Polskie Sieci Elektroenergetyczne

Development plan for meeting current and future electricity demand for the years 2025-2034

Main document

www.pse.pl

Contents

List of names, abbreviations and designations

AC PF	Alternating Current Power Flow
CBAM	Carbon Border Adjustment Mechanism – a mechanism of adjusting prices on borders taking account of carbon dioxide emissions
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilisation
CDGU	Centrally Dispatched Generation Unit
CEP	Clean Energy Package – a legislative package ratified in 2019, regulating the operation of the electricity market in the European Union – "Clean Energy for all Europeans"
CEP70	A requirement provided in Article 16(8) of Regulation 2019/943 included in the CEP, imposing on the EU transmission system operators, including PSE S.A., the obligation to make available to market participants, from 1 January 2020, cross-zonal capacity of not less than 70% of the transmission capacity for the border concerned (CNTC approach – Coordinated Net Transmission Capacity) or a critical network element (the FBA method – Flow Based Allocation) determined respecting the operational security limits of the system.
CY	(Climate Year) – is a term introduced for the purpose of adequacy analyses conducted by ENTSO-E. One climate year is a set of such data as air temperature, insolation, wind power and hydrological conditions for every price zone in Europe. The entire database covers climate data from 38 climate years (1982-2019)
DC SCUC	Direct Current Security Constrained Unit Commitment – is an economically optimal demand coverage while meeting the permissible load of network components as well as technical restrictions of generation resources operation and cross-border exchange set.
DSO	Distribution System Operator
DSR	Demand Side Response – a service consisting in voluntary and temporary reduction of electricity consumption by consumers or rescheduling consumption at an instruction of TSO in exchange for expected remuneration.
DTS	Dynamic Transformation Scenario
DTSO	Dynamic Transformation Scenario with unlocking the Offshore potential
EENS	Expected Energy Not Supplied – expected volume of not supplied energy due to power deficits in the given period
EHV	Extra High Voltage
EL Act	Energy Law Act
ENTSO-E	European Network of Transmission System Operators for Electricity
EPP	Energy Policy of Poland until 2040, approved by the Council of Ministers on 2 January 2021
ERAA	European Resource Adequacy Assessment – a requirement included in regulation of the European Parliament and of the Council (EU) 2019/943 of 5 June 2019 on the internal market for electricity
ERO	Energy Regulatory Office
ES	Electricity storage
EU	European Union
EU ETS	European Union Emissions Trading System
EV	Electric Vehicles
"Fit for 55" package	A package of legislative proposals as part of the European Green Deal presented on 14 July 2021 by the European Commission and concerning proposed changes to EU legislation and the introduction of new initiatives to ensure that EU policies are in line with the climate targets agreed by the Council and the European Parliament.
FTS	Free Transformation Scenario

HVDC	High-Voltage Direct Current line
LADP	Local Area Development Plan
LOLE	Loss of Load Expectation – expected aggregated duration of power deficits in the given period
MAF	Mid-Term Adequacy Forecast
NECP	The National Energy and Climate Plan for 2021-2030 submitted to the European Commission on 30 January 2019.
NPP	Nuclear power plant
NPS	National Power System
NTN	National Transmission Network
OfWPP	Offshore wind power plant
OnWPP	Onshore wind power plant
PNPP	Polish Nuclear Power Programme of 2 October 2020
PRSP	Development Plan for meeting current and future electricity demand
PRSP 2023-2032	Development Plan for meeting current and future electricity demand for the years 2023-2032
PRSP 2025-2034	Development Plan for meeting current and future electricity demand for the years 2025-2034
RES	Renewable Energy Sources
P2P	Power-to-Power – the use of the process of transforming electricity into stored energy (e.g. in hydrogen) and re-transforming it into electricity afterwards
PCI	Projects of Common Interest for the European Union
PEJ	Polskie Elektrownie Jądrowe sp. z o. o.
PSE S.A.	Polskie Sieci Elektroenergetyczne S.A.
PSP	Pumped storage plant
PV	Photovoltaic
SCED	Security Constrained Economic Dispatch – the most economical generation distribution taking into account restrictions concerning the power generation system operation
SWS	Severe Weather Scenario – a model of climate year elaborated for the purpose of analyses carried out as part of PRSP 2025-2034
TEN-T	Trans-European Transport Networks
TSO	Transmission System Operator
TYNDP	Community-wide Ten-Year Network Development Plan

1 Introduction

This Development Plan for meeting current and future electricity demand for the years 2025-2034, in short: Transmission network development plan (PRSP 2025-2034), is a continuation and extension of the planned investment actions laid down in the previous plans, in particular in its latest edition for the years 2023-2032.

The presented scope of network investments has been confirmed by relevant technical and economic analyses which took account of the scenarios for the development of the environment and the interior of the power system, based on the most recent knowledge. The objectives of the investments presented in the Development Plan have not changed. Their future implementation still means supporting:

- the ongoing energy transition manifested, among others, through the increase in the share of energy from low- and zero-carbon sources,
- plans to build offshore wind farms in the Baltic Sea as well as nuclear power plants,
- connections of new customers, generation units and energy storage facilities,
- improving power supply conditions, including minimising network congestions throughout the system in particular in the context of the planned construction of renewable (wind) sources in northern Poland, both offshore and onshore,

as well as the implementation of the hydrogen strategy, the development of electromobility and prosumerism or the "Fit for 55" package.

In this plan, PSE S.A. continues to work on the construction of an HVDC line connecting areas in the northern and southern parts of the country, the purpose of which is to create conditions for the transmission of electricity generated by onshore and offshore wind sources gathered in the north to consumers located in the south.

In light of the amendment to the Act on promoting electricity generation in offshore wind farms, increasing support for offshore wind development by another 7 GW to almost 18 GW, it is also legitimate to strengthen the network in the north-western and western parts of the country, as conceptually presented in the PRSP 2025-2034.

In this plan, PSE S.A. has also expanded its offer to investors and DSOs by presenting a series of investments in substations for the purpose of connecting new customers. These investments basically cover the entire territory of the country.

Summing up, the PRSP 2025-2034 presents a network that:

- will enable the implementation of the country's energy transition, with the ultimate goal of achieving climate neutrality in 2050,
- will provide a solid basis for planning future changes in the NPS environment, especially in the scope of initiatives increasing demand for power and electricity.

Therefore, the Management Board of Polskie Sieci Elektroenergetyczne S.A. is convinced that this Development Plan fits very well into the country's energy transition programme and offers a strong foundation for the development of the Polish economy.

At the same time, it should be emphasised that due to the obsolescence of the assumptions made in the existing strategic documents, in particular the EPP and the NECP, this document uses them only in part as supporting material, while it does not ensure full compliance with them. Similarly, due to the early stage of the work, the PRSP does not take into account the draft partial update of the "National Energy and Climate Plan until 2030" submitted in March 2024 by the Ministry of Climate and Environment to the European Commission. If updates to the NECP, EPP or other documents of significant importance for the development of the transmission network are adopted – they will be included in subsequent editions of the PRSP, respectively.

Notwithstanding the above, PSE S.A. is also working to include in future editions of the Development Plan opportunities arising from the potential for flexibility and possible scenarios for amending the rules applicable to capacity markets.

2 Context and structure of the document

PSE S.A. is an enterprise acting as a power transmission system operator in Poland, which under the Act of 10 April 1997 – the Energy Law, is involved in power transmission and is responsible for network operation in the transmission system, current and long-term operational security of the system, operation, maintenance, repairs and necessary expansion of the transmission network, including interconnections with other power systems.

This document represents the development plan for meeting current and future electricity demand for electricity. It has been prepared in accordance with the provisions of Article 16 of the EL Act, taking into account, in particular:

- Spatial development plans of provinces (Article 16(12) of the EL Act),
- Energy policy of Poland (Article 16(1)(3) of the EL Act),
- National Energy and Climate Plan (Article 16(1)(7) of the EL Act),
- ENTSO-E’s 10-year development plan TYNDP 2022 (Article 16(1)(4) of the EL Act),
- implementation of connection agreements and defined conditions for connection to the transmission network (Article 16(11) of the EL Act),
- fulfilment of other commitments, including arrangements with DSOs (Article 16(12) of the EL Act).

In addition, this plan takes into account the requirements of the provisions of the Directive of the European Parliament and of the Council (EU) 2019/944 of 5 June 2019 on common rules for the internal market for electricity (and amending Directive 2012/27/EU) and the Regulations of the European Parliament and of the Council (EU) of 5 June 2019, i.e.:

- 2019/941 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC,
- 2019/942 establishing the European Union Agency for the Cooperation of Energy Regulators,
- 2019/943 on the internal market for electricity.

The table on the following page presents the structure of this document, i.e. titles and contents of each chapter.

Document structure

Chapter	Content
3. Environment and current status of the National Power System	▪ Selected elements of the environment and the interior of the NPS of key significance from the point of view of transmission network development planning
4. Assumptions and results of planning studies	▪ Assumptions for transmission network development analyses, i.e. the baseline environment development option and possible sub-options that this plan addresses ▪ Results of partial analyses of the NPS operating conditions resulting from the assumed development of the environment
5. Results of the transmission system development analysis	▪ List of planned investment tasks ▪ Maps and material effects of planned investment tasks
6. HVDC line construction project	▪ Justification for the use of DC power transmission technology in the NPS
7. Own power resources	▪ Justification and basic assumptions for TSO's plans to build new power resources
8. Transmission network development concept for OWF connection	▪ List of planned investment tasks necessary to connect and evacuate power from the OWF
9. Connection and evacuation of power from nuclear power plants	▪ List of planned investment tasks necessary to connect and evacuate power from the nuclear power plants ▪ Implementation phases
10. Generation resources adequacy analysis	▪ Forecast of the electricity supply security for the years 2025-2040

3 Environment and current status of the National Power System

3.1 National strategic documents on energy sector development

Currently applicable strategic documents concerning the development of the sector are presented below.

- The National Energy and Climate Plan for 2021-2030 (NECP)
  Submitted to the European Commission on 30 December 2019
- Act on promoting electricity generation in offshore wind farms
  Passed by the Sejm on 17 December 2020 and amended on 17 August 2023
- Energy Policy of Poland until 2040 (EPP)
  Approved by the Council of Ministers on 2 February 2021
- Polish Nuclear Power Programme (PNPP)
  Approved in its current version by the Council of Ministers on 2 October 2020
- Polish Hydrogen Strategy until 2030 (with an outlook to 2040)
  Adopted by the Council of Ministers 2 November 2021

Since the drafting of PRSP 2023-2032 approved in November 2022, no new documents outlining the directions of changes to the National Power System have come into force.

Both the EPP, PNPP and NECP assume that significant structural changes will take place in the NPS in the next few decades. By 2040, the total net generation capacity of power generation sources is projected to increase significantly. The role of coal-fired system units will be limited – their share in the net installed capacity will be reduced. There will be a marked increase in the share of RES (mainly from wind and solar power plants) in electricity generation. The share of gas units is also expected to increase. All these documents are consistent in terms of the starting date of the nuclear power programme. They assume that the first nuclear power plant unit will be put into operation in 2033 and the following years will see the gradual launching of subsequent units.

The hydrogen strategy defines the main goals behind the development of the hydrogen economy in Poland and the directions of activities needed to achieve them, but does not include projections of the structure of installed capacity in the power system.

The fundamental conditions arising from the presented strategic documents continue to form the basis for the preparation of this update of the PRSP; nevertheless, the assumptions derived from them have been supplemented by PSE S.A.'s current knowledge of the possible directions of future changes in the power sector. According to PSE S.A., these additions are directionally consistent with the changes specified in the referenced national documents.

3.2 Strategy for the development of the energy sector in the European Union

In line with the EU climate strategy, the goal of the energy transition is to provide low-carbon, reliable and cost-effective energy services at the lowest possible cost to society, which will also decarbonise the entire energy system.

In practice, this means decarbonisation and electrification of the EU economy by linking its sectors through electricity derived mainly from renewable sources. Electricity is expected to be the dominant carrier to meet energy needs, including for heat generation, cooling and transportation in the broadest sense.

Integration of sectors will be based on large-scale electrification. For this reason, in order to ensure a significant reduction in CO_2 emissions, most of the required energy in the long term will have to be supplied from renewable energy sources or nuclear sources, which is a significant challenge in terms of construction: new energy sources, energy storage facilities and electricity networks. This also means that in the future the importance of operators responsible for operation management will increase, as they will acts as integrator of interconnected energy subsystems.

EU legal regulations

On 14 July 2021 the European Commission presented the “Fit for 55” package of legislative proposals as part of the European Green Deal. It is a set of proposed changes to EU legislation and new initiatives to ensure that EU policies are in line with the climate targets agreed by the Council and the European Parliament. The primary goal is to decarbonise the EU economy by 55% by 2030 compared to the levels from 1990, which is to enable the achievement of climate neutrality by 2050.

In terms of its impact on the NPS, the “Fit for 55” package introduces, among other things, a tightening of the rules of the EU ETS (European Union Emissions Trading System), the establishment of a separate emissions trading system for buildings and road transport, and the addition of a Carbon Border Adjustment Mechanism (CBAM) in order to tax imports of carbon-intensive products such as steel and cement. Other proposals in the package include the dynamic development of infrastructure for charging cars with alternative fuels in the field of transportation, phasing out the sale of petrol and diesel cars by 2035, raising targets for energy efficiency and the share of renewable energy sources.

Directives and regulations affecting the system development planning process and included in the “Fit for 55” package have recently come into force.

On 16 May 2023 a Directive amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community and Decision (EU) 2015/1814 on the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme was published in the EU Official Journal. The new legislation increases to 62% the emission reductions projected for 2030 in the covered sectors (compared to the 2005 levels).

On 22 September 2023 a Regulation on the deployment of alternative fuels infrastructure was published in the EU Official Journal. The Regulation stipulates specific targets to be met by 2025 and 2030, among others:

- by 2025, stations with an output of at least 150 kW for fast charging of cars and vans should be installed every 60 km along the EU’s most important transport corridors (the so-called Trans-European Transport Network TEN-T),
- stations with a minimum output of 350 kW for truck charging should be placed every 60 km along the TEN-T core network and every 100 km along the broader comprehensive TEN-T network. The process should start in 2025 to be completed by 2030.

On 20 September 2023 a new energy efficiency directive was published in the EU Official Journal. The Directive significantly increases the EU ambitions with regard to energy efficiency. Raising the EU energy efficiency target means that by 2030 EU countries will have to collectively ensure an additional reduction in energy consumption by 11.7% compared to 2020 baseline scenario projections. EU Member States are required to achieve cumulative savings in final energy consumption over the entire obligation period (from 2021 to 2030), corresponding to new annual savings of at least 0.8% of final energy consumption in the years 2021-2023, at least 1.3% in the years 2024-2025, 1.5% in the years 2026-2027, and 1.9% in the years 2028-2030.

On 31 September 2023 a new renewable energy directive was published in the EU Official Journal. Its main objective is that by 2030 the share of this form of energy in gross final energy consumption in the EU should increase to 42.5%, and possibly, with an additional commitment at the indicative level of 2.5%, even to 45%. Each Member State is to take part in achieving this common goal. According to preliminary estimates, Poland's contribution in 2030 should be about 31.5% of renewable energy in gross final energy consumption.

The above decisions do not seem to have exhausted the European Union's climate ambitions, and more plans are already being announced to further reduce emissions and tighten the climate policy.

3.3 Tasks carried out by ENTSO-E

Fulfilling its obligation under the provisions of Regulation (EU) 2019/943 of the European Parliament and of the Council on the internal market for electricity, ENTSO-E adopts and publishes a non-binding Ten-Year Network Development Plan (TYNDP) every two years. The plan covers the pan-European development of electricity infrastructure and the manner of using cross-border electricity interconnections and energy storage facilities to make the energy transition cost-effective and secure. The latest edition of this plan, i.e. TYNDP 2022, was published in May 2023.

Regulation 2022/869 requires ENTSO-E to develop and publish high-level strategic integrated maritime network development plans for each sea basin forming part of the TYNDP. The plans provide a comprehensive overview of offshore energy production potential and associated needs concerning offshore transmission network, including potential needs with respect to interconnection, hybrid projects, radial connections, reinforcements and hydrogen infrastructure. The first edition of this plan was published in January 2024, and subsequent editions will be published as part of each TYNDP plan.

3.3.1 Community-wide Ten-Year Network Development Plan

The table below presents projects forming part of TYNDP 2022 concerning the development of the national transmission network and cross-border connections. These projects are also present on the current EU list of Projects of Common Interest (PCI) established by the European Commission. PRSP 2025-2034 takes into account the below investment projects within the territory of Poland until 2034.

Table 3.1 List of projects in TYNDP 2022 including the development of the national transmission network

Project name and number	Investment	TYNDP No.	PCI No.
GerPol Power Bridge I No. 230	Construction of the 400 kV Baczyna-Krajnik line	230.353	
	Construction of the 400 kV Mikułowa-Świebodzice line together with expansion of the 400/220/110 kV Świebodzice substation and 400/220/110 kV Mikułowa substation	230.355	
	Construction of the 400 kV Baczyna-Plewiska line	230.1232	
	Construction of the 400/220/110 kV Baczyna substation together with the connection of the 400 kV Krajnik-Plewiska line and the 220 kV Krajnik-Gorzów line	230.1035	
LitPol Link Stage II No. 123	Construction of the 400 kV Ostrołęka-Stanisławów line together with expansion of the 400 kV Stanisławów substation and 400/220/110 kV Ostrołęka substation as well as connection to the 400(220)/110 kV Wyszków substation	123.373	3.1
Baltic States Synchronisation with Continental Europe No. 170	Upgrade of the 400 kV Żarnowiec-Gdańsk I/Gdańsk Przyjaźń-Gdańsk Błonia line	170.1665	3.3.14
	Upgrade of the 400 kV Morzyczyn-Dunowo-Słupsk-Żarnowiec line	170.1664	3.3.13
	Upgrade of the 400 kV Krajnik-Morzyczyn line	170.1663	
	Construction of the 400 kV Piła Krzewina-Żydowo Kierzkowo line	170.1662	3.3.12
	Construction of the 400 kV Dunowo-Żydowo Kierzkowo line	170.1661	3.3.11
	Construction of the HVDC Poland-Lithuania cable connection	170.1034	3.3.6

3.3.2 Plans for development of an integrated offshore network

The main objective of the implementation of the Offshore Network Development Plan for European Offshore Areas (ONDP) was to determine the cost-optimised offshore network structure connecting offshore wind farms with the European onshore network. As a result, ENTSO-E had a basis for determining the needs for the construction of new offshore connections on a European scale and the need for their timely implementation in the context of the assumed schedule for the development of installed capacity in offshore wind farms. As part of the work on the plan, assumptions, methodologies, and a model were developed that allowed calculations to be made for the 2040-2050 timeframe. The analyses were conducted under three price scenarios and two technology options. In addition, the possibility of implementing radial and hybrid connections was considered.

The results of the analysis indicate that there is significant investment potential for offshore construction in European Offshore Areas, particularly in the North Sea and the Baltic Sea, where the vast majority of offshore wind farms have been located. Regarding the Baltic Sea, the analysis showed the potential to build new offshore connections with a total capacity of 3 GW in 2040 and 11 GW in 2050. For both 2040 and 2050, the analysis showed no need for developing cross-border maritime connections to Poland.

3.4 National Power System in recent years

3.4.1 Previous development of photovoltaic sources and wind power plants

Onshore wind power plants and photovoltaic sources are characterised by the largest volumes of installed capacity in the NPS among all RES technologies.

The period between 2010 and 2016 saw a rapid growth in onshore wind capacity. In total, there was a threefold increase in installed capacity observed during this period. In the years 2016-2019, power output remained at a similar level, due in large part to the entry into force of the so-called “distance law” which introduced a ban on building wind turbines at a distance of less than 10 times their height, including the rotor, from buildings and forms of nature conservation. However, this provision does not cover, among other things, investments for which the construction permit had been issued before the entry of this law into force. These investments can still apply for funding in the ongoing auctions for the sale of energy from renewable energy sources, resulting in the increase in capacity generated as part of this technology in the years 2020-2023.

Between 2016 and 2023, a significant increase in the capacity of photovoltaic sources took place. In 2015, the total net installed capacity was less than 100 MW, while at the end of 2023 it will exceed 17 GW. This growth can be attributed to a great degree to prosumer sources, whose development is driven by the implementation of national programmes such as "My Electricity" and regulatory facilities such as "virtual storage". In addition, auctions have been held since 2016 as part of which new capacity in professional photovoltaic power plants is contracted to a significant extent.

The charts below show the changes in installed capacity volumes at different voltage levels, both in onshore wind power plants and photovoltaic sources.

Figure 3-1 *Installed electrical capacity of onshore wind power plants connected to the power system (data as at the end of 2023) [MW]*

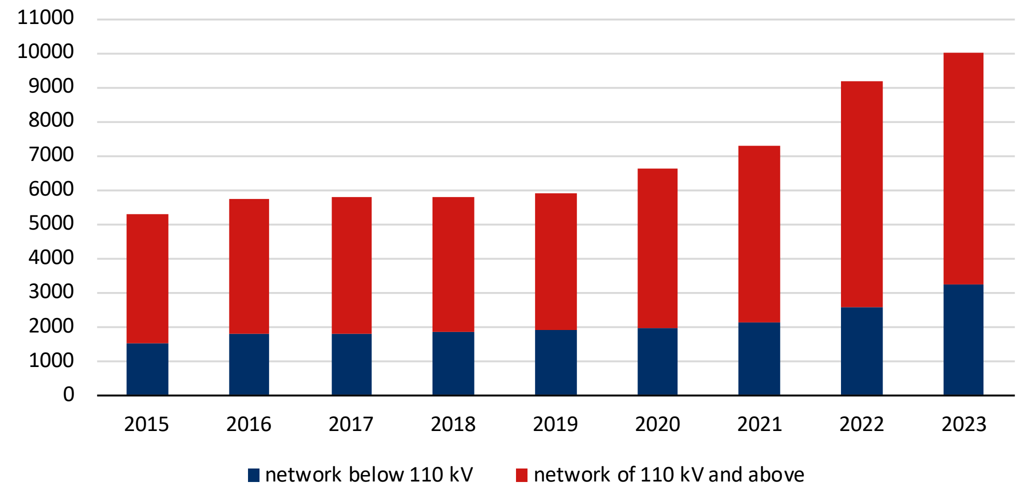
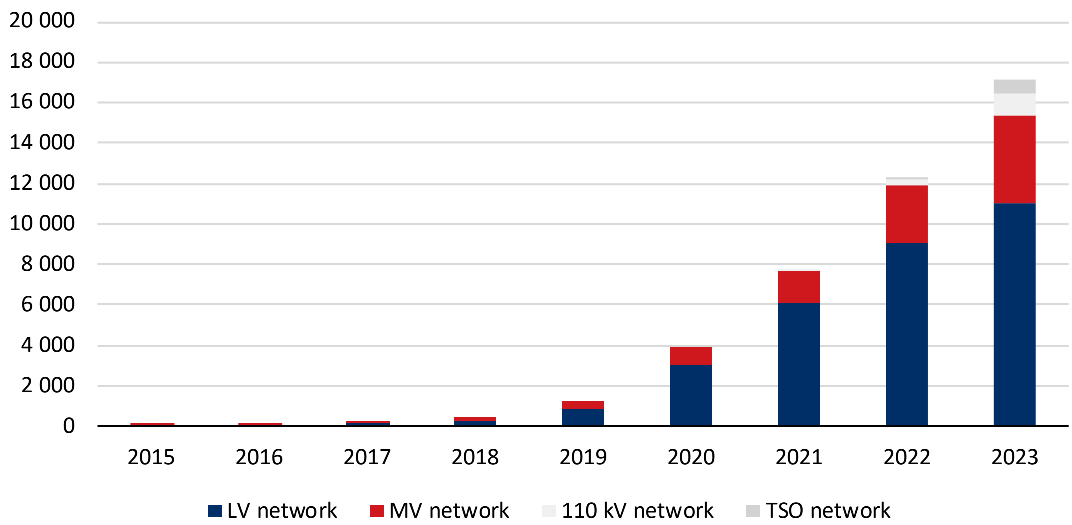


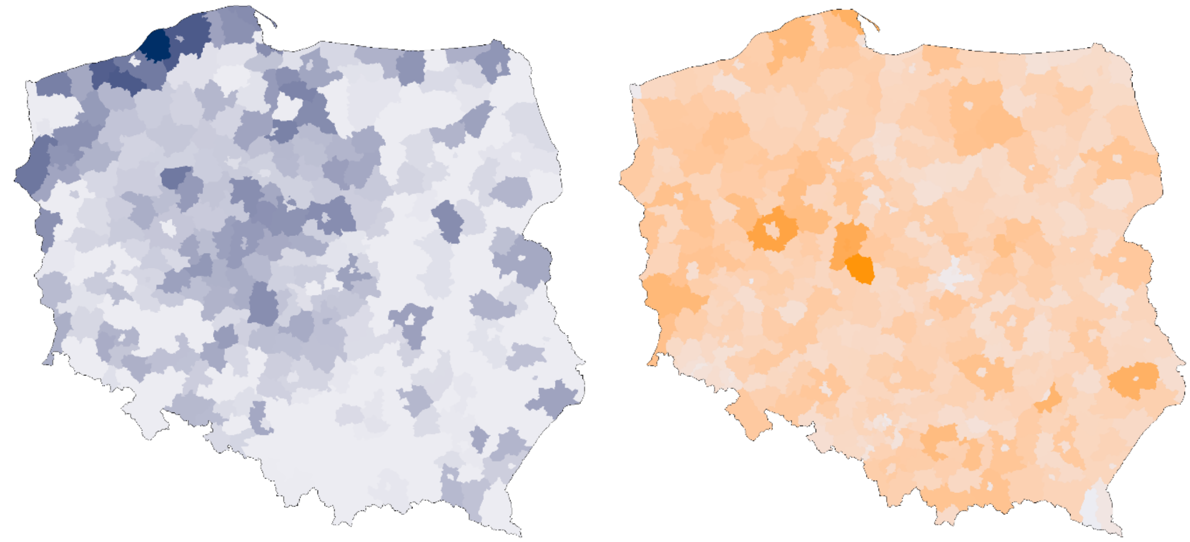
Figure 3-2 *Installed electrical capacity of photovoltaic sources connected to the power system (data as at the end of 2023) [MW]*



Spatial distribution of installed capacity of onshore wind power plants and photovoltaic sources in particular districts is presented in Figure 3-3. It should be noted here that the assignment of installed capacity to individual districts is based on where the sources are physically connected to the energy network and may not correspond to the actual location of the sources.

Figure 3-3 *Spatial distribution of installed capacity of onshore wind power plants and photovoltaic sources broken down by districts**

Onshore wind power plants	**Photovoltaic sources**



** darker colour indicates higher saturation of sources connected to the network in a given district*

3.4.2 RES auctions and resulting volumes

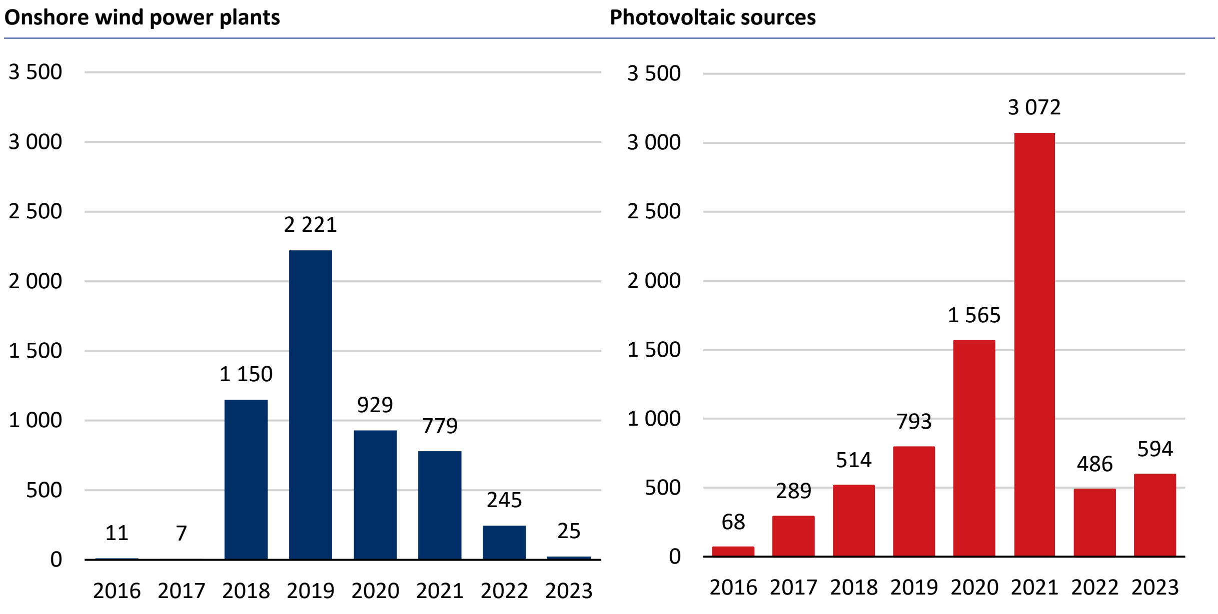
Auctions for the sale of electricity from renewable energy sources serve as a tool for implementing further energy transition.

In total, according to TSO estimates, the 2016-2023 auctions resulted in contracting:

- 7,381 MW of new capacity in photovoltaic sources,
- 5,366 MW of new capacity in onshore wind power plants,
- 22 MW of new capacity in hydroelectric installations,
- 35 MW of new capacity in biogas facilities,
- 26 MW of new capacity in biomass facilities.

For the new sources that won the auctions, a maximum time is set for them to feed the generated energy into the network for the first time, therefore further growth in the volume of installed capacity generated by these technologies is expected in the following years. It should also be borne in mind that in the current state of the law, RES auctions can be held until 2027. The total electrical power of onshore wind power plants and photovoltaic sources that have been built or may be built as a result of the auctions held in 2016-2023, as estimated by PSE S.A., is presented in Figure 3-4.

Figure 3-4 *Estimated power contracted as a result of RES auctions held in each year [MW]*



3.4.3 Connection processes of new generation resources, electricity storage facilities, distribution systems connected to the transmission network and consuming installations

As at 31.12.2023 PSE S.A. has concluded agreements for the connection of generation units with a total capacity of 20,191.4 MW, including 8,735.8 MW for conventional generation units, and the remaining capacity of about 11,455.6 MW for RES installations, of which 8,388.5 MW concerns offshore wind farms. In addition, PSE S.A. has concluded agreements for the connection of distribution systems with a total capacity of 595.1 MW and electricity storage facilities with a total capacity of 1,901.4 MW.

Moreover, as at 31.12.2023 PSE S.A. has issued connection conditions for:

- a nuclear power plant with a capacity of 3,720 MW,
- onshore wind farms with a total capacity of 1,070.1 MW,
- photovoltaic units with a total capacity of 4,681.2 MW,
- an offshore wind farm with a capacity of 101 MW,
- conventional energy sources with a total capacity of 300 MW,
- electricity storage facilities with a total capacity of 9,786.7 MW,
- costumer installations (including own consumption power plant transformers) with a total capacity of 1,090 MW,
- distribution systems applying for connection to the transmission network with a capacity of 3,892.8 MW.

The connection conditions are valid for two years from the date of their delivery to the applicant and constitute a conditional commitment to conclude a connection agreement. The execution of connected facilities, in particular generation sources, is influenced, among other things, by locational considerations, i.e. the ability to obtain administrative decisions required as part of the construction process. Despite the requirement to submit, together with the application for connection conditions, documents confirming the possibility of implementation of the source in a given area (Local Development Plan or planning permit), it is not definitively determined whether a given investment will be implemented and in what timeframes. The second factor that has impact on the implementation of new projects is the ability to finance their construction and the economic efficiency of the entire project. The mechanism for making advance payments together with the application for connection conditions for electricity sources and storage does not ensure confirmation that applicants are financially ready to implement the requested facilities. Business decisions to start the construction are very often made at a later stage, including after obtaining a building permit, being granted funding or public aid.

The table below presents a list of entities applying for the connection of sources to the National Transmission Network.

***Table 3**.2 Entities applying for the connection of sources to the National Transmission Network as at end of December 2023.*

Item	Connection point (substation)	Power [MW]	Installation type	Applicant	Connection date*
1	Ostrołęka	782	CCGT	CCGT Ostrołęka Sp. z o.o.	2025.08.08
2	Żarnowiec	111	WF	Respect Energy Trading Sp. z o.o.	2024.06.30
3	Słupsk Wierzbięcino	319.8[D]	WF+PV	Potegowo Mashav Sp. z o.o.	2024.07.04
4	Mikułowa	150	WF	DOLNOŚLĄSKIE ELEKTROWNIE Sp. z o.o.	2022.12.31
5	Pelplin	107.4	WF	Radan Nordwind Sp. z o.o.	2025.10.31
6	Grudziądz Węgrowo	874	CCGT	CCGT Grudziądz Sp. z o.o.	2026.08.31
7	Dunowo	250	WF	ENERTRAG-Dunowo Sp. z o.o.	2026.03.31
8	Słupsk Wierzbięcino	720	OWF	MFW Bałtyk II Sp. z o.o.	2025.11.30
9	Gdańsk Błonia	456	CCGT	CCGT Gdańsk Sp. z o.o.	2020.06.30
10	Słupsk Wierzbięcino	720	OWF	MFW Bałtyk III Sp. z o.o.	2025.11.30
11	Choczewo[A]	1,045.5	OWF	Elektrownia Wiatrowa Baltica-3 Sp. z o.o.	2027.05.31
12	Krajnik	1,434	CCGT	PGE Gryfino 2050 Sp. z o.o.	2024.04.30
13	Krzemienica[B]	350	OWF	RWE OFFSHORE WIND POLAND Sp. z o.o.	2027.01.15
14	Choczewo[A]	1,498	OWF	Elektrownia Wiatrowa Baltica-2 Sp. z o.o.	2028.03.09
15	Choczewo[A]	1,200	OWF	Baltic Power Sp. z o.o.	2028.02.22
16	Choczewo[A]	896	OWF	Elektrownia Wiatrowa Baltica-1 Sp. z o.o.	2031.09.31
17	Krzemienica[B]	1,560	OWF	MFW Bałtyk I S.A.	2029.12.31
18	Choczewo[A]	399[H]	OWF	C-Wind Polska Sp. z o.o.	2027.05.30
19	Konin	115	BU	PAK - PCE Biopaliwa i Wodór Sp. z o.o.	2022.11.15
20	Krajnik	340	PV	BeGreen Poland 2018-31 sp. z o.o. sp. k.	2025.12.31
21	Kromolice	150	PV	Elektrownia PV Młodzikowo sp. z o.o.	2027.07.30
22	Polkowice	230[C]	PV	LS1 Sp. z o.o.	2027.10.31
23	Leszno Gronowo	123.2	WF	Finadvice Polska 1 Sp. z o.o.	2028.02.28

Item	Connection point (substation)	Power [MW]	Installation type	Applicant	Connection date*
24	Baczyna	40	PV	ENEA Nowa Energia Sp. z o.o.	2026.06.30
25	Pątnów	150	PV	Solar Kazimierz Biskupi Sp. z o.o.	2027.09.09
26	Adamów	163.8	GU	K Green Japan Sp. z o.o.	2030.08.12
27	Piła Krzewina	105	WF	MEGAWATT Polska Sp. z o.o.	2028.03.01
28	Łagisza	520	CCGT	TAURON Inwestycje Sp. z o.o.	2027.08.30
29	Adamów	600[F]	CCGT+PV	ZE PAK S.A.	2028.10.31
30	Kozienice	2420	CCGT	ENEA ELKOGAZ Sp. z o.o.	2030.04.30
31	Wielopole	1006	CCGT	Rybnik 2050 Sp. z o.o.	2026.12.31
32	Nysa	100.1	PV	Grand Solar 8 Sp. z o.o.	2029.08.30
33	Leśniów	40	PV	FOTONES Sp z o.o.	2029.11.15
34	Polkowice	124.9	PV	Nala Renewables Poland 1 Sp. z o.o.	2029.02.16
35	Pasikurowice	220.8	PV	Solarfarm Brzezinka Sp. z o.o.	2029.04.15
36	Wielopole	225.4	WF	Energia Przykona Sp. z o.o.	2029.12.18
37	Leśniów	20	PV	Solar Technics Sp. z o.o.	n/a
38	Świebodzice	66	WF	YVS Udanin Farma Wiatrowa Sp. z o.o.	n/a
39	Rożki	100.1	PV	Qair Polska S.A.	n/a
40	Groszowice	84	WF	Energia Przykona Sp. z o. o.	n/a
41	Krosno Iskrzynia	118.8	WF	Wind Lynx Sp. z o.o.	n/a
42	Mokre	56	WF	VRW 6 Żółkiewka Sp. z o.o.	n/a
43	Ełk Bis	60.2	PV	Wiesław Mieczkowski	n/a
44	Siedlce Ujrzanów	85.8	WF	OX2 Green Sp. z o.o.	n/a
45	Dobrzeń	300	PV	PV Piotrowa Sp. z o.o.	n/a
46	Dobrzeń	50	PV	Mega Elektrownia PVPL 49 Sp. z o.o.	n/a
47	Leśniów	90	PV	Elektrownie MPA15 Sp. z o.o.	n/a
48	Ełk Bis	163.2	PV	GF Biała Piska 1	n/a
49	Jarosław	150	PV	LS 8 Sp. z o.o.	n/a
50	Polkowice	290[C]	PV	LS 1 Sp. z o.o.	n/a
51	Nysa	57	PV	Elektrownia PV 65 Sp. z o.o.	n/a
52	Ełk Bis	120	PV	Sun Energy Projekt Sp. z o.o.	n/a

Item	Connection point (substation)	Power [MW]	Installation type	Applicant	Connection date*
53	Żydowo Kierzkowo	162	PV	TORP Energy Bis Sp. z o.o.	n/a
54	Baczyna	25	PV	Solar West II Sp. z o.o.	n/a
55	Trębaczew	100	PV	Qair Polska S.A.	n/a
56	Leśniów	89	PV	Sun4 Koryta Sp. z o.o.	n/a
57	Recław	60	PV	Elektrownia PV 82 Sp. z o.o.	n/a
58	Stryków	49	WF	OX2 Green Sp. z o.o.	n/a
59	Gdańsk Błonia	280	PV	Better Energy Solar Park 221 Sp. z o.o.	n/a
60	Narew	0.1	ES+PV[G]	Eplant 31 Sp. z o.o.	n/a
61	Żagań	0.1	ES+PV[G]	Eplant 51 Sp. z o.o.	n/a
62	Polkowice	0.1	ES+PV[G]	Eplant 32 Sp. z o.o.	n/a
63	Pabianice	0.1	ES+PV[G]	Eplant 96 Sp. z o.o.	n/a
64	Łośnice	0.1	ES+PV[G]	Eplant 95 Sp. z o.o.	n/a
65	Świebodzice	127.5	WF	Neo Energia Przykona I Sp. z o.o.	n/a
66	Ząbkowice Śląskie	40	WF	Energia Przykona V Sp. z o.o.	n/a
67	Plewiska	72.6	WF	Solar West I Sp. z o.o.	n/a
68	Kutno	30.9	WF	CGE 25 Sp. z o.o.	n/a
69	Rokitnica	0.1	ES+PV[G]	Eplant 91 Sp. z o.o.	n/a
70	Pątnów	250	PV	PV Konin Sp. z o.o.	n/a
71	Mikułowa	43.4	WF	VRW 1 Sp. z o.o.	n/a
72	Konin	100	PV	PV Konin Sp. z o.o.	n/a
73	Dunowo	500	PV	Green Bear Corporation Poland sp. z o.o.	n/a
74	Żarnowiec	77.3	WF	PGE Energia Odnawialna S.A.	n/a
75	Ząbkowice Śląskie	100	WF	Energia Przykona IX Sp. z o.o.	n/a
76	Choczewo[A]	500[H]	OWF	C-Wind Polska Sp. z o.o.	n/a
77	Żydowo Kierzkowo	0.1	ES+PV[G]	Eplant 64 Sp. z o.o.	n/a
78	Joachimów	0.1	ES+PV[G]	Eplant 90 Sp. z o.o.	n/a
79	Ełk Bis	120	PV	Eplant 80 Sp. z o.o.	n/a
80	Toruń Elana	15	ES+PV[I]	FRV Poland I Sp. z o.o.	n/a
81	Gdańsk Przyjaźń	130	PV	OX2 Green Sp. z o.o.	n/a

Item	Connection point (substation)	Power [MW]	Installation type	Applicant	Connection date*
82	Leśniów	104	PV	PV 1420 Sp. z o.o.	n/a
83	Narew	90	PV	PV 1320 Sp. z o.o.	n/a
84	Lublin Systemowa	300.2	PV	Qair Polska S.A.	n/a
85	Mikułowa	0.1	ES+PV[G]	Eplant 32 Sp. z o.o.	n/a
86	Blachownia	104.9	PV	Karolinka PV Sp. z o.o.	n/a
87	Nysa	10	PV	RRSP 9 Sp. z o.o.	n/a
88	Leszno Gronowo	118.8	WF	Virazon Sp. z o.o.	n/a
89	NP substation[J]	3,720	NP	Polskie Elektrownie Jądrowe Sp. z o.o.	n/a
90	Bydgoszcz Zachód	57	PV	PVE 222 Sp. z o.o.	n/a
91	Skawina	300	CCGT+GU[K]	CEZ SKAWINA S.A.	n/a
92	Grudziądz	105	PV	Qair Polska S.A.	n/a
93	Kromolice	150	PV	Eko Farma PV Kostrzyn Sp. z o.o.	n/a
94	Chełm	220	ES+PV[L]	Eplant 83 Sp. z o.o.	n/a
95	Olsztyn Mątki	307.8	PV	Polska Agencja Energetyczna Sp. z o.o.	n/a

** - In accordance with the provisions of the connection agreement; some of the facilities are physically operating units that have not yet completed the connection process in terms of formal conditions, hence their presence in the compilation; n/a – in the absence of a concluded connection agreement*

A - Future substation in the vicinity of the Żarnowiec substation.

B - Future substation in the vicinity of the Słupsk substation.

C - The applicant has applied for changing the connection conditions of a PV plant with a capacity of 229.9825 MW (see item 22) to a PV plant with a capacity of 289.978 MW (see item 50).

D - The connected facility consists of a WF with a capacity of 256.9 MW and a PV plant with a capacity of 62.85 MW.

E - The connected facility consists of a PV plant with a capacity of 250.780280 MW and a WF with a capacity of 11.7 MW. The connection capacity is 204.797352 MW.

F - The connected facility consists of a CCGT with a capacity of 600 MW and a PV plant with a capacity of 287.276 MW. The connection capacity is 600 MW.

G - The applicant has applied for the determination of connection conditions for the electricity storage and the PV plant. Electricity storage capacity is indicated in the Information on electricity storage, distribution systems and receiving installations planned for connection to the transmission network.

H - The applicant has applied for changing the connection conditions of an OWF with a capacity of 399 MW to an OWF with a capacity of 500 MW (see items 18 and 76).

I - The applicant has applied for the determination of connection conditions for the electricity storage and the PV plant. Electricity storage capacity is indicated in the Information on electricity storage, distribution systems and receiving installations planned for connection to the transmission network.

J - A future substation for a nuclear power plant in the Gdańsk Pomerania.

K - A gas-steam unit with a capacity of 270 MW and three gas-fired units with a capacity of 10 MW each planned for connection.

L - The applicant has applied for the determination of connection conditions for the electricity storage and the PV plant with a capacity of 220 MW. Electricity storage capacity is indicated in the Information on electricity storage, distribution systems and receiving installations. The connection capacity is 220 MW.

Installation type: PV - photovoltaic plant, WF - wind farm, OWF - offshore wind farm, CU - conventional coal-fired unit, GU - gas-fired unit, CCGT – combined-cycle gas turbine, BU - biomass unit, ES+PV - electricity storage with photovoltaic plant, NP - nuclear power plant.

The following tables show, respectively: Table 3.3 – a list of electricity storage facilities, Table 3.4 – a list of distribution systems, Table 3.5 – a list of consuming installations planned for connection to the transmission network.

Table 3.3 *Entities applying for the connection of energy storage facilities as at end of December 2023.*

Item	Connection location (substation)	Capacity [MW]	Installation type	Connection date*
1	Narew	200	ES	2027.05.30
2	Kozienice	112	ES	2029.05.30
3	Ełk Bis	200	ES	2029.05.30
4	Pątnów	200	ES	2028.05.30
5	Siedlce Ujrzanów	600	ES	2029.05.30
6	Adamów	100	ES	2028.05.30
7	Krosno Iskrzynia	220	ES	2030.04.01
8	Żarnowiec	269.4	ES	2028.06.30
9	Ząbkowice	80	ES	n/a
10	Siersza	133	ES	n/a
11	Ostrołęka	99.5	ES	n/a
12	Klikowa	62.7	ES	n/a
13	Rzeszów	202.4	ES	n/a
14	Ełk Bis	59.2	ES	n/a
15	Blachownia	184	ES	n/a
16	Kielce	119.8	ES	n/a
17	Blachownia	204.7	ES	n/a
18	Kielce	35	ES	n/a
19	Mikułowa	96.6	ES	n/a
20	Bujaków	120	ES	n/a
21	Zgierz	96.6	ES	n/a
22	Radkowice	97	ES	n/a
23	Tucznawa	99.5	ES	n/a
24	Baczyna	46	ES	n/a
25	Ełk Bis	107	ES	n/a
26	Świebodzice	61.3	ES	n/a

Item	Connection location (substation)	Capacity [MW]	Installation type	Connection date*
27	Joachimów	153.3	ES	n/a
28	Stanisławów	50.6	ES	n/a
29	Kielce	101.2	ES	n/a
30	Narew	50	ES+PV[A]	n/a
31	Żagań	50	ES+PV[A]	n/a
32	Polkowice	200	ES+PV[A]	n/a
33	Klikowa	50.6	ES	n/a
34	Ostrowiec	50.6	ES	n/a
35	Kromolice	138	ES	n/a
36	Pabianice	200	ES+PV[A]	n/a
37	Łośnice	50	ES+PV[A]	n/a
38	Plewiska	50.6	ES	n/a
39	Toruń Elana	100	ES	n/a
40	Rokitnica	400	ES+PV[A]	n/a
41	Leszno-Gronowo	99	ES	n/a
42	Rożki	200	ES	n/a
43	Abramowice	99.5	ES	n/a
44	Żydowo Kierzkowo	200	ES+PV[A]	n/a
45	Joachimów	200	ES+PV[A]	n/a
46	Czarna	352.5	ES	n/a
47	Łomża systemowa	300	ES	n/a
48	Rogowiec	300	ES	n/a
49	Tucznawa	300	ES	n/a
50	Pelplin	50.6	ES	n/a
51	Rokitnica	199.1	ES	n/a
52	Baczyna Systemowa	53.8	ES	n/a
53	Siedlce Ujrzanów	99.5	ES	n/a
54	Baczyna Systemowa	121.6	ES	n/a
55	Połaniec	200	ES	n/a

Item	Connection location (substation)	Capacity [MW]	Installation type	Connection date*
56	Morzyczyn	200	ES	n/a
57	Lublin Systemowa	99.5	ES	n/a
58	Toruń Elana	81.1	ES+PV[B]	n/a
59	Żydowo Kierzkowo	400	ES	n/a
60	Lubocza	200.2	ES	n/a
61	Nysa	39	ES	n/a
62	Czarna	99.5	ES	n/a
63	Żagań	121.6	ES	n/a
64	Mikułowa	300	ES+PV[A]	n/a
65	Polkowice	49.8	ES	n/a
66	Rogowiec	51	ES	n/a
67	Pabianice	98.9	ES	n/a
68	Krajnik	400.1	ES	n/a
69	Jarosław[C]	300	ES	n/a
70	Jarosław[C]	49.8	ES	n/a
71	Połaniec	250	ES	n/a
72	Gdańsk Błonia	250	ES	n/a
73	Rokitnica	101.2	ES	n/a
74	Chełm	220	ES+PV[D]	n/a
75	Poręba	49.8	ES	n/a
76	Ząbkowice	49.8	ES	n/a
77	Łagisza	50.6	ES	n/a

** - In accordance with the provisions of the connection agreement; some of the facilities are physically operating facilities that have not yet completed the connection process in terms of formal conditions, hence their presence in the compilation; n/a – in the absence of a concluded connection agreement*

A - The applicant has applied for the determination of connection conditions for the electricity storage and the PV plant. Capacity of PV plants is indicated in the list of entities applying for the connection of sources to the National Transmission Network.

B - The applicant has applied for the determination of connection conditions for the electricity storage with a capacity of 81.098 MW and the PV plant. Capacity of PV plants is indicated in the list of entities applying for the connection of sources to the National Transmission Network. The connection capacity is 80 MW.

C - Future substation planned within the 400 kV Rzeszow - Chmielnicka line.

D - The applicant has applied for the determination of connection conditions for the electricity storage with a capacity of 220 MW and the PV plant. Capacity of PV plants is indicated in the list of entities applying for the connection of sources to the National Transmission Network. The connection capacity is 220 MW.

Installation type: ES - electricity storage, PV - photovoltaic plant.

***Table 3.4** Distribution systems planned for connection to the transmission network as at end of December 2023.*

Item	Connection location (substation)	Capacity [MW]	Installation type	Connection date*
1	Praga	30	DS	2024.12.31
2	Krajnik	245.2	DS	2023.11.10
3	Piła Krzewina	187	DS	2024.07.04
4	Stanisławów	132.9	DS	2025.07.31
5	Chmielów	202.4	DS	n/a
6	Klikowa	202.4	DS	n/a
7	Stanisławów	202.4	DS	n/a
8	Kielce	202.4	DS	n/a
9	Siersza	202.4	DS	n/a
10	Tucznawa	202.4	DS	n/a
11	Krajnik	245.2[A]	DS	n/a
12	Krosno Iskrzynia	48.8	DS	n/a
13	Mościska	202.4	DS	n/a
14	Zgierz	202.4	DS	n/a
15	Wanda	250	DS	n/a
16	Siedlce Ujrzanów	202.4	DS	n/a
17	CPK[B]	122	DS	n/a
18	Rzeszów	202.4	DS	n/a
19	Rożki	100	DS	n/a
20	Klikowa	150	DS	n/a
21	Olsztyn Mątki	400	DS	n/a
22	Mokre	202.4	DS	n/a
23	Kielce	150	DS	n/a
24	Krosno Iskrzynia	200	DS	n/a

** - In accordance with the provisions of the connection agreement; some of the facilities are physically operating facilities that have not yet completed the connection process in terms of formal conditions, hence their presence in the compilation; n/a – in the absence of a concluded connection agreement*

A - The applicant has applied for changing the conditions for connection of the distribution system (see item 1) without a change in connection capacity.

B - Future substation in the vicinity of the Central Communication Port (CPK).

Installation type: DS - Distribution system.

Table 3.5 *Consuming installations planned for connection to the transmission network as at end of December 2023.*

Item	Connection location (substation)	Capacity [MW]	Installation type	Connection date*
1	Tucznawa	800	CONS	n/a
2	Ostrowiec	190	CONS	n/a
3	Żarnowiec	100	CONS	n/a

** - In accordance with the provisions of the connection agreement; some of the facilities are physically operating facilities that have not yet completed the connection process in terms of formal conditions, hence their presence in the compilation; n/a – in the absence of a concluded connection agreement*

Installation type: CONS - consuming installation.

In the period from 01.01.2022 to 31.12.2023. PSE S.A. agreed on the conditions for connection to the 110 kV distribution network respectively for:

- RES installations, including:
  - photovoltaic sources with a total capacity of 4,091 MW - 93 facilities,
  - wind power plants with a total capacity of 959 MW - 33 facilities,
  - consisting of a photovoltaic source and a wind power plant with a total capacity of 288 MW (including: photovoltaic source 135 MW, wind power plant 153 MW) - 3 facilities,
- synchronous generation units with a total capacity of 879 MW - 13 facilities,
- consumers with a total capacity of 2,672 MW - 58 facilities,
- installations consisting of a consumer and RES installations, with a total injected capacity of 124 MW and received capacity of 40 MW - 13 facilities,
- electricity storage facilities with a capacity of 2,928 MW fed into the network and 2,860 MW taken from the network - 62 facilities,
- installations consisting of electricity storage and RES installations, with a total capacity injected into the network of 632 MW (including: 450 MW electricity storage, 152 MW photovoltaic installation and 30 MW wind power plant) and power taken from the network of 310 MW - 15 facilities,
- distribution networks with no direct connection to the transmission network with a total capacity injected into the network of 309 MW (including: 240 MW photovoltaic installations) and power taken from the network of 228 MW - 18 facilities.

The above figures do not include RES installations connected to the power network with a voltage lower than 110 kV.

According to changes in the law, the terms of connection and the scopes and conditions of expert opinions on the impact of the connected facilities on the power system are also subject to mandatory agreement with the TSO as of mid-2023 in the case of RES installations with an installed capacity of more than 2 MW, connected to the distribution network.

As part of this obligation, TSO additionally agreed:

- 1,613 assumptions for performing an expert opinion on the impact of connected facilities on the power system (photovoltaic installations with a total capacity of 10,130 MW and wind farms with a total capacity of 489 MW),
- 130 connection conditions (photovoltaic installations with a total capacity of 689 MW and wind farms with a total capacity of 51 MW).

Below you will find aggregated information held by PSE S.A. on RES connection plans according to own data and data received from DSOs as part of connection processes. The next table shows the connection capacities of sources that are at different stages of the connection process, broken down by the types of installations and the voltage of the network to which the installations are to be connected. The overview includes onshore wind power plants, photovoltaic sources and offshore wind power plants planned for connection.

Table 3.6 *Capacity of RES and electricity storage facilities planned for connection to the transmission and distribution network. Condition as at 31.12.2023 [MW]*

Stage		Total planned capacity	OnWPP	PV	OfWPP	ES	DS
Transmission network	Connection agreements have been concluded	13,836	1,190	1,761	8,389	1,901	595
	Connection conditions have been issued	19,435	1,070	4,681	101	9,787	3,893*
Distribution network	Planned to be connected to the 110 kV network (connection conditions agreed between TSO and DSO)	14,804	3,639	6,987	0	3,606**	572
	Planned to be connected to MV network (volumes estimated based on connection conditions issued; new prosumer installations not included)	16,397	1,056	12,451	0	2,890**	-
Total		**64,569**	**6,955**	**25,880**	**8,490**	**18,184**	**5,060**

** - Capacity of distribution systems with connection conditions issued that are planning the connection of photovoltaic installations, electricity storage and hybrid installations.*

*** - Discharge power of electricity storage.*

- The above information indicates the significant real potential of RES sources. Based only on the aggregated capacity of existing sources, connection agreements concluded or connection conditions issued, and the capacity of offshore wind power plants specified in the Act on supporting offshore wind farms, within the next 10 years NPS can operate:
  - more than 43 GW of solar sources with a generation potential of 43 TWh,
  - around 18 GW of onshore wind power plants with a generation potential of 55 TWh,
  - around 18 GW of offshore wind power plants with a generation potential of 70 TWh.
- Together with the generation potential of other types of RES, this means the possibility of generating well over 180 TWh of renewable energy annually within 10 years.
- Given the above, after the implementation of the investments indicated in this PRSP, it is not legitimate to claim that the power network restricts the development of renewable energy sources.
- It should be borne in mind that a significant increase in RES capacity will periodically cause an oversupply of electricity in the power system, especially during windy and sunny periods. This, in turn, will translate into the need to reduce the generation of these sources in order to ensure stable operation of the NPS, or alternatively to develop methods for managing their excess energy.
- Despite such large RES capacities derived from data on ongoing connection processes, investments in wind power and photovoltaic sources without adequate energy storage facilities have a severely limited impact on improving the power balance. Taking into account their power delivery characteristics, the corrected availability coefficient (CAC)[1], which approximates the potential averaged impact on the power balance for photovoltaic sources as well as onshore and offshore wind sources, amounts to 1.56%, 12.62%, and 17.25%, respectively.

3.4.4 Situation in terms of conventional generation units running on fossil fuels

For several years, the shutdown dates of existing generation units running on fossil fuels reported by the domestic generation sector have been provided as variants. The differences are mainly due to the projected profitability after 1 July 2025, i.e. the date from which, under current regulations, units commissioned before 4 July 2019 which emit more than 550g of CO_2 per kWh will not be able to earn revenue under the capacity market mechanism. The lack of such profitability may result in the permanent shutdown of individual units despite the technical feasibility of their continued operation. For some, their lifecycle can be extended as part of subsequent modernisation and maintenance activities. A factor that will affect decisions on decommissioning existing generation units in the near future is the adopted amendments to Regulation (EU) 2019/943 of the European Parliament and of the Council on the internal market for electricity. Should a situation arise in which the results of the conducted capacity auctions fail to resolve generation adequacy problems, the amendments in question will allow Member States to apply to the European Commission for approval to organise additional

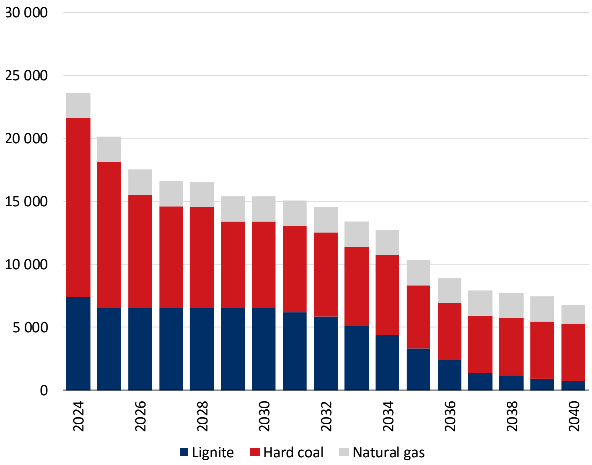
[1] CAC – the so-called Corrective Availability Coefficient – is used to determine the maximum capacity obligation of a given generation unit that can be offered as part of a capacity auction on the capacity market. CAC values are determined for each group of electricity generation technologies and primary energy sources, respectively. Data specified in the Regulation of the Minister of Climate and Environment of 8 August 2023 on the parameters of the main auction for the supply year 2028 and the parameters of supplementary auctions for the supply year 2025.

capacity auctions, in which units that do not meet the abovementioned emission limits will also be able to participate. Such a derogation will potentially be possible for the period from 1 July 2025 to 31 December 2028.

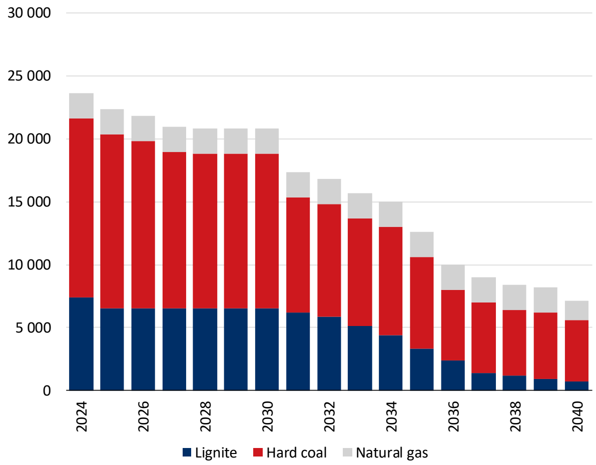
The following charts show the data obtained in the survey process of the power generation sector conducted in late 2022 and early 2023.

Figure 3-5 *Net achievable capacity in existing conventional units participating in the central balancing mechanism. Condition as at the end of year [MW]*

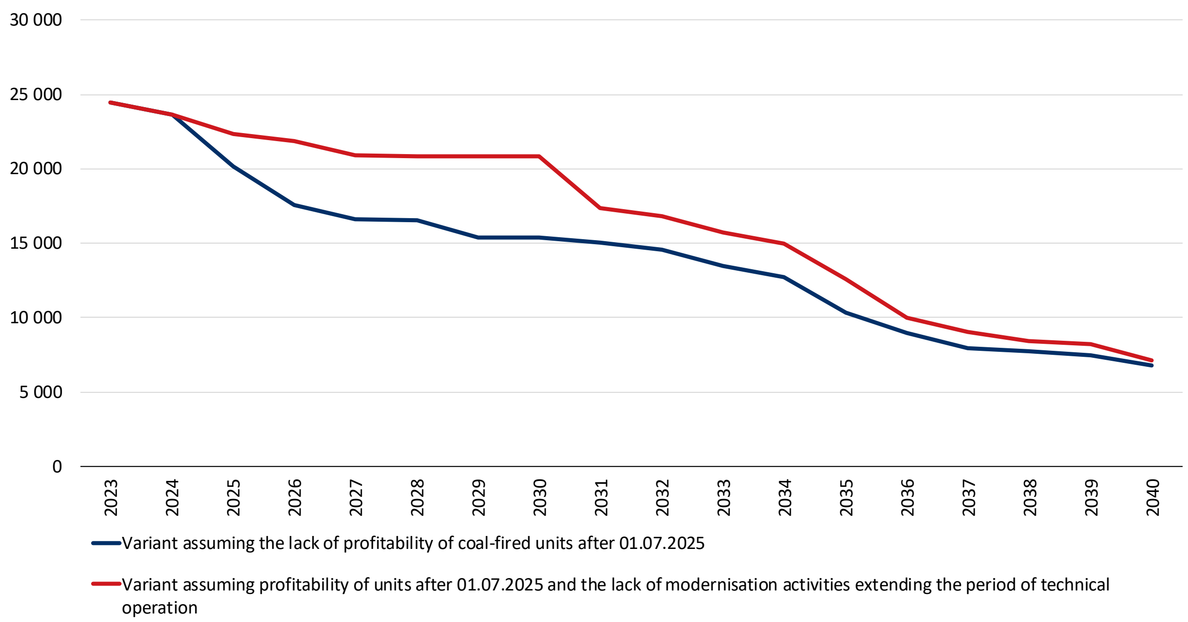
Variant assuming no profitability of coal-fired units after 01.07.2025.



Variant assuming profitability of units after 01.07.2025 and no modernisation extending technical service life

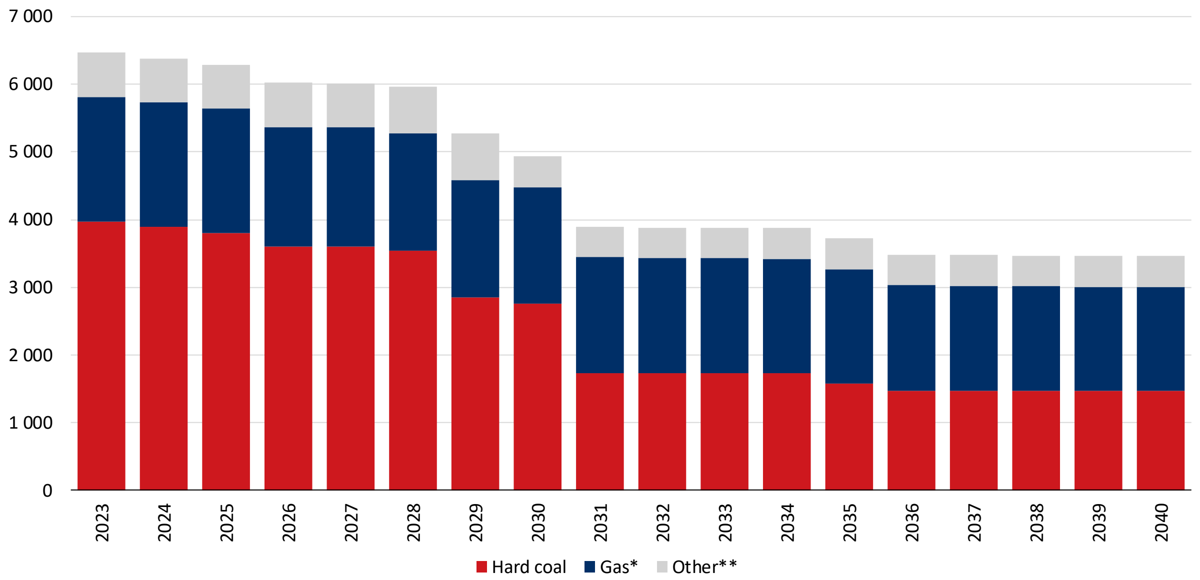


Comparison of the above variants



According to information gleaned from the survey, conventional units that do not participate in the central balancing mechanism will also be systematically phased out. Between 2025 and 2040, 2.9 GW of net generation capacity of these units will be shut down.

Figure 3-6 *Net achievable capacity in existing conventional units not participating in the central balancing. Condition as at the end of year [MW]*



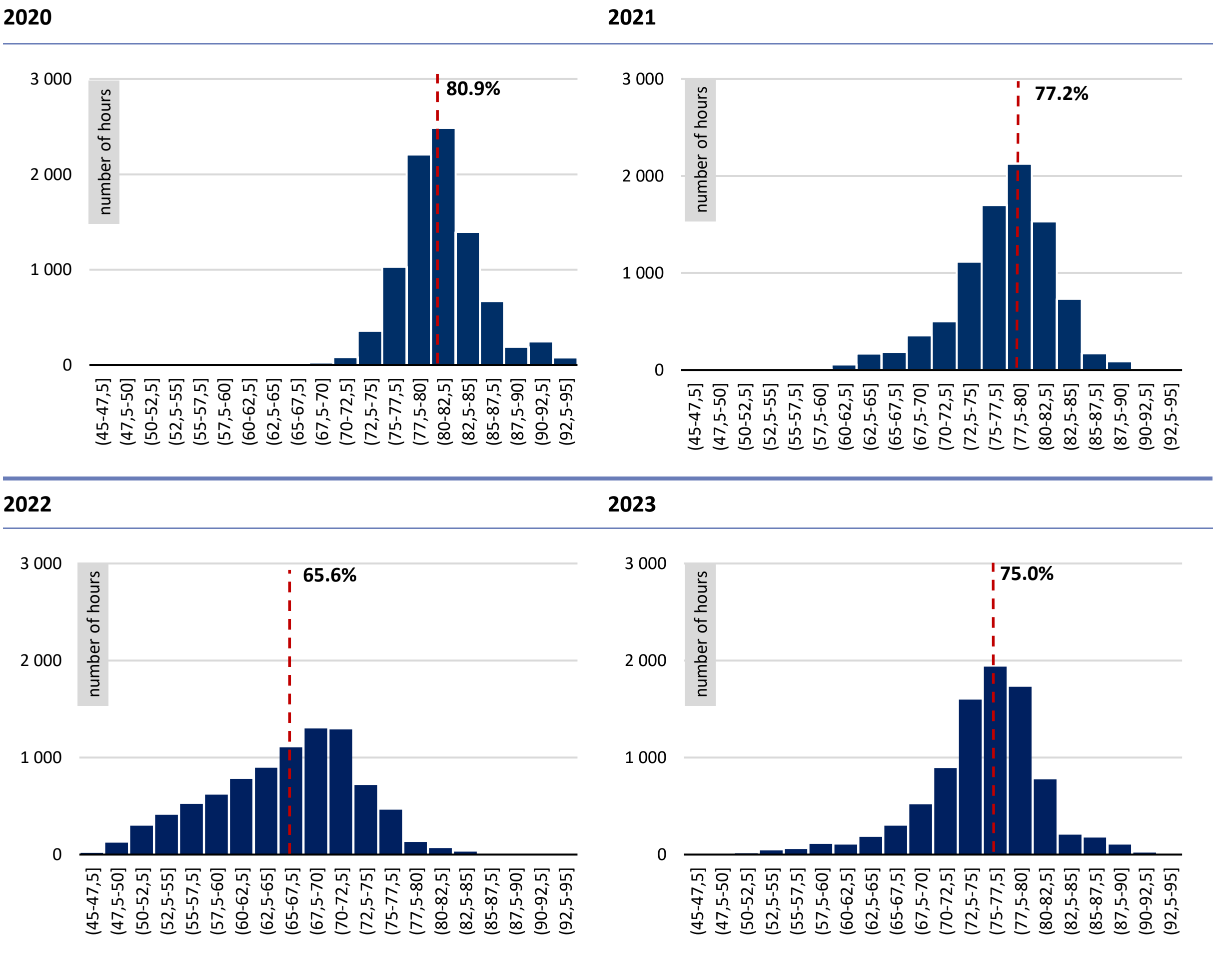
** - including but not limited to: methane-rich, nitrogen-rich, from mine de-methanation, coke oven*

*** - gudron, oil, other*

Availability of centrally dispatched generation units (CDGU)

TSO has analysed changes in CDGU availability over the past four years, i.e. 2020-2023. For each hour of the year, the available capacity for the TSO was determined, i.e. CDGU available capacity reduced by planned and unplanned losses in relation to the available capacity. The indicator thus defined is included in percentage format. Figure 3-7 shows histograms of hourly sets of CDGU availability by year (horizontal axis – availability in percent, vertical axis – number of hours per year). In addition, the dotted line shows the annual average value of CDGU availability. The results of the analysis indicate the decreasing availability of CDGUs in recent years.

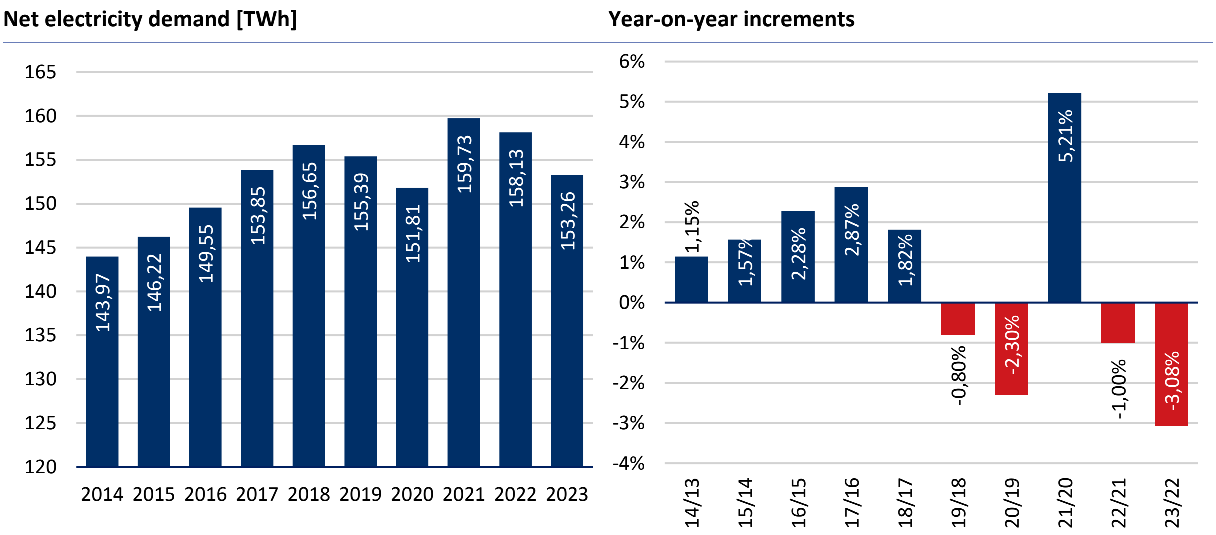
***Figure 3-7** CDGU availability histograms for the years 2020-2023 [%]*



3.5 Demand for power and energy

Between 2014 and 2023, annual electricity demand increased by about 9 TWh, and the cumulative annual demand growth rate for the period was 0.70%. Historical annual demand for electricity is presented in subsequent charts.

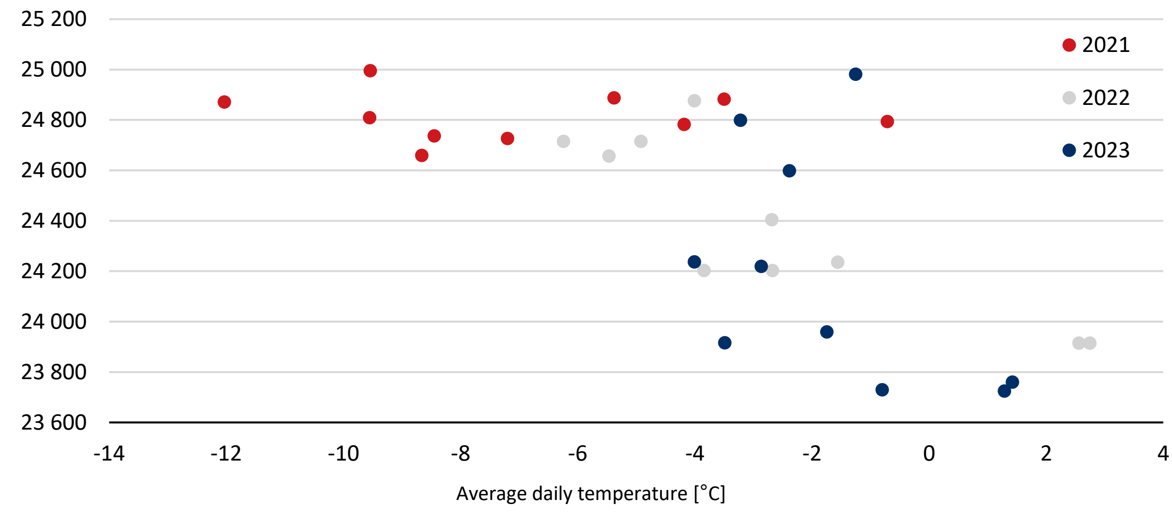
***Figure** 3-**8** Historical net electricity demand*



The next figure shows ten largest net peak demand values depending on the average 24-hour temperature, which occurred in the years 2021-2023.

***Figure 3-9** Net peak demand values for the years 2021-2023 and average temperatures on the days when this demand occurred*

Ten highest daily peaks of net power demand in a given year [MW]

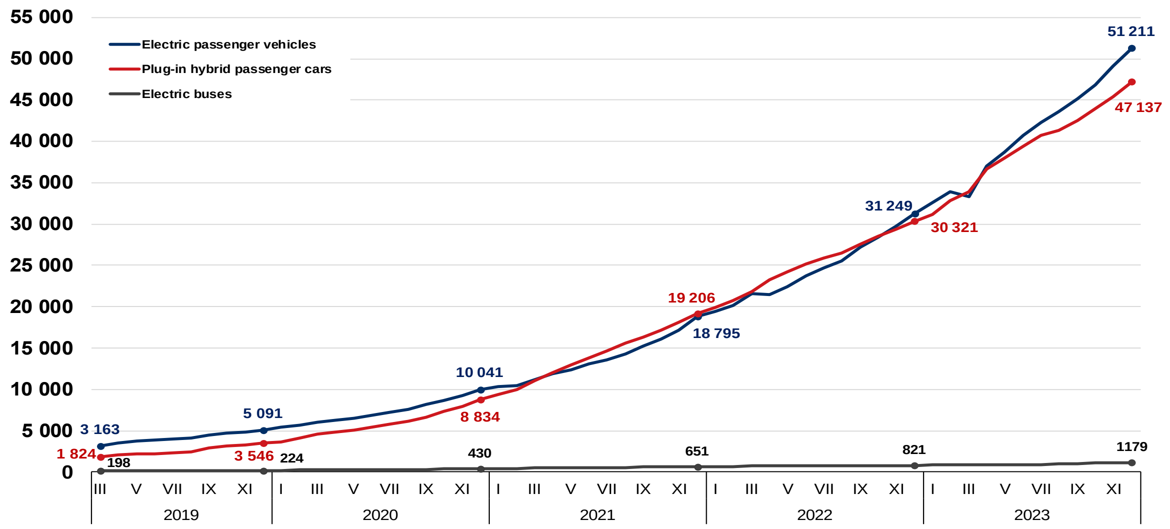


Power demand increases steadily in both summer and winter. Between 2014 and 2023, the cumulative annual growth rate for net summer peak demand for electric power amounted to 0.86%, whereas for winter peak demand it amounted to 0.85%. Further increases in power demand are to be expected in the winter period due to the increasing electrification of heating, as well as in the summer period due to the development of air conditioning. In addition, it should be borne in mind that power demand values in the summer and winter peaks depend on meteorological conditions and may vary from year to year.

Development of electric vehicles

Recent years have seen rapid growth in the number of electric vehicles. From December 2019 to December 2023, the number of electric vehicles increased from 8,900 to about 100,000.

***Figure 3-10** Development of electromobility in Poland in recent years**



** - based on the data provided by Polish Alternative Fuels Association*

Currently, the increase in electricity demand due to the development of electromobility does not significantly affect the operation of the NPS. However, in the long term, energy consumption for the purpose of powering electric vehicles will be seen every hour of the day, including during peak demand hours. For this reason, an important element will be the operation of appropriate solutions to stimulate the rationalisation of electricity consumption by electric vehicles during peaks, as well as to prevent simultaneous, higher-than-allowable consumption of charging power in specific locations. Solutions that positively shape the daily charging profile of EVs may include dynamic pricing and the use of smart charging solutions that allow market signals and technical constraints to be taken into account.

3.6 Considerations arising from spatial development plans of voivodeships

From the point of view of implementation of the transmission network development process, the Voivodeship Spatial Development Plan (VSDP) is the basic planning document prepared by voivodeship governments. The VSDP defines, in particular, geographical distribution of public purpose investments of supra-local significance. In order to ensure consistency between PSE S.A.'s investment plans and the plans and strategies drawn up by voivodeship governments, PSE S.A. is in ongoing correspondence with local government bodies. PSE S.A. consults with interested parties each draft PRSP (in accordance with Article 16(15) of the EL Act). Voivodeship government bodies participate in the consultations.

The draft development plan is also presented to Voivodeship management bodies directly by the President of ERO for opinion on the basis of Article 23(2)(5), (3) and (4) of the EL Act. As part of the procedure for agreeing on the draft PRSP, a positive opinion was submitted by the Management Bodies of 6 Voivodeships: Lubelskie, Lubuskie, Mazowieckie, Opolskie, Podlaskie and Zachodniopomorskie in the previous edition. The management of one Voivodeship reported a comment on the draft development plan, which did not necessitate any changes to the PRSP 2023-2032 submitted to the President of ERO. Within 14 days of submitting the draft PRSP for an opinion, the remaining Voivodeship Management Bodies did not provide such an opinion, which, according to the provisions of Article 23(4) of the EL Act, is tantamount to issuing a positive opinion.

Since the development of the last edition of PRSP, the procedure of amending VSDP has begun in neither of the Voivodeships, nor a new VSDP has been adopted in neither of the Voivodeships. In recent years, PSE S.A. has participated in periodic evaluations of the VSDP for monitoring the implementation of public purpose investments included in the VSDP. Upon agreement of the PRSP 2023-2032 by the President of ERO, in 2023 PSE S.A. referred to all Marshals of Voivodeships requests to include planned development projects in upcoming updates to Voivodeship Spatial Development Plans.

3.7 Coordination of EHV and 110 kV network development and agreements with DSOs

The national transmission network (at 400 and 220 kV) together with a large part of the 110 kV distribution network operates in the multiple-feed meshed network configuration. One of the key aspects in planning the development of transmission infrastructure both at the EHV network level and the 110 kV network level is to ensure the coherent and coordinated development of the entire meshed network. Such an approach makes it possible to ensure long-term operational security of the NPS and optimal, in technical and economic terms, dimensioning of needs for network expansion in different areas. This issue is provided for in the applicable laws and regulations, including the EL Act and the Transmission Grid Code (Conditions for network use, operation, maintenance and development planning). In particular, in accordance with Article 9c(2)(5) of the EL Act, TSO, applying objective and transparent rules safeguarding equal treatment of users of these systems and taking into account the environmental protection requirements, is responsible for, among others, cooperation with other power system operators or energy companies to ensure the reliable and efficient operation of power systems and to coordinate their development. Moreover, pursuant to Article 16(6) of the EL Act, the development plans for meeting current and future electricity demand drawn up by the DSO take into account the development plan drawn up by the TSO, as appropriate, and pursuant to Article 9c(3)(4) the DSO is required to cooperate with PSE S.A. to ensure consistency in the operation of the power systems and coordinate their development.

Integrated planning requires multi-variant analyses for the entire meshed network, taking into account changing system conditions. In the period preceding the preparation of the PRSP 2025-2034, as part of the cooperation between PSE S.A. and the DSOs, a number of multi-variant analyses were carried out for individual areas of the NPS, taking into account the current conditions affecting the needs for the development of the 110 kV transmission and distribution network in the period until 2030. These analyses were carried out by independent experts appointed jointly by the operators. They enabled the development of the following integrated 110 kV transmission and distribution network development plans under the name:

1. The concept of operation of the EHV transmission and 110 kV distribution network as a meshed network in the area of TAURON Dystrybucja S.A. operations until 2030 – developed on 19.06.2019.
2. The concept of operation of the EHV transmission and 110 kV distribution network as a meshed network in the area of PGE Dystrybucja S.A. operations – developed on 03.07.2019.
3. The concept of operation of the EHV transmission and 110 kV distribution network as a meshed network in the area of ENERGA-OPERATOR S.A. operations – developed on 07.08.2019.
4. The concept of operation of the EHV transmission and 110 kV distribution network as a meshed network in the area of innogy Stoen Operator operations until 2030 – developed on 25.03.2020.
5. The concept of operation of the EHV transmission and 110 kV distribution network as a meshed network for North-Western Poland until 2030 – developed on 25.09.2020.

The aforementioned integrated plans for the development of the transmission and 110 kV distribution network, developed in cooperation with the individual DSOs, determined potential development directions, which the operators then took into account in the transmission and 110 kV distribution network operation configurations and planning documents prepared by the companies.

As a result of integrated planning of the development of the EHV and 110 kV meshed network, in order to improve the reliability of power supply to different DSO areas, the TSO and DSOs have agreed and concluded or are in the course of concluding respective agreements addressing the need to strengthen the existing and construction of new connections of the 400 and 220 kV transmission network with the 110 kV network. The current PRSP includes about 40 investment projects related to system development at the interface between the TSO and DSOs.

In the years 2024-2025, TSOs and DSOs plan to carry out the next round of analyses, the results of which will be used in subsequent development plans of individual companies.

4 Assumptions and results of planning studies

4.1 Main assumptions concerning the transmission network environment

Transmission network planning over the long-term depends on assumptions concerning the future environment of the power system, including, most importantly, global volumes and geographic distributions of energy and power demand and the delivery of power by specific generation resources. There is still considerable uncertainty in the development forecasts for Europe's energy sectors and, consequently, it is difficult to reach consensus regarding the existence of an optimal power system that guarantees both climate and environmental neutrality, security of supply and acceptable energy costs. The result is different scenarios for the development of the transmission network environment, often based on contradictory assumptions about the size and nature of future electricity demand and the fuel structure of its generation. Correct planning for the development of the transmission network requires knowledge of the number, size, and location of generation and energy storage facilities, keeping abreast of legal and technological developments, and periodically reviewing answers to fundamental questions outlined below.

How much?	▪ Which will happen faster: an increase in energy consumption caused by economic development or improvements in energy efficiency supported by population decline? ▪ Sector pooling, electrification of transportation and heat generation: how soon will it happen, in which sectors, and to what level? ▪ Are there alternatives to electrification? Electrolysis vs. reforming vs. gasification? ▪ To what extent can we rely on primary energy and electricity imports?
What?	▪ RES + electricity storage, RES + hydrogen economy, RES + natural gas, RES + alternative fuels, nuclear, fossil fuels with CCS/CCU?
How?	▪ Large and centralised or small and local generation resources? ▪ Large generation resources maximising efficiency or smaller ones that are more flexible? ▪ Public support or market competition?
Where?	▪ Generation at the point of consumption or at the point of primary energy resources? ▪ Wind turbines onshore or offshore? ▪ Photovoltaics on building roofs or on the ground?
When?	▪ Now! Or is it better to wait until there is sufficient technical and economic availability of energy storage facilities or hydrogen/alternative fuel technologies? ▪ Should we shut down coal-fired sources earlier or condition it on the emergence of adequate stable sources? Will the risks of delays in commissioning planned and ongoing new generation sources materialise?
At what cost?	▪ How much of an increase in energy costs is acceptable? ▪ Is it acceptable to decrease security of supply or give up on treating electricity as a public good? ▪ What is the risk of not commercialising energy storage or hydrogen/alternative fuel technologies?

The answers to the above questions lead to an infinite number of combinations of options that, from the point of view of the implementation of specific investment tasks, have no clear common part. The universal scenario for the development of the transmission network would therefore have to be the sum of the sets of investment tasks for all combinations and would certainly not be technically or economically feasible.

When planning new generation resources, very limited consideration is given to their location from a network perspective. As a result, new resources can be created in multiple locations, often competing with each other. Thus, even for the specific fuel mix development option selected, there is no sufficiently reliable indication at the network planning stage that would clearly identify the location of new resources. For the implementation of this plan, specific assumptions have been made regarding the development of the transmission network environment and the associated required functionality. They are presented below:

- The assumptions for the development of the transmission network environment are based on existing strategic documents, in particular: The National Energy and Climate Plan, Poland's Energy Policy, the Polish Nuclear Power Programme, the Act on promoting electricity generation in offshore wind farms, the Polish Hydrogen Strategy until 2030 with an outlook until 2040.
- Over the next 10 years, photovoltaic power plants and wind power plants may develop faster than the strategic documents suggest.
- Poland's transmission network in 2034 is expected to provide a solid basis for planning future developments in the NPS environment. It is not supposed to limit the ability to lead the energy transition process, and thus not to be a bottleneck to achieving the goal of climate neutrality in 2050. It should allow to achieve a level of more than 50% share of RES generation in net electricity consumption, without significant restrictions concerning the issuance of network connection conditions for locating new RES sources, resulting from current applications for the determination of connection conditions.
- After 2034, the transmission network should provide the possibility of further increases in the share of RES in electricity generation in suitable locations from the point of view of technical conditions of network operation and the possibility of developing network infrastructure.
- The ongoing "transformation and merging of sectors" will translate into an increase in electricity demand and peak power value. The transmission network should be ready for this increase and allow power transmission to cover more than 240 TWh of annual net electricity consumption and up to 42 GW of peak power demand.
- The transmission network should allow the connection of new large energy consumers located in special economic zones, as well as possible sources of energy accompanying these consumers.
- The transmission network should allow for the connection of new energy storage and P2P facilities in suitable locations from the point of view of technical conditions of network operation and the possibility of developing network infrastructure.
- The transmission network should have the capacity to serve a power system that is self-sufficient in terms of generation and to conduct free commercial and technical exchange with other systems. Investments in the transmission system should support the optimisation of the use of existing cross-border connections and those currently under construction, ensuring that these connections can contribute significantly to the balance of power and energy in the NPS. New cross-border connectivity projects can only be initiated on the basis of unequivocally demonstrated, multidimensional benefits, as regards which there is consensus among stakeholders.
- The transmission network should allow connection of and power output from a nuclear power plant at the location currently preferred by Polskie Elektrownie Jądrowe.
- The transmission network should have the possibility of further development, corresponding to the change in the environment in the long-term perspective, including in particular the location of new nuclear power plants and offshore wind farms.

- The development of the transmission network must not lead to a shock increase in transmission tariffs and should minimise the risk of stranded costs. The increase in transmission tariffs should be based on reasonable expenditure and transition costs.

Given the above, two progressive scenarios have been drawn up for this plan:

- free transformation (FTS),

- dynamic transformation (DTS),

aimed at defining a transmission network structure that will not act as a “bottleneck”, but instead provide a solid basis for achieving climate neutrality. The assumptions for each scenario are described in more detail in the following chapters.

4.2 Network analysis method – technical and economic considerations

For the purpose of basic identification and selection of investment projects, complex analyses based on technical and economic modelling of the operation of the transmission network in multiple variants are carried out. They take into account, among other things, the topology of the national extra high voltage and high voltage networks, individual representation of generation resources with their technical and economic characteristics, forecasts of national power demand in hourly granularity along with the dynamics of geographic change, as well as cross-border commercial and physical flows. Analyses are made using the PLEXOS software, which solves *DC SCUC* type problems. The calculations consist in determining the economically optimal way of covering demand in such a way that the power flows do not cause exceedances of the maximum permissible load capacities of network elements and allow a given cross-border exchange, while maintaining conditions and technical limitations of the generation resources operation.

When analysing calculation results, the following quantities were taken into account:

- value and location of energy not supplied,
- indicators of the presence of network congestion pointing at specific limiting elements – lines or transformers,
- the degree of load on individual network elements,
- costs of network congestions.

The above figures allow the evaluation of the analysed network variants on the basis of which the selection of investment tasks is made, eliminating the diagnosed network congestions, with the final qualification of the task selection being confirmed by a positive result of the economic analysis. Economic analyses are carried out according to the discounted cash flow method. On the positive flow side, the benefits achieved from the implementation of a given investment, i.e. the value of reduction of the cost of network congestions, and on the negative flow side, the planned capital expenditures, operating costs, and network loss costs are taken into account. The level of benefits achieved from the implementation of each investment is defined as the difference in the cost of congestions between the system “with the investment analysed” and the system “without this investment.”

4.3 Network analysis method – technical considerations

In parallel with the technical and economic calculations, power flow calculations were carried out using a full model of the national transmission and 110 kV networks as well as those of neighbouring countries. During the analyses, an AC PF (Alternating Current Power Flow) type model was used in the PLANS software. Through simulation of specific network operating conditions, the sufficiency of investments identified during technical and economic calculations was verified, the need for additional investments was identified, and workable changes to the network's operating configuration were developed. In addition, necessary investments in voltage control and reactive power compensation measures have been identified for the target network layout.

Analysis of voltage conditions in the NPS

NPS models taking into account the expansion of the extra-high voltage network were also subjected to analyses of voltage conditions in terms of selecting additional reactive power compensation devices necessary to ensure the safety of NPS operation. In this regard, the identification of potential exceedances of permissible voltage levels, the operating states of the NPS that determine the risks, and the voltage characteristics of individual nodes were made. Preliminary identification as to the desired locations and magnitude of reactive power resources was made on the basis of reactive power distribution using "virtual compensators," i.e. the assumption that they will be able to be either synchronous or static compensators (*statcom*). The selection of actual reactive power compensation equipment also took into account location and implementation conditions related to network expansion, limitations on the installation of such devices in substations, total installed capacity in one substation, and the possible capacity of individual devices. Consideration has been given to the need to provide smooth voltage regulation to respond to changing network conditions, such as emergency line outages. The possibility of using generators from decommissioned coal-fired units to operate as synchronous compensators was also considered. In addition, the results of a paper titled "The concept of long-term offshore wind farm interconnection for the National Power System" were also made use of. This approach has optimised the need to install additional reactive power compensation equipment in the NPS.

The following operating states of the NPS were adopted as criteria, in terms of analysing voltage conditions:

- low power demand with high generation of RES at the distribution system level and low generation at the transmission system level – causing reactive power flows from the 110 kV network to the transmission network, which, combined with the generation of reactive power by unloaded EHV lines, cause voltages to rise above permissible values,
- high power demand when not covered by local generation with minimal participation of CDGUs – causing large transfers of active power through the EHV network from areas of rapidly developing offshore and onshore wind farms and thus resulting in high demand for reactive power on the network, may contribute to lowering voltages below acceptable values and reducing the voltage stability margin in the NPS.

4.4 Energy and power demand forecast

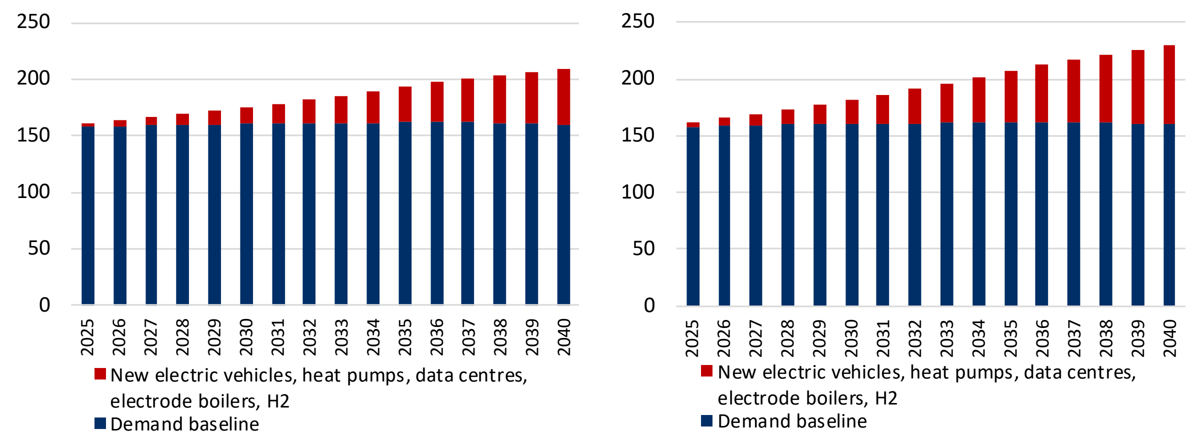
Energy demand forecast

The long-term forecast of net energy demand in the NPS was prepared taking into account historical trends and the forecast of final energy consumption. Macro-factors affecting the structure of energy consumption in the household, transportation, industry and service sectors, changes taking place in the area of energy efficiency, forecasts for the growth of Gross Domestic Product in each sector, technological and consumer changes, as well as changes resulting from EU directives regarding Poland's achievement of the required RES target in final energy consumption were taken into account. In addition, anticipated structural changes in final energy consumption were taken into account, i.e. the growth in the number of electric vehicles, heat pumps and fuel cells, among others. Projections for EVs and heat pumps were determined based on publicly available data and information, as well as PSE S.A.'s own analysis.

The forecast was prepared in two scenarios that address the adopted development path of the NPS environment. The first is a free transition scenario, while the second is a dynamic transition scenario, which assumes a significant increase in energy demand. These scenarios are shown in the charts below. It should be noted that they do not include the demand resulting from the implementation of large industrial investments in the areas of special economic zones, which are currently in the initial conceptual stage and which are included in this plan as part of the sensitivities studied (the potential of installed consumer capacity in these zones over the next ten years exceeds 3.5 GW). The planned development of the transmission network addresses both demand forecast scenarios and the possible additional increase in demand as a result of the aforementioned investments.

***Figure** 4-1 Annual net electricity demand in the years 2025-2040 – average from climate years 1982-2019 [TWh]*

FTS scenario **DTS scenario**



**H2 – electricity demand resulting from hydrogen production*

Power demand forecast

The power demand profile depends on weather factors and can therefore show significant variations from year to year.

A dedicated climate year – SWS – has been developed for the analyses performed. It reflects difficult network operation conditions, i.e. primarily the size and simultaneity of RES generation and the possible occurrence of high power demand values due to weather factors.

A climate year (CY) is a term introduced for the purpose of adequacy analyses conducted by ENTSO-E. One climate year is a set of such data as air temperature, insolation, wind power and hydrological conditions for every price zone in Europe. The entire database covers climate data from 38 climate years (1982-2019). The profiles reflect a wide range of possible climate conditions, including rare extreme events. Although it is impossible to accurately predict future weather conditions, the use of such a wide range of historical data helps to sufficiently assess risk and prepare the transmission network for the occurrence of certain events.

***Table 4.1** Structure of the SWS climate year*

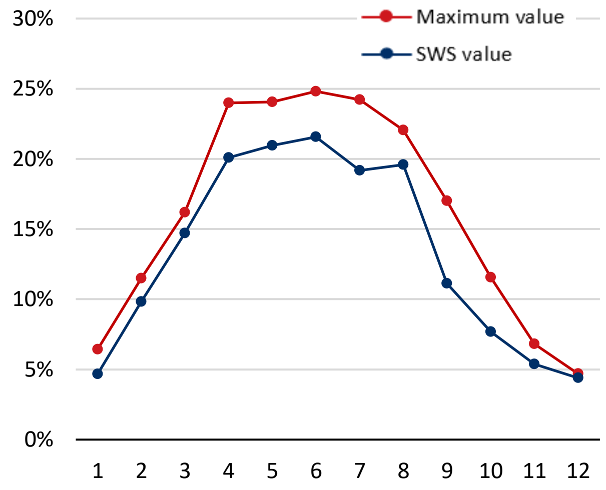
Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Climate year	1987	1986	1986	1997	2012	1994	2007	2019	1986	1997	1988	2010

The figure below shows, for illustrative purposes, a comparison of demand values and RES capacity utilisation rates in the SWS climate year with the maximum values occurring in each month in the 1982-2019 period.

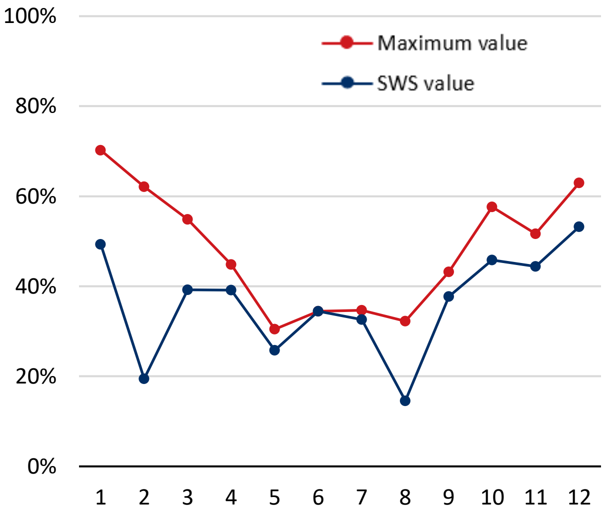
***Figure 4-2** Comparison of maximum demand values and RES capacity utilisation rate with SWS climate year values*

Power demand forecast for the year 2034 [GW]
Monthly peak – DTS scenario

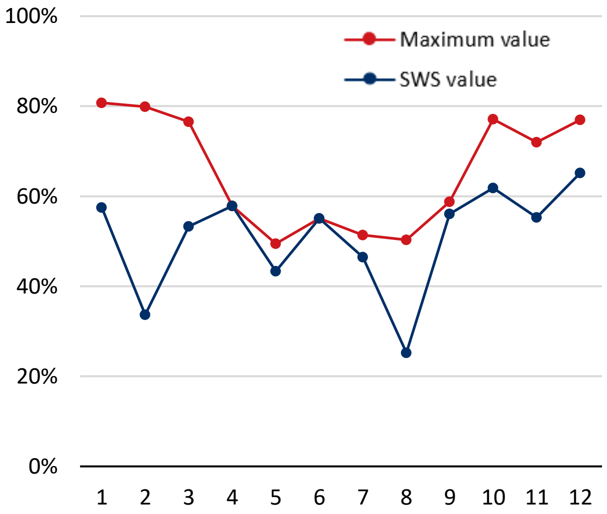
Solar power plants
Average monthly capacity utilisation rate



Onshore wind power plants
Average monthly capacity utilisation rate



Offshore wind power plants
Average monthly capacity utilisation rate

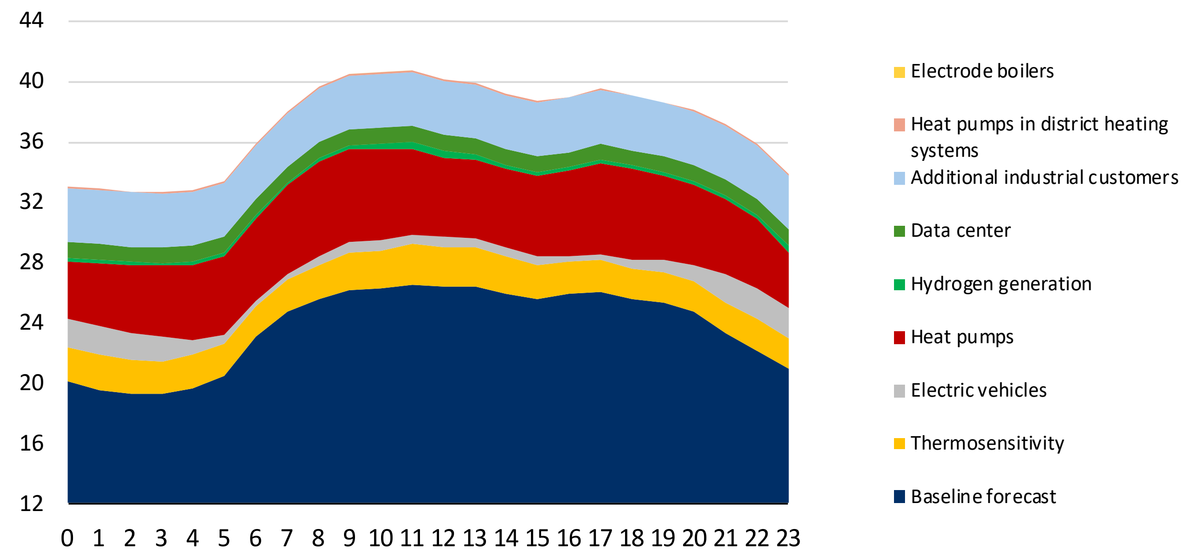


Net demand is the power demand of customers connected to the transmission and distribution networks and directly to the equipment, installations, or networks of other power companies, plus losses in the transmission and distribution networks.

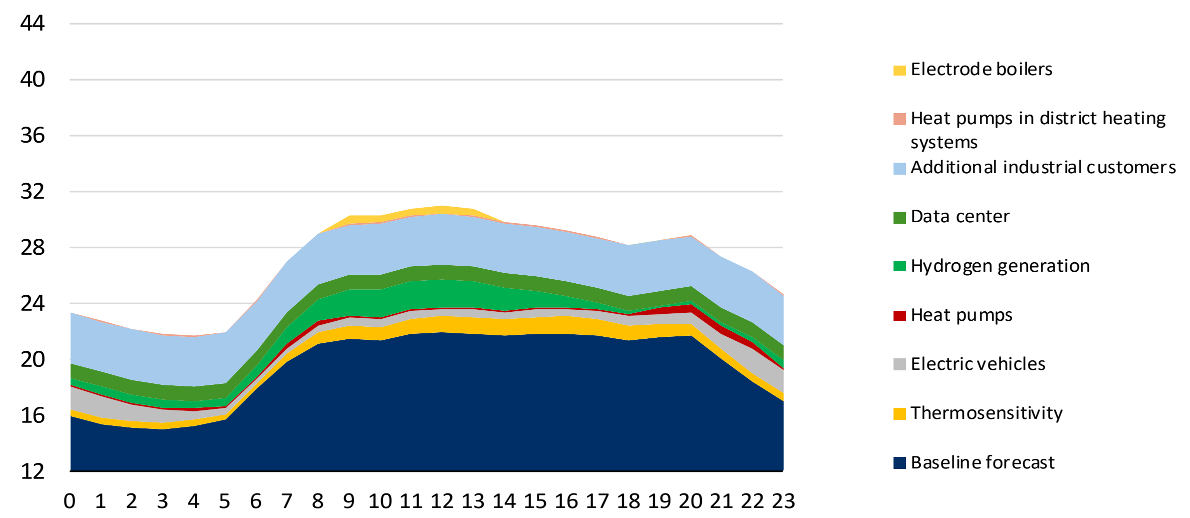
Figure 4-3 shows the daily power demand profiles for a sample day in winter and summer broken down by components in 2034, for the SWS climate year used in the transmission network development planning process. The profiles apply to the DTS scenario. The thermal sensitivity component illustrates the impact of extreme weather conditions relative to normal conditions.

Figure 4-3 Profile of net power demand – DTS scenario

DTS scenario, sample winter day – 2034 [GW]



DTS scenario, sample summer day – 2034 [GW]



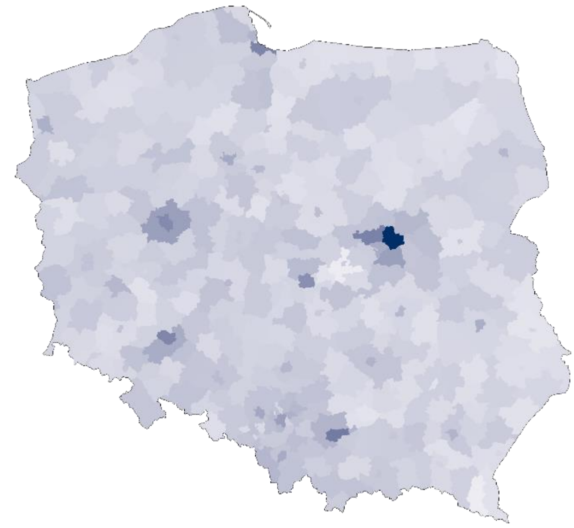
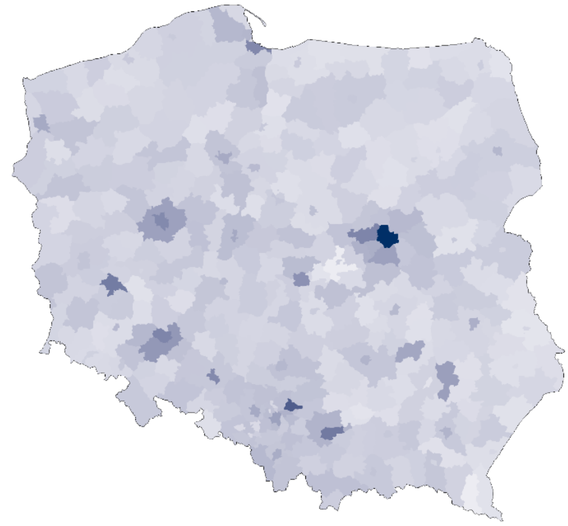
Spatial distribution of demand for electricity

Information on projected global demand for energy and electric power is not complete, as it does not include variability in the spatial distribution of demand. This distribution shows significant variability as a function of time, so its forecast was developed for the purpose of planning the development of the transmission network.

The spatial distribution of energy and power demand for the DTS scenario (for the SWS climate year), visualised at the district level, is shown below:

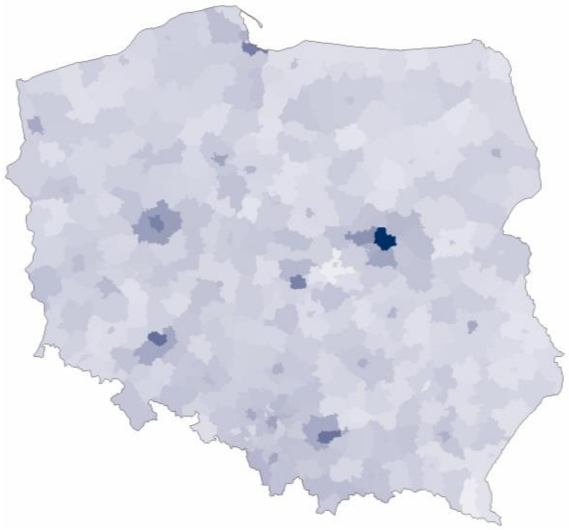
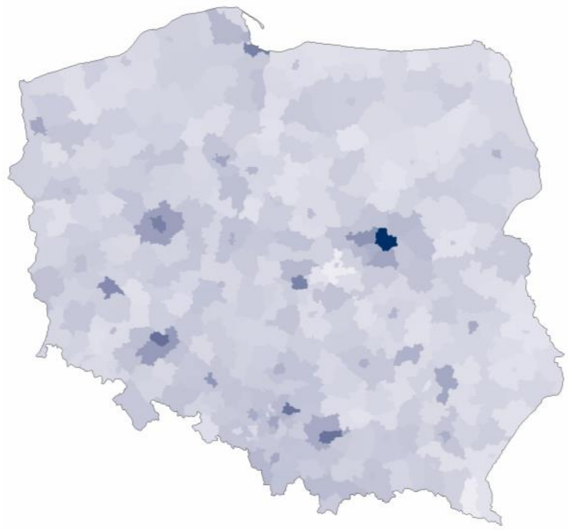
- without taking into account the development of electric vehicles and new potential industrial customers,
- taking into account electric vehicles and new potential industrial customers.

Figure 4-4 *Spatial distribution of annual electricity demand in 2034 – DTS scenario*

Without taking into account EV development and potential additional customers, in total: 205.7 TWh	**Taking into account EV development and potential additional customers, in total: 243.2 TWh**
	

** - darker colour indicates higher demand in a particular area*

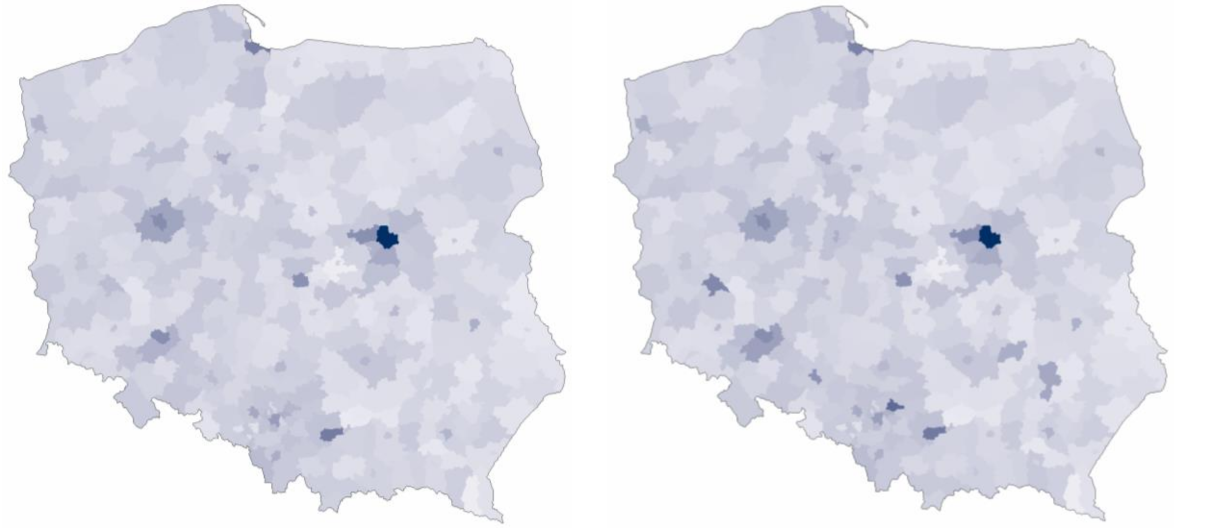
Figure 4-5 *Spatial distribution of electric power demand in the winter peak in 2034 – DTS scenario*

Without taking into account EV development and potential additional customers, in total: 38,505 MW	**Taking into account EV development and potential additional customers, in total: 42,782 MW**
	

** - darker colour indicates higher demand in a particular area*

***Figure 4-6** Spatial distribution of electric power demand in the summer peak in 2034*

<u>Without</u> taking into account EV development and potential additional customers, in total: 27,198 MW	**Taking into account EV development and potential additional customers, in total: 31,232 MW**



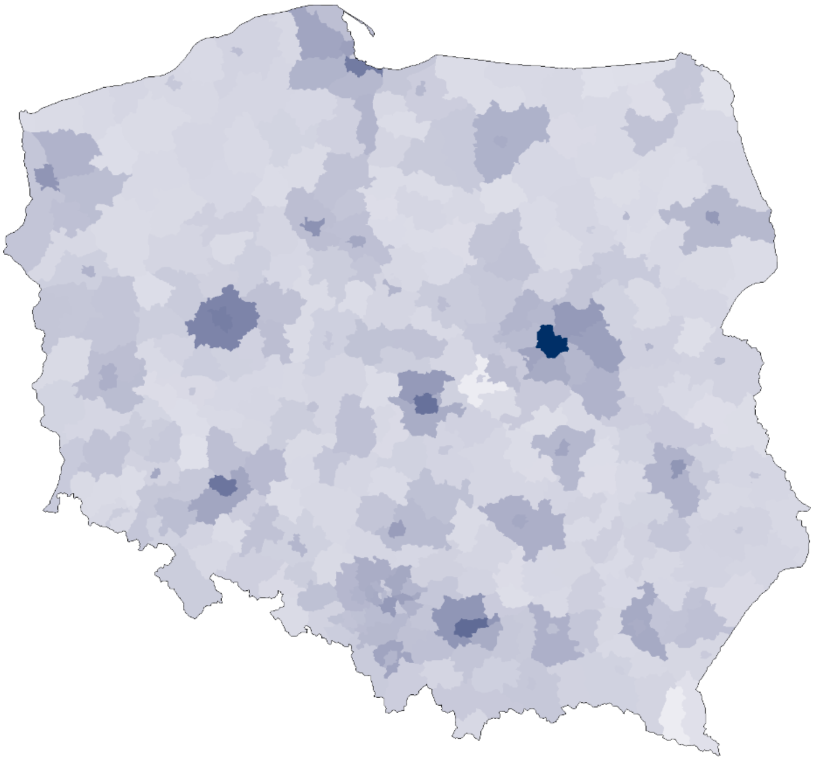
** - darker colour indicates higher demand in a particular area*

Spatial distribution of electric vehicles' demand for electricity

In order to obtain spatial distribution of electric vehicles' power and electricity demand at individual NPS nodes, the national forecast developed by PSE S.A. was broken down by individual districts. A prerequisite for such electromobility development throughout the country is the expansion of charging infrastructure both in urban areas and along major transportation routes. The basic assumption provides that the most intense development of electromobility will take place in large metropolitan areas and districts directly bordering them. The degree to which electromobility will develop in each district was determined based on the number of inhabitants and population density of the district. Low-density district-level cities that have planned or are planning to develop a fleet of urban electric buses were also included Individually. The process of creating the spatial distribution of electric vehicle power demand also took into account the proposal published on 25 September 2023 by the Ministry of Climate and Environment for the distribution of publicly available charging infrastructure that meets the requirements of the Regulation of the European Parliament and of the Council on the deployment of alternative fuels infrastructure.

The figure below shows the results of the distribution of annual energy demand for the DTS scenario, broken down by districts.

***Figure** 4-7 Electric vehicles' demand for electricity in 2034 – DTS scenario, in total: 6.3 TWh*



4.5 The structure of electricity generation

For the purpose of determining the future structure of generation, the information obtained from commercial electricity producers as part of a survey process conducted by the TSO in the late 2022 and early 2023 was taken into account. Plans for the development of offshore wind farms and nuclear power, which have been identified in strategic documents, were also considered. Moreover, information on the connection conditions issued by the TSO and DSO, available information on the results of the RES auctions held, as well as the main national support programmes dedicated to prosumer sources, and the results of the capacity auctions settled were considered and used. The electricity generation structure was developed in the form of two scenarios, corresponding to the assumptions made as part of the FTS and DTS scenarios and taking into account additional offshore wind capacity analysed in the sensitivity framework. The table below provides information on the adopted structure of electricity generation resources in 2034.

***Table 4.2** Structure of electricity generation resources in 2034*

<table>
<tr><th>Type of power resource</th><th>FTS scenario
Net capacity
[MW]</th><th>DTS scenario
Net capacity
[MW]</th><th>Notes and additional capacities analysed in the sensitivity framework</th></tr>
<tr><td>Lignite</td><td colspan="2">4,401</td><td>▪ Conventional units participating in the central balancing mechanism</td></tr>
<tr><td>Hard coal</td><td colspan="2">6,317</td><td>▪ Conventional units participating in the central balancing mechanism</td></tr>
<tr><td>Hard coal - reserve sources</td><td colspan="2">2,277</td><td>▪ The capacity of existing sources at risk of early shutdown for economic reasons, despite the technical potential for their continued operation. Capacity required to balance energy and power demand.</td></tr>
</table>

Type of power resource	FTS scenario Net capacity [MW]	DTS scenario Net capacity [MW]	Notes and additional capacities analysed in the sensitivity framework
			▪ An alternative to maintaining the operation of these sources is the construction of new resources of equivalent capacity, energy production capacity, and location. These can be energy storage facilities or P2G installations with additional capacity of RES sources (relative to the assumed one)
Natural gas	10,236		▪ Conventional units participating in the central balancing mechanism ▪ Existing and new gas power plants
Biomass and biogas	2,830		▪ Total capacity of power plants and combined heat and power plants
Large nuclear power units	1,146	2,292	▪ A timetable for the construction of new nuclear power plants, consistent with PNPP, has been adopted. ▪ The DTS scenario assumes the possibility of commissioning two nuclear units in the 2034 timeframe
SMR	560	840	▪ The locations of new power plants resulting from applications received by PSE S.A. for the issuance of connection conditions were adopted ▪ The DTS scenario assumes the possibility of commissioning the third unit in the 2034 timeframe
Hydropower	1,250		▪ Run-of-river hydroelectric plant
PSP	2,462		▪ Existing and planned pumped storage power plants
Photovoltaic sources	36,000	45,000	▪ Total capacity of prosumer and commercial sources
Onshore wind power plants	16,940	19,362	▪ The locations of new power plants resulting from the connection agreements concluded and the connection conditions issued have been adopted ▪ The DTS scenario also takes into account the locations of new power plants resulting from applications for the issuance of connection conditions
Offshore wind power plants	10,900	11,885	▪ The locations of new power plants resulting from the connection agreements and applications for the issuance of connection conditions ▪ The sensitivity analyses included the possibility of building offshore wind farms with a total capacity of about 18,000 MW
Energy storage facilities	3,750	15,207	▪ Aggregate capacity of large-scale and household energy storage facilities
Combined heat and power plants	5,217		▪ Commercial and industrial combined heat and power plants, including new gas-fired

Type of power resource	FTS scenario Net capacity [MW]	DTS scenario Net capacity [MW]	Notes and additional capacities analysed in the sensitivity framework
			combined heat and power plants in place of shut down coal-fired units

The development of the transmission system proposed in this plan takes full account of the fuel structure shown in the table above. In addition, the sensitivity analyses took into account the accelerated pace of construction of more offshore wind farms, which would reach about the capacity of approx. 18,000 MW in 2034.

4.5.1 Locations of new conventional sources

Locations of new gas-fired power plants have been adopted in accordance with the TSO's current knowledge resulting from concluded capacity contracts, connection agreements, specified connection conditions and information provided by investors at an advanced conceptual stage, preparing to submit an application for the determination of connection conditions.

The location of a new nuclear power plant was adopted in accordance with the PNPP and the connection conditions issued by PSE S.A., while the locations for SMR facilities were based on the applications for connection conditions received by the TSO in 2022 and 2023.

4.5.2 Spatial distribution of photovoltaic sources

Table 4.3 shows the assumptions for the installed capacity of each type of photovoltaic sources planned for 2034.

Table 4.3 Volume of installed capacity in photovoltaic sources assumed for 2034.

PV type	FTS scenario			DTS scenario		
	prosumer	commercial	total	prosumer	commercial	total
Installed capacity [MW]	16,000	20,000	36,000	20,000	25,000	45,000

Spatial distribution of prosumer sources was determined taking into account:

- the nature of each area: urban, urban-rural, rural and industrial,
- spatial distribution of demand for electricity,
- population density for each district,
- insolation coefficients for individual areas,
- existing connected installations broken down by DSO branches according to data as at November 2023.

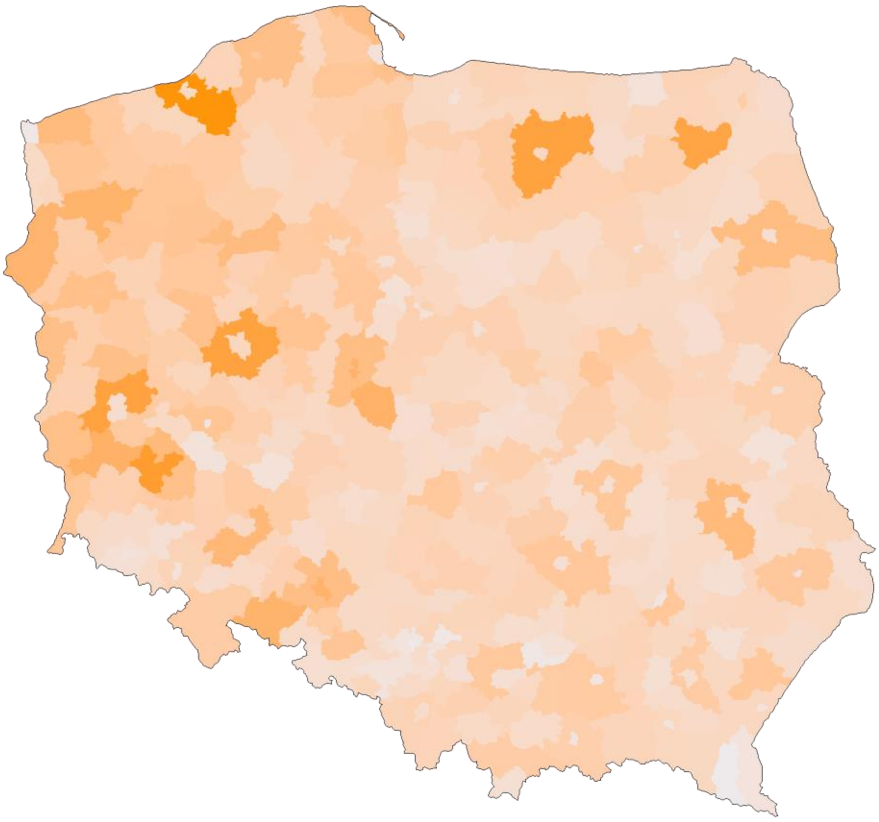
Spatial distribution of commercial photovoltaic power plants was determined taking into account the locations of:

- projects with connection agreements concluded,
- projects with connection conditions issued,
- projects with agreed terms and conditions of conducting expert opinions on the impact on the power system,
- projects that were denied connection as part of the PSE network connection process,

- installations connected broken down by network nodes.

Figure 4-8 presents the spatial distribution of photovoltaic sources as part of the DTS scenario for 2034, broken down by districts.

Figure 4-8 *Spatial distribution of installed capacity of photovoltaic sources**



* - assignment of installed capacity to individual districts is based on where the sources are physically connected to the network and may not correspond to the actual location of the sources.

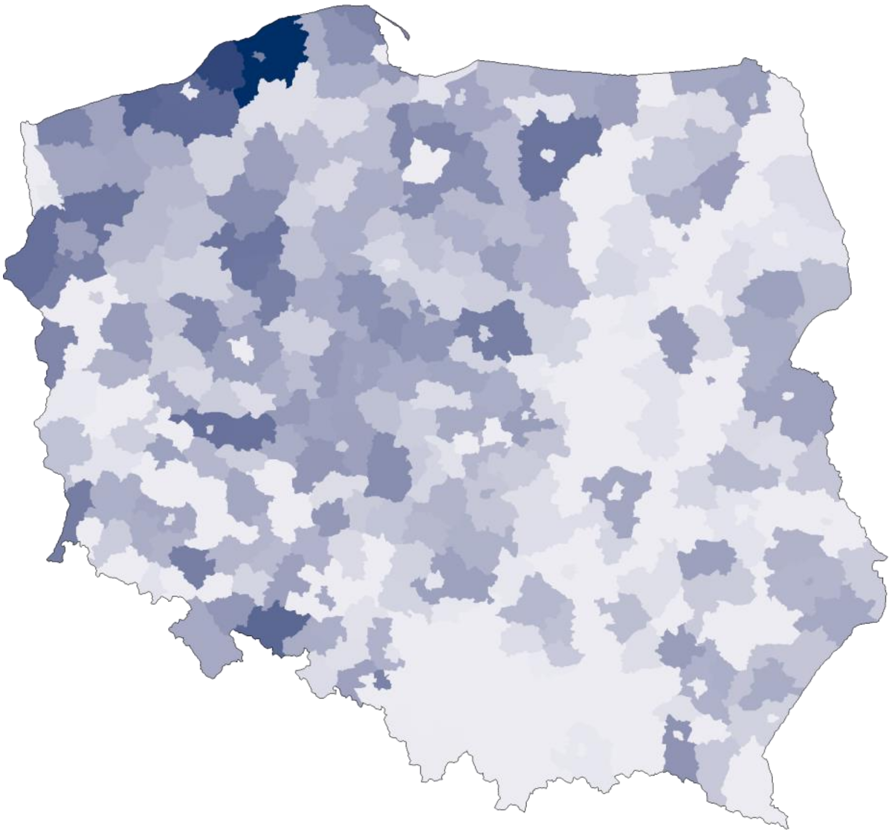
4.5.3 Spatial distribution of onshore wind power plants

For the purpose of developing the spatial distribution of the installed capacity of onshore wind power plants the following aspects were taken into account:

- results of auctions for the sale of electricity from renewable energy sources carried out in the years: 2018 - 2022,
- existing transmission network connection agreements and connection conditions issued by the TSO as at October 2023.

Figure 4-9 shows the projected geographic distribution of onshore wind capacity in 2034 for the DTS scenario, broken down by districts.

Figure 4-9 *Spatial distribution of installed capacity of onshore wind power plants**



* - assignment of installed capacity to individual districts is based on where the sources are physically connected to the network and may not correspond to the actual location of the sources.

4.5.4 Location of offshore wind farms

The following assumptions were made for the DTS scenario for the year 2034 regarding the connection of offshore wind power plants:

- Krzemienica substation (Słupsk substation area) – 5,060 MW,
- Choczewo substation (Żarnowiec substation area) – 5,350 MW,
- Słupsk substation – 1,440 MW.

Whereas for the dynamic transformation with unlocking offshore potential (DTSO) scenario the following assumptions were made for the connection of offshore wind power plants:

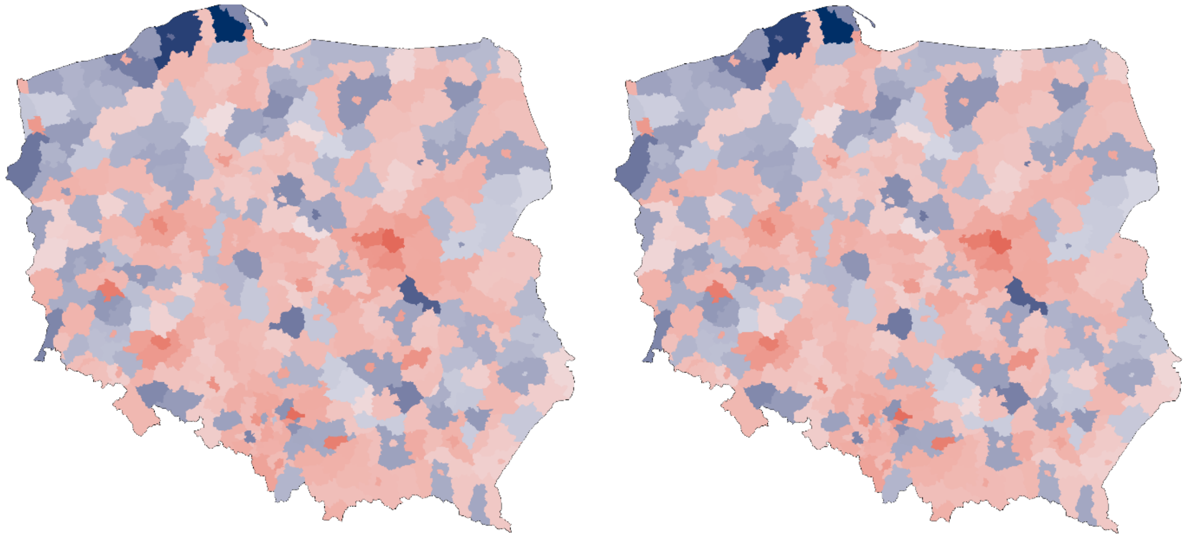
- Krzemienica substation (Słupsk substation area) – 5,615 MW,
- Choczewo substation (Żarnowiec substation area) – 6,285 MW,
- Słupsk substation – 1,440 MW,
- a new 400 kV substation in the West Pomerania area – 4,560 MW.

4.6 Structural power flows in the NPS

Figure 4-10 shows the projected geographic distribution of the balance of electricity production and annual electricity demand in 2034 for the DTS scenario, as well as the projected geographic distribution of generation and peak power demand balance in 2034, broken down by districts.

Figure 4-10 *Spatial distribution of the balance of electricity production and electricity demand in 2034*

Balance of electricity production and demand in 2034	**Balance of generation and peak power demand in 2034**



** - darker colour indicates higher saturation of generation (blue) and demand (red), respectively, in a given district*

4.7 Fundamental conditions of the energy market and NPS operation

In order to evaluate fundamental market relations and the operation of the NPS in 2034, analyses were performed according to the SCED method. The result is the production volumes of individual generation units and simulations of their revenues and operating costs. The following assumptions were made:

- Analyses were carried out for the FTS, DTS, and DTS with increased installed capacity scenarios for offshore wind power plants up to 18 GW (DTSO).
- Fuel prices for 2034 were assumed on the basis of World Energy Outlook 2023 and the APS scenario (real prices), i.e. at PLN 11/GJ for hard coal and PLN 28/GJ for gas. The cost of emission allowances was assumed at 140 €/t.
- In the absence of the possibility of effective forecasting, it was decided not to include the share of cross-border exchange, although its eventuality was taken into account in the commentary on the results obtained and in sensitivity analyses.
- Analyses were performed for the SWS climate year.

The following tables show the production levels of each type of energy source.

Table 4.4 *Simulated structure of electricity production in the NPS in 2034 and the SWS climate year, without taking into account cross-border exchange*

Scenario	FTS		DTS		DTSO	
Fuel source	**TWh/year**	**Share***	**TWh/year**	**Share***	**TWh/year**	**Share***
RES (generation/ potential)	138.9/162.4	57.7%	156.6/186.2	55.6%	163/212.6	56.5%
Hard coal	15.6	6.5%	13.0	4.6%	12.2	4.2%
Lignite	6.4	2.7%	5.7	2.0%	5.5	1.9%
Natural gas	57.1	23.8%	52.1	18.5%	48.9	17.0%
Nuclear energy	11.2	4.6%	21.5	7.6%	20.6	7.1%
Storage facilities, including PSP	9.1	3.8%	30.7	10.9%	36.0	12.5%
Other	2.1	0.9%	2.1	0.7%	2.1	0.7%

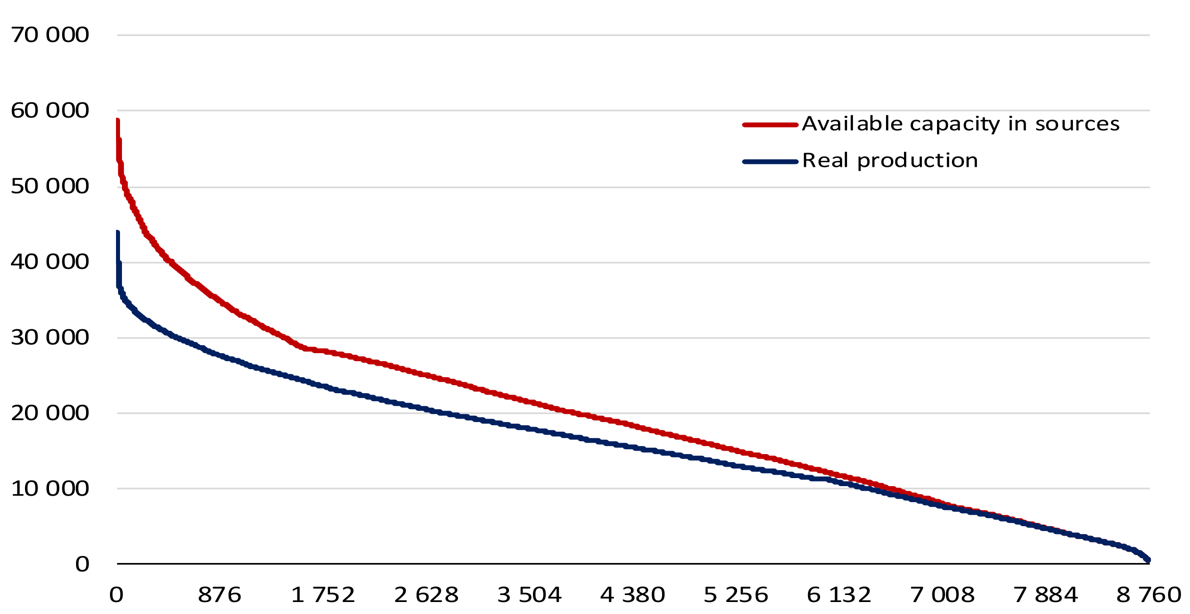
* - share in customer demand coverage and loading of storage facilities and PSPs

In 2034, RES sources could provide between 162 and 212 TWh of electricity, depending on the scenario, based on the amount of their installed capacity and the projected availability of primary energy in the SWS climate year. However, taking into account the hourly power demand profile and the technical conditions of the system's operation (mainly other sources), the real production of RES remains at 139-163 TWh, which translates into a 55-58% share of national net electricity production. The next chart shows the ordered curves of available capacity and real production for the three largest RES generation groups, i.e. photovoltaic sources, onshore and offshore wind for the DTS scenario. They illustrate a significant part of the year, i.e. several thousand hours, in which the generation from these sources is lower than the one resulting from available capacity.

The SWS climate year is characterised by a high supply of primary energy from RES. The use of a different, less abundant year, although it could mitigate the scale of the reduction in RES potential, directionally does not affect the conclusions from the simulations carried out.

Figure 4-11 *Actual power generation from photovoltaic, onshore and offshore wind sources and available capacity resulting from primary energy, in the DTS scenario, in 2034 and the SWS climate year*

DTS scenario, ordered of available capacity and generation after redispatch [MW]



With RES capacity volumes as large as assumed, it is not the networks that are the reason for the inability to fully utilise the primary energy potential of these sources. It is primarily the structure of power demand, i.e. the lack of structural demand at all times of availability of RES primary energy. Second are the operating conditions of other generation sources, which are necessary to maintain stable operation of the power system and ensure a secure power balance. Within the framework of the above analyses, they were represented by considering a very small range of constraints, i.e. the required power reserve and a small minimum power of conventional units.

The way to increase the share of RES in the NPS is to be able to manage the energy they produce. In principle, it can be export, storage, or consumption of this energy directly by consumers or for the production of alternative fuels. For energy storage, significant storage capacity is needed to allow both daily and seasonal operation. In the case of exporting surplus RES generation, it should be borne in mind that such surplus may occur simultaneously over a large area of interconnected systems, which will limit export opportunities. This is very likely, given the simultaneity of weather conditions in European regions. In the future, an element that optimises the operation of RES may be the correlation of renewable generation with hydrogen or alternative fuel production processes, including storage.

The simulations carried out indicate that a significant share of RES sources in the structure of installed capacity, requires simultaneous and coordinated development of resources allowing the management of surplus energy, which will occur with the increase in the capacity of these sources.

The next table shows fuel consumption volumes resulting from simulated electricity production broken down by generation technologies. When analysing the results presented, one has to keep in mind that:

- simulations were performed for the SWS climate year, assuming higher-than-average availability of RES primary energy,
- cross-border exchanges were not taken into account, including possible energy exports and imports from Poland,
- the assumed structure of electricity generation assumes a large increase in RES capacity, gas units, as well as nuclear units. Any delays in investment plans will increase demand for coal,
- the figure given in the table refers to the demand for natural gas and coal at power plants and combined heat and power plants for electricity generation and does not include fuel requirements for heat generation outside the cogeneration process.

In the event of possible delays in the implementation of some of the offshore wind farm or nuclear power plant projects, electricity production in coal-fired units will be higher than simulated in these analyses even by over 20 TWh. This would mean an additional demand for hard coal of at least 9 million tons.

Table 4.5 *Simulated volumes of fuel consumption in the NPS in 2034 and the SWS climate year, without taking into account cross-border exchange*

Fuel source	Unit	FTS	DTS	DTSO
Hard coal (21.5 MJ/t)	million tons	10.0	8.7	8.4
Lignite (9 MJ/t)	million tons	7.2	6.3	6.1
Natural gas (35.3 MJ/Nm^3)	billion Nm^3	10.5	9.6	9.1

4.8 A method of taking cross-border exchanges into account for the evaluation of network performance

The European electricity transmission infrastructure is an interconnected system of vessels, creating import and export opportunities according to a country's current energy balance. The directions of electricity exchange are determined by the preferences of market participants, expressed through the price bids they make for the purchase and sale of electricity. The process of commercial cross-border exchange is often disrupted by unplanned exchanges, for which the transmission network must be prepared. The role of the TSO is to take care of the safety of system operation during the execution of electricity flows resulting from commercial transactions of market participants and all the factors that distort it.

The TSO's primary tool for balancing NPS resources in real time is the balancing market. A major balancing challenge is the development of RES sources, for which the possibility of cross-border exchange is a way of exporting current surpluses. In a situation where the security of system operation is threatened, the operator has the right to reach for remedial action, including inter-operator redispatching. However, the primary role and responsibility of the operator is to designate and make available transmission capacity that is used by market players. The trade observed on the borders of the NPS is the result of transactions made by individual market participants as part of their business strategies.

A legislative package – "Clean Energy for all Europeans" (CEP) – regulating the operation of the electricity market in European Union was ratified in 2019. Regulation (EU) 2019/943 contained therein sets out obligations for the provision of cross-border capacity. According to its provisions, EU transmission system operators, including PSE S.A., are obliged to make cross-border interconnection capacities available at maximum volumes due to safe network operating conditions. The regulation introduced a requirement to make available from 1 January 2020 not less than 70% of technical interconnection capacity for cross-border exchanges (the so-called CEP70 requirement), which for Poland was relaxed by the possibility of gradually making capacity available until a minimum of 70% is reached from 1 January 2026.

As of 2026, this requirement, in simple terms, boils down to the fact that in N-1 states the flow on interconnectors must not exceed 30% of their technical capacity in a hypothetical no-trade situation. This is the so-called natural unscheduled flow, which is due to the heterogeneous geographic distribution of demand and generation across zones (countries). When this flow exceeds the 30% threshold, countermeasures must be triggered to reduce it. As regards Poland, this measure may be the adjustment of phase shifters on DE/PL connections, and if this is insufficient, one must then expect to incur significant costs for re-dispatching of operating points of generation capacity located in the NPS or in other countries.

In accordance with the National Energy Policy, it was assumed that the NPS would fundamentally remain self-sufficient in meeting demand by maintaining and developing domestic generation. Nonetheless, the transmission network should have the capacity to benefit from cross-border connections, allowing for risk diversification and mitigating the effects of random events, such as significant simultaneous failures or catastrophic weather events, among others.

In addition, it was assumed that the natural unscheduled flows on DE-PL and PL-CZ/SK connections structurally do not exceed the 30% threshold, i.e. the level of availability of Polish interconnections meets the CEP70 requirement, making the national network open for cross-border trade.

Taking this into account, a level of natural unscheduled flow in the DE → PL → CZ/SK direction of 1,000 MW was assumed in the 2034 perspective, which is the maximum value at which the CEP70 requirement for cross-border connections is met. It was assumed that the export of frequent RES power surplus is possible only during hours of low NPS energy prices compared to neighbouring countries and modelled by increasing the physical flow from the NPS toward all neighbouring countries simultaneously, in proportion to the physical export capacity of each link. The maximum export capacity was determined assuming no network congestions within the country, taking into account only the technical capacity of cross-border lines, as required by CEP70.

5 Results of the transmission system development analysis

5.1 Planned investment tasks as part of the expansion and modernisation of the transmission network

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.104	Upgrade (redevelopment) of the 220 kV Adamów-Konin line, circuit I and II	Improvement of the technical condition of the line together with an increase in the permissible current carrying capacity in order to create conditions for power evacuation from generation sources planned for connection in Adamów substation	2023	2029
II.105	Upgrade (redevelopment) of the 220 kV Joachimów-Łośnice line	Increasing the permissible current carrying capacity of the line to eliminate structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity	2024	2028
II.106	Upgrade of the 220/110 kV Komorowice substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2023	2029
II.107	Expansion of the 220/110 kV Blachownia substation including connection of the 220 kV Groszowice-Kędzierzyn line	Improving the reliability of power supply to electricity consumers in the eastern part of the Opolskie Voivodeship	2024	2030
II.108	Expansion and upgrade of the 400/110 kV Tarnów substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers through the installation of the second 400/110 kV transformer	2024	2030
II.109	Upgrade of the 400/110 kV Mościska substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2024	2030
II.110	Upgrade of the 220/110 kV Chmielów substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2024	2030
II.111	Expansion and upgrade of the 400/110 kV Ostrowiec substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers in the Ostrowiec area through replacing 400/110 kV transformers with larger ones	2024	2030
II.112	Upgrade of the 220/110 kV Radkowice substation	Increasing the reliability of the operation of substation telecontrol and EAZ systems, adapting to the current technical standards of PSE S.A., and increasing the number of remotely controlled substations	2024	2029
II.113	Upgrade of the 220/110 kV Podolszyce substation	Increasing the reliability of the operation of substation telecontrol and EAZ systems, adapting to the current technical standards of PSE S.A., and increasing the number of remotely controlled substations	2024	2029
II.114	Upgrade of the 220/110 kV Piotrków substation	Increasing the reliability of the operation of substation telecontrol and EAZ systems, adapting to the current technical standards of PSE S.A., and increasing the number of remotely controlled substations	2024	2029

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.115	Upgrade of the 220 kV Bujaków substation	Increasing the reliability of the operation of substation telecontrol and EAZ systems, adapting to the current technical standards of PSE S.A., and increasing the number of remotely controlled substations	2023	2029
II.116	Upgrade of the 220/110 kV Ząbkowice substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2024	2030
II.117	Upgrade of the 220/110 kV Moszczenica substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2024	2029
II.118	Upgrade of the 220/110 kV Cieplice substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2024	2029
II.119	Upgrade of the 400/110 kV Ostrów substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2024	2030
II.120	Upgrade of the AC/DC Słupsk converter station – phase II	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards), including modernisation of the control system and MACH2 safeguards to the latest version and also to ensure conditions for power evacuation from renewable sources in northern part of the country	2024	2031
II.121	Replacement of lightning protection conductors on selected lines 220 kV and 400 kV – phase I	Ensure adequate fibre optic link capacity	2024	2029
II.122	Upgrade of electricity metering systems – phase 2	Adaptation of metering systems to the current technical standards of PSE S.A.	2024	2029
II.123	Upgrade of 400/110 kV transformers at the 400/110 kV Żarnowiec substation and the 400/110 kV Dobrzeń substation	Modernisation of a damaged transformer at Żarnowiec substation and a transformer at Dobrzeń substation	2021	2028
II.124	Construction of reservoirs for fire-fighting purposes at 220/110 kV Bieruń and 220/110 kV Katowice substations and upgrade of drainage of the 220/110 kV Bieruń substation area	Improving the safety of station equipment operation by constructing fire tanks and upgrading site drainage	2021	2025
II.125	Circuit breaker upgrading programme	Ensuring the continuity of operation and safety of NPS and improving the efficiency of equipment operation	2021	2025
II.126	Construction of an access road to the 400/110 kV Czarna substation	Provision of free access to the station area for maintenance services (ZES headquarters) and external companies to perform maintenance work	2024	2026
II.127	Upgrading of selected transformer units	Improving the safety of NPS operation and the reliability factors of transformer unit operation	2021	2027
II.128	Upgrading of transformer unit equipment	Improving technical condition through preventive replacement of worn-out transformer components	2021	2025
II.129	Transformer upgrading programme	Ensuring the continuity of operation and safety of NPS and improving the efficiency of equipment operation	2024	2027
II.130	Replacement of bus bars of MV technological equipment at the 400/110 kV Ostrów substation and the 400/220/110 kV Plewiska substation	Providing the possibility of reactive power compensation with the use of MV reactors at Ostrów and Plewiska substations	2024	2026
II.131	Upgrade of 110 kV cable lines at the 400/110 kV Żarnowiec substation	Ensuring the reliability of power supply for Żarnowiec Hydroelectric Power Plant (PSP) own needs	2023	2025
II.132	Upgrading selected 220 kV lines to reduce the line's impact on the environment	Elimination of risks arising from the negative impact of EHV lines on objects in their impact area	2024	2030

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.133	Supply and installation of a 6 kV cable line at the 400/220/110 kV Ostrołęka substation	Increasing the reliability of power supply for Ostrołęka substation own needs	2023	2025
II.134	Supply and installation of a 6 kV cable line at the 220 kV Bujaków substation	Increasing the reliability of power supply for Bujaków substation own needs	2022	2025
II.135	Upgrading obstruction lighting on selected EHV lines	Upgrading obstruction lighting on poles that have been designated as air obstructions as a result of arrangements with air traffic authorities	2023	2026
II.136	Replacement of components, accessory and peripheral parts	Maintaining the efficiency of substations by replacing, among others: cooling systems of autotransformers, bushing insulators, disconnectors, current and voltage transformers	permanent task	permanent task
III.1	Expansion of the 400/220/110 kV Ołtarzew substation	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2026	2031 (1)
III.2	Upgrade (redevelopment) of the 220 kV Podolszyce-Mory line on the Ołtarzew-Mory section	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2026	2031 (1)
III.3	Construction of the 400/220/110 kV substation in the Warsaw area with the connection of the 400 kV Mościska-Miłosna line	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2027	2033 (1)
III.4	Installation of a 400/220 kV transformer at the 400 kV Stanisławów substation	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2032	2034 (1)
III.5	Upgrade (redevelopment) of the 220 kV Mory - Praga - (Miłosna) Stanisławów line	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2029	2034 (1)
III.6	Upgrade of the 400 kV Ołtarzew - Mościska - Miłosna line	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2029	2034 (1)
III.7	Replacement of transformers together with infrastructure adaptation at the 220/110 kV Mory substation	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2033	2035 (1)
III.8	Replacement of a transformer together with infrastructure adaptation at the 220/110 kV Piaseczno substation	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2034	2036 (1)
III.9	Construction of the 400/220/110 kV substation in the Warsaw area together with the connection of the 400 kV Kozienice-Miłosna line	Improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2031	2037 (1)
III.10	Expansion of the 400/220 kV Joachimów substation by adding a 110 kV switchgear	Improving the reliability of power supply to electricity consumers in the Częstochowa area	2032	2034
III.11	Change in the power supply of the 220/110 kV Poznań Południe substation	Improving the reliability of power supply to electricity consumers in the Poznań area	2032	2034
III.12	Construction of a 400 kV substation in the Włocławek area together with the connection of the Grudziądz Węgrowo - Płock line	Improving the reliability of power supply to electricity consumers in the Wloclawek area and power evacuation from new generation sources	2025	2031
III.13	Expansion of the 110 kV switchgear at the 400/110 kV Narew substation for the purpose of connecting Turośń Kościelna energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2021	2027 (2)
III.14	Construction of the 400 kV Grudziądz-Płock line	Power evacuation from offshore wind power plant	2022	2031

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.15	Upgrade (redevelopment) of the 400 kV Płock-Ołtarzew line	Increasing the permissible current carrying capacity of lines to improve conditions for north-south power transmission, including power evacuation from offshore wind power plant	2022	2033
III.16	Construction of the 400 kV Stryków (Dmosin) - Kutno (Witonia) line - new substation in the Konin area	Power evacuation from offshore wind power plant and improvement of the reliability of power supply to electricity consumers in central Poland (including, in the future, the Central Communication Port)	2021	2030
III.17	Construction of the 400/110 kV substation in the CPK area together with the connection of the 400 kV Rogowiec (Dmosin)-Ołtarzew line	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2022	2029 (5)
III.18	Interconnection between Poland and Lithuania (currently known as Harmony Link) together with the connection of the Suwałki Special Economic Zone	Improving the security of the Baltic States' systems operating synchronously with the CESA (Continental Europe Synchronous Area) system, as well as a significant reduction in the risk of island operation of the Baltic States	2023	2029/2030 (9s)
III.19	Upgrade (redevelopment) of the 220 kV Polkowice-Żukowice line	Improving the reliability of power supply to Tauron Dystrybucja S.A. customers, as well as strengthening the safety of NPS operation in the southwestern part of Poland	2023	2029 (1)
III.20	Expansion of the 400 kV switchgear at the 400/110 kV Pasikurowice substation for the purpose of connecting the Brzezinka photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2023	2027 (2)
III.21	Construction of the 400/110 kV substation in the Legnica area together with the connection of the 400 kV Mikułowa-Pasikurowice and Czarna-Pasikurowice line	Supplying the investment area in the vicinity of Legnica and improving the reliability of power supply to customers within Wrocław and its metropolitan area	2023	2030
III.22	Construction of the 400/110 kV substation in the Głogów area together with the construction of a 400 kV line plus new substation in the Głogów area – the 400 kV Czarna-Polkowice line tap	Power supply to the investment area in the vicinity of Głogów, improving the reliability and power supply conditions of TAURON Dystrybucja S.A. distribution network in the area of southern Poland	2023	2029 (1)
III.23	Construction of the 220/110 kV Żagań substation together with the connection of the 220 kV line	Improving the reliability of power supply to electricity consumers within the Lubuskie Voivodeship and creating conditions for power evacuation from renewable energy generation sources	2019	2027
III.24	Expansion of the 220 kV switchgear at the 220/110 kV Leśniów substation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2023	2028 (1) (2)
III.25	Construction of Gdańsk Błonia-Olsztyn Mątki 400 kV line	Power evacuation from offshore wind power plant	2018	2028
III.26	Construction of the 400 kV line from Choczewo to the Gdańsk Błonia-Grudziądz Węgrowo line tap	Power evacuation from offshore wind power plant	2019	2029
III.27	Construction of Gdańsk Przyjaźń-Choczewo 400 kV line	Power evacuation from offshore wind power plant	2019	2028
III.28	Switching the circuit of the 400 kV Olsztyn Mątki-Olsztyn I-Ostrołęka line operating at 220 kV to 400 kV	Power evacuation from offshore wind power plant	2021	2031
III.29	Construction of the 400 kV line between Kozienice and a substation in Stalowa Wola area. Construction of the 400 kV line between Połaniec/Rzeszów and a substation in Stalowa Wola area.	Power supply to the investment area in the vicinity of Stalowa Wola	2023	2033 (1)
III.30	Construction of the north-south HVDC connection	Construction of a direct current connection for the transmission of electricity from the northern part to the southern part of the country in the Upper Silesia region	2022	2033

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.31	Construction of the 400 kV Krzemienica substation together with the connection of the 400 kV Dunowo-Słupsk line and 400 kV Słupsk-Żydowo Kierzkowo line	Connection and evacuation of power from offshore wind power plant	2019	2029 (2)
III.32	Construction of a new 400 kV substation in the Tri-City area together with the connection of the 400 kV Żydowo Kierzkowo-Gdańsk Przyjaźń line	Connection and evacuation of power from the nuclear power plant	2022	2034 (7)
III.33	Construction of a new 400 kV substation in the area of Gdańsk Pomerania (Nuclear power plant)	Connection and evacuation of power from the nuclear power plant, power supply to the nuclear power plant construction site in the transition period	2022	2031 (7)
III.34	Construction of two 400 kV lines from a new substation in the Gdańsk Pomerania area (Nuclear power plant) to a new substation in the Tri-City area	Connection and evacuation of power from the nuclear power plant	2022	2034 (7)
III.35	Construction of the 400 kV line between a new substation in the Tri-City area and Grudziądz Węgrowo-Jasiniec line tap	Evacuation of power from the nuclear power plant	2022	2034 (7)
III.36	Upgrade (redevelopment) of the 220 kV Grudziądz Węgrowo-Toruń Elana line	Power evacuation from offshore wind power plant and creating conditions for supplying power to the investment area in the vicinity of Toruń	2024	2028
III.37	Construction of a new 400(220)/110 kV substation in the Toruń area with a 400 kV switchgear temporarily operating at 220 kV voltage	Power supply to the investment area in the vicinity of Toruń	2024	2030 (1)
III.38	Construction of a 220 kV line from the substation in the area of Toruń to the 220 kV Grudziądz Węgrowo-Toruń Elana line tap	Power supply to the investment area in the vicinity of Toruń	2024	2029 (1)
III.39	Upgrade (redevelopment) of the 220 kV Włocławek Azoty-Toruń Elana line	Power supply to the investment area in the vicinity of Toruń	2024	2028 (1)
III.40	Construction of a 400 kV line from the substation in the vicinity of Toruń to the 400 kV Grudziądz Węgrowo-Płock line tap together with the expansion of a 400 kV and 110 kV switchgear at the substation in the vicinity of Toruń	Power supply to the investment area in the vicinity of Toruń	2024	2033 (1)
III.41	Construction of a new 400/110 kV substation in the Stalowa Wola area	Power supply to the investment area in the vicinity of Stalowa Wola	2024	2031 (1)
III.42	Upgrade of the 220/110 kV Boguchwała substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers in the Rzeszów and Boguchwała area through replacing a 220/110 kV transformer with a larger unit	2024	2029
III.43	Expansion of the 400/220/110 kV Łagisza substation for the purpose of connecting gas-steam unit at Łagisza Power Plant	Creating conditions for connection and power evacuation from the new generation unit	2024	2029 (2)
III.44	Construction of the 400 kV Świebodzice-Ząbkowice-Wrzoski/Groszowice line together with the expansion of the 220/110 kV Ząbkowice substation by adding a 400 kV switchgear	Connection and power evacuation/injection from/to the new pumped storage power plant	2024	2032 (6)
III.45	Construction of the new 400/110 kV substation in the Opole area together with the 400 kV Dobrzeń-Pasikurowice line connection	Power supply to the investment area in the vicinity of Opole	2024	2029 (1)
III.46	Construction of the new 400/110 kV substation in the Poznań area together with the 400 kV Kromolice-Pątnów line connection	Power supply to the investment area in the vicinity of Poznań	2024	2029 (1)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.47	Expansion of the 220 kV switchgear at the 220/110 kV Ząbkowice substation for the purpose of connecting Ząbkowice energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2023	2027 (2)
III.48	Building up power resources in the NPS	Increasing the safety and flexibility of NPS operation by building up a resource of available power that can be used during anticipated periods of generation shortage in the NPS or for the purpose of improving network operating conditions	2024	2029 (3)
III.49	Upgrade (redevelopment) of the 220 kV Ołtarzew-Mory line, circuit II	Improving the technical condition of the line together with increasing the permissible current carrying capacity in order to improve the reliability of power supply to electricity consumers in the Warsaw metropolitan area	2027	2030
III.50	Upgrade (redevelopment) of the 400 kV Rogowiec-Płock line	Increasing the permissible current carrying capacity of lines to improve conditions for north-south power transmission	2025	2030
III.51	Upgrade (redevelopment) of the 400 kV Rogowiec-Ołtarzew line	Increasing the permissible current carrying capacity of lines to improve conditions for north-south power transmission and improving the reliability of supplying power to consumers in central Poland including, in the future, the Central Communication Port	2025	2030
III.52	Upgrade of the 400/220 kV Kielce substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2025	2032
III.53	Upgrade (redevelopment) of the 400 kV Kozienice-Ostrowiec line	Increasing the permissible current carrying capacity of lines to improve conditions of network operation while evacuating power from the Kozienice Power Plant and to improve the reliability of supplying power to consumers in the Świętokrzyskie Voivodeship	2028	2031
III.54	Upgrade of the 220/110 kV Poręba substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2026	2031
III.55	Upgrade of the 400/110 kV Kromolice substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2025	2030
III.56	Upgrade of the 400/220/110 kV Łagisza substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2026	2031
III.57	Upgrade of the 220/110 kV Janów substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2025	2030
III.58	Upgrade of the 400/110 kV Narew substation	Increasing the reliability of the operation of substation telecontrol and EAZ systems, adapting to the current technical standards of PSE S.A., and increasing the number of remotely controlled substations	2025	2030
III.59	Expansion of the 400/110 kV Dobrzeń substation together with an installation of the 400/110 kV autotransformer	Improving the reliability of power supply to electricity consumers in the Opole area	2030	2032 (1)
III.60	Construction of the 400 kV Dobrzeń-Blachownia-Wielopole line together with the expansion of the Blachownia substation by adding a 400 kV switchgear	Improving the conditions for the transmission of electricity between central and southern part of the country	2029	2036 (4)
III.61	Construction of 2 × 400 + 220 kV Byczyna-Podborze line	Improving the reliability of power supply to electricity consumers in the Silesian Voivodeship and improving the operating conditions of the north-south direct current link	2025	2032
III.62	Upgrade (redevelopment) of the 400 kV Byczyna-Tucznawa line	Increasing the permissible current carrying capacity of lines to improve conditions for north-south direct current link operation	2029	2032

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.63	Construction of the 400 kV line from Byczyna to the Tucznawa-Skawina line tap together with extension of the 400/220/110 kV Byczyna substation	Creating conditions for the transmission of electricity through the north-south direct current link	2026	2033
III.64	Upgrade (redevelopment) of the 220 kV Moszczenica-Czeczott (Podborze) line	Increasing the permissible current carrying capacity of the line to improve the reliability of supplying power to consumers in the Silesian Voivodeship	2027	2030
III.65	Upgrade (redevelopment) of the 220 kV Groszowice-Ząbkowice line	Increasing the permissible current carrying capacity of the line to improve the reliability of power supply to electricity consumers in the Wałbrzych Special Economic Zone in Radzikowice and the elimination of congestions in the transmission of electricity in the western part of the NPS, especially with increased cross-border exchange with respect to power import or transit	2025	2028
III.66	Upgrade of the 220 kV Żukowice - Leśniów line	Elimination of congestions in electricity transmission in the western part of the NPS	2029	2034
III.67	Upgrade of the 220 kV Kielce - Radkowice line	Elimination of congestions in electricity transmission in the Kielce area	2029	2034
III.68	Upgrade (redevelopment) of the 220 kV Blachownia-Groszowice line	Elimination of congestions in electricity transmission in the south-western part of the NPS	2030	2035
III.69	Upgrade (redevelopment) of the 220 kV Wielopole-Moszczenica line	Increasing the permissible current carrying capacity of the line to improve the reliability of supplying power to consumers in the Silesian Voivodeship	2026	2029
III.70	Expansion of the 400/220/110 kV Baczyna substation in connection with the installation of a second 400/110 kV transformer	Creating conditions for the power evacuation from renewable sources in the north-western part of the country and improving the reliability of power supply to electricity consumers in Lubuskie Voivodeship	2025	2028 (2)
III.71	Construction of the 400/110 kV substation in the Poznań area together with the 400 kV Baczyna-Plewiska line connection	Improving the reliability of power supply to electricity consumers within the Poznań and Zielona Góra metropolitan areas	2027	2033
III.72	Construction of the 400 kV line from the Polkowice substation to the 400 kV Baczyna-Plewiska line tap	Power evacuation from offshore wind power plant and improvement of the reliability of power supply to electricity consumers in Lubuskie Voivodeship	2026	2033
III.73	Upgrade (redevelopment) of the 220 kV Mikułowa-Cieplice line	Increasing the permissible current carrying capacity of the line to improve the reliability of supplying power to consumers in the southern part of the Dolnośląskie Voivodeship	2027	2030
III.74	Upgrade (redevelopment) of the 220 kV Krajnik-Morzyczyn line	Improving the technical condition of the line together with increasing the permissible current carrying capacity of the line in order to improve the reliability of power supply to electricity consumers in the Szczecin metropolitan area	2032	2035
III.75	Upgrade (redevelopment) of the 220 kV Pątnów-Konin line	Increasing the permissible current carrying capacity of the line to improve conditions for power evacuation from offshore wind power plants	2032	2035
III.76	Upgrade (redevelopment) of the 220 kV Pomorzany-Krajnik line	Improving the technical condition of the line together with increasing the permissible current carrying capacity of the line in order to improve the reliability of power supply to electricity consumers in the Szczecin metropolitan area	2032	2035
III.77	Expansion of Gdańsk I substation by a 400 kV switchgear together with the installation of a 400/110 kV transformer	Improving the reliability of power supply to electricity consumers in Pomorskie Voivodeship	2031	2036
III.78	Construction of the 110 kV switchgear at the 400/110 kV Gdańsk Przyjaźń substation	Creating conditions for connection of the 110 kV distribution system	2025	2030 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.79	Expansion of the 110 kV switchgear at the 400/110 kV Pelplin substation	Creating conditions for connection of the 110 kV distribution system	2025	2028 (2)
III.80	Redevelopment of the Gdańsk Błonia-Olsztyn Mątki 400 kV single-circuit line	Power evacuation from offshore wind power plant	2026	2031
III.81	Upgrade (redevelopment) of the 220 kV Pątnów-Włocławek Azoty line	Improving the technical condition of the line together with increasing the permissible current carrying capacity of the line in order to improve the reliability of power supply to electricity consumers in Kujawsko-Pomorskie Voivodeship	2032	2035
III.82	Replacement of a transformer together with infrastructure adaptation at the 400/110 kV Ostrów substation	Improving the reliability of power supply to electricity consumers in the Ostrów area	2030	2032 (1)
III.83	Purchase and installation of reactive power management equipment to support NPS stability management	Increasing the stability and improving voltage regulation capabilities of the NPS	2027	2031
III.84	Expansion of the EHV substation for the purpose of installing reactive power compensation equipment (stage III)	Adaptation of station facilities for the installation of reactive power compensation equipment	2027	2031
III.85	Upgrade of the transformer population – Stage IX	Installation of new or replacement of existing transformer units to improve the reliability of power supply to electricity consumers and create conditions for connecting new entities to the transmission system	2025	2036
III.86	Elimination of equipment restrictions on selected EHV lines	Adaptation of selected EHV lines to their nominal capacity by removing equipment limitations in substations	2031	2032
III.87	Expansion of the 400/220/110 kV Stryków (Dmosin) substation for the purpose of connecting a 220 kV end-user line (power supply to PT Dmosin)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2025	2027 (5)
III.88	Expansion of the 220/110 kV Pabianice substation for the purpose of introducing a 220 kV end-user line (power supply to PT Pabianice)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2027	2029 (5)
III.89	Construction of the 400 kV substation in the area of Złoczew together with the connection of the 400 kV Rogowiec/Trębaczew-Ostrów line (power supply to PT Kuźnica - Czajków)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2025	2030 (5)
III.90	Expansion of the 400/110 kV Ostrów substation for the purpose of introducing a 400 kV end-user line (power supply to PT Ostrów Wlkp.)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2027	2029 (5)
III.91	Expansion of the 400/110 kV Kromolice substation for the purpose of introducing a 400 kV end-user line (power supply to PT Kromolice)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2027	2029 (5)
III.92	Expansion of the 400/110 kV Pasikurowice substation for the purpose of introducing a 400 kV end-user line (power supply to PT Dziadowa Kłoda)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2027	2029 (5)
III.93	Expansion of the 400/110 kV Płock substation for the purpose of introducing a 400 kV end-user line (power supply to PT Kruszczewo)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2029	2031 (5)
III.94	Expansion of the 400/220/110 kV Grudziądz substation for the purpose of connecting a 400(220) kV end-user line (power supply to PT Węgiersk)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2033	2035 (5)
III.95	Expansion of the 400/220/110 kV Grudziądz substation for the purpose of connecting a 400(220) kV end-user line (power supply to PT Skurgwy)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2033	2035 (5)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.96	Expansion of the 400/110 kV Pelplin substation for the purpose of connecting a 400 kV end-user line (power supply to PT Lisewo Malborskie)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2033	2035 (5)
III.97	Expansion of the 220/110 kV Mokre substation for the purpose of introducing a 220 kV end-user line (power supply to PT Płoskie)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2028	2030 (5)
III.98	Expansion of the 400/220/110 kV Wielopole substation for the purpose of connecting a 220 kV end-user line (power supply to PT Rybnik)	Supply of substation facilities included in the Central Communication Port construction project under the so-called railroad component	2028	2030 (5)
III.99	Construction of the 400 kV line from the new 400 kV substation in the area of Gdańsk Pomerania (Nuclear Power Plant) to the Kromolice-Pątnów line tap	Evacuation of power from the nuclear power plant	2028	2036 (7)
III.100	Construction of the new 400 kV substation in the Konin area together with the 400 kV Kromolice - Pątnów line connection	Power evacuation from PEJ sp. z o.o. nuclear power plant and from the planned PGE PAK Energia Jądrowa S.A. nuclear power plant.	2028	2034 (7)
III.101	Expansion of the 400/110 kV Żarnowiec substation for the connection of the Kartoszyno electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2025	2027 (2)
III.102	Expansion of the 400/220/110 kV Grudziądz Węgrowo substation for the purpose of connecting Unit 2 at the Grudziądz Power Plant	Creating conditions for connection and power evacuation from the new generation unit	2027	2029 (2)
III.103	Installation of the 400/110 kV transformer at the 400/110 kV Słupsk substation in relation to the connection of wind farms	Creating conditions for the connection and evacuation of power from new wind power plants	2026	2029 (2)
III.104	Expansion of the 220 kV switchgear at the 400/220/110 kV Świebodzice substation for the purpose of connecting the Udanin wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2026	2028 (2)
III.105	Expansion of the 220 kV switchgear at the 400/220/110 kV Mikułowa substation for the purpose of connecting the Studniska WF	Creating conditions for connection and power evacuation from the new wind power plant	2026	2028 (2)
III.106	Expansion of the 220 kV switchgear at the 400/220/110 kV Mikułowa substation for the purpose of connecting the Mikułowa energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.107	Expansion of the 220 kV switchgear at the 400/220 kV Kielce substation for the purpose of connecting Piekoszów energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.108	Expansion of the 220 kV switchgear at the 400/220 kV Kielce substation for the purpose of connecting the Micigózd energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.109	Expansion of the 220 kV switchgear at the 400/220 kV Kielce substation for the purpose of connecting the Promnik energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.110	Expansion of the 220 kV switchgear at the 400/220 kV Kielce substation for the purpose of connecting the Kielce distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.111	Expansion of the 220 kV switchgear at the 400/220 kV Kielce substation for the purpose of connecting the Micigózd distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.112	Expansion of the 220 kV switchgear at the 220 kV Bujaków substation for the purpose of connecting the Kobiernice energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.113	Expansion of the 220 kV switchgear at the 220/110 kV Konin substation for the purpose of connecting the Honoratka 1 photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.114	Expansion of the 400 kV switchgear at the 400/220/110 kV Pątnów substation for the purpose of connecting the Honoratka 2 photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2028 (2)
III.115	Expansion of the 400 kV switchgear at the 400/110 kV Rzeszów substation for the purpose of connecting the Rzeszów distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.116	Expansion of the 110 kV switchgear at the 400/110 kV Rzeszów substation for the purpose of connecting the Rzeszów energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.117	Expansion of the 400 kV switchgear at the 400/110 kV Rokitnica substation for the purpose of connecting the Czechowice Zachód energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2026	2028 (2)
III.118	Expansion of the 400 kV switchgear at the 400/110 kV Rokitnica substation for the purpose of connecting the Grzybowice 1 energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.119	Expansion of the 220 kV switchgear at the 220/110 kV Toruń Elana substation for the purpose of connecting the Szychowo energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.120	Expansion of the 220 kV switchgear at the 220/110 kV Toruń Elana substation for the purpose of connecting the Goplan Elana 3 energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2026	2028 (2)
III.121	Expansion of the 400 kV switchgear at the 400/220/110 kV Plewiska substation for the purpose of connecting Plewiska 1 energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.122	Expansion of the 110 kV switchgear at the 400/220/110 kV Plewiska substation for the purpose of connecting the Kuślin wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2025	2027 (2)
III.123	Expansion of the 220 kV switchgear at the 220/110 kV Ząbkowice for the purpose of connecting the Łambinowice wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2027	2029 (2)
III.124	Expansion of the 110 kV switchgear at the 220/110 kV Łośnice substation for the purpose of connecting the Zawiercie energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2026	2028 (2)
III.125	Expansion of the 220 kV switchgear at the 220/110 kV Pabianice substation for the purpose of connecting the Chechło Drugie energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2026	2028 (2)
III.126	Expansion of the 220 kV switchgear at the 220/110 kV Klikowa substation for the purpose of connecting the Tarnów distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.127	Expansion of the 220 kV switchgear at the 220/110 kV Klikowa substation for the purpose of connecting the Szczurowa 1 energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.128	Expansion of the 220 kV switchgear at the 220/110 kV Klikowa substation for the purpose of connecting the Klikowa distribution system	Creating conditions for connection of the 110 kV distribution system	2025	2027 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.129	Expansion of the 220 kV switchgear at the 220/110 kV Klikowa substation for the purpose of connecting the Klikowa energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.130	Expansion of the 220 kV switchgear at the 400/220/110 kV Polkowice substation for the purpose of connecting the Szklary Dolne energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2026	2028 (2)
III.131	Expansion of the 220 kV switchgear at the 400/220/110 kV Polkowice substation for the purpose of connecting the Bukowica photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.132	Expansion of the 110 kV switchgear at the 400/110 kV Gdańsk Błonia for the purpose of connecting the Elbląg photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2026	2028 (2)
III.133	Expansion of the 110 kV switchgear at the 400/110 kV Gdańsk Przyjaźń substation for the purpose of connecting the Osowo Lęborskie photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.134	Expansion of the 110 kV switchgear at the 400/110 kV Narew substation for the purpose of connecting the Krasowo Wielkie energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and the new photovoltaic power plant	2026	2028 (2)
III.135	Expansion of the 110 kV switchgear at the 400/110 kV Narew substation for the purpose of connecting Turośń Kościelna photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.136	Expansion of the 110 kV switchgear at the 220/110 kV Żagań substation for the purpose of connecting the Konin Żagański energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2026	2028 (2)
III.137	Expansion of the 400 kV switchgear at the 400/220/110 kV Stryków (Dmosin) substation for the purpose of connecting the Łyszkowice wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2027	2029 (2)
III.138	Expansion of the 110 kV switchgear at the 400/110 kV Kromolice substation for the purpose of connecting the Krerowo energy storage	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2030	2032 (2)
III.139	Expansion of the 220 kV switchgear at the 220/110 kV Recław substation for the purpose of connecting the Recław photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.140	Expansion of the 220 kV switchgear at the 220/110 kV Leszno Gronowo substation for the purpose of connecting the Lipno energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.141	Expansion of the 220 kV switchgear at the 220/110 kV Rożki substation for the purpose of connecting the Wysoka IIA 200 energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.142	Expansion of the 220 kV switchgear at the 220/110 kV Rożki substation for the purpose of connecting the Wierzbica photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2026	2028 (2)
III.143	Expansion of the 220 kV switchgear at the 220/110 kV Rożki substation for the purpose of connecting the Kowala distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.144	Expansion of the 400 kV switchgear at the 400/110 kV Ostrowiec substation for the purpose of connecting the Ostrowiec energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.145	Expansion of the 400 kV switchgear at the 400/110 kV Ostrowiec substation for the purpose of connecting the Celsa “Huta Ostrowiec” Sp. z o.o. receiving installation	Creating conditions for connecting the electricity recipient	2025	2027 (2)
III.146	Expansion of the 220 kV switchgear at the 220/110 kV Leśniów substation for the purpose of connecting the Koryta photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2026	2028 (2)
III.147	Expansion of the 220 kV switchgear at the 220/110 kV Leśniów substation for the purpose of connecting the Łagów photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.148	Expansion of the 220 kV switchgear at the 220/110 kV Leśniów substation for the purpose of connecting the Węgrzynice 1 photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.149	Expansion of the 110 kV switchgear at the 400/110 kV Krosno Iskrzynia for the purpose of connecting the Nozdrzec wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2026	2028 (2)
III.150	Expansion of the 110 kV switchgear at the 400/110 kV Krosno Iskrzynia for the purpose of connecting the Gryf Krosno distribution system	Creating conditions for connection of the 110 kV distribution system	2027	2029 (2)
III.151	Expansion of the 400 kV switchgear at the 400/110 kV Krosno Iskrzynia for the purpose of connecting the Wróblik Królewski energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2025	2027 (2)
III.152	Expansion of the 400 kV switchgear at the 400/110 kV Krosno Iskrzynia for the purpose of connecting the Korczyna distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.153	Expansion of the 400 kV switchgear at the 400 kV Stanisławów substation for the purpose of connecting the Wólka Czarnińska energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.154	Expansion of the 400 kV switchgear at the 400 kV Stanisławów substation for the purpose of connecting the Stanisławów distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.155	Expansion of the 400 kV switchgear at the 400/110 kV Trębaczew substation for the purpose of connecting the Kluczbork photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2026	2028 (2)
III.156	Expansion of the 110 kV switchgear at the 400/220/110 kV Baczyna substation for the purpose of connecting the Lubiszyn photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2026	2028 (2)
III.157	Expansion of the 110 kV switchgear at the 400/220/110 kV Baczyna substation for the purpose of connecting the Lubiszyn Wschód energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.158	Expansion of the 110 kV switchgear at the 400/220/110 kV Baczyna substation for the purpose of connecting the Lubiszyn Południe energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.159	Expansion of the 110 kV switchgear at the 400/220/110 kV Baczyna substation for the purpose of connecting the Baczyna energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.160	Expansion of the 220 kV switchgear at the 400/220 kV Joachimów substation for the purpose of connecting the Turów energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.161	Expansion of the 220 kV switchgear at the 400/220 kV Joachimów substation for the purpose of connecting the Dźbów energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2026	2028 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.162	Expansion of the 110 kV switchgear at the 400/110 kV Żydowo Kierzkowo substation for the purpose of connecting the P.A.M. photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.163	Expansion of the 110 kV switchgear at the 400/110 kV Żydowo Kierzkowo substation for the purpose of connecting the Żydowo III energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2027	2029 (2)
III.164	Expansion of the 400 kV switchgear at the 400/110 kV Żydowo Kierzkowo substation for the purpose of connecting the Słosinko energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.165	Expansion of the 110 kV switchgear at the 400/110 kV Siedlce Ujrzanów substation for the purpose of connecting the Siedlce Ujrzanów distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.166	Expansion of the 400 kV switchgear at the 400/110 kV Siedlce Ujrzanów substation for the purpose of connecting the Stoczek energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.167	Expansion of the 220 kV switchgear at the 220/110 kV Wanda substation for the purpose of connecting the Wanda distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.168	Expansion of the 110 kV switchgear at the 400/110 kV Ełk Bis substation for the purpose of connecting the Bakałarzewo-Góra photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.169	Expansion of the 110 kV switchgear at the 400/110 kV Ełk Bis substation for the purpose of connecting the Biała Piska photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2026	2028 (2)
III.170	Expansion of the 110 kV switchgear at the 400/110 kV Ełk Bis substation for the purpose of connecting the Ełk Solar Plant 25 energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2025	2027 (2)
III.171	Expansion of the 110 kV switchgear at the 400/110 kV Ełk Bis substation for the purpose of connecting the Olecko Bis energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.172	Expansion of the 110 kV switchgear at the 400/110 kV Ełk Bis substation for the purpose of connecting the Zdunki-Bobry photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.173	Expansion of the 400 kV switchgear at the 400/110 kV Ełk Bis substation for the purpose of connecting the Sztabinki photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.174	Expansion of the 220 kV switchgear at the 400/220/110 kV Świebodzice substation for the purpose of connecting the Piotrowice Świdnickie energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.175	Expansion of the 220 kV switchgear at the 400/220/110 kV Świebodzice substation for the purpose of connecting the Wądroże Wielkie wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2027	2029 (2)
III.176	Expansion of the 400 kV (220 kV) switchgear at the Kutno (Witonia) substation for the purpose of connecting the 25 Krzyżanów 1 wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2028	2030 (2)
III.177	Expansion of the 220 kV switchgear at the 220/110 kV Zgierz substation for the purpose of connecting the Zgierz distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.178	Expansion of the 220 kV switchgear at the 220/110 kV Zgierz substation for the purpose of connecting the Zgierz energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.179	Expansion of the 110 kV switchgear at the 400/110 kV Mościska substation for the purpose of connecting the Mościska distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.180	Expansion of the 110 kV switchgear at the 400/110 kV Mościska substation	Creating conditions for connecting the electricity recipient	2026	2028 (2)
III.181	Expansion of the 400 kV switchgear at the 400/110 kV Tucznawa substation for the purpose of connecting the Chruszczobród energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.182	Expansion of the 400 kV switchgear at the 400/110 kV Tucznawa substation for the purpose of connecting the Chruszczobród distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.183	Expansion of the 400 kV switchgear at the 400/110 kV Tucznawa substation for the purpose of connecting the ArcelorMittal Poland receiving installation	Creating conditions for connecting the electricity recipient	2026	2029 (2)
III.184	Expansion of the 400 kV switchgear at the 400/110 kV Tucznawa substation for the purpose of connecting the Łęka energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.185	Expansion of the 220 kV switchgear at the 220/110 kV Radkowice substation for the purpose of connecting the Chałupki energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.186	Expansion of the 110 kV switchgear at the 400/110 kV Jarosław (Makowisko) substation for the purpose of connecting the Jarosław photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.187	Expansion of the 220 kV switchgear at the 220/110 kV Blachownia substation for the purpose of connecting the Koźle energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2029	2031 (2)
III.188	Expansion of the 220 kV switchgear at the 220/110 kV Blachownia substation for the purpose of connecting the Pawłowiczki energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.189	Expansion of the 110 kV switchgear at the 400/110 kV Dobrzeń substation for the purpose of connecting the Prądy photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.190	Expansion of the 400 kV switchgear at the 400/110 kV Dobrzeń substation for the purpose of connecting the Piotrowa photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2028 (2)
III.191	Expansion of the 220 kV switchgear at the 220/110 kV Siersza substation for the purpose of connecting the Trzebinia distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.192	Expansion of the 220 kV switchgear at the 220/110 kV Siersza substation for the purpose of connecting the Trzebinia energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.193	Expansion of the 110 kV switchgear at the 220/110 kV Chmielów substation for the purpose of connecting the Chmielów distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.194	Expansion of the 110 kV switchgear at the 400/220/110 kV Ostrołęka substation for the purpose of connecting the Kolno I electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.195	Expansion of the 220 kV switchgear at the 400/220/110 kV Chełm substation for the purpose of connecting the Karolinów ME1 energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2025	2027 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.196	Expansion of the 220 kV switchgear at the 220/110 kV Groszowice substation for the purpose of connecting the Ostrożnica wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2026	2028 (2)
III.197	Expansion of the 220 kV switchgear at the 220/110 kV Mokre substation for the purpose of connecting the Żółkiewka wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2025	2027 (2)
III.198	Expansion of the 220 kV switchgear at the 220/110 kV Mokre substation for the purpose of connecting the Mokre distribution system	Creating conditions for connection of the 110 kV distribution system	2027	2029 (2)
III.199	Expansion of 110 kV switchgear at the 400/220/110 kV Olsztyn Mątki substation for the purpose of connecting the Milejewo distribution system	Creating conditions for connection of the 110 kV distribution system	2026	2028 (2)
III.200	Expansion of the 110 kV switchgear at the 400/110 kV Żarnowiec substation for the purpose of connecting the Lotnisko II wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2026	2028 (2)
III.201	Expansion of the 110 kV switchgear at the 400/110 kV Żarnowiec substation for the purpose of connecting the ENERGA-OPERATOR SA line	Creating conditions for connection of the 110 kV distribution system	2025	2027 (2)
III.202	Expansion of the 220 kV switchgear at the 220/110 kV Ząbkowice substation for the purpose of connecting the Ząbkowice Śląskie wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2027	2029 (2)
III.203	Construction of the 400/110 kV Wrzoski substation together with connection of the 400 kV Dobrzeń-Wielopole/Detmarovice line	Creating conditions for the connection of an electricity consumer through the construction of a new connection between the transmission network and the distribution network at the Wrzoski substation	2025	2031 (1)
III.204	Expansion of the 220 kV switchgear at the 220/110 kV Abramowice substation for the purpose of connecting the Moniaki energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.205	Expansion of the 400 kV switchgear at the 400/110 kV Czarna substation for the purpose of connecting the Ustronie energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.206	Expansion of the 400 kV switchgear at the 400/220 kV Rogowiec substation for the purpose of connecting the Janówka energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.207	Expansion of the 400 kV switchgear at the 400 kV Łomża Systemowa substation for the purpose of connecting the Kalinowo energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.208	Expansion of the 110 kV switchgear at the 400/110 kV Pelplin substation for the purpose of connecting the Klonówka energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.209	Expansion of the 400 kV switchgear at the 400/110 kV Lublin Systemowa substation for the purpose of connecting the Lublin Południe energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.210	Expansion of the 400 kV switchgear at the 400/110 kV Lublin Systemowa substation for the purpose of connecting the Lotnisko photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2026	2028 (2)
III.211	Expansion of the 220 kV switchgear at the 400/220/110 kV Morzyczyn substation for the purpose of connecting the Marianowo energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.212	Expansion of the 220 kV switchgear at the 400/220/110 kV Połaniec substation for the purpose of connecting the Brzozowa energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.213	Expansion of the 220 kV switchgear at the 220/110 kV Lubocza substation for the purpose of connecting the Lubocza energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.214	Expansion of the 110 kV switchgear at the 220/110 kV Nysa substation for the purpose of connecting the Złotogłowice energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.215	Expansion of the 400 kV switchgear at the 400/110 kV Czarna substation for the purpose of connecting the Lubin III energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2026	2028 (2)
III.216	Expansion of the 220 kV switchgear at the 220/110 kV Żagań substation for the purpose of connecting the Żagań energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.217	Expansion of the 400 kV switchgear at the 400/220/110 kV Mikułowa substation for the purpose of connecting the Niwnice energy storage facility and photovoltaic installation	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2027	2029 (2)
III.218	Expansion of the 220 kV switchgear at the 220/110 kV Blachownia substation for the purpose of connecting the Gogolin photovoltaic installation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2025	2027 (2)
III.219	Expansion of the 110 kV switchgear at the 220/110 kV Nysa substation for the purpose of connecting the Kobiela photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.220	Expansion of the 220 kV switchgear at the 220/110 kV Leszno Gronowo substation for the purpose of connecting the Krzemieniewo wind farm	Creating conditions for connection and power evacuation from the new wind power plant	2027	2029 (2)
III.221	Expansion of the 400 kV switchgear at the 400/110 kV Bydgoszcz Zachód substation for the purpose of connecting the Osowa Góra photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.222	Expansion of the 220 kV switchgear at the 400/220/110 kV Polkowice substation for the purpose of connecting the Lubin I energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.223	Expansion of the 220 kV switchgear at the 400/220 kV Rogowiec substation for the purpose of connecting the Bełchatów electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.224	Expansion of the 220 kV switchgear at the 220/110 kV Pabianice substation for the purpose of connecting the Wymysłów Francuski electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.225	Expansion of the 400 kV switchgear at the 400/220 kV Krajnik substation for the purpose of connecting the Gryfino electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.226	Expansion of the 400/220/110 kV Skawina substation involving 220 kV and 110 kV switchgear for the purpose of connecting the combined cycle steam and gas unit with gas-powered engines at the Skawina Power Plant	Creating conditions for connection and power evacuation from the new gas-fired power plant	2027	2029 (2)
III.227	Expansion of the 220 kV switchgear at the 400/220/110 kV Grudziądz substation for the purpose of connecting the Grudziądz wind farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.228	Expansion of the 110 kV switchgear at the 400/110 Kromolice substation for the connection of the Kostrzyn photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.229	Expansion of the 400 kV switchgear at the 400/110 kV Jarosław (Makowisko) substation for the purpose of connecting the Gniewczyna Łańcucka electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.230	Expansion of the 400 kV switchgear at the 400/110 kV Jarosław (Makowisko) substation for the purpose of connecting the Jarosław Krakowska I electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.231	Expansion of the 110 kV switchgear at the 400/220/110 kV Połaniec substation for the purpose of connecting the Tursko Wielkie electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.232	Expansion of the 110 kV switchgear at the 400/110 kV Gdańsk Błonia substation for the purpose of connecting the Gdańsk 2 electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.233	Expansion of the 220 kV switchgear at the 220/110 kV Ząbkowice substation for the purpose of connecting Bardo I energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.234	Expansion of the 400 kV switchgear at the 400/110 kV Rokitnica substation for the purpose of connecting the Grzybowice 2 electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.235	Expansion of the 220 kV switchgear at the 400/220/110 kV Łagisza substation for the purpose of connecting the Sarnów electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.236	Expansion of the 220 kV switchgear at the 220/110 kV Poręba substation for the purpose of connecting the Dwory II electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2027	2029 (2)
III.237	Expansion of the 220 kV switchgear at the 220/110 kV Chełm substation for the purpose of connecting the Sajczyce electricity storage facility and photovoltaic farm	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2027	2029 (2)
III.238	Expansion of the 400 kV switchgear at the 400/220/110 kV Olsztyn Mątki substation for the purpose of connecting the Mątki 4 photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2027	2029 (2)
III.239	Expansion of the 110 kV switchgear at the 220/110 kV Nysa substation for the purpose of connecting the Rusocin 2 electricity storage facility and photovoltaic farm	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2028	2030 (2)
III.240	Expansion of the 400 kV switchgear at the 400/110 kV Mościska substation for the purpose of connecting the Mościska BESS electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.241	Expansion of the 220 kV switchgear at the 400/220/110 kV Ołtarzew substation for the purpose of connecting the HEP 001 electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.242	Expansion of the 400 kV switchgear at the 400(220)/110 kV Wyszków substation for the purpose of connecting the HEP 002 electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.243	Expansion of the 220 kV switchgear at the 400/220/110 kV Plewiska substation for the purpose of connecting Duszniki energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.244	Expansion of the 220 kV switchgear at the 400/220 kV Byczyna substation for the purpose of connecting the Chełm electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.245	Expansion of 110 kV switchgear at the 400/220/110 kV Olsztyn Mątki substation for the purpose of connecting the Mikołajki photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2028	2030 (2)
III.246	Expansion of the 220 kV switchgear at the 220/110 kV Kopanina substation for the purpose of connecting the Wyry electricity storage facility and photovoltaic farm	Creating conditions for connection and evacuation of power from/to the electricity storage facility and from the new photovoltaic power plant	2028	2030 (2)
III.247	Expansion of the 110 kV switchgear at the 400/110 Pelplin substation for the connection of the Skarszewy photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2028	2030 (2)
III.248	Expansion of the 110 kV switchgear at the 400/220/110 kV Ostrołęka substation for the purpose of connecting Sieluń 30 energy storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.249	Expansion of the 400 kV switchgear at the 400/110 Pasikurowice substation for the connection of the Oborniki photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2028	2030 (2)
III.250	Expansion of the 220 kV switchgear at the 400/220 kV Rogowiec substation for the purpose of connecting the Chrzanowice electricity storage facility	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2028	2030 (2)
III.251	Construction of a new 400 kV substation in the area of Gdańsk Pomerania	Power evacuation from offshore wind power plant	2029	2035
III.252	Construction of the 400 kV line from the 400 kV substation in the Gdańsk Pomerania to the 400/110 kV substation in the Poznań area	Power evacuation from offshore wind power plant	2028	2035
III.253	Upgrade of the 400 kV Krajnik-Morzyczyn-Dunowo line in terms of OPGW replacement	Ensure adequate fibre optic link capacity	2027	2030
III.254	Replacement of ground wires on selected 220 kV and 400 kV lines - phase II	Ensure adequate fibre optic link capacity	2030	2035
III.255	Construction of data transmission network for safety instrumented system (SIS) equipment	The need to build a network applying new technology to ensure the transmission of SIS signals	2026	2029
III.256	Commissioning of data transmission node at new BDC location	Ensuring business continuity of PSE S.A. processes in case of emergencies	2025	2026
III.257	Deployment of LAN/WAN infrastructure at new BDC location	Ensuring business continuity of PSE S.A. processes in case of emergencies	2025	2026
III.258	Construction of an office building D in Konstancin-Jeziorna	Meeting current and future job needs related to the Company's operations	2029	2033 (8)
III.259	Construction of a BT-2 building on the premises of ZKO PSE S.A. in Bydgoszcz	Meeting current and future job needs related to the Company's operations	2029	2034 (8)
III.260	Replacement of the freight elevator at PSE S.A. headquarters.	Replacement of a lift platform with a freight and passenger crane, which will expand the existing function of cargo transportation to include the carriage of people with disabilities	2029	2030

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
III.261	Redevelopment of the primary point of the Regional Surveillance Centre in the Eurocentrum building	Creating an additional workstation for employees of the Regional Surveillance Centre (RSC) in cases of emergencies	2025	2025
III.262	Modernisation of the premises of the basic dispatching point of the NDC at the PSE S.A. headquarters	Improving the security of the dispatch centre	2025	2026

Key to footnotes in the top row of the table:

*1 *Numbering used at PSE S.A. for internal processes*

*2 *As a rule, PSE S.A.'s network investments are not dedicated to the achievement of single objectives, and thus should not be individually assigned as dedicated to single facilities or entities. These investments most often support multiple objectives, such as:*

- reliability of power supply to electricity consumers,
- connection and evacuation of power from generation sources,
- removing constraints in the use of cross-border transmission capacities,
- creating conditions for the operation of manufacturing sources in line with commercial transactions,
- obtaining broader opportunities for operation, repair and investment work in the northern area of the NPS.

Network investments make it possible to serve the needs of both consumers and generators, enabling the transmission and distribution of electricity as part of electricity trading and the responsibilities of power system operators. The infrastructure that will be created as a result of the investments in question will be used according to current system conditions.

*3 *Date of completion of the task in technical, financial, and formal terms*

Remarks concerning dates of implementation of investment tasks:

(1) Legitimacy of the task and its completion date depend on the emergence and development of energy consumers in the investment area.

(2) Task completion date depends on the fact and schedule of the physical construction of: a generation source, an electricity consumer, or an electricity storage facility.

(3) The rationale for the task and its completion date are related to the risk of insufficient power resources in the NPS with stable operating characteristics.

(4) Task schedule depends on the pace and extent of withdrawals and restoration of generation capacity in the Upper Silesia area, as well as the pace and extent of generation capacity increments in the northern part of the NPS.

(5) Legitimacy of the task and its schedule depend on the construction of the CPK infrastructure.

(6) Legitimacy of the task and its schedule depend on the construction of the pumped storage power plant in the Kłodzko Basin region.

(7) Task execution schedule depends on the number of units, their capacity, and the construction schedule.

(8) Legitimacy of the task and its completion date depend on the future needs concerning the number of jobs at PSE S.A.

(9) The execution schedule depends on contracting opportunities for construction works.

5.2 Ongoing investment tasks as part of the expansion and upgrading of the transmission network

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.1	Construction of the 400 kV Ostrołęka-Stanisławów line together with expansion of the 400 kV Stanisławów substation and 400/220/110 kV Ostrołęka substation and connection of the 400(220)/110 kV Wyszków substation	Elimination of structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity as well as improving the reliability of power supply to electricity consumers in the eastern part of Mazowieckie Voivodeship. In addition, improving the conditions for power evacuation from the Ostrołęka Power Plant after the commissioning of the new unit	2017	2025
II.2	Switching the circuit of the 400 kV Ostrołęka-Wyszków-Stanisławów line operating at 220 kV to 400 kV together with replacing the 220/110 kV transformer at the Wyszków substation for a 400/110 kV unit	Creating conditions for the evacuation of power from offshore wind power plants and other renewable sources in the north-eastern part of the country, as well as improving the reliability of power supply to electricity consumers in northern and north-eastern Poland	2021	2028
II.3	Expansion of the 220/110 kV Praga substation for the purpose of connecting the 110 kV/MV Golędzinów substation	Creating conditions for connecting the electricity recipient	2021	2025 (2)
II.4	Expansion of the 110 kV switchgear at the 220/110 kV Praga substation for the purpose of connecting the 110 kV Bródno 1 and Bródno 2 lines	Improving power supply to consumers of the Capital City of Warsaw by creating conditions for the connection of 110 kV lines	2022	2025 (2)
II.5	Upgrade of the 220/110 kV Mory substation	Adapting the substation to the current cyber-security standards as regards critical infrastructure, as well as improving the security of network operations by upgrading the technical condition of the substation	2023	2029
II.6	Expansion of the 400/220/110 kV Miłosna substation	Safeguarding evacuation of full power from the Kozienice Power Plant and improving the reliability of power supply to electricity consumers in the Warsaw metropolitan area	2017	2030
II.7	Replacement of a 400/110 kV transformer together with infrastructure adaptation at the 400/220/110 kV Miłosna substation	Improving the reliability of power supply to electricity consumers in the Warsaw agglomeration by replacing the 400/110 kV transformer with a larger unit	2021	2027
II.8	Expansion of the 400 kV and 110 kV switchgear at the 400/110 kV Siedlce Ujrzanów substation	Creating conditions for connection and evacuation/injection of power from/to the electricity storage facility	2022	2029 (2)
II.9	Expansion of the 400/110 kV Ełk Bis substation together with reconstruction of the 220/110 kV Ełk substation	Improving the reliability of power supply to electricity consumers in the north-eastern part of the country by installing a second 400/110 kV transformer at the Ełk Bis substation and creating conditions for decommissioning the worn out 220 kV switchgear at the Ełk substation	2021	2028 (2)
II.10	Expansion of the 400/220/110 kV Ostrołęka substation for the purpose of connecting the unit at the Ostrołęka Power Plant	Creating conditions for connection and power evacuation from the new gas-fired power plant	2022	2025 (2)
II.11	Construction of the 400/110 kV Kutno (Witonia) substation together with connection of the 400 kV line from the Stryków (Dmosin) substation and a new substation in the Konin area	Improving the reliability of power supply to electricity consumers in the northern part of Łódzkie Voivodeship	2022	2031
II.12	Construction of the 400/220/110 kV Stryków (Dmosin) substation together with connection of the 400 kV Rogowiec-Płock/Ołtarzew line and 220 kV Janów-Ołtarzew line	Power evacuation from offshore wind power plant and improvement of the reliability of power supply to electricity consumers in central Poland (including, in the future, the Central Communication Port)	2021	2030

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.13	Expansion and upgrade of the 400/220/110 kV Polkowice substation	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2022	2027 (2)
II.14	Upgrade of the 220/110 kV Żukowice substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers through replacing 220/110 kV transformers with larger ones	2016	2025
II.15	Expansion of the 400/110 kV Pasikurowice substation in relation with the connection of the 400 kV line and replacement of the 400/110 kV transformer	Improving the reliability of power supply to electricity consumers in Wrocław and its metropolitan area through replacing the 400/110 kV transformer with a larger unit, and eliminating structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity	2017	2027
II.16	Construction of the 400 kV Mikułowa-Świebodzice line together with expansion of the 400/220/110 kV Świebodzice substation and 400/220/110 kV Mikułowa substation	Improving conditions for network operation at power evacuation from the Turów Power Plant and when the plant is taken out of service, as well as eliminating structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity. Moreover, creating conditions for power evacuation from renewable sources in the south-western part of the country	2017	2026
II.17	Upgrade of the 220 kV Mikułowa-Leśniów line	Increasing the permissible current carrying capacity of lines to improve the conditions for network operation at power evacuation from the Turów Power Plant and when the plant is taken out of service, as well as creating conditions for power evacuation from renewable sources in the south-western part of the country	2020	2026
II.18	Upgrade of the 220 kV Świebodzice-Ząbkowice line	Increasing the permissible current carrying capacity of the line to improve the reliability of power supply to electricity consumers in the Wałbrzych Special Economic Zone in Radzikowice and the elimination of congestions in the transmission of electricity in the western part of the NPS, especially with increased cross-border exchange towards power import or transit	2020	2027
II.19	Construction of the 400 kV line from Dobrzeń to the Pasikurowice-Ostrów line tap	Elimination of structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity as well as improving the conditions for electricity transmission to the southern part of the country in connection with the planned shutdowns of power units in the Upper Silesia area	2019	2028
II.20	Construction of the 400 kV line from Trębaczew to the Joachimów (Rokitnica)-Wielopole line tap	Elimination of structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity as well as improving the conditions for electricity transmission to the southern part of the country in connection with the planned shutdowns of power units in the Upper Silesia area	2019	2028
II.21	Expansion and upgrade of the 400/110 kV Rokitnica substation	Elimination of structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity as well as improving the conditions for electricity transmission to the southern part of the country in connection with the planned shutdowns of power units in the Upper Silesia area. Improving the reliability of power supply in the Upper Silesia area by replacing 400/110 kV transformers with larger units	2019	2027
II.22	Replacement of 4 poles of the 400 kV Joachimów-Trębaczew line	Improving the technical condition and operating conditions of the line (adaptation to PSE S.A. technical standards)	2018	2028
II.23	Upgrade of the 220/110 kV Boguszów substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2020	2027
II.24	Upgrade of the 220/110 kV Leszno Gronowo substation – Stage II	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as creating conditions for the connection of a renewable source	2021	2028 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.25	Construction of the 400/220/110 kV Baczyna substation together with connection of the 400 kV Krajnik-Plewiska line and 220 kV Krajnik-Gorzów line	Power evacuation from new units at the Dolna Odra Power Plant and elimination of structural restrictions for cross-border exchanges in connection with the European Parliament and Council Regulation 2019/943 of 5 June 2019 on the internal market for electricity, as well as creating conditions for power evacuation from renewable sources in the north-western part of the country and improving the reliability of power supply to consumers from Lubuskie Voivodeship	2016	2027
II.26	Construction of the 400 kV Baczyna-Plewiska line	Power evacuation from new units at the Dolna Odra Power Plant and elimination of structural restrictions for cross-border exchanges in connection with the European Parliament and Council Regulation 2019/943 of 5 June 2019 on the internal market for electricity, as well as creating conditions for power evacuation from renewable sources in the north-western part of the country and improving the reliability of power supply to electricity consumers from Zachodniopomorskie, Lubuskie, and Wielkopolskie Voivodeship	2017	2025
II.27	Upgrade of the 400/220/110 kV Plewiska substation involving a 110 kV switchgear	Elimination of threats of exceeding short-circuit currents in 110 kV switchgear (adaptation to PSE S.A. technical standards)	2020	2027
II.28	Expansion and upgrading of the 220 kV switchgear at the 400/220/110 kV Pątnów substation	Improving the technical condition and operating conditions of the 220 kV switchgear at the substation (adaptation to PSE S.A. technical standards)	2022	2036
II.29	Construction of the 220 kV line from Pomorzany to the Krajnik-Glinki line tap	Improving the reliability of power supply to electricity consumers of Szczecin and its metropolitan area and creating conditions for power evacuation from renewable generation sources	2014	2028
II.30	Expansion of the 110 kV Pomorzany substation by adding 220 kV switchgear	Improving the reliability of power supply to electricity consumers of Szczecin and its metropolitan area and creating conditions for power evacuation from renewable generation sources	2014	2028
II.31	Reconstruction of the 220 kV Krajnik-Glinki line	Improving the reliability of power supply to electricity consumers of Szczecin and its metropolitan area and creating conditions for power evacuation from renewable generation sources	2015	2028
II.32	Expansion of the 400 kV switchgear at the 400/220 kV Krajnik substation for the purpose of connecting the Banie 2 photovoltaic farm	Creating conditions for connection and power evacuation from the photovoltaic farm	2021	2026 (2)
II.33	Upgrade of the 400/220/110 kV Morzyczyn substation	Ensuring short short-circuit elimination times through the use of two sets of busbar protection and BFP in the 400 kV switchgear, as well as the adaptation of the Technical Security System to the requirements of regulations for the protection of facilities classified as critical infrastructure	2020	2029
II.34	Upgrade of the 220/110 kV Toruń Elana substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as creating conditions for power evacuation from renewable energy generation sources	2018	2028
II.35	Upgrade of the 220/110 kV Gorzów substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2021	2030
II.36	Upgrade of the 220/110 kV Adamów substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as creating conditions for connecting generators, consumers and electricity storage facility and improving the reliability of power supply to electricity consumers from Wielkopolskie Voivodeship through replacing the 220/110 kV transformer with a larger unit	2021	2030 (2)
II.37	Expansion of the 110 kV switchgear at the 400/110 kV Kromolice substation for the connection of the Młodzikowo photovoltaic farm	Creating conditions for connection and power evacuation from the new photovoltaic power plant	2022	2026 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.38	Expansion of the 400 kV Gdańsk Przyjaźń substation and the 400(220)/110 kV Żydowo Kierzkowo substation together with the installation of reactive power compensation equipment and adaptation of the 400/220/110 kV Gdańsk I substation to switching the track of the 400 kV Dunowo-Żydowo Kierzkowo-Gdańsk I and Piła Krzewina-Żydowo Kierzkowo lines to 400 kV voltage	Creating conditions for power evacuation from offshore wind power plant and improvement of the reliability of power supply to electricity consumers in the Tri-City metropolitan area through launching a new 400/110 kV transformer as well as installation of reactive power compensation equipment for the purpose of adjusting voltages in the transmission network in the northern part of the NPS, especially during periods of low power demand and low operation of renewable sources. In addition, creating conditions for the connection of new 110 kV lines at the Gdańsk I substation	2021	2028
II.39	Expansion of the 400/110 kV Pelplin substation including the installation of reactive compensation devices	Installation of reactive power compensation equipment for the purpose of adjusting voltages in the transmission network in the northern part of the NPS, especially during periods of low power demand and low operation of renewable sources	2021	2025
II.40	Expansion of the 400/220/110 kV Pątnów substation together with the connection of the 400 kV Kromolice-Pątnów line	Creating conditions for the connection and evacuation of power from renewable sources in the northern part of the country and improving the reliability of power supply to electricity consumers in Wielkopolskie Voivodeship	2016	2025 (2)
II.41	Expansion and upgrade of the 400/110 kV Żarnowiec substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as creating conditions for synchronisation of the Baltic Countries with continental Europe and creating conditions for evacuating power from renewable sources in the northern part of the country	2021	2026
II.42	Upgrading of the 400 kV Słupsk-Żarnowiec line together with the construction of the 400 kV line section from Choczewo to the Słupsk-Żarnowiec line tap	Increasing the permissible current carrying capacity of the line to create conditions for synchronisation of the Baltic countries with continental Europe and to create conditions for the power evacuation from renewable sources in the northern part of the country, as well as to improve the reliability of power supply to electricity consumers in Pomorskie Voivodeship	2018	2027
II.43	Upgrade of the 400 kV Żarnowiec-Gdańsk I/Gdańsk Przyjaźń-Gdańsk Błonia line	Increasing the permissible current carrying capacity of the line to create conditions for connection and power evacuation from offshore wind power units	2018	2026 (2)
II.44	Expansion of the 400/110 kV Gdańsk Błonia substation together with installation of reactive power compensation equipment	Power evacuation from offshore wind power plant and creating conditions for connecting a new generation unit as well as installation of reactive power compensation equipment for the purpose of adjusting voltages in the transmission network in the northern part of the NPS, especially during periods of low power demand and low operation of renewable sources	2021	2029 (2)
II.45	Construction of the 400 kV Choczewo substation	Connection and evacuation of power from offshore wind power plant	2019	2027 (2)
II.46	Redevelopment of the 400 kV Choczewo-Żarnowiec line into a double-circuit 400 kV line (Construction of the 400 kV Choczewo-Żarnowiec line)	Power evacuation from offshore wind power plant	2019	2027
II.47	Expansion of the 400/220/110 kV Grudziądz Węgrowo substation for the purpose of connecting Unit 1 at the Grudziądz Power Plant	Creating conditions for connection and power evacuation from the new gas-fired power plant	2022	2026 (2)
II.48	Construction of the new 220/110 kV substation in the Warsaw area together with the 220 kV Mory-Kozienice/Piaseczno line connection	Power supply to the investment area in the vicinity of Warsaw as well as improving the reliability of power supply to electricity consumers within the Warsaw metropolitan area	2022	2030 (1)
II.49	Expansion and redevelopment of the 400/220/110 kV Kozienice substation /included task scope: Expansion of the 400 kV switchgear at the 400/220/110 kV Kozienice substation for the	Improving the technical condition and operating conditions of the 220 and 110 kV switchgears (adaptation to PSE S.A. technical standards)	2020	2032 (2)

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
	purpose of connecting the Kozienice electricity storage facility/			
II.50	Replacement of transformers together with infrastructure adaptation at the 220/110 kV Olsztyn I substation	Elimination of risks related to emergency shutdowns of transformers of obsolete design and poor technical condition, and creating conditions for power evacuation from renewable generation sources	2017	2025
II.51	Expansion of the 220/110 kV Sochaczew substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as increasing the reliability of power supply to consumers through the construction of a second 220/110 kV transformer and creating conditions for power evacuation from renewable energy generation sources	2018	2025
II.52	Upgrade of the 220/110 kV Zamość substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as creating conditions for power evacuation from renewable energy generation sources	2018	2028
II.53	Expansion of the 220/110 kV Stalowa Wola substation together with an installation of the 220/110 kV transformer	Power supply to the investment area in the vicinity of Stalowa Wola	2021	2026 (1)
II.54	Upgrade of the 400/220/110/15 kV Połaniec substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers in the Świętokrzyskie and Podkarpackie Voivodeship through replacing 220/110 kV transformers with a larger unit	2021	2031
II.55	Upgrade of the 220 kV Połaniec-Chmielów line, circuit II	Increasing the allowable current carrying capacity of the line to supply the investment area in the vicinity of Stalowa Wola	2021	2027 (1)
II.56	Upgrade of the 220 kV Abramowice-Puławy line	Increasing the allowable current carrying capacity of the line to supply the investment area in the vicinity of Stalowa Wola and improving the reliability of power supply to the Lublin and Zamość area	2021	2028
II.57	Upgrade of the 400/110 kV Krosno Iskrzynia substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as allowing for the connection of new 110 kV lines to the 110 kV switchgear and creating conditions for power evacuation from renewable energy generation sources	2020	2030 (2)
II.58	Expansion and upgrade of the 750/400/110 kV Rzeszów substation including the installation of reactive compensation devices	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as installation of a gland for reactive power compensation for the purpose of adjusting voltages in the transmission network in the eastern part of the NPS	2017	2031
II.59	Construction of the 400/110 kV Jarosław (Makowisko) substation together with connection of the Rzeszów-Chmielnicka line switched into the 400 kV voltage /included task scope: Adjustment and switching of 750 kV lines to operate at 400 kV/	Improving the reliability of power supply to electricity consumers in the Podkarpackie Voivodeship, including investment areas The investment does not preclude future synchronous cooperation with the Ukrainian power system, which may be subject to possible arrangements with the Ukrainian partner	2022	2030
II.60	Expansion of the 400/110 kV Lublin Systemowa substation	Improving the reliability of power supply to electricity consumers in the eastern part of the Lubelskie Voivodeship and improving the conditions of power evacuation from the new source in Łęczna, as well as providing power reception from renewable energy generation sources in the Lublin area	2017	2028
II.61	Upgrade of the 220/110 kV Rożki substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as increasing the reliability of power supply to electricity consumers in Radom through replacing 220/110 kV transformers with larger units and creating conditions for power evacuation from renewable energy generation sources	2018	2027

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.62	Adaptation of facilities and equipment to the requirements of the EU Commission Regulation of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER)	Adaptation of substations for the purpose of maintaining operation of equipment and systems for at least 24 hours in the event of loss of basic power supply in connection with the Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration	2019	2026
II.63	Expansion and upgrade of the Technical Security System for EHV substations	Replacement of depleted and failing TSS components/systems that do not meet current standards and requirements in order to create conditions for power connection and evacuation from the generation unit and to ensure effective perimeter protection of substations	2023	2030
II.64	Establishment of an Emergency Centre within the structures of PSE S.A.	Centralisation and unification of operation of Technical Security Systems operating at substations and streamlining of ongoing maintenance and operation work at TSS	2023	2027
II.65	Expansion and upgrade of the 400/220/110 kV Wielopole substation	Improving the technical condition as well as operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to consumers in the Śląskie Voivodeship through the construction of a second 400/110 kV transformer and a second 400/220 kV transformer	2021	2036
II.66	Upgrade of the 220/110 kV Konin substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers in Wielkopolskie Voivodeship through replacing the 220/110 kV transformer with a larger unit	2015	2028
II.67	Construction of the 220 kV line from Konin to the Pątnów-Podolszyce line tap together with the extension of the 220/110 kV Konin substation	Improving conditions for the power evacuation from RES located in the northern part of the NPS	2022	2028
II.68	Expansion and upgrade of the 400/220 kV Joachimów substation	Elimination of structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity as well as improving the conditions for electricity transmission to the southern part of the country in connection with the planned shutdowns of power units in the Upper Silesia area, as well as increasing the reliability of power supply to electricity consumers in Częstochowa and its metropolitan area	2021	2032
II.69	Upgrade of the 400/220 kV Rogowiec substation	Improving the technical condition as well as operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power evacuation from Bełchatów Power Plant and increasing the reliability of power supply to electricity consumers in Łódź and its metropolitan area	2018	2037
II.70	Expansion and upgrade of the 400/110 kV Tucznawa substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as improving the reliability of power supply to electricity consumers in Śląskie Voivodeship through the construction of a third 400/110 kV transformer	2021	2032
II.71	Upgrade (redevelopment) of the 400 kV Rogowiec-Joachimów, Rogowiec-Tucznawa (Joachimów) line	Increasing the permissible current carrying capacity of the line to eliminate structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of 5 June 2019 on the internal market for electricity as well as improving the conditions for electricity transmission to the southern part of the country in connection with the planned shutdowns of power units in the Upper Silesia area, as well as increasing the reliability of power supply to electricity consumers in Częstochowa and its metropolitan area	2022	2029
II.72	Upgrade of the 220/110 kV Wrzosowa substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers in Częstochowa and its metropolitan area through replacing 220/110 kV transformers with larger ones and creating conditions for receiving power from renewable energy generation sources	2021	2030

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.73	Upgrade of the 220/110 kV Kędzierzyn substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as improving the reliability of power supply to electricity consumers in Opolskie Voivodeship through the installation of a second 220/110 kV transformer	2021	2030
II.74	Upgrade of the 220/110 kV Wanda substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) and improving the reliability of power supply to electricity consumers in Krakow and its metropolitan area through replacing the 220/110 kV transformer with a larger one	2022	2028
II.75	Replacement of a transformer together with infrastructure adaptation at the 220/110 kV Siersza substation	Improving the reliability of power supply to electricity consumers in Śląskie and Małopolskie Voivodeships by replacing the 220/110 kV transformer with a larger unit	2021	2028
II.76	Upgrade of the 400 kV Krosno Iskrzynia-Lemešany line	Adaptation of the line parameters to weather conditions and climate changes that cause exceeded load limits due to the formation of cadastral soot, and replacement of the OPGW cable to increase the availability of the cross-border connection	2018	2025
II.77	Construction of the 220 kV from Nysa to the Ząbkowice-Groszowice line tap together with construction of a 220/110 kV Nysa substation	Provision of power supply conditions for electricity consumers in the Wałbrzych Special Economic Zone in Radzikowice	2018	2028
II.78	Construction of the 220 kV lines: Podborze - Kopanina-Liskovec tap, Podborze - Bujaków-Liskovec tap, Podborze - Bieruń-Komorowice tap, Podborze - Czeczott-Moszczenica tap line and the 400 kV lines: Podborze - Nosovice-Wielopole tap, Podborze - Dobrzeń-Detmarovice tap line together with the construction of the 400/220/110 kV Podborze substation	Increasing the reliability of power supply to electricity consumers in Śląskie Voivodeship and elimination of structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity	2020	2032
II.79	Upgrade of the 400 kV Rzeszów-Krosno Iskrzynia line	Increasing the permissible current carrying capacity of the line to eliminate structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of 5 June 2019 on the internal market for electricity	2019	2026
II.80	Upgrade of the 220 kV Jamki-Łagisza line	Increasing the permissible current carrying capacity of the line to eliminate structural restrictions for cross-border exchanges in connection with Regulation 2019/943 of 5 June 2019 on the internal market for electricity and provision of power evacuation from the Łagisza Power Plant	2019	2026
II.81	Upgrade of the 220/110 kV Łośnice substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards)	2022	2029
II.82	Upgrade of the 220/110 kV Halemba substation	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards) as well as creating conditions for power reception from renewable energy generation sources	2013	2029
II.83	Replacement of a transformer together with infrastructure adaptation at the 220/110 kV Groszowice substation	Creation of technical conditions at selected substations for the installation of new transformer units	2023	2025
II.84	Expansion of power quality monitoring system	Meeting the electric power quality parameters in connection with the obligations under the utilities regulation, tariff regulation and the TGC	2019	2025
II.85	Upgrade of metering and billing systems of CDGUs and general needs of power plants	Adaptation of metering and billing systems to the current technical standards of PSE S.A.	2021	2027
II.86	Adaptation of substation infrastructure for the installation of transformers	Creation of technical conditions at selected substations for the installation of new transformer units	2020	2029

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
II.87	Upgrade of electricity metering systems – phase 1	Adaptation of metering systems to the current technical standards of PSE S.A.	2022	2027
II.88	Construction of the HVDC Poland-Lithuania cable connection (Harmony-Link)	Creating conditions for synchronisation of the Baltic Countries with continental Europe	2019	2033
II.89	Upgrade of the AC/DC Słupsk converter station	Improving the technical condition and operating conditions of the substation (adaptation to PSE S.A. technical standards), including upgrade of the control system and MACH2 safeguards to the latest version and also to ensure conditions for power evacuation from renewable sources in northern part of the country	2019	2026
II.90	Purchase and installation of reactive compensation devices – Stage II	Increasing the voltage stability and improving voltage regulation capabilities of the NPS	2021	2030
II.91	Upgrade of the transformer population – Stage V	Installation of new or replacement of existing transformer units to improve the reliability of power supply to electricity consumers and create conditions for connecting new entities to the transmission system	2013	2025
II.92	Upgrade of the transformer population – Stage VI	Installation of new or replacement of existing transformer units to improve the reliability of power supply to electricity consumers and create conditions for connecting new entities to the transmission system	2016	2026
II.93	Upgrade of the transformer population – Stage VII	Installation of new or replacement of existing transformer units to improve the reliability of power supply to electricity consumers and create conditions for connecting new entities to the transmission system	2017	2029
II.94	Upgrade of the transformer population – Stage VIII	Installation of new or replacement of existing transformer units to improve the reliability of power supply to electricity consumers and create conditions for connecting new entities to the transmission system	2020	2032
II.95	Construction of the 400 kV Piła Krzewina-Plewiska line	Creating conditions for synchronisation of the Baltic Countries with continental Europe. In addition, creating conditions for the evacuation of power from renewable sources in the northern part of the country and improving the reliability of power supply to consumers in Pomorskie and Zachodniopomorskie Voivodeships	2015	2026
II.96	Expansion of the 400 kV and 110 kV switchgear at the 400/220/110 kV Dunowo substation including the installation of 400/110 kV transformers	Creating conditions for synchronisation of the Baltic countries with continental Europe and creating conditions for the power evacuation from renewable sources in the northern part of the country, as well as improving the reliability of power supply to electricity consumers in Koszalin area	2019	2028
II.97	Construction of the 400 kV Dunowo-Żydowo Kierzkowo-Piła Krzewina line	Creating conditions for synchronisation of the Baltic countries with continental Europe and creating conditions for the power evacuation from renewable sources in the northern part of the country, as well as improving the reliability of power supply to electricity consumers in Pomorskie and Zachodniopomorskie Voivodeships	2018	2027
II.98	Expansion and upgrade of the Piła Krzewina substation together with switching the circuit of the 400 kV Piła Krzewina-Plewiska line operating at 220 kV to 400 kV	Creating conditions for synchronisation of the Baltic countries with continental Europe and creating conditions for the power evacuation from renewable sources in the northern part of the country, as well as improving the reliability of power supply to electricity consumers in Piła area	2018	2028
II.99	Switching the 220 kV Bydgoszcz Zachód-Jasiniec line to operate at 400 kV	Creating conditions for the evacuation of power from offshore wind power plants and other renewable sources in the northern part of the country, as well as improving the reliability of power supply to electricity consumers in northern part of Poland	2021	2031
II.100	Adjustment of the Bydgoszcz Zachód substation to work at 400 kV together with the installation of a 400/110 kV autotransformer and reactive power compensation equipment	Creating conditions for the evacuation of power from offshore wind power plants and other renewable sources in the northern part of the country, as well as improving the reliability of power supply to electricity consumers in northern part of Poland	2023	2030
II.101	Expansion of the 400/220/110 kV Jasiniec substation together with the installation of the 400/110 kV	Creating conditions for the evacuation of power from offshore wind power plants and other renewable sources in the northern part of the country, as well as improving the reliability of power supply to electricity consumers in Bydgoszcz and its metropolitan area	2021	2027

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
	autotransformer and the switchover of the 220 kV Jasiniec-Grudziądz Węgrowo line to 400 kV voltage			
II.102	Upgrade of the 400 kV Dunowo-Słupsk line	Increasing the permissible current carrying capacity of the line to create conditions for synchronisation of the Baltic countries with continental Europe and to create conditions for the power evacuation from renewable sources in the northern part of the country, as well as to improve the reliability of power supply to electricity consumers in Pomorskie and Zachodniopomorskie Voivodeship	2018	2026
II.103	Expansion of the 400/110 kV Słupsk substation for the connection of the Bałtyk Środkowy OWF and Bałtyk Środkowy II OWF	Creating conditions for connection and power evacuation from offshore wind farms	2022	2027 (2)

Key to footnotes in the top row of the table:

*1 *Numbering used at PSE S.A. for internal processes*

*2 *As a rule, PSE S.A.'s network investments are not dedicated to the achievement of single objectives, and thus should not be individually assigned as dedicated to single facilities or entities. These investments most often support multiple objectives, such as:*

- reliability of power supply to electricity consumers,
- connection and evacuation of power from generation sources,
- removing constraints in the use of cross-border transmission capacities,
- creating conditions for the operation of manufacturing sources in line with commercial transactions,
- obtaining broader opportunities for operation, repair and investment work in the northern area of the NPS.

Network investments make it possible to serve the needs of both consumers and generators, enabling the transmission and distribution of electricity as part of electricity trading and the responsibilities of power system operators. The infrastructure that will be created as a result of the investments in question will be used according to current system conditions.

*3 *Date of completion of the task in technical, financial, and formal terms*

Remarks concerning dates of implementation of investment tasks:

(1) Legitimacy of the task and its completion date depend on the emergence and development of energy consumers in the investment area.

(2) Task completion date depends on the fact and schedule of the physical construction of: a generation source, an electricity consumer, or an electricity storage facility.

5.3 ICT investment tasks

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
I.1	Development and implementation of IT tools supporting commercial/technical balancing	Implementation of European and national regulations through the construction and implementation of a number of IT tools to support the area of NPS operation management, including in particular the area of commercial and technical balancing	permanent task	permanent task
I.2	Deployment of the IT system supporting the mechanisms of power system operation management based on a full network model	Implementation of the European Network Codes (SOGL) through the implementation of NMMS (Network Model Management System) software designed for centralised creation and management of network models covering the medium and long-term planning of network operation (up to 5 years ahead)	2015	2031
I.3	Upgrade of the software of the SCADA and EMS subsystems of the DYSTER System	Equipping the dispatching services of the Transmission System Operator with an IT tool to ensure effective and reliable performance of tasks in the area of NPS operational control within a single, centralised SCADA system, equipped with EMS computing tools and interfaces to meet interoperability requirements with other systems at PSE S.A.	2017	2031
I.4	Upgrade of the Primary Control Room of the National Dispatch Centre	Adjusting the ceiling lighting for the newly built large-format graphic wall of NDC PCR	2021	2025
I.5	Upgrade of dispatching systems	Adaptation of currently used applications to new or changing processes related to pan-European model exchange under CGMES, D2CF, DACF, IDCF procedures to support short term planning of NPS operation	2006	2028
I.6	Installation of line load monitoring system	Implementation of the SMOL system to enable the determination of the allowable current carrying capacity of the line resulting from the current and prognosed weather conditions and the current distance of the phase conductors from the ground or from the intersecting object	2017	2028
I.7	Purchase of software and licences from software producers	Equipping the Company's employees with appropriate IT software necessary to carry out the work in the field of TSO activities	permanent task	permanent task
I.8	SAP Systems Transformation Program	Implementation of functionalities supporting full lifecycle management of the property	2021	2027
I.9	SAP systems development			
I.9.1	SAP systems development in the financial, accounting and logistics areas	Cost and organisational optimisation in the financial, accounting and logistics areas	2021	2025
I.9.2	Development of functionalities based on SAP SuccessFactors cloud solutions	Cost and organisational optimisation in the area of managing the Company's goals	2021	2025
I.9.3	Building and developing the functionality of the HR island (SAP)	Cost and organisational optimisation as well as technological modernisation in the field of SAP HR	2021	2028
I.10	Purchase and implementation of enterprise management systems (EOD, Workflow, Analytical/Decision-making, etc.)			
I.10.1	Development of the Asset Management system functionalities	Adaptation of the system to changes in its business and technical environment	permanent task	permanent task
I.10.2	Updating the Spatial Information System (SIS)	Adapting the system to work with WFM (Workforce Management) class mobile applications and ensuring compliance with the BIM investment guidance methodology	2021	2026

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
I.10.3	Implementation of Workforce Management (WFM) mobile applications	Implementation of mobile applications to support the field work of operational services	2020	2028
I.10.4	Migration of computing applications to the Computing Platform	Moving applications to the Computing Platform to ensure availability and proper computing performance	2024	2026
I.10.5	JIRA system development	Adaptation of the JIRA/Confluence system to the current needs of the organisation in support of task and ITC project execution	2024	2026
I.10.6	Development of functionalities of the Case Handling System	Improving the efficiency of processes at PSE S.A. through the implementation of an electronic case flow management system in the Case Handling System	2017	2029
I.10.7	ZRiP - Claims and rights management tool	Implementation of a tool for handling claims and court cases in the area of network asset operation	2021	2025
I.10.8	Microsoft Project Server functionality development (PPM)	Adaptation of Microsoft Project Server functionalities to current needs in order to increase the efficiency of project implementation at PSE S.A.	2019	2027
I.10.9	SharePoint / WEB application platform functionality development	Adaptation of the application functionalities for the purpose of automating and supporting the Company's processes	2019	2028
I.10.10	Business Process Automation	Increasing the efficiency of important business processes by reducing labour intensity, increasing the quality of work performed, and the ability to redirect employees to tasks that require a higher level of awareness and decision making	2022	2025
I.10.11	Development of methods and tools to support IT systems architecture management	Integration of enterprise architecture domains (business, data, applications and systems, and technical domains) into a single central repository, along with definition of rules for its construction and management	2021	2025
I.11	Development of the SCADA system functionalities used by CN/RCN at the Department of Operations	Adaptation of the WindEx System to changes resulting from segmentation of IT/OT networks to minimise threats of cyber attacks on the NPS	2022	2026
I.12	Hardware platform of PSE S.A. systems	Upgrade or expansion of the Company's existing IT systems to ensure safe and reliable operation of critical and core systems and services as well as systems that support PSE S.A.'s operations.	permanent task	permanent task
I.13	Development of the reports management system together with CMDB	Improvement of the implementation of IT services in the organisation and facilitation of their planning, provision and continuous improvement of their quality	2024	2028
I.14	Subscription renewal for Proofpoint email gateway antivirus protection system and purchase of additional licences	Providing security for PSE's critical, core and office systems. Minimising and repelling external threats. Management of the risk of loss of ability to control/manage the operation of the PPS, related to cyber-attacks against IT/OT systems of the transmission system operator and distribution system operators, generators, traders, exchanges or industrial consumers	2024	2026
I.15	Upgrade of communication systems	Adaptation of dispatching communication systems to the requirements of Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing the network code on electricity emergency and restoration (NC ER)	2017	2027
I.16	Upgrade of tele-security systems on power lines	Replacement of depleted tele-security devices	2018	2025
I.17	Upgrade of power supply systems for data communication devices	Replacement of depleted ICT equipment	2017	2027
I.18	Upgrade of air-conditioning systems at electrical substations	Replacement of depleted equipment included in air conditioning systems in substations	2017	2028

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
I.19	Implementation of a monitoring system for power and air conditioning equipment	Implementation of a surveillance system for ICT infrastructure equipment	2020	2025
I.20	Construction of fibre optic lines (basic and backup) in the PDC - BDC relationship	Providing teletransmission and telecommunication connectivity at a high level of reliability and availability for the Backup Data Centre (RDC for short) and the upgraded Miłosna substation	2019	2032
I.21	IT platforms for the operationalisation of the three data centres (PDC-RDC-BDC)	Provision of ICT equipment for the Backup Data Centre	2024	2028
I.22	ICT equipment for the new headquarters and reserve points in Radom	Provision of IT and telecommunication equipment for the newly constructed office and technology building in Radom for the needs of ZKO Radom, ODM Radom, RCN Radom, rCPD, RPD KDM, rRCN, rCZST, rSOC and other backup operating points		
I.22.1	Supply and commissioning of network and teletransmission equipment at the new headquarters in Radom	Provision of IP network equipment for ZKO Radom information systems, reserve operator functions and Backup Data Centre	2024	2025
I.22.2	Supply and implementation of large-format displays for operator rooms in Radom	Ensuring efficient and safe operation of the National Power System, effective supervision of facilities and coordination of investment and upgrade works. The visualisation systems will also support the work of PSE teletransmission system operators as well as security and cybersecurity system administrators	2023	2025
I.23	Transformation of the Container Platform (TCP)	Transforming the Container Platform to achieve its expected performance and disaster resilience	2024	2027
I.24	Construction of the ICT infrastructure monitoring system	Ensuring comprehensive monitoring of all areas of the infrastructure to improve the quality of services provided	2021	2028
I.25	IT security systems			
I.25.1	Network Segmentation Programme – separation of computer networks of individual OT, IT and external entities' zones	Mitigation of cybersecurity threats under the Segmentation programme	2020	2027
I.25.2	Network Segmentation Programme – implementation of security architecture components. Data diode implementation [SEG_DIODA]	Mitigation of cybersecurity threats under the Segmentation programme	2021	2027
I.25.3	Network Segmentation Programme – implementation of security architecture components [SEG_AD]	Mitigation of cybersecurity threats under the Segmentation programme	2021	2027
I.25.4	PCN Out of Band	Implementation of the European Network Codes (NC ER) through the construction of a communication network of European Transmission System Operators, the so-called OOB (Out of Band), independent of the communication network – the so-called PCN (Physical Communication Network) – in case of its unavailability	2023	2026
I.26	DWDM network expansion	Providing opportunities to increase data transmission capacity between PSE S.A. headquarters and ZKO sites and key substations by expanding the existing DWDM system	2022	2029
I.27	LAN CPD network expansion	The need to expand the existing LAN in data centres (CPD, RCPD and LCPD) to increase the number of high-bandwidth ports available on the LAN	2024	2025
I.28	Construction of central energy market information system (CSIRE)	Implementation of the provisions of the EL Act through the construction of an IT solution necessary for PSE S.A. to carry out the tasks of the Energy Market Information Operator (OIRE)	2018	2029

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
I.29	Construction of power quality metering and billing system (SPRJEE)	Implementation of a power quality metering and billing system (SPRJEE) that integrates, processes and provides access to metering data necessary to support information exchange processes regarding the quality of delivered electricity within CSIRE	2022	2026
I.30	PQ Secure power quality monitoring system software update	Upgrade of the PQ Secure system software to meet the requirements concerning IT security standards and to ensure continued support of the business process connected with power quality monitoring	2025	2026
I.31	IT solutions for DR			
I.31.1	Implementation of machine learning automation for selected financial tasks	Digitisation and simplification of the process of handling selected financial tasks at PSE S.A.	2025	2028
I.31.2	Implementation of the eDelegacje tool – an IT solution to support the process of handling and settling business trips	Digitisation and simplification of the process of business trip handling and settling at PSE S.A.	2024	2025
I.31.3	Implementation of a tool for handling bank transfers – a solution using SAP S4HANA	Implementation of new solutions supporting the process of bank financial settlements: transfers, bank statements, other settlements increasing the level of security of bank operations performed	2024	2025
I.31.4	Implementation of Workflow for purchase invoices	Implementation of an IT solution to support the processes of handling purchase invoices using Workflow mechanisms	2026	2027
I.31.5	Implementation of an IT solution to support the master data management process at PSE	Digitisation and simplification of the process of handling master data management at PSE S.A.	2026	2028
I.32	Development of long-term climate change projections to assess their potential impact on NPS operations	Providing access to climate change models on a multi-year basis, taking into account estimated frequencies and intensities of extreme weather events relevant to the safety of NPS operations	2024	2026
I.33	Development of risk management support tools	Support decision-making activities related to risk management in the operation of the NPS and the Company by developing the functionality of analytical and computational tools	2019	2025
I.34	Construction of balancing energy exchange platform from mFRR reserves (MARI)	Implementation of the European Grid Codes (EGBL) by building a platform within the framework of the international MARI project, to support the operation of the European balancing energy market in terms of mFRR regulations	2020	2028
I.35	Construction of balancing energy exchange platform from aFRR reserves (PICASSO)	Implementation of the European Grid Codes (EGBL) by building a platform within the framework of the international PICASSO project, to support the operation of the European balancing energy market in terms of aFRR regulations	2020	2028
I.36	Construction of an IT tool for capacity management for balancing energy exchange platforms (Capacity Management Module)	Implementation of the European Grid Codes (EGBL, SOGL) by building an IT tool within the framework of the international MARI project responsible for capacity management (Capacity Management Module) for balancing energy exchange platforms from RR, aFRR, mFRR and IN reserves	2021	2028
I.37	Development of IT tools for monitoring the Balancing Market	Design and development of IT tools for monitoring the Balancing Market (BM) in accordance with the requirements of the REMIT Regulation	2022	2027
I.38	Deployment of IT system for the Capacity Market (STORM)	Implementation of the provisions of the capacity market Act through the construction of the Telecommunications System for the Operation of the capacity market (STORM) to support the implementation of processes in the capacity market to ensure generation adequacy in the mid- and long term	2017	2029
I.39	Building the CORE CC Tool Package	Implementing European network codes (CACM, FCA, SOGL) by building capacity calculation tools in the CORE region	2021	2028

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
I.40	Implementation of CDE data exchange platform as an extension of FileNet system	Ensuring the exchange of information within the investment and operation process, using the BIM model	2024	2027

Key to footnotes in the top row of the table:

*1 *Numbering used at PSE S.A. for internal processes*

*2 *Date of completion of the task in technical, financial, and formal terms*

5.4 Investment tasks in the field of buildings and structures, purchases of finished capital goods, as well as the purchase of network facilities and the clarification of the legal status of real property

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
Buildings and structures				
IV.1	BDC construction	Ensuring business continuity of PSE S.A. processes in case of emergencies at the Primary Data Centre located at PSE S.A. headquarters in Konstancin-Jeziorna	2016	2026
IV.2	Expansion of the technological building to include staff rooms at the 220/110 kV Klikowa substation	Provide back facilities conditions for employees in accordance with health and safety requirements	2022	2025
IV.3	Upgrade of the control room building at the 400/220/110 kV Łagisza substation	Improving the technical condition of the building and reducing the cost of thermal energy consumption	2022	2025
IV.4	Construction of a back facilities building for WTE Plock	Provide office and back facilities for employees of the Janów and Plock Field Operations Departments in accordance with health and safety requirements	2021	2026
IV.5	Upgrade of structures located at the back of the 400/220/110 kV Kozienice substation	Improving the technical condition of upgraded facilities in accordance with health and safety requirements	2022	2025
IV.6	Construction of a workshop and office building for WTE Janów	Ensuring that employees of the Janów Field Operations Department (WTE) have proper working conditions in accordance with occupational health and safety regulations	2024	2026
IV.7	Upgrade of the power generator buildings, control room building, and the building for own needs at the 400/220/110 kV Olsztyn Mątki substation	Improvement of the technical condition of buildings and adaptation to the current requirements for heat transfer coefficient for roofs and walls	2024	2026
IV.8	Upgrade of rooms of control room building at the 400/110 kV Ełk Bis substation	Ensuring proper conditions and technical facilities for employees by adapting the control room building for permanent residence of employees	2023	2025
IV.9	Reconstruction of stormwater drainage and internal roads at the 400/220/110 kV Mikułowa station	Obtaining an unobstructed and fully functional stormwater drainage system that effectively drains the substation infrastructure, Providing internal roads with a carrying capacity that meets PSE S.A. standards, providing safe access for ZES employees and external companies to electro-power gear and buildings	2024	2027

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
IV.10	Upgrade of the water intake and hydrophore set at the 400/220/110 kV Grudziądz Węgrowo substation	Improving the technical condition and performance of the water intake and hydrophore set	2024	2025
IV.11	Construction of a new office and development of the PSE S.A. property in Radom	Meeting current and future job needs as regards workstations related to the operation of the Company and meeting the requirements under the Business Continuity Plan	2017	2025
IV.12	Construction of an energy storage facility for the new headquarters of ZKO PSE S.A. in Radom	Achieving the greatest possible energy efficiency, thereby optimising the cost of purchasing electricity	2023	2025
IV.13	Upgrade of water supply system at PSE S.A. headquarters	Increasing the reliability of water supply and significantly reducing the failure rate of the water supply system	2022	2025
IV.14	Installation of an air-conditioning system in telecommunications and technological rooms at PSE S.A. headquarters	Increasing the security of the cooling supply to the telecommunications/technical nodes and technology rooms	2021	2026
IV.15	Construction of an irrigation system at the PSE S.A. headquarters	Reducing the cost of maintaining biologically active areas and optimising the water distribution system	2021	2026
IV.16	Replacement of central equipment of the voice alarm system (VAS) at PSE S.A. headquarters.	Maintaining high safety conditions by ensuring proper operation of fire protection and evacuation systems at PSE S.A. headquarters in Konstancin-Jeziorna and replacing outdated central equipment with new ones subject to manufacturer's technical support	2024	2025
IV.17	Upgrade of dry gas extinguishing system (SUG) at the PSE S.A. headquarters	Ensuring safe operation of the technical infrastructure in technical (generators, switchgears, UPS) and technological (server rooms) rooms	2024	2025
IV.18	Providing redundancy of critical buildings together with infrastructure	Providing fast and well-connected transport between NDC, ODM and backup points enabling immediate response to transmission network events	2021	2029
IV.19	Upgrade of the auxiliary building in the 400/110 kV Mościska substation area	Increasing the safety of PSE S.A.'s operating services and ensuring business continuity in the event that it is necessary to move operating services from the primary point located in Konstancin-Jeziorna	2022	2025
IV.20	Modernisation of sanitary facilities in the B1 building of ZKO PSE S.A. in Katowice	Improvement of the technical condition of sanitary facilities	2025	2026
IV.21	Upgrade of TSS at ZKO PSE S.A. in Katowice	Replacement of depleted and failing TSS components/systems that do not meet current standards and requirements	2020	2027
IV.22	Adaptation of facilities at ZKO PSE S.A. in Katowice to the requirements of the Commission Regulation (EU) of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER)	Comprehensive upgrading of power supply systems at ZKO headquarters to meet the requirements of the Commission Regulation (EU) of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER) as well as adjustment of power supply systems at ZKO headquarters to current PSE S.A. standards.	2021	2027
IV.23	Upgrade of the air conditioning and ventilation system at the dispatching point of the ODM of PSE S.A. in Katowice	Preventing failures of the existing depleted system	2024	2025
IV.24	Thermal modernisation of B2, B4 and B5 buildings at ZKO PSE S.A. in Katowice	Improvement of the technical condition of buildings	2027	2029
IV.25	Upgrade of TSS at ZKO PSE S.A. in Bydgoszcz	Replacement of depleted and failing TSS components/systems that do not meet current standards and requirements	2018	2027

Item *1	Investment task name	Primary purpose of implementing the investment task *2	Year of initiation	Year of completion *3
IV.26	Adaptation of facilities at ZKO PSE S.A. in Bydgoszcz to the requirements of the Commission Regulation (EU) of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER)	Comprehensive upgrading of power supply systems at ZKO headquarters to meet the requirements of the Commission Regulation (EU) of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER) as well as adjustment of power supply systems at ZKO headquarters to current PSE standards.	2019	2028
IV.27	Upgrade of premises of an administrative building in the area of ZKO PSE S.A. in Bydgoszcz	Increasing safety and bringing the building into compliance with fire safety requirements.	2023	2025
IV.28	Upgrade of central heating and plumbing systems in the buildings and on the premises of ZKO PSE S.A. in Poznań	Comprehensive replacement of old obstructed plumbing in all risers in the main building and on the premises of the ZKO Poznań headquarters, as well as ensuring security of water supply continuity and wastewater discharge from the premises	2018	2025
IV.29	Upgrade of the HWN building on the premises of ZKO PSE S.A. in Poznań	Adaptation of buildings to guidelines and recommendations resulting from audits, inspections and overhauls	2025	2030
IV.30	Upgrade of the Dispatcher Training Centre building on the premises of ZKO PSE S.A. in Poznań	Adaptation of buildings to guidelines and recommendations resulting from audits, inspections and overhauls	2023	2027
IV.31	Upgrade of TSS at ZKO PSE S.A. in Poznań	Enhancing the security of PSE S.A.'s headquarters in Poznań by adjusting the standard of technical protection to the requirements for facilities that constitute critical infrastructure and are subject to mandatory protection	2020	2027
IV.32	Adaptation of facilities to the requirements of the Commission Regulation (EU) of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER) at ZKO PSE S.A. in Poznań	Comprehensive upgrading of power supply systems at ZKO headquarters to meet the requirements of the Commission Regulation (EU) of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER) as well as adjustment of power supply systems at ZKO headquarters to current PSE S.A. technical standards.	2019	2026
Purchase of finished capital goods				
V.1	ZGDI – Administration and Procurement Department	Ensuring effective supervision of events occurring on the premises of PSE S.A. headquarters in Konstancin-Jeziorna	permanent task	permanent task
V.2	ZGDI – Data Communication Department	Providing adequate ICT equipment for workplaces and workstations	permanent task	permanent task
V.3	ZGDI – Operations Department			
V.3.1	ZGDI – Operations Department (basic scope)	Increasing the reliability of EHV substation operations through the ongoing installation of new equipment and the elimination of potential environmental hazards	permanent task	permanent task
V.3.2	ZGDI - Delivery of a mobile bay (CJI scope)	Support of investment and upgrade intentions without restricting the NPS operation	2022	2026
Purchase of network facilities and clarification of the legal status of properties				
VI.1	Clarification of the legal status of properties at electrical substations	Clarification of the legal status of substation properties with respect to land on which PSE S.A. equipment, buildings and structures are located.	permanent task	permanent task

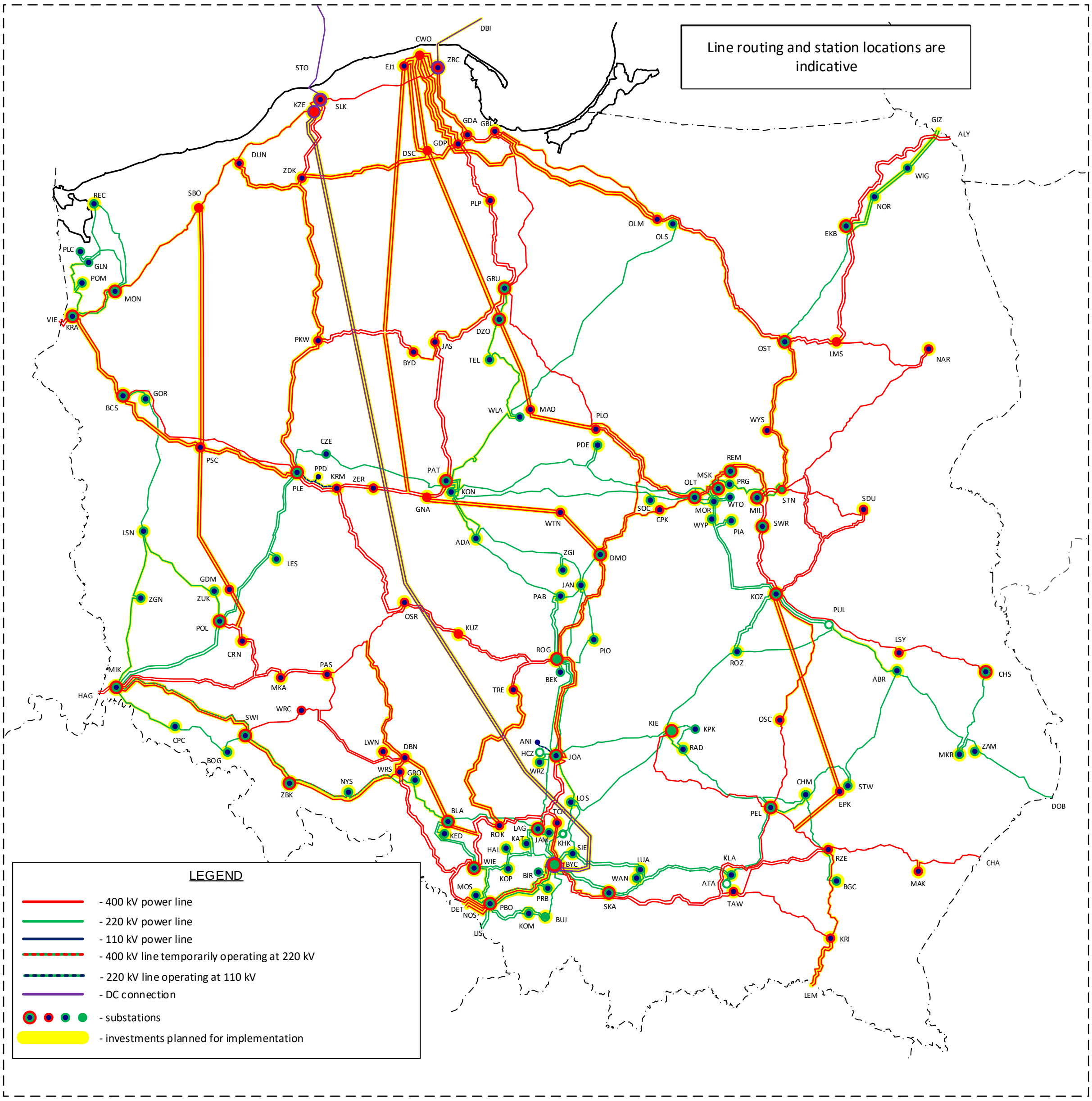
Key to footnotes in the top row of the table:

**1 Numbering used at PSE S.A. for internal processes*

**2 Date of completion of the task in technical, financial, and formal terms*

5.5 Result of transmission network development analyses – map of planned network investments

Figure 5-1 *Diagram of the transmission network with changes resulting from the implementation of planned investment tasks according to the DTS scenario*



5.6 Result of transmission network development analyses – effects of planned investment tasks

Type of effect	2025-2034	After 2034	2025-2037
Increase in circuit length of HVDC lines [km] of which:	**1,615**	**0**	**1,615**
Poland-Lithuania HVDC cable connection	175	0	175
north-south HVDC overhead connection	1,440	0	1,440
HVDC converters [pcs.]	**9**	**0**	**9**
Increase in circuit length of 400 kV lines [km] of which:	**4,479**	**816**	**5,295**
new lines	4,690	816	5,506
decommissioned lines	211	0	211
Increase in circuit length of 220 kV lines [km] of which:	**-448**	**0**	**-448**
new lines	143	0	143
decommissioned lines	591	0	591
Circuit length of upgraded 400 kV lines [km]	**1,575**	**0**	**1,575**
Circuit length of upgraded 220 kV lines [km]	**1,629**	**189**	**1,818**
Incremental 400/220 kV transformation capacity [MVA] of which:	**7,100**	**670**	**7,770**
new transformers	7,500	1,000	8,500
decommissioned transformers	400	330	730
Incremental 400/110 kV transformation capacity [MVA] of which:	**26,340**	**1,680**	**28,020**
new transformers	30,990	1,680	32,670
decommissioned transformers	4,650	0	4,650
Incremental 220/110 kV transformation capacity [MVA] of which:	**1,540**	**185**	**1,725**
new transformers	8,110	825	8,935
decommissioned transformers	6,570	640	7,210
Incremental reactive power compensation capacity [MVar] of which:	**2,400**	**0**	**2,400**
new glands [MVar]	1,350	0	1,350
new synchronous compensators [MVar]	1,050	0	1,050
Expenditures incurred for the implementation of tasks [billion PLN]	**64.3**	**2.0**	**66.3**

6 HVDC line construction project

The PRSP 2023-2032 includes the task titled "Construction of the north-south HVDC connection" as a necessary investment, aimed at adapting the transmission network to the challenges of the energy transition. A number of technical and economic justifications were presented as a result of the analyses that supported the adoption of such a solution.

As the lead time for new technology and large-scale investment is relatively long, PSE has taken steps to clarify the technical details of the investment and find a recommended solution. In 2023, work began on a feasibility study for the north-south HVDC link. Phase I of the study has already been completed, outlining possible technical solutions to meet the TSO's functional requirements for the connection, particularly in terms of its power. To this end, an in-depth analysis of global solutions and trends in the development of HVDC technology and future opportunities on the part of suppliers of individual components was carried out. A consultant developed a multi-criteria evaluation of the proposed technical alternatives, which made it possible to select one of the most promising solutions for more detailed analysis in Phase II of the study, where the preliminary shape of the line's route will also be presented.

Compared to the assumptions made in the PRSP 2023-2032, the scenarios currently under consideration place even greater demands on the network, hence the need to build HVDC lines is even more relevant. Of decisive importance is the planned increased growth in the installed capacity of wind farms, especially offshore ones. These assumptions are reflected in this development plan in the DTSO scenario, which envisions their installed capacity at a level of about 18 GW, resulting from the guidelines of the Act on promoting electricity generation in offshore wind farms.

7 Own power resources

As in the PRSP 2023-2032, the results of the generation adequacy analyses, which are presented in Chapter 10, indicate that additional dispatchable capacity is required in the coming years in order to maintain the safety criteria for the power system operation. This can be achieved, among other things, by building new, controllable generation sources or electricity storage facilities.

The primary mechanism for ensuring an adequate level of available dispatchable capacity in the NPS is the capacity market, which has been in operation since 2018. Under this mechanism, investments in generation resources are being made by external entities, but nevertheless the observed rate of new capacity additions may not be sufficient to cover the growth in power demand and to restore the available capacity of decommissioned coal and lignite-fired generation sources.

With the above in mind, PSE S.A. is continuing the activities included in PRSP 2023-2032 and is considering the construction of its own generation source or electricity storage.

The scenarios adopted by PSE S.A. for its analyses are the construction of a generation source (one or more) fired by gas or liquid fuel, based on a gas turbine or piston engine units with a total capacity of about 500 MW, or the construction of a battery-based electricity storage facility or several such storage facilities of analogous power, but with a volume that allows at least 8 hours of operation at the maximum capacity.

For the purposes of this plan, capital expenditures for the source were determined for the thermal unit with a capacity of about 500 MW.

8 Transmission network development concept for OWF connection

Poland's ongoing energy transition requires a smooth decarbonisation process and basing the economy on low- and zero-carbon generation sources, in particular renewable energy sources.

To this end, on 17 December 2020 the Act on promoting electricity generation in offshore wind farms was adopted, where the original provisions envisioned the construction of wind sources in the Baltic Sea with a total capacity of 10.9 GW, of which:

- 5.9 GW were distributed in the first phase of operation of the support system through administrative decisions issued by the President of ERO,
- for the additional 5 GW, the right to cover the negative balance through an auction was to be granted in subsequent years.

PSE S.A.'s previous development plan assumed that offshore wind power plants with a total capacity of 10.9 GW would be connected to substations located in the northern part of the country, according to the decomposition shown below:

- Choczewo station - about 5.2 GW,
- Słupsk station - about 1.4 GW,
- Krzemienica station - about 4.3 GW.

As a result of the amendment of the aforementioned Act in 2023 (Act of 17 August 2023 amending the Act on renewable energy sources and certain other acts), raised the capacity limit from 5 GW to 12 GW to cover the negative balance to be distributed through auctions planned to be held in the following years:

- auction in 2025 – 4 GW,
- auction in 2027 – 4 GW,
- auction in 2029 – 2 GW,
- auction in 2031 – 2 GW.

Thus, under current regulations, offshore wind technology is expected to reach a potential of 17.9 GW in the long term.

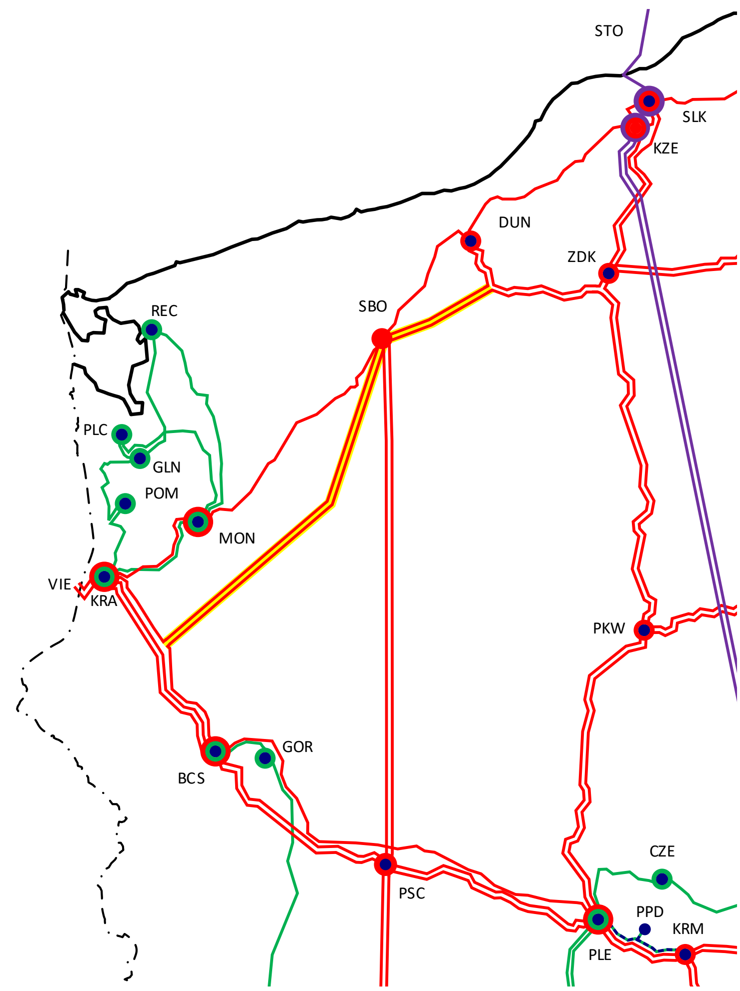
This development plan evaluates two stages in the dynamics of offshore wind development. The first one assumes that in the 2034 outline, the expansion of the transmission networks should allow for the connection to the NTS and power evacuation at the level of about 13 GW – the analyses carried out have shown that the scope of transmission network expansion included in the existing development plan for 2023-2032 for the purpose of power connection and evacuation from the OWF is also sufficient for the capacity indicated above. Connection of greater offshore capacity requires an adequate preparation of power infrastructure through the construction of new points allowing for OWF connection.

As part of the work on this development plan, a concept has been elaborated for the development of the transmission network to ensure the integration of the full volume of OWF power into the power system at the level specified in the act, while assuming that most of the new power will be located on the Odra Shoal and connected to a new substation located in West Pomerania. The method of linking this substation to the system at the 400 kV voltage level, adopted in the main part of the plan, which includes the connection of the Morzyczyn - Dunowo line and the construction of a line to a new substation in the Poznań area, will enable power evacuation from this substation at a total level of about 2.5 - 3 GW.

Achieving the potential of 4.6 GW of OWF generation capacity at this substation will require additional expansion of the transmission network in the north-western part, i.e. new double-circuit 400 kV lines from the new substation in West Pomerania (SBO) to the Dunowo - Piła Krzewina line tap (approx. 70 km) and from the new substation in West Pomerania (SBO) to the Krajnik - Baczyna line tap (approx. 140 km). The planned total outlays for this investment amount to approx. PLN 1.3 billion.

Figure 8-1 shows the concept of NTS development required to connect and evacuate the full power of OWFs located in western part of Baltic Sea.

Figure 8-1 *Network investments required for connection and evacuation of additional OWF power*



- **SBO** – a new 400 kV substation in the West Pomerania area
- **PSC** – a new 400/110 kV substation in the Pszczew area

The implementation of the investment tasks for the expansion of the power network specified in Chapter 5 of this document will enable offshore wind farms with a maximum total installed capacity of 17.9 GW, as defined under the Act on promoting electricity generation in offshore wind farms, to be connected to the national transmission system (NTS). This power will be connected to the following substations with available connection capacity for OWF amounting to:

- Choczewo substation – 6,285 MW,
- Słupsk substation – 1,440 MW,
- Krzemienica substation – 5,615 MW,
- a new 400 kV substation in the West Pomerania area – 4,560 MW.

9 Connection and evacuation of power from nuclear power plants

According to the Polish Nuclear Power Programme (PNPP) approved by the Council of Ministers in 2020, the total capacity of nuclear power plants planned to be built is approx. 6-9 GW. The first nuclear technology unit is expected to be commissioned in 2033. Subsequent units are to be commissioned every two years until 2043.

An entity responsible for preparing the investment process and functioning as an investor is Polskie Elektrownie Jądrowe sp. z o.o. (PEJ). According to the location decision for the construction of a nuclear power facility issued by the Voivode of Pomerania in October 2023, Poland's first nuclear power plant will be built in the municipality of Choczewo, in Lubiatowo-Kopalino. The location was selected following detailed environmental and location studies. It is planned to commission up to three nuclear power plant units at the site in the years 2033, 2035 and 2037. In December 2023 PSE S.A. issued connection conditions to PEJ allowing the connection of nuclear generation sources with a total capacity of 3,720 MW to a new 400 kV substation planned in the northern part of the country.

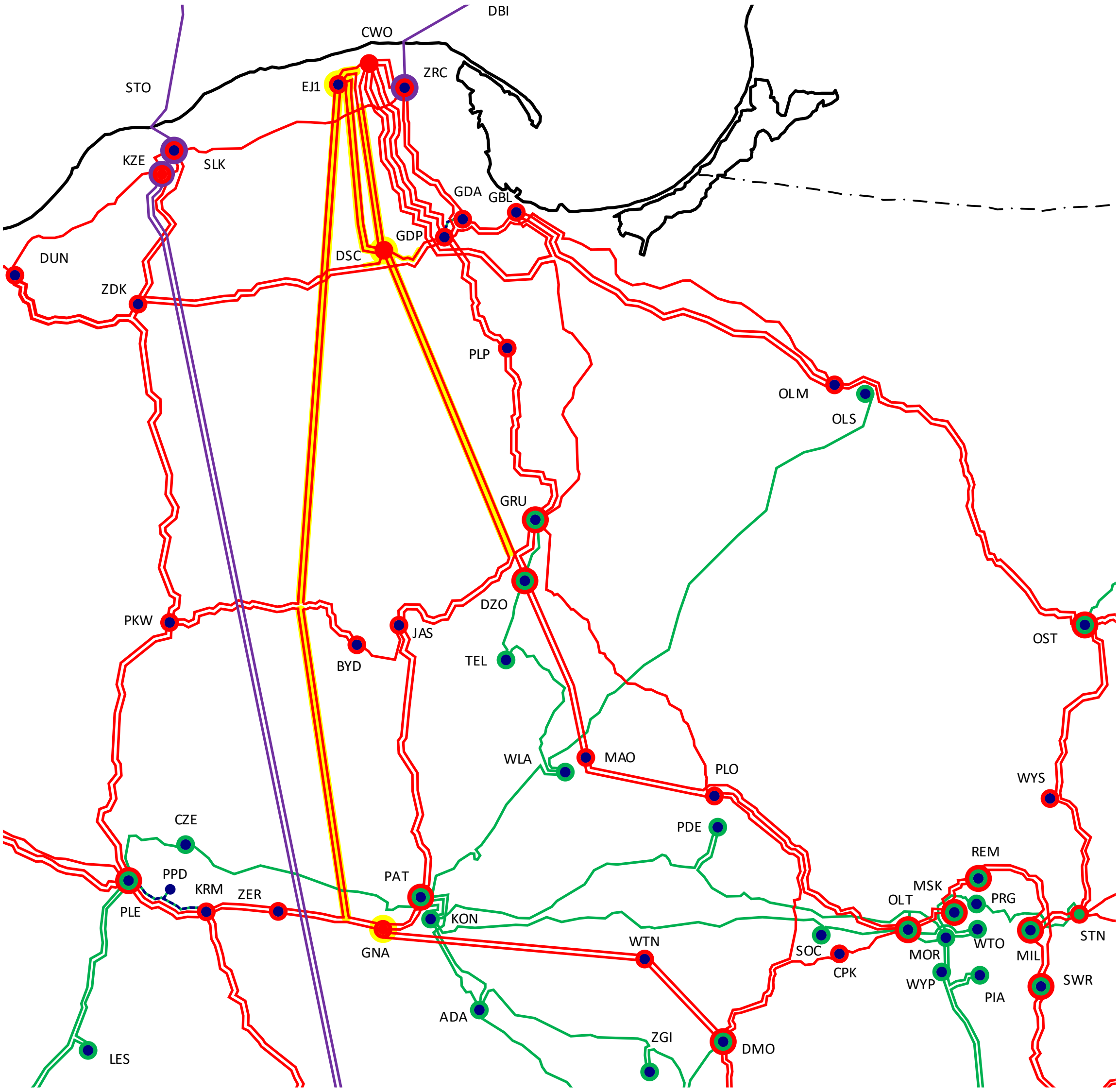
Therefore, this development plan takes into account the network investments required to connect and evacuate power from the three nuclear units. The implementation of these investments includes two phases:

- **Phase 1** (connection of the first unit of the nuclear power plant):
- construction of a new 400 kV substation in the area of Gdańsk Pomerania (EJ1) which constitutes the connection point of the nuclear power plant,
- construction of the 400 kV line from new EJ1 substation to the Choczewo substation,
- construction of a new 400 kV substation to the west from the Tri-City (DSC), to which the following will be connected:
  - a new dual-circuit 400 kV line from the EJ1 substation,
  - two circuits of the new 400 kV line from the direction of EJ1 and Choczewo (a section of the double-circuit line from the existing 400 kV Słupsk - Żarnowiec line to the Choczewo substation is planned to be built under a separate project),
  - the existing 400 kV Żydowo Kierzkowo – Gdańsk Przyjaźń line,
  - a new dual-circuit 400 kV line from the existing 400 kV Grudziądz Węgrowo - Jasiniec line tap.
- **Phase 2** (connection of the second and third unit of the nuclear power plant):
- construction of the new 400 kV substation in the Konin area (GNA) together with the connection of the 400 kV Kromolice - Pątnów line,
- construction of the 400 kV line from new EJ1 substation to the Kromolice – Pątnów line tap and creation of the lines:
  - from the new EJ1 substation to the 400 kV Bydgoszcz Zachód – Piła Krzewina line tap (EJ1-Bydgoszcz Zachód and EJ1-Piła Krzewina),
  - from the 400 kV Bydgoszcz Zachód – Piła Krzewina line tap to the 400 kV Kromolice – Pątnów line tap (Bydgoszcz Zachód – GNA and Piła Krzewina – Kromolice or ZER).

The planned total outlays for the above network investments amount to approx. PLN 4.3 billion.

Figure 9-1 shows the illustrative location of new substations and new lines.

Figure 9-1 *Network investments dedicated to the connection and evacuation of power from a nuclear power plant*



- **EJ1** - a new 400/110 kV substation that serves as the connection point for the nuclear power plant units
- **DSC** - a new 400 kV substation to the west of the Tri-City
- **GNA** - a new 400 kV substation in the Konin area
- **DZO** – a new 400/110 kV substation in the Toruń area

Chapter 5 which presents PSE S.A.'s planned investment projects indicates, among other things, their completion dates. Given that these deadlines represent the year of final completion of the investment in formal terms, while the system effect of a given investment in the form of physical commissioning of a line or substation is usually achieved earlier, below the schedule is detailed in terms of tasks dedicated to the connection of the nuclear power plant, which also included the commissioning date.

***Table 9.1** Investment projects dedicated to the nuclear power plant*

Investment project number	Investment project name	Year of initiation	Year of commissioning	Year of completion
Phase 1				
III.33	Construction of a new 400 kV substation in the area of Gdańsk Pomerania (Nuclear power plant)	2022	2031	2031
III.32	Construction of a new 400 kV substation in the Tri-City area together with the connection of the 400 kV Żydowo Kierzkowo-Gdańsk Przyjaźń line	2022	2033	2034
III.34	Construction of two 400 kV lines from a new substation in the Gdańsk Pomerania area (Nuclear power plant) to a new substation in the Tri-City area	2022	2033	2034
III.35	Construction of the 400 kV line between a new substation in the Tri-City area and Grudziądz Węgrowo-Jasiniec line tap	2022	2033	2034
Phase 2				
III.100	Construction of the new 400 kV substation in the Konin area together with the 400 kV Kromolice - Pątnów line connection	2028	2033	2034
III.99	Construction of the 400 kV line from the new 400 kV substation in the area of Gdańsk Pomerania (Nuclear Power Plant) to the Kromolice-Pątnów line tap	2028	2035	2036

Recent years have also seen an increase in interest in nuclear generation units using the SMR technology (Small Modular Reactor). These are sources of electricity and heat, whose generation capacity is defined at a level that most often reaches approx. 300 MWe. Due to their nature, it is anticipated that reactors of this type may be located in various locations around the country, in areas surrounding metropolitan areas or in the vicinity of areas with high saturation of electricity demand.

The growing interest in this type of technology could be an important determinant for the development of the national transmission network in the long term. This plan has been developed taking into account the commissioning of the first SMR units, as regards which the investors have signalled their interest in connecting such facilities to the NPS.

10 Generation resources adequacy analysis

10.1 Forecast of the electricity supply security for the years 2025–2040

This chapter presents a summary of the work related to the development of an analysis of the sufficiency of generation resources in the NPS in the years 2025-2040.

The result of the analysis is a forecast of the NPS power balance and probabilistic indicators of generation resources adequacy:

- LOLE – the expected total duration of power deficits in a particular period. In accordance with Regulation of the Minister of Energy 18 July 2018 on the exercise of the capacity obligation, its settlement, demonstration and trading on the secondary market, this indicator is a standard for the security of electricity supplies to end users and amounts to no more than 3 hours per year,
- EENS – the expected volume of energy not supplied due to power deficits in a particular period.

The performed analyses are in line in terms of methodology with the pan-European analysis of generation resources adequacy conducted by ENTSO-E, with an extension and development of the methods used there for national indicators .

Despite the application of the probabilistic method, the results of the analyses remain sensitive to environmental elements taken as determined data, including:

- commissioning dates of the conventional generation units currently under construction,
- schedules of repair outages of generation units,
- fuel availability for conventional generation units in the short-term and medium-term perspective,
- rate of development of new capacity in renewable sources,
- technical availability of the capacity of cross-border interconnections.

Taking into account the variability of, among others, the above and other factors, the assessment of generation resources adequacy is a continuous process being updated on an ongoing basis.

10.2 Assumptions for the analysis carried out

Power and electricity demand

For the purpose of analysing the sufficiency of generation resources, the projection of power and electricity demand in the NPS until 2040 was assumed on the basis of the projection of power and electricity demand made on the basis of the expected consumption of final energy in Poland in the long term.

Generation capacity values

Capacities in conventional units participating in the central balancing mechanism and in other conventional industrial and large-scale generating units in particular years have been determined on the basis of:

- a survey of national power companies and investors planning to build new conventional generation units, conducted in late 2023 and early 2024,
- information provided by the generation sector on planned outages with regard to conventional generation units and pumped storage power plants in the years 2025-2026 (outages for later years were determined based on survey data),
- up-to-date information on expected commissioning dates for conventional generation units under construction.

The generation resources adequacy analysis assumed:

- decommissioning of conventional generation units resulting from declarations made by the generation sector according to a pessimistic option that assumes no profitability of coal-fired units after 1 July 2025,
- commissioning of new conventional units and energy storage facilities that hold a capacity contract concluded on the capacity market,

nuclear units were not included.

As regards the development of onshore renewable energy sources, the forecasts of their maximum capacity in each year have been estimated on the basis of, among others, the results of auctions for the sale of RES electricity to end-2023. A gradual development of onshore RES to a capacity level of 55.4 GW (including 36 GW of photovoltaic sources and 16.9 GW of onshore wind sources) was assumed in 2034 and 67.4 GW (including 45 GW of photovoltaic sources and 19.9 GW of onshore wind sources) in 2040.

With regard to the development of offshore wind power plants, the commissioning of the first installations was assumed from 2026 onwards and their gradual development to a capacity level of 10.9 GW in 2034 and 17.9 GW in 2040. The connection dates of specific facilities were adopted in accordance with investors' declarations and investment schedules as part of the connection process for these units.

The adoption of the abovementioned approach to new units makes it possible to present the results of the generation resources analysis in a situation where no further actions are taken for the reconstruction and development of the generation capacity volume of conventional units, including nuclear ones, in the NPS. This is to illustrate the scale of potential challenges in building new capacity.

Climate year scenarios

NPS is increasingly sensitive to changes in weather conditions. In order to realistically predict possible events affecting the balance situation, it is necessary to take into account data covering a wide range of possible combinations, considering both "normal" and "extreme" climate conditions.

The analysis is based on the ENTSO-E's climate years method used to elaborating, among others ERAA reports (European Resource Adequacy Assessment) – and TYNDP (Community-wide Ten-Year Network Development Plans). This method allows variable weather conditions observed in past years to be represented in the future. Each climate year is characterised by interrelated parameters defining, among others, wind capacity, insolation and outdoor temperature, which allows operation of the NPS to be simulated taking into account the correlation of such phenomena.

The analysis was carried out using the full available database of climate years, i.e. hourly profiles derived from 38 climate years for the period 1982-2019 were considered.

Operating profiles of conventional industrial and commercial generation units not participating in the central balancing mechanism

The values of installed capacity factors for conventional industrial and commercial generation units not participating in the central balancing mechanism were determined based on historical generation data for these sources. Thermal sensitivity curves have been calculated for commercial units, describing loads versus temperature. For each month of the year, a separate thermal sensitivity curve has been applied.

The data have been adjusted to the hourly granulation used in the model. Curves have been obtained characterising the operation of the units for each climate year in the form of coefficients taking into account both planned outages and failures.

RES operating profiles

The operating profiles of onshore and offshore wind farms and photovoltaic sources used in the calculations were based on the ENTSO-E database, i.e. dedicated climate database – the Pan-European Climate Database (PECD). For each of the above technologies, an hourly profile of installed capacity factor has been applied, corresponding to the respective weather conditions: windiness or insolation in the climate years considered (1982-2019).

In order to account for the development of onshore and offshore wind and photovoltaic technologies over the analysis period 2025-2040, the hourly profiles of capacity factors were adjusted as a function of projected technological progress for planned installations and the degradation of existing equipment. The above translated into a change in the values of annual average capacity factor relative to PECD.

Cross-border exchange

One of the objectives behind the national generation resource adequacy analysis is to indicate the potential required volume of cross-border exchange needed to meet NPS generation resources adequacy indicators. Therefore, the calculations were made without taking into account the power available through cross-border connections. The reason for this approach is that there are numerous uncertainties and changing conditions in the operation of power systems in European Union countries, which in practice make it impossible to reliably forecast the long-term use of cross-border connections.

Result of adequacy analyses

For each of the analysed years, the values of LOLE and EENS indicators were determined until 2040. The following graphs and table show the average and extreme values of the aforementioned indicators for the climate years considered.

Figure 10-1 *Average values of the LOLE index [h/year] in the years 2025-2040*

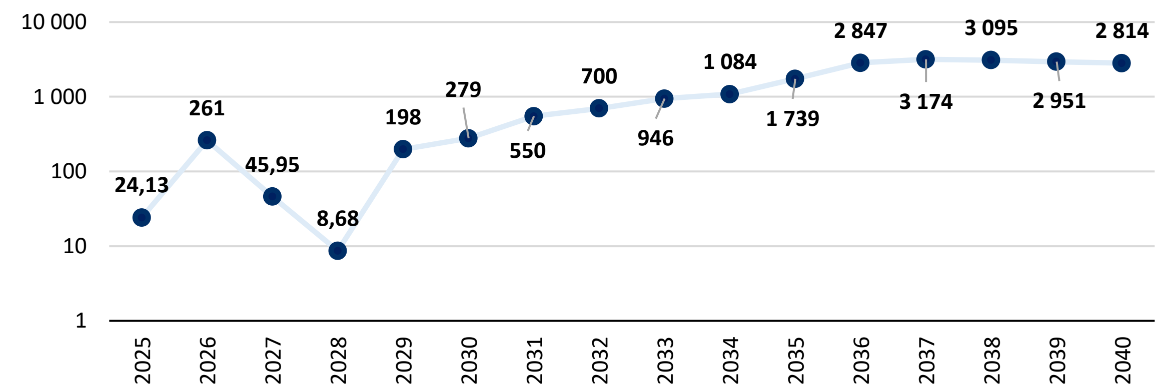


Figure 10-2 *Average values of the EENS index [GWh/year] in the years 2025–2040*

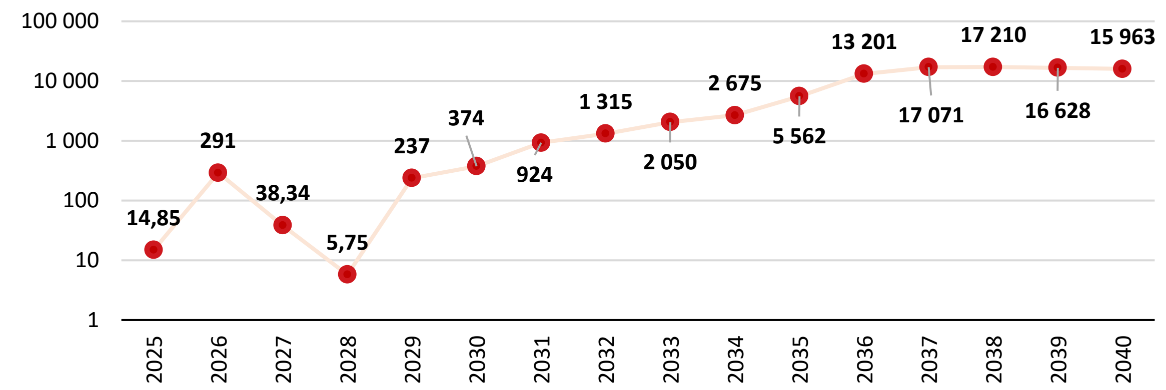


Table 10.1 *Minimum, average, and maximum values of LOLE and EENS indicators in the years 2025-2040*

LOLE and EENS indicator values																
Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
LOLE [h]																
Minimum (CY82-19)	6.73	138	10.35	0.59	73.43	100	255	373	585	704	1,298	2,381	2,694	2,609	2,475	2,349
Average (CY82-19)	24.13	261	45.95	8.68	198	279	550	700	946	1,084	1,739	2,847	3,174	3,095	2,951	2,814
Maximum (CY82-19)	55.91	374	97.00	33.80	332	446	820	1,009	1,332	1,503	2,380	3,616	3,947	3,861	3,710	3,564
EENS [GWh]																
Minimum (CY82-19)	2.98	107	5.46	0.23	77.63	122	338	521	929	1,285	3,288	9,303	12,487	12,535	11,980	11,401
Average (CY82-19)	14.85	291	38.34	5.75	237	374	924	1,315	2,050	2,675	5,562	13,201	17,071	17,210	16,628	15,963
Maximum (CY82-19)	40.33	520	102	33.04	459	688	1,546	2,110	3,163	3,969	7,983	18,133	23,069	23,293	22,635	21,880

It should be noted that the maximum value of the LOLE index, understood as the value for the critical climate year, is significantly higher than the average of the climate years 1982-2019. This relationship illustrates the possibility of adverse weather conditions in future years.

10.3 Additional available capacity required

For the results obtained, the required additional available capacity was estimated to meet the generation resources adequacy indicators. As a safety standard, the condition of maintaining the average LOLE from the 1982-2019 climate years at no more than 3 hours per year was adopted.

Table 10.2 *Net additional available capacity required in the NPS [MW]*

2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
1,400	4,200	2,200	800	4,200	4,800	6,400	7,200	8,400	9,400	11,600	15,400	17,000	17,400	17,800	18,000

It should be borne in mind that the required additional available capacity may be higher due to the following conditions:

- increase in the pace of energy transition, faster than assumed growth in energy and capacity demand, as well as plans to implement large industrial investments in special economic zones,
- the occurrence of extremely adverse climate conditions in future years,
- uncertainty as to the timely implementation of investments contracted as part of the capacity market,
- uncertainty as to the timing of permanent decommissioning of existing generation units participating in the central balancing mechanism.

For this reason, in order to ensure that the safety standard is met in the future, it is necessary to take urgent measures leading to an increase in the available capacity. Sources of such capacities can comprise, in particular:

- new gas-fired power plants – beyond the ones contracted as part of the capacity market – to PSE S.A.'s knowledge, projects with a total capacity of more than 3 GW currently demonstrate significantly advanced conceptual and preparatory stages,
- extending the operation of existing coal-fired units, including the use of the possibility of organising additional capacity auctions that take into account units not meeting the emission limit for the period from 1 July 2025 to 31 December 2028,
- new energy storage facilities, using a variety of technologies, and the accompanying further development of RES,
- new biomass and biogas plants,
- large-scale nuclear power plants commissioned in the 2030s, as well as modular nuclear reactors with a unit capacity of approx. 300 MW,
- hydrogen and P2P alternative fuel technologies, probably in the 2030s, once they have achieved sufficient level of commercialisation,
- possible energy imports (including through inter-operator support) and forms of demand reduction, such as DSR services, in response to the occurrence of stress conditions and extreme events.