy the needs of the refineries of PKN ORLEN in Płock and of the LOTOS GROUP in Gdańsk at the same time. Furthermore, if an emergency occurs and security incidents accumulate in this section of the pipeline, there is a risk of prolonged stoppage in crude oil injection and, consequently, of destabilisation of the chain logistics of supplies to the most important Polish refinery. Baseline value (2017): Three-element infrastructure for crude oil transmission, comprising the Przyjaźń pipeline (Eastern Section – 240 km, Western Section – 416 km) and the Pomorski pipeline (235 km) Expected effects (2030): Expansion of crude oil transmission infrastructure – construction of the second leg of the Pomeranian pipeline (Płock-Gdańsk)
		11. Development of regulations concerning crude oil and petroleum product stocks To ensure an efficient emergency stock system in Poland, legal regulations must be amended to increase the role of the Agency of Stocks Reserves in building up, maintaining and financing (with the use of a system of stock charges) emergency stocks. Producers and traders build up and maintain obligatory crude oil or fuel stocks, with the exclusion of liquefied petroleum gas (LPG), in quantities corresponding to the product of 53 days and the average daily output of fuels or the imports of crude oil or fuels by the producer or trader in the preceding calendar year. The optimisation of crude oil and fuel emergency stock system management should be achieved by lessening the administrative burden resting on producers and traders obliged to build up and maintain obligatory crude oil and fuel stocks.
		12. Development of the electricity market operation rules Experience based on the operation of a single-commodity market and theoretical studies concerning electricity markets show that the achievement of an ‘ideal’ single-commodity electricity market where there is no missing money problem resulting subsequently in the missing

		capacity problem, is a difficult task. This concerns both the substance-based solutions and the obtaining of acceptance for periodic high electricity prices, or even the need to introduce restrictions on electricity supplies. The problem is made worse by support systems used in Europe on a large scale in relation to some generation technologies, which currently, due to the lack of developed energy storage technologies, cannot safeguard the security of supplies. In connection with the results of analyses concerning the assessment of capacity adequacy, which clearly showed there was a risk for the security of electricity supplies in Poland over the next years, a decision has been taken to implement a capacity market with the aim to have an effective tool for safeguarding the security of supplies in place. The implementation of the capacity market does not imply the cessation of works aimed at improving the effectiveness of operation of the electricity market in Poland. These works are conducted in parallel with works on the capacity market. The efficiency of operation of the electricity market depends largely on solutions adopted on the balancing market and the system services market. The balancing market ensures the energy demand to be balanced on an on-going basis with its generation, with the energy supply security criteria being met at the same time. The energy prices on this market are reference prices for forward markets (bilateral and exchange prices, including day-ahead and intraday ones), since they reflect the value of energy at the time of its supply. The system services market makes it possible to ensure short-term excess capacity in the system with specific technical parameters, maintained for the purpose of balancing the electricity system. Reserve capacity prices show, in the first place, balancing tensions (reserve shortfall leads to an increase in prices), which generates investment signals by influencing prices. The prices of individual system services create incentives for the development of sources with specific technical abilities, which support the safe operation of the electricity system, such as ability to quickly increase or reduce the quantity of generated electricity, in accordance with the current demand, or ability to operate with a broad range of loads. For the above reasons, correct pricing processes in the balancing market and in the system services market are an important factor affecting the quality of operation of market mechanisms in the electricity sector. The following works are conducted in Poland to improve the efficiency of operation of the electricity market: – ancillary frequency control services – changes are aimed at applying market mechanisms

		for obtaining reserve capacity (system services) which generate pricing signals for the development of sources necessary to balance the system in an effective manner and at the same time assume an increase in reserve capacity prices in a situation of its deficit; – **balancing energy pricing mechanism** – changes are aimed at applying a pricing mechanism based on offers actually used to generate electricity, which at the same time reflects various energy values in particular system locations due to restrictions on available network resources. By applying this approach, appropriate pricing incentives will be created for market participants to counteract short-term balancing difficulties in the system; – **development of consumer participation in the balancing market** – changes are aimed at expanding the scope of consumer participation by enabling them to offer both energy supplies and system services (reserve capacity).As part of offering their services, consumers should be able to define the detailed reduction parameters, such as the time of activating a reduction, the maximum and minimum reduction period and level, intervals between subsequent reductions etc. Such a solution will ensure conditions for maximising the available volume of consumer load reduction and its effective use by the system operator for system balancing purposes. The above-specified range of works are carried out as part of a broader project, aimed at implementing advanced tools for managing the operation of the national electricity system in market conditions (Market Management System – MMS), enabling its operation to be optimised with the use of precise technical and cost models and techniques of allowing for uncertainties caused by unstable sources.
		13. Introduction of a capacity market as a solution ensuring the sufficiency of generation in a medium- and long-term perspective The main goal of the capacity market is to safeguard the security of electricity supplies to end consumers in a long-term perspective. The capacity market is a market mechanism whose objective is to safeguard the required level of security of energy supplies while minimising the costs for the economy. The capacity market is neutral in technological terms, due to which it creates the same

		competition conditions for all electricity generation technologies and the DSR (Demand Side Response)[28], taking into account the degree in which particular technologies contribute to safeguarding the security of supplies and provided that the requirements set out in the Act on the capacity market of 8 December 2017 are met. The capacity market rewards capacity market units which supply capacity in risk periods, that is in periods in which the risk of losing the continuity of supplies in the National Power System (NPS) has been identified. The capacity market operates in parallel to the electricity market and does not introduce restrictions on pricing processes in the electricity market – prices are formed on the basis of the relationship between electricity demand and supply. The capacity market is a commodity derivatives market, where physical delivery of capacity is carried out after the main trading processes are completed. The primary market has the form of auctions with the transmission system operator (TSO) as the only buyer. The primary market is composed of the main auction taking place four years before the physical delivery and an additional auction taking place one year before the physical delivery. There is the secondary market to complement the primary market by enabling the reduction of risks borne by the capacity market participants, at which capacity obligations of certified capacity market units are traded in. The capacity market is an additional market mechanism complementary in relation to the energy market: – it creates conditions for the stable operation of existing generation sources and their repowering, as long as these sources are necessary to safeguard the security of supplies; – it ensures clear pricing signals aimed at coordinating decisions to construct new generation capacities, as well as to decommission specific generation resources; – it limits the investment cycle phenomenon that can be observed in energy prices for end consumers on a single-commodity electricity market, since decisions to invest in or to decommission resources are coordinated by the capacity market; – it creates conditions for developing DSR services, both through the participation of the DSR in capacity market processes and through the provision of DSR services at the facilities of industrial consumers in order to reduce their peak power demand and thus to reduce the incurred costs of operation of the capacity market.

		Three capacity auctions took place on 2018, for the delivery years 2021, 2022 and 2023. In 2019 the auction for the delivery year 2024 will take place.
b)	Regional cooperation in this area.	**1. Co-operation within the framework of the Visegrad Group (V4)** Co-operation on the following issues is planned in the period 2021-2030 among the Visegrad Group states: – joint position within the European Union on the directions of development for the energy sector, – scientific research and development cooperation, – exchange of experiences in the field of the development of the energy sector, including in the area of cooperation with individual technology suppliers, in particular the suppliers of nuclear power technologies.
		2. Market integration Advanced works are being conducted at the EU level on an agreement on the course of operations in the intraday balancing market, the DSR and fees and burdens. Poland is a member of the following groups: Penta Plus 'Electricity Neighbours' HLG, Penta Initiative Technical Group on Flexibility (SG III). Poland declares further participation in the works of the aforementioned groups and involvement in creating an appropriate framework for further market integration. Poland assumes that the continuation of the above-described measures will result in the achievement of the set market integration objectives through an agreement among EU Member States on matters concerning the elimination of all barriers restricting flexibility both in the generation area, demand side involvement and the development of spot and balancing markets at the level of Member States and at the regional and European Union-wide levels.
		3. Co-operation with EU states and exchange of experience relating to the implementation of nuclear power programmes Poland maintains an active dialogue with EU states having advanced nuclear power programmes,

		taking advantage of their experience both in the field of development of nuclear power projects, including those aimed at increasing the share of domestic industry, as well as in the field of radioactive waste and spent fuel management. Talks are also held in the area of development of new nuclear power technologies, in particular the high-temperature gas-cooled reactor (HTGR) technology. Expected effects for 2030: – exchange of experience, – competency building, – industrial cooperation. Further Cooperation Agreements may be entered into in the field of nuclear power projects with further states at the level of Ministers responsible for nuclear power.
		4. Cooperation with pro-nuclear like-minded states In November 2017, the United Kingdom proposed an initiative to re-activate the pro-nuclear like-minded group. The re-activated group is composed of representatives of Bulgaria, the Czech Republic, France, Finland, Hungary, Poland, Romania, Slovakia, Slovenia and the United Kingdom. To date, the Group has developed several joint positions on nuclear power matters, addressed to European Union institutions. Expected effects of the works of the Group: – working party meetings of the Group (two meetings/semester at the level of ambassadors at the EU, working party coordination before the meetings of the Working Party on Atomic Power Questions (WPAQ), appointment of the state to coordinate the works of the Group); – joint positions within the EU on the optimisation of conditions for the development of the nuclear power sector; – coordination of positions on important issues within the Working Party on Atomic Power Questions (WPAQ); – establishment of a coalition for the purpose of voting on an amendment to the regulation implementing Article 41 of the Euratom Treaty;

		– establishment of a coalition for the purpose of possible voting on amendments to the Euratom Treaty; – exchange of information that is important form the point of view of nuclear power projects in the EU.
c)	If applicable, financing measures in this area at national level, including EU support and the use of EU funds.	**1. The financing measures for, among other things, energy security in the electricity and gas sectors** have been described in 3.4.2.
		2. Obtaining financing measures as part of the Connecting Europe Facility financial instrument or other EU financial instruments in operation after 2020. It is appropriate to maintain the possibilities of financial support for infrastructure projects, including gas projects, in a future EU financing perspective.
		3. Development of the use of LNG infrastructure in Poland This area covers the following projects carried out by the GAZ-SYSTEM Group: – **Construction of liquefying (LNG) installations with the use of technologies based on the transmission network potential.** The rapid development of the LNG market in Poland requires all gas supply possibilities to be used, both with regard to supply to companies and for vehicle fleet. Energy-efficient gas liquefying installations, by taking advantage of the potential of high-pressure gas pipelines, will make it possible to increase the energy efficiency of the transmission system and the scope of services provided by the aforementioned company. – **Construction and operation of LNG bunkering infrastructure in the Baltic Sea-LNG Bunkering Vessel.** The objective of the project is to expand infrastructure for bunkering vessels in the Baltic Sea with low-sulphur LNG fuel. The planned development and modernisation of supply systems for vessels, relating to the legal regulations in force and the development of the LNG market, will require the expansion of LNG fuel bunkering infrastructure. Due to the expected increase in demand for the service of bunkering vessels with LNG, a possibility of bunkering vessels in the Baltic Sea with LNG quickly and

		reliably should be provided. – **CHP (Combined Heat and Power) – increasing the regasification capacity of the LNG terminal in Świnoujście.** Project objective: Enhancing the energy efficiency of the terminal will allow to reduce its operating costs. – **Inter-modal LNG logistic base.** Project objective: Increasing the reach of the logistic services of the LNG terminal in Świnoujście. Possibility of implementing a virtual pipeline service. Possibility of transporting high volumes of LNG at a distance. Enhancing the effectiveness of the services provided by the LNG terminal in Świnoujście and thus increasing its role in the CEE & Baltic region. Supplying necessary volumes of LNG to peak shaving stations supporting the National Transmission System (NTS) and satellite regasification. Transmitting raw material for the purpose of carrying out the remaining services relating to LNG use, e.g. supplies for vehicle refuelling stations, vessel bunkering stations etc. – **ISO containers.** Project objective: Enabling the use of intermodal gas carriers. – Peak shaving regasification station. Project objective: Using LNG to supply the areas of GAZ-SYSTEM infrastructure with insufficient transmission capacities. Ensuring a possibility of providing areas and customers which are not connected to the NTS with gas infrastructure on a temporary or permanent basis. Creating infrastructural foundations (transshipment depots for ISO containers) for further distribution of natural gas in liquefied form. – **LNG transshipment skid.** Project objective: Ensuring a possibility of quick and reliable LNG transshipment and bunkering. Implementing projects in the area under discussion will contribute to the enhancement of energy security (not only in terms of import possibilities, but also in terms of ensuring gas supplies taking into account infrastructure constraints in Poland) and to a reduction in the emission of air pollutants and greenhouse gases. *Proposed form of financing:* CEF grant, non-repayable grant.
		4. Underground gas storage: From the point of view of increasing domestic gas consumption possibilities, subsidies for investments relating to the construction and expansion of underground gas storage facilities

		should be sought. Forecast increase in domestic gas consumption is due to: – investments in gas-fuelled cogeneration units; – provision of gas infrastructure to new areas and the replacement of heat sources used so far with gas sources; – increase in the importance of gas in road and maritime transport; – increase in the role of gas as an energy source providing back-up for the operation of the sector of unstable renewable energy sources. Additionally, Poland, as a place in which a gas transmission and trading hub is planned to be created, should have storage capacities to meet the needs of the correct operation of the transmission system and the needs of entities from other states of the region. Support should be provided to investments in the construction or expansion of cavern underground gas storage facilities, being key facilities to be used to safeguard the security of supplies in winter and in a situation where supplies from prevailing import directions are discontinued. The construction and expansion of cavern underground gas storage facilities are characterised by high capital intensity and time consumption. The aforementioned factors and low profitability of investments prevent construction in reliance on market mechanisms in most cases. Nevertheless, they need to be carried out to ensure the correct operation of the gas system.
		5. Support for the development of large-scale energy storage facilities which may level energy demand with its generation, or power balance Having regard to current trends in the development of the energy sector and an unavoidable increase in the use of renewable energy sources, there is a need for developing an energy storage technology which will facilitate the integration and development of distributed RES. Support from European funds should cover both the application and purchase of storage technologies, and research, development and implementation works in this respect. With the current level of technological development and the current economic situation, there are no incentives to implement this type of solutions concerning energy storage in an intense manner.

		6. Improvement of the energy security of the country with regard to the diversification of crude oil supplies and expansion of liquid fuel storage facilities This area covers the following projects (carried out by PERN S.A.): – 2nd stage of development of the Oil Terminal in Gdańsk; – construction of two tanks for crude oil at the Storage Depot in Gdańsk/Górki; – construction of tanks for liquid fuels; – construction of the 2nd leg of the Pomeranian Section; – construction of the Boronów-Trzebinia fuel pipeline. The aforementioned projects form part of the implementation of the Policy of the Government of the Republic of Poland for Logistic Infrastructure in the Oil Sector. The projects are aimed at supporting the diversification of crude oil supplies through the expansion of the infrastructure system for the supply of crude oil from sources alternative in relation to pipeline supplies from the Russian Federation. The projects will enable an increase in emergency stock storage capacities which will enhance regional energy security.

3.4. Dimension Internal energy market[29]

3.4.1. Electricity infrastructure

a)	Policies and measures to achieve the targeted level of interconnectivity presented in 2.4.	**1. The availability of the currently existing cross-border interconnections will be increased by eliminating barriers to access to cross-border lines and optimising the allocation of available capacity due to applying the FBA** (flow-based approach)[30] It is assumed that the implementation of the FBA, which is expected to take place by 2020, will enable electricity flows to be calculated more precisely, due to which the transmission capacities made available by Poland will increase. The level of interconnection capacity which, as planned by the Republic of Poland, is to be set in 2030 will largely depend on the methodology of its calculation adopted in the Regulation on the Governance of the Energy Union. In view of the above, Poland is unable to set a numerical target at the present stage (end of 2018). It should be stressed that such phenomena as unscheduled compensatory power flows are to be taken into account appropriately when determining the interconnectivity factor.
		2. With respect to the transmission network, the implementation of three projects concerning the national development of the transmission network and the cross-border interconnections covered by the TYNDP2018 (the Community-wide Ten Year Network Development Plan) is planned to be completed by 2030: **1. GerPol Improvements** **2. GerPol Power Bridge I** **3. LitPol Link Stage II** Poland is aware of the need to ensure efficient and well developed network infrastructure, which is why the investment area related to transmission infrastructure is regarded as extremely important. The cross-border interconnection capacity between Member States should be increased primarily by the optimum use of existing interconnections and the elimination of barriers preventing market participants from getting access to the grid, including the elimination of bottlenecks in

		national systems. The purpose of the GerPol Improvements project is to increase the cross-border transmission capacities in the synchronous area (covering interconnections at the border with Germany, the Czech Republic and Slovakia) by switching the 220 kV Krajnik-Vierraden line to 400 kV and installing phase-shifters on the existing Poland-Germany interconnections. The implementation of the project will make it possible to increase the NPS's import capabilities by 500 MW and its export capabilities by 1500 MW. The purpose of the GerPol Power Bridge I project is to increase the cross-border transmission capacities in the Polish synchronous area. In the 2030 perspective, the expansion of the internal transmission network is planned in the western part of the country, which will make it possible to increase the import capabilities of the National Power System by 1500 MW and its export capabilities by 500 MW. The GerPol Power Bridge I project was included in the third PCI list, published on 23 November 2017, and covers the following investment projects: – the internal 400 kV Krajnik-Baczyna line, – the internal 400 kV Mikułowa-Świebodzice line, – the internal 400 kV Baczyna-Plewiska line. The LitPol Link Stage II project is a continuation of the construction of an interconnection between Poland and Lithuania to achieve the planned transmission capacity of 1000 MW in both directions. Additional transmission network facilities must be constructed in Poland and Lithuania (including the second back-to back converter at the Alytus station) in order for the project to be carried out. Nevertheless, in 2016, the Lithuanian Government decided not to proceed with the construction of the second converter because of the dialogue conducted as part of the BEMIP HLG on another option of interconnection with the European transmission system, which will include elements of the LitPol Link Stage II project. The third PCI list included a project covering the construction of the 400 kV Stanisławów-Ostrołęka line. The investment project will be completed by 2023 and its effect will be the creation of conditions for electricity exchange with the Lithuanian electricity system while ensuring the safe operation of this interconnection. In connection with a political agreement between the Baltic states and Poland of 28 June 2018, Poland regards this project as necessary to

		integrate the Baltic states with the Continental Europe system in synchronic terms and the Stanisławów-Ostrołęka line will be constructed despite the fact that Lithuania has withdrawn from the Alytus second direct current converter project.
b)	Regional cooperation in this area[31].	**Support, as part of regional fora (Penta Plus 'Electricity Neighbours' HLG, Penta on Flexibility (SG III)), for the implementation of the FBA for calculating and allocating transmission capacities throughout the region and the adoption of fair rules for settling the costs of remedying measures conducted in the region.** To increase the transmission capacities of cross-border interconnections Poland intends to develop cooperation with neighbouring countries, primarily with the Republic of Lithuania and the Federal Republic of Germany. Among the positive results of cooperation to date is the construction of a 'power bridge' between Poland and Lithuania completed in 2015. The project has included the construction of an interconnection between the Ełk Bis station with the Alytus station in Lithuania and, at the same time, on the Polish side, the construction and modernisation of power lines and stations in three provinces. 11 major network infrastructure investment project were carried out as part of the Project, four 400 kV power lines were constructed with an aggregate length of ca. 400 km, five power stations were constructed and two power stations already in operation were modernised.
c)	If applicable, financing measures in this area at national level, including EU support and the use of EU funds.	**1. Monitoring of the use of proceeds from interconnection capacity allocation by the operator** The transmission system operator will continue to use all proceeds from interconnection capacity allocations to guarantee the actual availability of the allocated capacity or to maintain or increase interconnection capacity by investing in the network, especially in new interconnections. The President of the Energy Regulatory Office (URE) will monitor the implementation of this measure. Each year, by 31 July, the President of URE publishes a report specifying: – the amount of proceeds obtained over a period of twelve months ending on 30 June of a given year; – the method of using these proceeds, along with verification whether the income has been used in accordance with Regulation 714/2009 and the guidelines; and – information on whether the aggregate amount of income from restrictions has been

		allocated to one or more of the three recommended targets. The designation of income from the allocation of interconnection capacity will contribute to ensuring the desirable level of the available cross-border transmission capacity and to developing transmission infrastructure.
		2. Entering the projects which are to contribute to the integration of regional markets in the list of Projects of Common Interest (PCI) and implementing them in an effective manner Poland actively participates in the development of the lists of Projects of Common Interest (PCI). The lists created so far include projects the Promoter of which is Polskie Sieci Elektroenergetyczne S.A.(PSE S.A.). In the period 2021-2030, Poland will seek to include new PCIs in further PCI lists, which will contribute to the further integration of regional markets.
		3. Investment support from the Connecting Europe Facility (CEF) funds It is justifiable to leave the possibility of financing infrastructure projects within the framework of the Connecting Europe Facility, as part of a future financial perspective. The CEF instrument is dedicated to PCIs and Poland will seek the PCI status to be granted to new infrastructure projects.
		4. Development of a gas transmission network in Eastern Poland Support in the form of EU funds should be allocated to, among other things, the development of a transmission network in the eastern part of Poland. As a result of the implementation of transmission investment projects, it will be possible to carry out gas distribution network projects further on in areas lacking in gas infrastructure. GAZ-SYSTEM is going to carry out most of the planned projects by the end of 2022, i.e. within the framework of the current financial perspective, which includes the expansion of the national network, the LNG terminal in Świnoujście and interconnectors with neighbouring EU Member States. Pursuant to the Ten-Year National Plan (TYNP) 2018-2027, a far-reaching investment plan is to be carried out in the first five-year period, i.e. from 2018 to 2022. In the period 2023-2028, i.e. in the actual period of implementation of the EU future financial perspective, the investment plans of GAZ-SYSTEM are more modest and conditional, i.e. the gas

		pipelines of the eastern leg in the north-south axis will be constructed if 'this becomes necessary due to the forecast level of development of the gas market in Poland' – in accordance with the TYNP of GAZ-SYSTEM.
3.4.2. Energy transmission infrastructure		
a)	Policies and measures related to the elements set out under 2.4.2, including, where applicable, specific measures to enable the delivery of Projects of Common Interest (PCIs) and other key infrastructure projects.	**1. Electricity projects of Poland regarded as Projects of Common Interest (PCI)** Electricity projects of Poland are regarded as Projects of Common Interest and included in the 1st, 2nd and 3rd list of Projects of Common Interest (PCI). Those among them which are located in the Poland-Lithuania and Poland-Germany corridors (phase shifter at the Mikułowa station) have already been completed. The PCI list published on 23 November 2017 includes three Polish projects forming part of the NSI East Group: – 3.14.2 Krajnik-Baczyna internal line (to be completed in 2023), – 3.14.3 Mikułowa-Świebodzice internal line (to be completed in 2023), – 3.14.4 Baczyna-Plewiska internal line (to be completed in 2023), and one project belonging to the BEMIP Group: – 4.5.2 Stanisławów-Ostrołęka internal line (to be completed in 2023). The aforementioned projects are expected to be carried out as part of investment activities aimed at developing the transmission network and cross-border interconnections by 2030.
		2. Investment tasks aimed at diversifying gas supplies to Poland Implementation of investment tasks consisting in constructing infrastructure enabling gas supplies to Poland from new sources (Norway and LNG) and in developing the national transmission network along with increasing the storage capacity and the receipt and injection capacity of underground gas storage facilities, and then in constructing system interconnections integrating the national transmission system with neighbouring markets. Expected effects for 2030: Operational cross-border interconnections with neighbouring EU countries and Ukraine and an expanded and modernised transmission network enabling gas

		to be supplied to customers in Poland and abroad.
		3. Monitoring of the implementation, by the operators, of investment projects included in the development plans for meeting current and future electricity demand An energy company transmitting or distributing gaseous fuels or energy is to prepare a development plan for its area of operation, concerning the satisfaction of current and future demand for gaseous fuels or energy, for a period of at least three years. Pursuant to Article 16(2) of the Energy Law (Journal of Laws z 2017, item 220), a gas transmission system operator and an electricity transmission system operator are to prepare a development plan concerning the satisfaction of current and future demand for gaseous fuels or electricity for a period of 10 years. The aforementioned plan is subject to updating every two years as regards demand for gaseous fuels, and every three years as regards electricity demand. Pursuant to Article 16(4) of the Energy Law, a gas distribution system operator and an electricity distribution system operator are to prepare a development plan concerning the satisfaction of current and future demand for gaseous fuels or electricity for a period of at least five years. The President of the Energy Regulatory Office (URE) is obliged, under Article 23(2a)(2) of the Energy Law, to prepare a report presenting and assessing, among other things, the fulfilment of the plans referred to in Article 16(2) and 16(4) (i.e. development plans concerning the satisfaction of current and future demand for gaseous fuels or electricity of the operators of the transmission and distribution systems). The report is to be prepared in accordance with Article 23(2c) of the Energy Law every two years. It was prepared in the years 2013, 2015 and 2017. In addition to the above, the achievement of the planned volumes is analysed on an annual basis as part of the carried out tasks, and the results of the analysis are used in the process of agreeing subsequent editions of development plans or their updates. Such analyses are conducted on the basis of annual reports on the fulfilment of the development plan, which energy companies are obliged to submit on the basis of Article 16(18) of the Energy Law. In the period 2021-2030, the President of URE will monitor the fulfilment of development plans on an annual basis and will prepare, every two years, a report presenting and assessing the conditions for undertaking and conducting business activities in the field of electricity generation, transmission or distribution and the fulfilment of the development plans with respect to the satisfaction of current and future demand for gaseous fuels or energy of the operators of

		transmission and distribution systems.
b)	Regional cooperation in this area[32].	**1. Integration of the energy transmission networks of the Baltic states** On 23 November 2017, the 3rd list of Projects of Common Interest (PCI) was published, including projects relating to the integration of the networks of the Baltic states and the North-South (N-S) Corridor projects. The 3rd PCI list includes the Stanisławów-Ostrołęka line project, identified with number 4.5.2., as an element of the Baltic Energy Market Interconnection Plan (BEMIP Electricity) corridor. The investment project will be carried out before 2030, and its effects will include the creation of conditions for the exchange of electricity with the Lithuanian electricity system, while ensuring the secure operation of this interconnection. On 28 June 2018, on the sidelines of the European Council, an agreement on the synchronisation of the Baltic states (BS) with the electricity system of the Continental Europe was signed by the Prime Ministers of Poland and the Baltic states and the President of the European Commission in the form of a Political Road Map.
		2. Construction of a gas interconnection between the transmission systems of Poland and Ukraine The launching of the Hermanowice-Bilche Volytsia two-way high-pressure gas interconnection with an annual capacity of up to 5 billion m^3. As an effect of the interconnection, the export capacities of the Polish gas market will increase and Polish entities will be able to use underground storage facilities located in the territory of Ukraine.
c)	If applicable, financing measures in this area at national level, including EU support and the use of EU funds.	**1. Financial support for the construction of electricity transmission and distribution and gas transmission and distribution infrastructure** EUR 1 billion has been allocated to support transmission and distribution infrastructure as part of the Operational Programme Infrastructure and Environment 2014-2020 (OPI&E). Support will be provided in the form of grants. In accordance with the 'n+3' rule, funds for the aforementioned purposes may be spent until 2023. As part of the Smart Growth Operational Programme 2014-2020 (SM OP), 160 projects,

		concerning high-efficiency, low-carbon and integrated energy generation, storage and distribution systems have received PLN 525 million worth of support. Given the electricity system interconnections target set at 15 %, support must be provided for this area within the next financial perspective. The acceleration of the transformation of the EU energy system towards a low-carbon system and the increasing share of renewable energy sources in energy mix results in the need to ensure appropriate funds to invest in flexible generation sources and the expansion of gas infrastructure. Financial support for the area in question in the financial perspectives 2021-2027 and 2028-2034 is desirable. The amount and scope of support for distribution projects should take into account the need to reduce low-carbon emission and to improve the quality of the air. Support for cross-border electricity and gas interconnections is possible as part of the Connecting Europe Facility (CEF) or other EU financial instruments to be in operation after 2020. Strong competition from Member States in the process of seeking funds for the expansion of transmission infrastructure results in a situation where financial support, if any, as part of this source will only be granted to few investment projects.
		2. Development of an electricity transmission network This category covers the following project areas, in which Polskie Sieci Elektroenergetyczne S.A. operates. The listed projects improve the energy security of the Republic of Poland. The implementation of the specified projects enhances the energy efficiency of the electricity transmission network in Poland. – Expansion of the transmission network to improve the reliability of power evacuation from conventional energy sources – location of the project (province): Dolnośląskie, Mazowieckie, Śląskie – Expansion of the transmission network to improve the reliability of power evacuation from renewable energy sources – location of the project (province): Zachodniopomorskie, Wielkopolskie – Development of the transmission network to enhance transmission capacities of the NPS – location of the project (province): Dolnośląskie, Lubuskie, Łódzkie, Świętokrzyskie

		– Enhancement of the security of electricity supplies and the improvement of the conditions of supply from the transmission network – location of the project (province): Łódzkie, Małopolskie, Mazowieckie, Śląskie, Zachodniopomorskie – Interconnection of and power evacuation from the first nuclear power plant in Poland – the construction of a nuclear power plant will imply the need to adapt the transmission network to safe power evacuation from the facility. The determination of the investment needs will be possible once the location has been selected and the basic parameters of the facility have been specified. – Interconnection of and power evacuation from off-shore wind farms (including the construction of off-shore transmission capacities).The scope of necessary investments in transmission networks will depend on the installed capacity of off-shore wind farms and the model of interconnection to the NPS adopted for these plants.
		3. Transmission loss reduction for all voltage types, including the replacement of MV overhead lines with underground cable lines in wooded areas. Medium voltage (MV) network overhead-to-underground conversion is strongly correlated with the SAIDI and SAIFI, and the share of underground cable lines in MV lines in Poland (ca. 26 % in 2017) is one of the lowest in Europe. Over 41 000 km of overhead MV lines are located in forest and woodland areas, where the overhead-to-underground conversion is particularly important for the reduction of the causes and effects of failures. To achieve a greater reliability of operation of the network, medium voltage networks must be successively converted from overhead to underground lines. For this purpose, a national plan of overhead-to-underground conversion until 2040 will be developed in 2019. Additionally, equipping medium voltage line connectors with remote control systems is also regarded as a priority. Appropriate funding for the aforementioned investments needs to be guaranteed.
		4. Provision of gas supply infrastructure through the development of a distribution network and local LNG supply stations If financing is obtained from EU funds as part of Multiannual Financial Frameworks for the period 2021-2027 for projects in the gas sector, a portion of funds should go to the gas distribution

		sector understood as a distribution network and local networks equipped with local LNG regasification stations, with an emphasis on the following issues: – civilisational advancement of rural areas and Eastern Poland not covered by gas supply infrastructure; – reduction of low-carbon emissions – PM2.5 and PM10 (smog); – gas as low-carbon fuel in the context of CO_2 emissions. Despite the fact that in a vast majority of cases investments in distribution networks are regarded as commercial investments, it is appropriate to accelerate investments enabling an increment in areas covered by gas supply infrastructure. Despite the existence of PSG's broad plan for constructing gas supply infrastructure until 2022, the level of coverage of Poland with gas supply infrastructure is expected to raise from 58 % to 61 %. As part of the assessment of projects for which financial support is sought, the impact of the project on the air pollution with particulate matter should be treated as an equally important criterion as maturity (understood as a possibility of carrying out the investment project within the financial perspective). Plans for the provision of gas supply infrastructure for areas currently regarded as most polluted on the basis of the official data of the Chief Inspectorate for Environmental Protection (Główny Inspektorat Ochrony Środowiska - GIOŚ) should be treated on a priority basis.
		5. Expansion of gas transmission infrastructure In the case of granting financing from EU funds for investments in the gas sector, the area covers the following projects, planned to be implemented by the company Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A.: – Rembelszczyzna-Wronów DN 1000 gas pipeline, – Rozwadów-Końskowola-Wronów gas pipeline with a diameter of at least DN 700, – Jarosław-Rozwadów gas pipeline with a diameter of at least DN 700, – Hermanowice-Jarosław gas pipeline with a diameter of at least DN 700, – Gustorzyn-Wronów DN 1000 gas pipeline, – Reszki-Gustorzyn DN 1000 gas pipeline, – Tworzeń-Oświęcim gas pipeline with a diameter of at least DN 500,

		– Damasławek-Mogilno-Odolanów DN 1000 gas pipeline. The projects enhance the energy efficiency of the natural gas transmission system in Poland. Investments are a form of implementing the policy of levelling differences between regions in the area of energy network infrastructure. The projects are aimed at supporting the diversification of natural gas supplies through the expansion of transmission system infrastructure, which will allow to improve the energy security of Poland.
3.4.3. Market integration		
a)	Policies and measures related to the elements set out in point 2.4.3.	**1. Implementation of the provisions of network codes and the European Commission guidelines concerning mechanisms for allocating transmission capacities and coupling markets in various time horizons** Participation in the implementation of network codes and the European Commission guidelines prepared in the form of EU regulations. The aforementioned tasks will be implemented in accordance with the time schedules specified in these regulations. Commission Regulation (EU) 2017/459 of 16 March 2017 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems and repealing Regulation (EU) No 984/2013 took effect on 6 April 2017. The most important change to the amended network code consists in supplementing the regulation by new provisions setting out the Europe-wide rules for identifying market demand for the expansion of existing system interconnections or the construction of new interconnections and the rules for allocating additional capacity or new capacity referred to as incremental capacity (the so-called incremental procedure). The Regulation has also been supplemented by new dates of interconnection capacity auctions for annual and quarterly products. In the case of quarterly product auctions, also the frequency of conducting them has been increased. Also the rules for offering firm and interruptive capacity for long-term products have been defined more precisely. On 17 March 2017, Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas was published. The Regulation took effect on 6 April 2017, but the applicability of some of its provisions will be delayed. The full implementation of the code is to be completed by 31 May 2019.

		The purpose of the new regulation is to enhance the transparency of the process of determining gas transmission tariffs, as well as to make their structures in the European Union area uniform. The Regulation also sets out consultation and publication obligations concerning the calculation methodology and the technical parameters to be adopted to calculate transmission tariffs, which is to ensure the users of EU systems a greater predictability of the level of fees and their comparability. Solutions enabling the application of a discount at the entry to the transmission system from an LNG terminal have also been adopted. The adoption of the uniform standards of capacity allocation in transmission systems throughout the EU will contribute to the smooth operation of the gas market and to increasing energy security. The implementation of the Code concerning the harmonisation of gas transmission tariff structures should contribute to a better integration of the European gas market, enhancement of the security of supplies and the development of system interconnections, which in turn may improve the competitiveness of European companies and will contribute to reducing gas bills issued to households.
		2. Monitoring the security of electricity and natural gas supplies in various time horizons The President of the Energy Regulatory Office (URE) is obliged, under Article 23(2)(20) of the Energy Law, to monitor, among other things, the operation of the electricity system as regards the security of electricity supply, under Article 23(2a) of the Energy Law, to prepare a report presenting and assessing the conditions for undertaking and conducting business activities in the field of generation, transmission and distribution of electricity and the fulfilment of the plans referred to in Article 16(2) and (4) (i.e. development plans concerning the satisfaction of current and future demand for gaseous fuels or electricity of the Operators of transmission and distribution systems). In the period 2021-2030, the existing prerogatives are expected to be maintained, i.e. the President of URE will monitor the operation of the electricity system in terms of the security of electricity supply and will prepare, every two years, a report presenting and assessing the conditions for undertaking and conducting business activities in the field of electricity generation, transmission and distribution and the fulfilment of the plans referred to in Article 16(2) and (4). With respect to the gas sector, the Minister for Energy will assess, on an annual basis, the security

		of natural gas supplies.
		3. Conducting actions to guarantee an appropriate level of flexibility of the electricity system through: – **expansion of transmission infrastructure;** – **construction of modern generation units with a high-range control possibilities;** – **modernisation of small and medium-sized units (redevelopment of thermal units enabling operation with a minimum technical load of up to 20-30 %);** – **expansion of smart energy networks along with smart metering systems enabling electricity demand to be shifted;** – **shift of electricity demand from peaks to night valleys;** – **use of system ancillary frequency control services.** The changing characteristics of operation of the National Power System (NPS), including in particular the growing share of uncontrollable renewable sources, increasing participation of self-consumers and also – in the future – of electric vehicles, accompanied by changes in the development of power demand during the 24 hour cycle, result in the need to implement measures aimed at increasing energy system flexibility. Additionally, in practice no regulating reserve sources operate in the Polish NPS (except for pumped-storage plants) capable of dynamically changing the level of production depending on the level of electricity demand. The implemented measures will contribute to a greater flexibility of the NPS and will enable the transmission system operator to operate the energy system in a secure and effective manner.
		4. Strengthening of mechanisms protecting electricity consumers' rights in the retail market The task will be carried out by making the already existing consumer protection mechanisms more efficient, Partly also by implementing the Directive of the European Parliament and of the Council on common rules for the internal market in electricity (COM2016)864 into the Polish legal regime. In this respect, the Ministry of Energy will expand and propose new mechanisms for protecting household consumers. The platform for comparing supplier offers will be expanded.

		Additionally, information will be presented in bills in an expanded form, so that end consumers know the components of the fees they pay in connection with using electricity. At the same time, bills and additional information will be presented in a way that will be more comprehensible for end consumers, to increase their knowledge. Moreover, the already implemented alternative dispute resolutions methods will be developed and streamlined, so that end consumers have access to information on possible alternative solutions (e.g. distribution of payment over time, advice on debt management) reasonably in advance before being disconnected from the grid.
		5. Strengthening of regulations to increase the activity of household consumers and the proposing of new legal solutions The task will be carried out by streamlining the already existing incentive mechanisms aimed at encouraging consumers to be more active in the electricity market. The task will be partly carried out by implementing the Directive of the European Parliament and of the Council on common rules for the internal market in electricity into the Polish legal regime. It is expected that new mechanisms will be introduced and the existing ones will be expanded in the period 2021-2030 as part of works on strengthening the legal environment encouraging household consumers to take a more active role in the electricity market. The first solution to be applied will be the introduction of regulations encouraging suppliers to offer dynamic price contracts. The availability of these services will be linked to the introduction of smart meters into universal use. Additionally, regulations encouraging consumers to self-consumer activities will be prepared, so that consumers be able to generate energy as well as store and sell it. In view of the fact that consumers will adopt more active roles, legal environment will have to be prepared for the development of demand aggregation services, not only at the level of entities with a greater demand for electricity, but also at the level of household consumers. What is more, households may become active in the electricity market not only on an individual basis (as self-consumers), but also on a collective basis, for example by becoming involved in setting up local energy communities.

		6. Implementation of the EU Environmental Technology Verification (ETV) Pilot Programme (ETV System) Works are being conducted to adopt the ISO 14034 Standard – Environmental management – Environmental technology verification as a Polish standard, and then the possibilities for creating the national ETV System are to be considered. The ETV system is aimed at providing independent and reliable information on innovative environmental technologies by verifying whether performance declarations submitted by the authors and producers of the technology are complete, fair and based on reliable research results. An ETV statement of verification enables business entities offering innovative technologies to confirm the parameters of their technologies and helps, and often enables, access to foreign markets worldwide. Since April 2017, the National Fund for Environmental Protection and Water Management (Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej - NFOŚiGW) has been offering a financial instrument to support business entities as part of the programme Support for Innovations Contributing to a Resource-Saving and Low-Carbon Economy, Part II, Promoting Technologies Verified under the ETV System). Companies may obtain a grant to finance the verification of their technologies, amounting to 50 % of costs, in the form of a refund. Adequate measures will be taken in the period 2021-2030.
b)	Measures to increase the flexibility of the energy system with regard to renewable energy production such as smart grids, aggregation, DSR, storage, distributed generation, mechanisms for grid traffic dispatching, re-dispatching and curtailment, real-time price signals, including the roll-out of intraday market coupling and cross-border balancing markets.	**Implementation of intraday market coupling mechanisms relating to electricity system balancing** The task will be implemented in accordance with the time schedules specified in the following regulations: – Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management, – Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation, – Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing. The implementation of measures will allow to ensure the security of the national energy system

		while enabling integration in the field of cross-border exchange. An important integration element to be considered when implementing balancing guidelines is the specific nature of the Polish centrally dispatched balancing system. The rules and time schedule for carrying out the task may be changed if an amendment to the EU legislative acts referred to under 1-3 is adopted, which is planned to take effect in 2021.
c)	If applicable, measures to ensure a non-discriminatory share of renewable energy, DSR and storage, in all energy markets.	**Ensuring priority access and transmission of renewable energy or energy from high-efficiency cogeneration on the basis of the Energy Law and the Act on renewable energy sources** To meet the target, the rule of priority for connecting installations using renewable energy to the electricity grid (Article 7(1) of the Energy Law), as well as the rule of priority for transmitting and distributing electricity from renewable sources and for cogeneration (Article 9c(6) of the Energy Law). Additional effects will be achieved through the structure of the auction-based support system (Article 73(3u) of the Act on renewable energy sources), which, by supporting the sale of electricity generated in RES installations, guarantees the maximisation of the quantity of energy introduced to the power grid.
d)	Policies and measures to protect consumers, especially vulnerable and, if applicable, energy poor consumers, and to improve the competitiveness and contestability of the retail energy market.	**Information actions addressed to electricity and gas consumers** On-going information actions addressed to electricity and gas consumers, to the extent these tasks are currently carried out by: – operating an Information Centre for electricity and gas consumers, – operating an online energy price calculator, – preparing a Set of Consumer Rights. The President of the Energy Regulatory Office (URE) is engaged in works aimed at developing standard agreements between suppliers and operators of electricity systems (the so-called general distribution agreements), as well as monitors the retail energy market on an on-going basis. With respect to the improvement of protection of household consumers, mechanisms are currently in place aimed at protecting these consumers, among other things, by URE enabling them to have access to the offer calculator or to alternative dispute resolution methods. Once

		the calculator has been expanded and billing information has been simplified, household consumers will have an easier and broader access to information about offers and, consequently, more possibilities of deciding whether to switch suppliers. Additionally, due to active forms of participation in the electricity market, e.g. through the use of aggregation services, the undertaking of the self-consumer role or the use of dynamic price contracts, becoming more common, they will be able to influence the market to increase competition in it. The aforementioned measures are intended to enhance the position of vulnerable consumers and encourage them to take on a more active role in the electricity market. Expected effects for 2030: – raising awareness among consumers with respect to the rules of operation of the energy and gaseous fuel markets, – activating consumers in the area of electricity supplier switching, among other things by enabling offers to be compared with the use of the online calculator, – strengthening of the position of consumers in the energy and gas markets by raising consumer knowledge on and awareness of rights in their relations with energy companies, – conducting information campaigns to make consumers aware of their rights in their relations with energy companies, – in connection with the timeframe for deregulating gaseous fuel prices in the household sector set out in statutory regulations, an online tool for comparing supplier offers in this segment is planned to provided.
e)	Description of measures to enable and develop demand response including those addressing tariffs to support dynamic pricing[33].	**1. Amendment to transmission network codes which set out the detailed rules for participating in system services on the demand side** The development of these rules will be supported by the President of the Energy Regulatory Office (URE) to the extent they meet the proportionality and effectiveness conditions, including cost-proportionality and effectiveness, and to the extent they are based on the implementation of network codes and guidelines developed in the form of EU regulations. Expected effects (2030):

		– increasing the share of system services of the demand side in the operation of the energy market, – reducing energy shortfalls during peak demand.
		2. Introduction of smart meters into universal use Smart meters and broadly understood smart grid solutions are at the stage of development and mainly pilot programmes are being implemented. With respect to smart metering, legal framework will be created concerning the technical, legal and economic aspects of bringing smart meters into universal use. It is expected that 80 % of consumers will be equipped with smart meters by 2026.
3.4.4. Energy poverty		
a)	Policies and measures to achieve the objectives set out in 2.4.4.	**1. Formulation of the definition of energy poverty and the development of methodology adapted to Polish conditions** The problem of protection of vulnerable consumers against energy poverty has been addressed in the Recommendations of the Cabinet Economic Committee (CEC) under the name Clean Air Programme. Pursuant to the Programme guidelines, works on the following issues were carried out in 2018: – creating a definition of energy poverty adapted to Polish conditions, – developing a coherent methodology for diagnosing energy poverty and – creating a statistical model necessary to monitor the scale of the phenomenon in Poland. On the basis of the results of the works, the number of households affected by energy poverty will be specified, and then the most effective methods of reducing energy efficiency will be indicated. The issue of protection of vulnerable consumers is related to the problem of energy poverty. A vulnerable consumer is defined in the Energy Law (Article 3(13c)) and is entitled to receive a flat-rate energy allowance. The amount of the energy allowance is specified each year by the Minister for Energy and depends on the product of electricity consumption limit and the average electricity price for household consumers.

		2. Monitoring of the number of households affected by energy poverty At present (Q4 2018), a report is being accepted including recommendations for the definition of energy poverty and the model for examining and monitoring this phenomenon, which will enable the quantification of its scale. The methodology must be repeatable and therefore it must be based on data that is generally available and is often updated (provided by the Central Statistical Office (GUS) and EU SILC). Depending on the adopted definition of energy poverty (and its related components, e.g. the threshold of energy costs in household disposable income), the target groups eligible for support will be specified. The monitoring of the number of households affected by energy poverty will enable a reliable evaluation of the effects of the proposed solutions. It will make it possible to assess whether the proposed solutions are effective and which of them need to be changed (e.g. lack of access to a tool due to an incorrect assessment of the needs of the poor).
		3. Continuation of publicly (including EU) funded programmes and their possible adaptation to the needs of energy poor consumers, in particular loan programmes intended to finance modernisation measures aimed at improving energy efficiency At present, the most popular energy efficiency support system is the system of subsidies for thermal upgrading works. The available investment co-financing programmes are designated for multi-family buildings and addressed to creditworthy entities. According to preliminary research, ca. 60 % of energy poor people use single-family dwellings. What is more, a considerable proportion of energy poor people have no creditworthiness. As a result, a considerable proportion of such people are excluded from support programmes. Due to subsidy programmes, energy poor people will be able to carry out the most expensive investment projects (e.g. thermal upgrading works), which will contribute to a considerable increase in the efficiency of energy consumption and to a reduction in the share of energy costs in household budgets. In addition to thermal upgrading support programmes, at present an energy allowance is available, granted by the district administrator (wójt) or the mayor of the city or town and paid by municipal authorities. Nevertheless, the amount of the energy allowance is often insufficient to cover the costs of consumed energy. Adapting the requirements and facilitating procedures

		involved in granting allowances will contribute to reducing energy poverty.
		4. Construction, expansion and modernisation of the internal gas transmission and distribution network A systematic expansion of the gas distribution and transmission system is being conducted. The plans of Gaz-System S.A. with respect to the development of the **gas transmission network** envisage the construction of ca. 2 000 km of new gas pipelines by 2027. Also the Plan for development to satisfy current and future demand for gaseous fuels for the years 2016-2022 of Polska Spółka Gazownictwa Sp. z o.o. (PSG Sp. z o.o.), approved by the President of the Energy Regulatory Office, envisages an increase in the degree of gas infrastructure coverage from the current 58 % to 61 % in 2022. In 2016, ca. 2 200 km of **gas distribution networks** were delivered for use. As part of the expansion of the gas distribution network, in the period from January to the end of October 2017, PSG Sp. z o.o. constructed 39 980 new gas connections with an aggregate length of 359 km and over 460 letters of intent were signed regarding the supply of gas to new areas. The elimination of bottlenecks in the transmission and distribution system and the development of a gas supply network in regions which do not have access to such a network will enable further consumers to be connected to the network and the number of gas transmission and distribution services provided to be increased. An increase in the use of gaseous fuel for energy purposes will contribute considerably to the improvement of the quality of the air.
		5. Completion of the tariff deregulation process in the gas trading sector A number of measures have been undertaken in recent years to stimulate the development of competition in the Polish natural gas market. By virtue of an amendment to the Energy Law of 26 July 2013, a gas exchange obligation has been introduced to enable the creation of a liquid, wholesale natural gas market in Poland and to make the consumer's right to switch suppliers a reality. The President of the Energy Regulatory Office, by issuing individual decisions, has released entities which have submitted appropriate applications from the obligation to submit tariffs for approval with respect to trading in natural gas:

		– at a commodity exchange; – at a wholesale gas market; – in the LNG and CNG form and – by selling natural gas to gas system operators in order for them to carry out their tasks. As a result of a further amendment to the Energy Law, gas prices for trading companies were deregulated in December 2016 with respect to the sale of: – gas to wholesale consumers (at a wholesale market); – LNG and CNG; – gas to end consumers purchasing this fuel at a virtual point (including at a commodity exchange), in a tender procedure or by auction or public procurement. On 1 October 2017, prices for all remaining consumers were deregulated, except for household consumers. Natural gas prices for household consumers will be regulated by the President of the Cabinet until 1 January 2024. The deregulation of natural gas prices for particular consumer groups will enable a far-reaching liberalisation of the gas market and the development of competition in the gas trading sector.
		6. Monitoring of the protection of vulnerable gaseous fuel consumers by granting a fixed allowance for the purchase of fuel To protect the poorest, the group of vulnerable gaseous fuel consumers has been defined in an amendment to the Energy Law of 26 July 2013 (Journal of Laws of 2013, item 984) and the system of support for this group has been regulated. A vulnerable gaseous fuel consumer is a person who has been granted a fixed allowance for the purchase of fuel, in accordance with the Act on housing allowances of 21 June 2001 (Journal of Laws z 2017, item 180) and who is a party to a comprehensive agreement or an agreement for the sale of gaseous fuel and resides at the location where gaseous fuel is delivered. The Act on housing allowances covers support for the purchase of fuel for heating purposes. Initial value (2016): 4 million housing allowances paid in 2016. Target value (2030): No increase in the number of paid allowances.

3.5. Dimension Research, innovation and competitiveness

a)	Policies and measures including those to achieve the objectives set out in 2.5	**1. Implementation of the State science, technology and innovation policy** The targets and objectives of the state science, technology and innovation policy have been defined along seven strategic directions of research and development works formulated in the National Research Programme (NRP) adopted by the Cabinet in 2011. These directions form the basis for the Council of the National Centre for and Development (Rada Narodowego Centrum Badań i Rozwoju - NCBiR) to develop strategic research and development programmes as part of which R+D projects are subsidised. Strategic programmes have been carried out successively since 2011, as budgetary funds are available, consecutively for all seven NRP areas. On 1 October 2018, an act reforming the science and higher education system in Poland took effect, i.e. the Higher Education and Science Law of 20 July 2018 (Journal of Laws, item 1668). Pursuant to the new regulations, the NRP will apply until the Cabinet adopts (no later than by 31 March 2020) a new state science policy as part of which the priorities and strategic research programmes will be updated. The updated strategic research directions in the field of energy and climate should be consistent with the Strategy for Responsible Development (SRD) and, in the field of low-carbon technologies, additionally with the new Energy Policy for Poland 2040. The expenditures on research and development activities in Poland are planned to be increased to 1.7 % of the GDP in 2020 and to 2.5 % of the GDP in 2030, and new rules for using these expenditures as part of the science and higher education reform carried out since 2016, better adapted to prevailing social and economic conditions, are planned to be implemented. This will result in, among other things, raising the level and effectiveness of science in Poland, understood as the delivery of research results and products with a high cognitive quality and social, economic and technological usefulness. As a joint effect of these actions, the innovativeness of the economy will be enhanced and the international importance and competitiveness of Polish science will increase.
		2. Implementation of the Directions for Energy Innovation Development Programme In 2017, the Ministry of Energy developed the Directions for Energy Innovation Development (DEID). It is a document defining the broad innovation activity framework for the sector and

		institutions supporting it. The directions are to correlate strategic documents at the level of government administration and state agencies in the field of development and innovation policy for the energy sector. From the point of view of the implementation of the DEID, it is important to target public expenditures on the most attractive and at the same time the most urgent challenges as well as to activate leading business entities operating in the Polish energy sector and to increase their involvement in, including financial commitment to, research and development and implementation activities. Pursuant to the objectives of the aforementioned document, projects in the following areas will be carried out: – integrated and interconnected energy system giving the central role to the energy user; – effective and flexible energy generation and the use of raw materials combining the reduction of the impact on the environment with energy security; – diversification of energy generation and use technologies; – green and energy-efficient city. The key factor for the development and implementation of innovations is the understanding of particular types of innovations and the development stages of a given technology. Innovations do not cover new technologies only, but also processes and organisational structures. Therefore a lot of attention has been given in the DEID to, among other things, new business models which are based on the application of technologies in a different manner or in another market segment. Moreover, to understand the fundamental problems of the phenomenon known as the valley of death, faced by companies not only in Poland but worldwide, innovations have been divided according to time and type: – current projects – short-term incremental innovations (up to two years), – development projects – medium-term incremental projects (two to four years), – projects for the future – long-term breakthrough innovations (more than four or five years). In view of the above, in the period 2021-2030, efforts should be focused mainly on three levels: – **support for new ideas and incubation**, where a condition for success is the generation of as many low-funding and high-risk projects as possible, with short processing and

		decision making time, and the creation of a start-up community and an innovation ecosystem; – **support for diffusion and commercialisation**, where a condition for success is the commitment of venture capital and the involvement of large entities as customers and product consumers; – **support for expansion and international development**, where a condition for success is cooperation of large and medium-sized companies and support for international expansion through economic diplomacy. A weakness of the Polish system is undoubtedly the technology development and implementation stages which involves the need for technologies to be piloted and scaled. This is why, in the operation of existing institutions dealing with energy sector innovations or institutions established for this purpose, special emphasis is placed on precisely the aforementioned issues. To streamline works in the area of energy sector innovations, works carried out as part of research and analytical back-up facilities must be coordinated. The objective remains to be the optimisation of the use of funds allocated to research, development and innovation due to [ ] the activities of various institutions. Cooperation between universities and companies should lead to an increase in the number of patents, and also in the exchange of staff between academic centres and industry. An important issue is the enhancement of the exchange of knowledge with foreign centres and the implementation of placement programmes for researchers in energy sector entities. One of the tools may be course programmes sponsored by and created jointly with market entities, conducted by lecturers working on a permanent basis for the most renowned foreign centres and the cooperation of the Polish energy business entities with renowned foreign research centres. Moreover, in addition to researchers, sector company employees should be more involved in international cooperation, through study visits or educational programmes in Poland or work for foreign subsidiary entities. This is particularly important for creating and developing an innovation ecosystem which should also cover cooperation with the following related sectors: chemical, information technology and telecommunications, motor industry or defence sectors. It is important to ensure that, within the framework of the regulations in force both concerning

		the energy sector (tariff system) and intersectoral ones (Public Procurement Law), entities investing in Poland in research, development and innovations be rewarded, e.g. by taking into account expenses on R+D+I and on cooperation with local research centres. It is also important that space be created for the implementation of new solutions. Investments in the energy sector, in particular in innovations, may leverage the development of the entire economy and should be analysed from the point of view of the maximisation of benefits for the Polish economy – not only in terms of standard economic parameters, but also in terms of their potential for the development of science and industry. Natural synergies exist between the energy sector and related sectors, e.g. the chemical, information technology and telecommunications, transport or construction sector. The use of these synergies is beneficial for companies operating in these sectors and offers new possibilities to consumers. Therefore, the criterion for the assessment whether to invest in the energy sector should be the maximisation of national value added, in particular the possibility of obtaining technologically advanced products and services. The achievement of the objectives set out in the strategic document Directions for Energy Innovation Development by 2030 will result in the strengthening of the synergy effect in the area of innovations between companies, public institutions and the science sector, leading to such effects as: – increase in expenditure on R+D+I in energy sector entities by 200 % as compared with 2018; – revenues in energy sector entities from segments which were not included in the existing offer or were marginal in 2018 reaching 25 %; – increase in the number of submitted employee innovations in energy sector entities by 200 % as compared with 2018; – SAIDI (System Average Interruption Duration Index) – improvement by 20 % as compared with 2018 and SAIFI (System Average Interruption Frequency Index) – improvement by 25 % as compared with 2018; – utilisation of 30 % of waste generated in the energy sector; – utilisation of at least 0.5 billion m^3 of coal-bed methane (CBM) annually; – increase in the utilisation of coal-mine methane (CMM), ventilation-air methane (VAM)

		and abandoned-mine methane (AMM) by 100 % as compared with 2018; – reduction of energy-consumption of buildings by 20 % as compared with 2018; – 10 % of industrial buildings being equipped with BEMS (Building Energy Management Systems); – increase in the number of patent applications in energy sector entities and research institutes by 200 % as compared with 2018; – reduction of unit energy consumption in industry by 20 % as compared with 2018; – increase in the number of agreements and understandings between the energy sector, industry and research units by 150 % as compared with 2018; – enhancement of the technological advancement and competitiveness of the Polish energy sector and reduction of the adverse impact on the environment.
b)	Cooperation with other Member States in this area, including information on how the SET Plan objectives and policies are being translated to a national context.	**Cooperation with the European Commission and Member States as part of the works of the SET-Plan Steering Group** Due to the range of topics: science-energy-industry, Members States are represented in the Steering Group both by representatives of the ministries responsible for energy policy, and those responsible for research (Poland is represented by the representative of the Ministry of Energy and the Ministry of Science and Higher Education). At present, cooperation concerns primarily the participation in the works of TWGs (temporary working groups), being successively converted to IWGs (implementation working groups), whose main task is to develop and then carry out implementation plans for the 10 key actions specified in the Commission Communication adopted on 19 September 2015, under the name Communication on accelerating the European energy system transformation – an integrated SET Plan (C(2015) 6317). In aggregate, 15 TWGs have been set up, dealing with topics corresponding to the 10 key areas specified in the aforementioned Communication (as part of selected priorities two different groups have been set up for each of them based on the complexity of issues). Poland has joined two TWGs: TWG Action 6 ‘Energy efficiency in industry’ and TWG Action 10 ‘Nuclear’.

c)	If applicable, financing measures in this area at national level, including EU support and the use of EU funds.	**1. Obtaining of European funds by domestic research units and companies for research and innovation projects** An analysis of the experience based on measures undertaken to day within the framework of the innovation policy conducted by Poland and the experience based on the implementation of the previous and current financial perspectives have highlighted the need to target support on areas with the greatest competition and innovation potential for the national economy. The current share of Polish entities in the Horizon 2020 framework research and innovation programme barely reaches 1 %. Among the factors that can be indicated as the reasons for Poland's insufficient share in the framework programme is the low capability of Polish entities to generate projects for which funds may be sought effectively in European competition conditions. The low level of this share is correlated with low national expenditures on research, development and innovations. On the basis of this experience, investments should be focused in areas ensuring an increase in the value added of the economy and its competitiveness in foreign markets. The basic instrument is support addressed to companies to enable them to undertake and develop (continue) R+D+I activities, owing to which companies will raise their competitiveness, relating to, among others, the following areas: – high-efficiency, low-carbon, flexible and integrated energy generation, storage, transmission and distribution systems; – smart and energy-efficient building technologies; – environment-friendly transport solutions; – minimisation of waste generation, including waste unfit for processing, and the use of waste for materials production and energy generation purposes (recycling and other forms of recovery). At present, research and development works are being conducted leading to innovations in the area of environmental and low-carbon technologies and technologies enabling the effective (economical) resource management. Innovative solutions to problems in the area of sustainable development, including low-carbon transport and renewable energy generation, identified by the public sector (e.g. through the pre-commercial public procurement mechanism) can also be

		developed. Moreover, the executive agency overseen by the Ministry of Science and Higher Education – the National Centre for Research and Development will subsidise the participation of Polish companies in R+D projects from the European Structural Funds, which should lead to carrying out between ten and twenty sector projects and research and innovation joint venture projects, including in the area of low-carbon emission technologies.
		2. Energy storage facilities, including cells and batteries for electric vehicles The development of electromobility is consistent with the EU strategic direction presented in e.g. the Clean Mobility Package (an initiative related to batteries) and the European Commission Communication concerning innovations in the energy sector COM (2016) 763. This area must be covered by a support instrument as a market that is only at the stage of development. The solutions that are currently in operation are expensive and do not meet consumers' expectations. Projects carried out in this area are characterised by a long payback period and a high-risk rate of return and therefore the private sector is not interested in investing on the required scale. New technologies in this area may have many applications, e.g. in the energy sector and in transport.
		3. Support for the expansion of infrastructure for the distribution and sale of alternative fuels used in transport Alternative fuels are at an early stage of development or at the pilot or even experimental stage and therefore this area needs special financial support. Due to the low level of development of the market, as well as the fact that it is a key element for bringing electric vehicles into universal use, vehicle charging and refuelling infrastructure should be supported primarily from public funds. In all market analyses, the absence of infrastructure is indicated as the main barrier, and because of major differences in the profitability of projects carried out in various locations support should be provided in as flexible forms as possible. Poland intends to be an active partner in creating the European network of alternative fuel charging and refuelling stations in accordance with the guidelines set out in Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure and the Clean Mobility Package published by the EC in November 2017. The Act on electromobility and

		alternative fuels implements Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure into Polish law. The act is to regulate the newly emerging market for the distribution and sale of alternative fuels used in transport and to enable the fulfilment of the obligation towards the EU. Due to the fact that air pollution and CO_2 emission in Polish cities exceed pollution and emissions in most EU states, support should be sufficiently intense and instruments sufficiently flexible to ensure reasonably quick development of zero- and low-carbon transport. Due to increasing global competition in the market of alternative fuel vehicles and infrastructure and software for them, Poland finds it necessary to support domestic industry with public funds at this early stage of its development. This is consistent with the incentivising models for the so-called infant industries adopted in the world, as well as is underpinned in, among other things, the directions set in the EC Communication on accelerating clean energy innovation COM (2016) 763.
		4. Implementation of the Power-to-Gas group technologies The implementation and development of Power-to-Gas technologies will make it possible to: – prevent electricity network congestion caused by over-generation of energy from the unstable operation of renewable sources; – optimise the use of the gas network (after power-to-gas transformation); – integrate the electricity and gas systems. The Power-to-Gas technology is currently used at an early stage of development. It should be assumed that the implementation of the technology on a scale having a real impact on the energy sector in Poland cannot be financed with the use of market mechanisms.
		5. Construction of small-scale regasification plants with a cooling energy recovery module The purpose of the project is to construct a small-scale regasification plant with a cooling energy recovery module which might also operate as a plant supplying natural gas to make up for shortfalls in the transmission/distribution system. The implementation of the project would contribute to enhancing the flexibility of the operation of the transmission network and to improving the energy efficiency of the natural gas transmission system in Poland. The project

		enhances the use of LNG importing infrastructure and promotes the development of low-carbon energy sources.
		6. Support for research and implementation projects relating to putting autonomous or partly autonomous alternative fuel vehicles into service The Act on electromobility and alternative fuels of 11 January 2018 introduces the possibility of using roads for testing autonomous vehicles, thus contributing to the development of this technology. The issue of introducing autonomous vehicles into transport services has also raised interest in the European Commission, which in its report Autonomous cars: a big opportunity for European industry (published in January 2017 in Digital Transformation Monitor) indicated the main areas of benefits – not only for the European economy, but primarily for EU citizens. First of all, the improvement of safety should be mentioned (ADAS – Advanced Driving Assistance System) and the fact that smart and interconnected transport systems (ITS – Intelligent Transport Systems) will be brought into universal use, an expected effect of which is, among other things, the shortening of the time of transport of goods in the EU. The need to drive the vehicle being eliminated, semi-autonomous cars will save approximately one hour of spare time for the driver each day. In view of the above it is expected that part of work-related activities could be carried out already in the vehicle. In the opinion of some analysts, this may contribute to the improvement of employee productivity by as much as 10 %-15 %.
		7. Support for recycling batteries from electricity-fuelled vehicles This area needs to be covered by a support instrument as a market at the development stage. Electric vehicles have appeared on roads relatively recently and, consistently with European plans and the economic trend, their number will be growing. Taking into account the rare-earth materials from which batteries are made, the current and planned price and also the fact that they continue to preserve ca. 80 % of their initial performance capacity, battery recycling is an area to develop. Moreover, recycling issues are also consistent with the sustainable growth and circular economy policies promoted in the European Union.

		8. Use of mining waste and combustion by-products The minimisation of the impact on the environment, implying, among other things, the reduction of waste generation at source, must refer to the conditions and specific nature of particular industries. The mining industry has its characteristics and circular economy (circular economy, CE) targets should be adapted to them. The mining sector, by using natural resources as the main raw material, has limited possibilities of becoming a typical area of circular activities. In spite of this, mining companies, when conducting their medium- and long-term operations, should take into account those changes in the political, legislative and market environment which will affect their competitiveness, flexibility, efficiency and innovativeness in the future. In the mining sector, waste generation at source is reduced already at the stage of designing mineral exploitation as well as through the optimisation of the applied deposit mining technologies. Waste in the form of fly ash, slag, ash-and-slag mixture and reaction waste from exhaust gas treatment plants constitutes anthropogenic minerals (AM), whose pozzolanic and hydraulic properties have been known for years. They may and should be fully used by construction industry. Due to their specific properties, combustion by-products (CBP) and mining by-products may replace natural raw materials and thus reduce the need to mine them and emissions relating to this process. There is a great potential in Poland for using anthropogenic minerals in the process of mining site recultivation. This area will develop in Poland due to a considerable scale of mining (both deep and open-cast mining) in the recent decades and growing pressure to restore environmental conditions in mining areas and thus to increase their potential to be used for other purposes.
		9. Creation of investment areas at former mining sites Development of former mining sites to assign them new economic functions along with a possibility of promoting them. Former mining sites are attractive in economic terms due to their location (agglomeration centres, vicinity of motorways) and the fact that they have utilities infrastructure, railway sidings, are zoned industrial in local zoning plans and occupy large areas.

		Possible measures in this respect will consist in the comprehensive preparation of sites for economic activity. The purpose will be to prepare investment sites, including economic activity zones, to be used for the needs of potential investors. Projects ensuring the comprehensive preparation of an investment site may be carried out, that is projects raising the attractiveness of the site for investors, for example consisting in: recultivating or securing former mining sites (e.g.: landslides), levelling them or providing or supplementing infrastructure (i.e. sewage and rainwater systems, water supply networks and power, heat supply, telecommunications or gas supply networks etc.). Expenditures on internal transport infrastructure (internal roads) should be treated as a complementary element of the project and thus may only account for a smaller portion of the project budget. Investments in the information technology infrastructure (ITI) are permissible if they are necessary to provide comprehensive infrastructure for the investment site. They may consist in providing a telecommunications and data transmission network while excluding the site on which the investment project is being carried out.
		10. Support for the producers of means of transport using alternative fuels Due to increasing global competition in the market of alternative fuel vehicles, Poland finds it necessary to support domestic industry with public funds at the early stage of its development. The main instruments stimulating the development of vehicle production should be repayable mechanisms, such as loans, capital entries and the acquisition of bonds. Non-repayable instruments should be applied only in exceptional and justified cases, in particular in relation to minor investment projects, for which the grant element is the last element enabling the financial arrangements to be concluded.

[1] Cabinet Regulation of 24 April 2017 regarding the minimum diversification level of natural gas supplies from abroad.

[2] Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (hereinafter: the Effort Sharing Regulation, ESR).

[3] Regulation of the European Parliament and of the Council on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision 529/2013/EU (hereinafter: the LULUCF Regulation).

[4] Regulation of the European Parliament and of the Council on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 for a resilient Energy Union and to meet commitments under the Paris Agreement and amending Regulation No 525/2013 of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change.

[5] According to the assessment of the Institute of Agricultural and Food Economics (Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej - IERiGŻ) National Research Institute (Państwowy Instytut Badawczy - PIB) conducted as part of the expert opinion prepared at the request of the Ministry of Agriculture and Rural Development.

[6] Estimates of the Institute of Agricultural and Food Economics (IERiGŻ).

[7] Institute of Soil Science and Plant Cultivation - National Research Institute (Instytut Uprawy Nawożenia i Gleboznawstwa – Państwowy Instytut Badawczy) in Puławy, the study entitled: 'Sprzedaż słomy przez rolników na cele energetyczne i jej wpływ na żyzność i urodzajność gleb'.

[8] The presented solid agricultural biomass estimates are based on crops harvested every year, having regard to the demand for it in agriculture.

[9] Consistency shall be ensured with the preventive action and emergency plans under Regulation [as proposed by COM(2016) 52] concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010, as well as the risk preparedness plans under Regulation [as proposed by COM(2016) 862] on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC.

[10] The function of the Transmission System Operator (TSO) is performed in Poland by Polskie Sieci Elektroenergetyczne S.A. (PSE) – defined in the Energy Law – as the energy company dealing with electricity transmission, responsible for grid traffic in the power transmission system, the on-going and long-term security of operation of this system, the operation, maintenance and renovation or overhaul as well as the necessary expansion of the transmission network, including interconnections with other electricity systems. The obligations of PSE include system balancing consisting in balancing electricity demand with supply and managing system constraints in order to ensure the secure operation of the electricity system. In the case of the occurrence of technical constrains in the capacity of these systems, the system constraints are managed within the required technical electricity parameters.

[11] Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013, p. 39).

[12] The 'flow-based approach' means a capacity calculation method in which energy exchanges between bidding zones are limited by power transfer distribution factors and available margins on critical network elements. The FBA makes it possible to use the available transmission capacity in a better manner which is more effective in economic terms.

[13] Source: National Inventory Report 2018, KOBiZE

[14] The programme is available at the website https://www.mos.gov.pl/srodowisko/ochrona-powietrza/krajowy-program-ochrony-powietrza/, as at 10 April 2018.

[15] 'Stan środowiska w Polsce, Sygnały 2016', Chief Inspectorate of Environmental Protection, Warsaw 2016.

[16] The report is available at the website https://powietrze.gios.gov.pl/pjp/content/show/1001097, as at 10 April 2018.

[17] When planning these measures, Member States are to take into account the end of life of existing installations and the potential for repowering.

[18] See also: Direction 3, Part A – Energy storage.

[19] The white certificate scheme was introduced on the basis of the Act on energy efficiency of 15 April 2011 (Journal of Laws z 2015, items 2167 and 2359 and of 2016, item 266), and was in place from 1 January 2013 to 30 September 2016 in accordance with this act. In 2016, a new act was adopted, i.e. the Act on energy efficiency of 20 May 2016 (Journal of Laws item 831), extending the scheme until 2020.

[20] In accordance with Article 2a of Directive 2010/31/EU, version as amended in accordance with proposal [COM(2016) 765].

[21] In accordance with Article 18 of Directive 2012/27/EU.

[22] In accordance with Article 8 of Directive 2012/27/EU.

[23] In accordance with Articles 12 and 17 of Directive 2012/27/EU.

[24] In accordance with Article 19 of Directive 2012/27/EU.

[25] In accordance with Article 15(2) of Directive 2012/27/EU.

[26] Policies and measures must reflect the energy efficiency first principle.

[27] Consistency shall be ensured with the preventive measure and emergency plans under Regulation [as proposed by COM(2016) 52] concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010, as well as the risk preparedness plans under Regulation [as proposed by COM(2016) 862] on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC.

[28] The Demand Side Response (DSR) service consists in reducing power demand with the use of tools to manage energy demand.

[29] Policies and measures must reflect the energy efficiency first principle.

[30] The 'flow-based approach' means a capacity calculation method in which energy exchanges between bidding zones are limited by power transfer distribution factors and available margins on critical network elements. The FBA makes it possible to use the available transmission capacity in a better manner which is more effective in economic terms.

[31] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

[32] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

[33] In accordance with Article 15(8) of Directive 2012/27/EU.