

# PGE Decarbonisation Pathway



December 2023



*Leading in the green transition*

# Agenda



1. PGE Group in the value chain
2. Evolving PGE business model
3. Clean Energy - stages on the road to climate neutrality by 2050
4. Strategic goals and key investments
5. Effects of decarbonisation process
6. Comprehensive decarbonisation programme in three scopes
7. The PGE Group's district heating on the road to climate neutrality
8. Portfolio development towards net zero emissions
9. Just transition

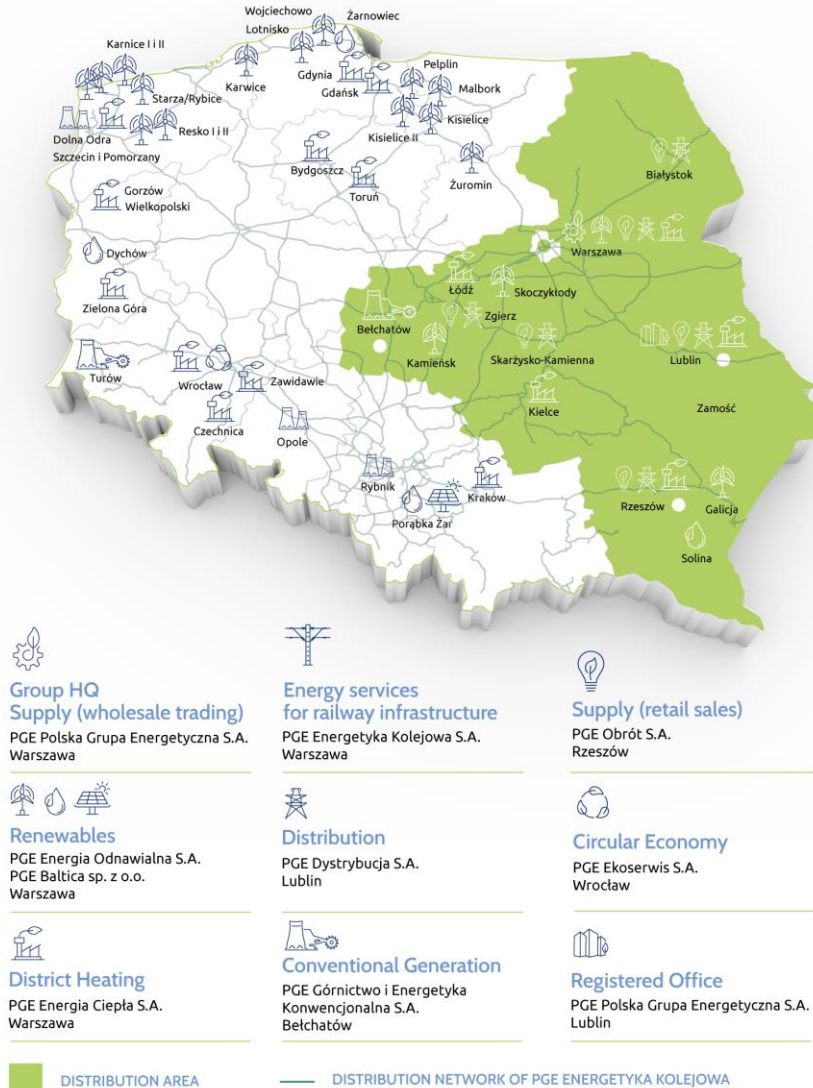
Disclaimer: all data presented in Decarbonization Pathway assume coal assets carve-out.

Therefore, all the decarbonisation effects are the result of PGE actions, not a transfer of emissions out of the group.

PGE at glance



# PGE Group in the value chain



## Mining

- 2 open pit lignite mines (Bełchatów and Turów)
- Lignite output 51.1 million tons

To be carved-out\*

## Power generation

- Electricity net production 66.1 TWh
- Installed electric capacity 17.9 GW
- Sales of heat 51.3 million GJ
- 2 Lignite-fired power plants (Bełchatów and Turów)
- 3 Hard coal-fired power plants (Opole, Dolna Odra, Rybnik)
- Combined heat & power plants – 16 sites (gas units in 7 sites, biomass units in 2 sites)
- Hydroelectric power plants (Hydro 96 MW, Pumped-storage with natural inflow 287 MW, Pumped-storage 1 256 MW)
- Wind farms 772 MW

To be carved-out\*

## Heat production

## Distribution

- Distribution of energy 37.1 TWh + 4.32 TWh\*
- Distribution grid: 298,670 km + 21,500 km\*
- Number of substations: 96,129

## Wholesale & Retail

- Final customers 34.3 TWh + 2.99TWh\*
- Wholesale market 62.5 TWh
- Balancing market 3.4 TWh

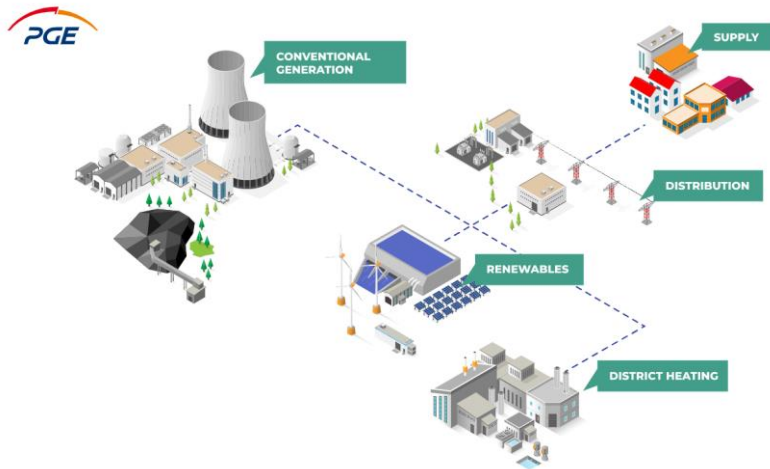
\* As assumed in adopted government's transformation plan  
\*\*Energy Services for Railway (acquired in 2023)

(all data for 2022)

# Evolving PGE business model

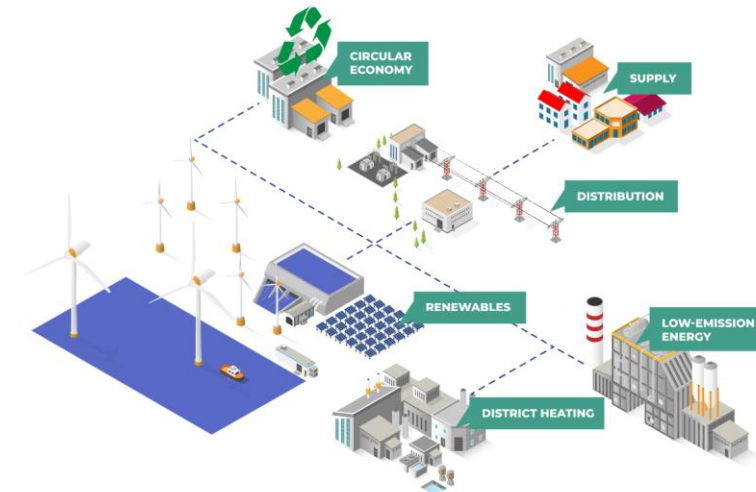


## Current business model



- Electricity generation basing on lignite and hard coal
- Minor role of other business segments, incl. distribution
- Fundamental exposure to electricity and CO<sub>2</sub> prices
- High CO<sub>2</sub>-intensity

## Business model 2023+



- Crucial role of electricity distribution after coal carve-out
- Generation potential re-built as investments in new generating assets, especially offshore wind farms, are implemented
- Investments in distribution and generation as a mitigation of physical climate risks
- Regulated and contracted revenues as financial foundations
- Low and declining CO<sub>2</sub>-intensity

# PGE Strategic Direction

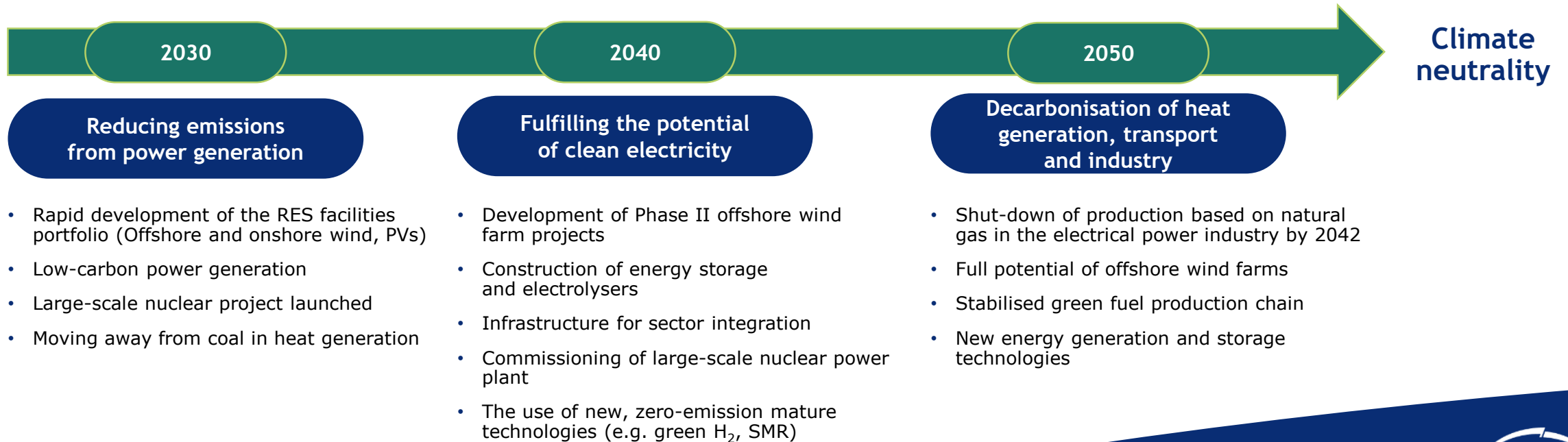


# Stages on the road to climate neutrality by 2050



## Principles of the PGE Climate neutrality:

- No investments in new mining or coal generation. Coal asset spinoff
- Evolution of the generation portfolio towards Renewable Energy Sources and other zero-carbon mature technologies
- Decarbonisation of District Heating
- Transitional role of natural gas with investment decisions for natural gas by 2025 at the latest
- Strive to achieve full alignment with the Paris Agreement while ensuring an uninterrupted supply of heat and electricity
- **All GHG reduction effects do not include coal assets provided for carve-out. Therefore, all the decarbonisation effects are effects of PGE actions, not a transfer of emissions out of the group**

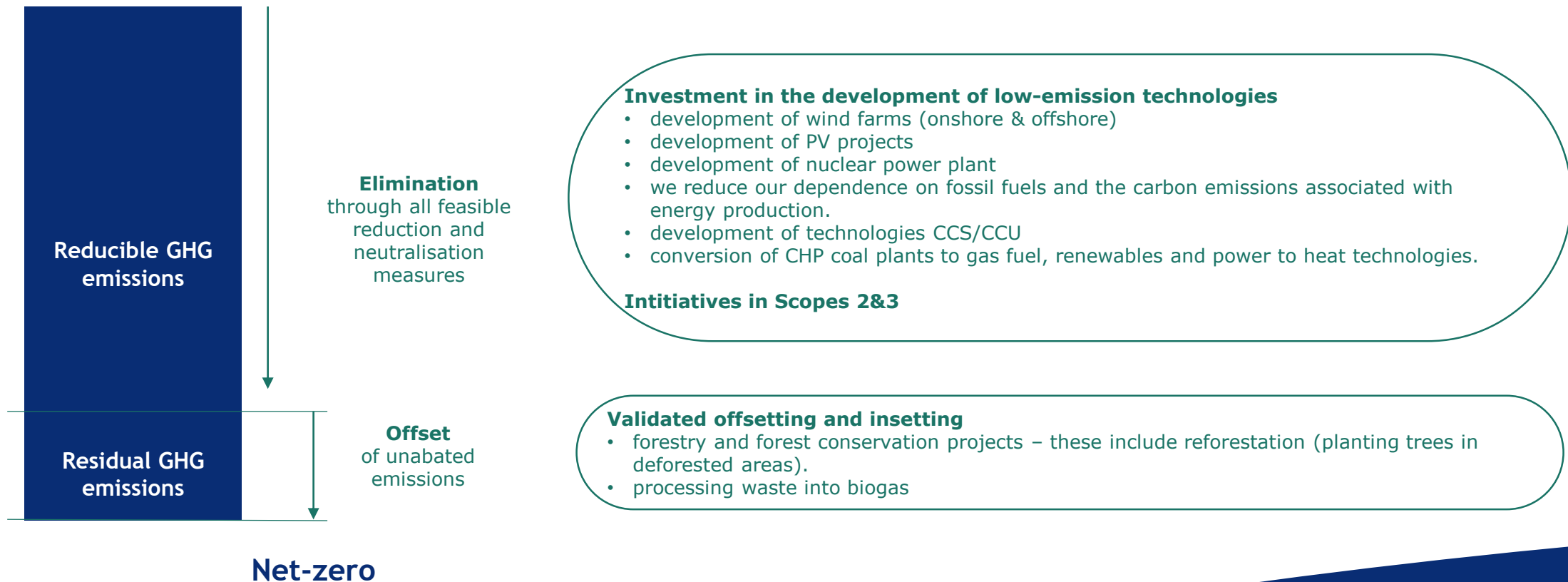




# Elimination and offsetting of emissions



The principle of the strategy is to eliminate GHG emissions through new investments. In the course of ongoing investments and initiatives, this is to lead to a minimum level of emissions. Offsetting will include residual emissions and emissions from the value chain.





# Strategic goals and key investments



## Offshore Wind

**2.5 GW**  
power by 2030  
  
**>6.5 GW**  
power by 2040



## Photovoltaic

**3 GW**  
power by 2030



## Onshore Wind

**1.5 GW**  
power by 2030



## CCGTs in coal locations

**2x671 MW** - Dolna Odra  
power plant by 2024  
**871 MW** - Rybnik  
Power plant by 2027



## Decarbonisation of District Heating

share of zero  
& low-emission sources  
in heat production  
at **>80% in 2040**



## Energy Storage

**0.8 GW**  
by 2030



## Nuclear Power

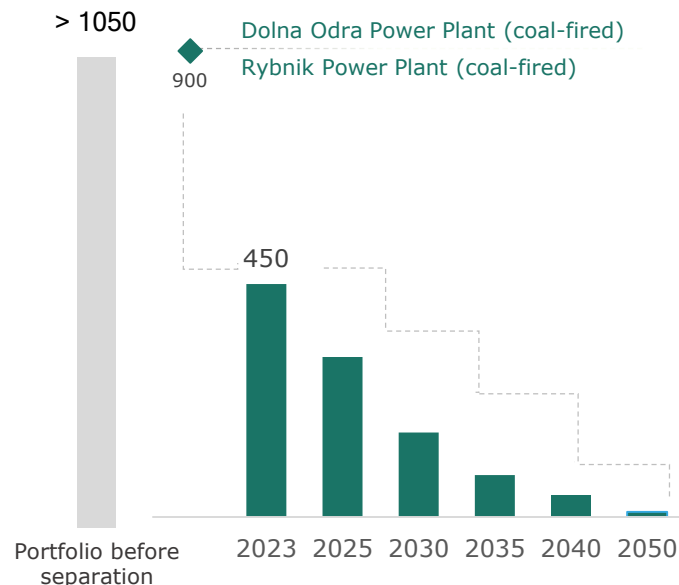
**2.8 GW**  
by 2040

# Effects of decarbonisation process

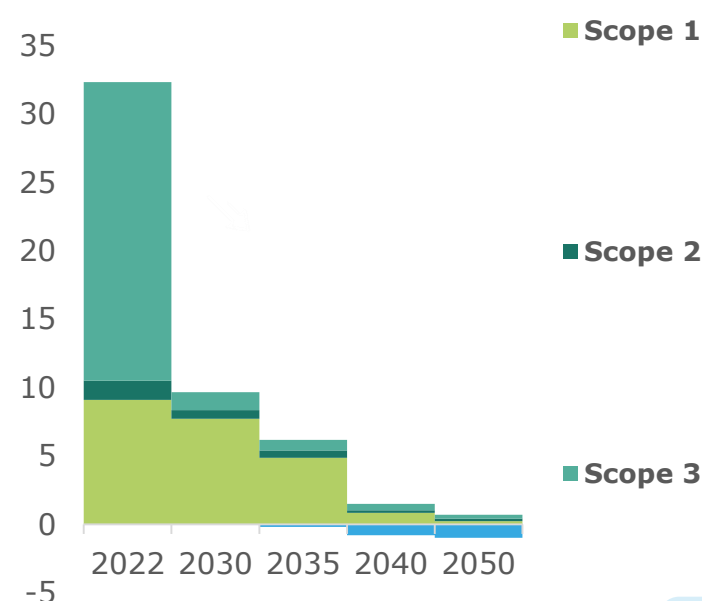


The long-term goal of the PGE Group is to achieve climate neutrality in the 3 scopes of CO<sub>2</sub> emissions. The transformation of the PGE Group's generation portfolio (scope 1) will have a significant impact on reducing the average carbon intensity of the national power system, including emissions associated with energy sold to end customers.

## Specific emissions of PGE Group's generation [kgCO<sub>2</sub>/MWh]



## Total net emissions in 3 scopes [million tCO<sub>2</sub>]



### Decarbonisation programme for district heating

- Reduction in the volume of emissions for heat generation
- Reduction in coal and gas purchase volumes (lower carbon footprint for transport)
- No combustion by-products
- 2035+ : transition to decarbonised gases and CO<sub>2</sub> capture

### Reducing distribution losses and own consumption

- Local balancing
- Energy efficiency of networks and buildings

### Sustainable sales and supply chains

- 100% clean energy for customers – development of sales offers based on clean energy and energy efficiency
- Environmental quality of capital expenditure – alignment with the decarbonisation pathway
- Electrification of the fleet and optimisation of logistics

PGE Group's milestones on the road to Net Zero\* (kgCO<sub>2</sub>/MWh)

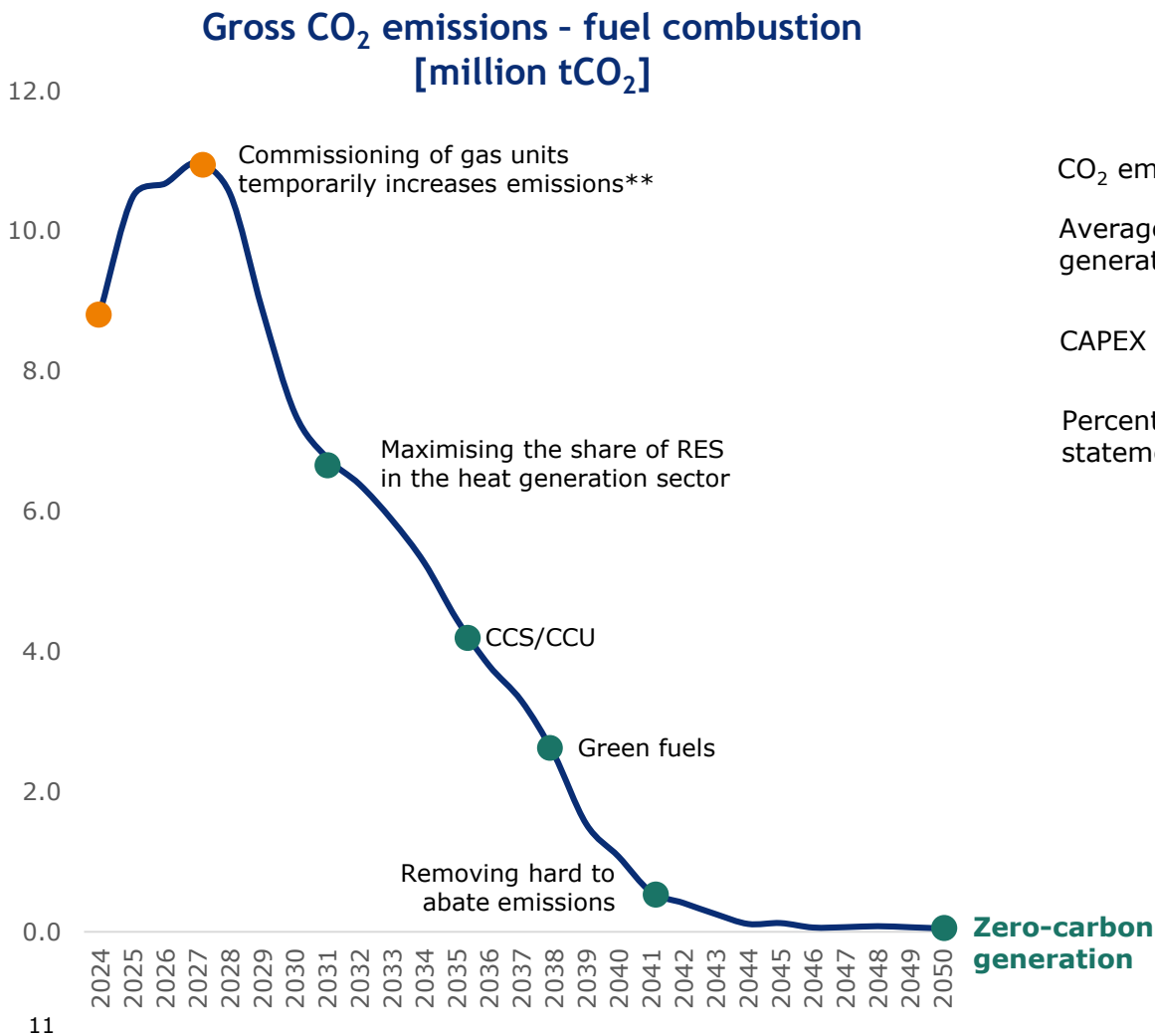


Negative emissions – lowering CO<sub>2</sub> level

- Bioenergy with CO<sub>2</sub> capture
- Forests Full of Energy project
- Green Roofs concept

\* An element of the decrease in emissions in scope 2 and scope 3 is the spillover effect of the decrease in the average carbon intensity of the national power system

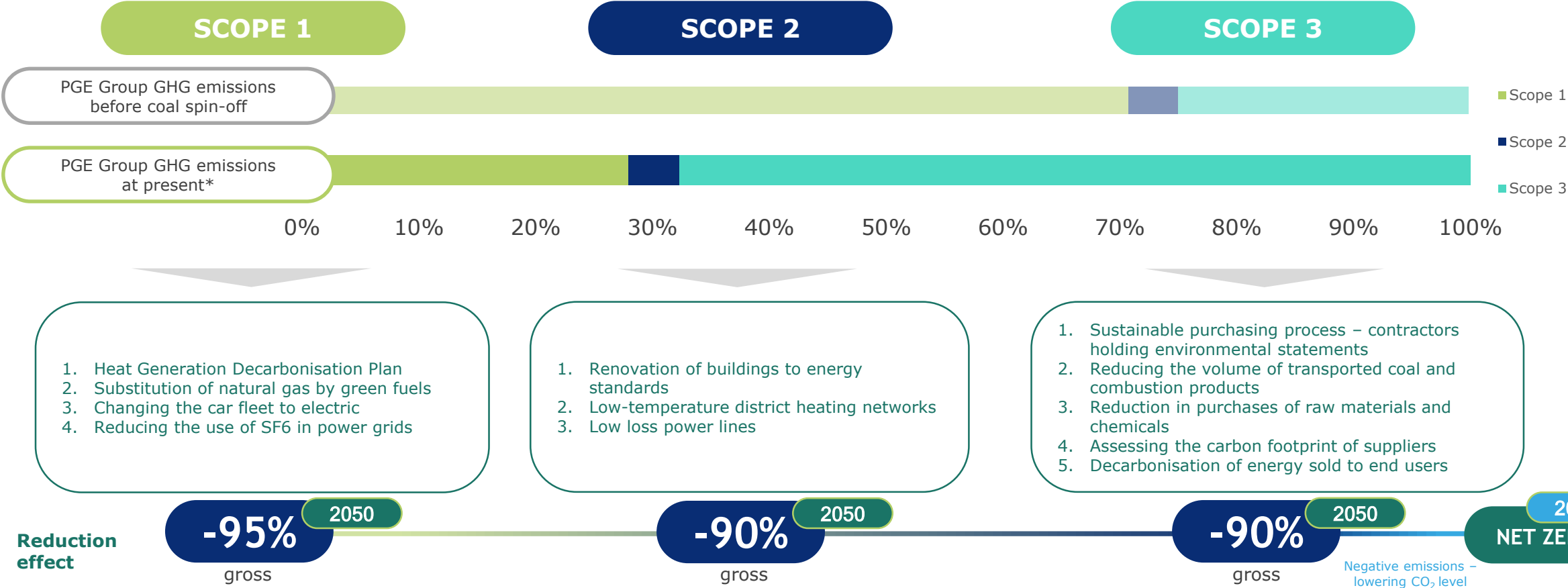
# Gross CO<sub>2</sub> emissions and milestones on the road to Net Zero



	2030	2040	2050
CO <sub>2</sub> emissions (scope 1)	-15%	-75%	-95%
Average gross carbon intensity of power generation [kgCO <sub>2</sub> /MWh]	<200	<50	0-50
CAPEX aligned with the Taxonomy	85%	95%	95%
Percentage of suppliers holding environmental statements	25%	80%	>95%

\* in the heat generation sector, gas-fired power plants, exclusive of nuclear power generation  
\*\* Dolna Odra & Rybnik not included at 2022 reference point as hard coal units are a subject of carve-out while CCGT units are being constructed in PGE

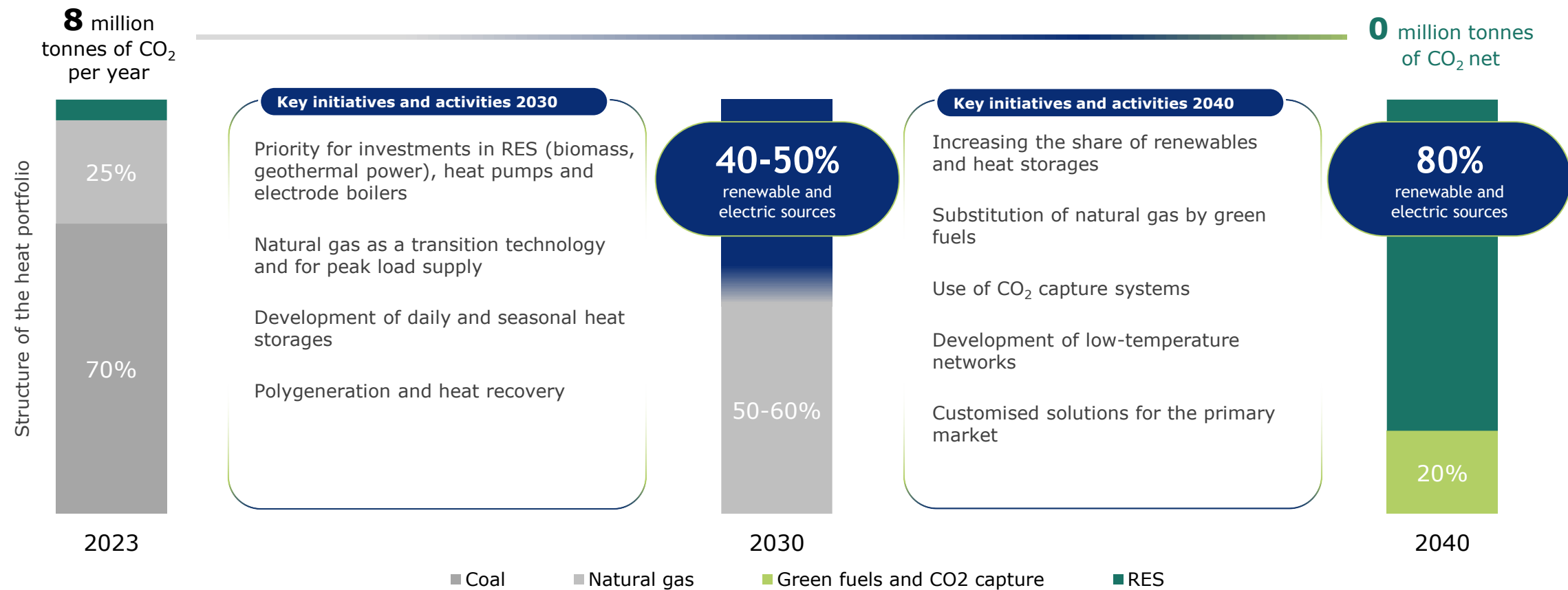
# Comprehensive decarbonisation programme in all scopes



# The PGE Group's district heating on the road to climate neutrality



The PGE Group is implementing the Decarbonisation Plan at all 16 district heating sites. Its overarching goal is to achieve climate neutrality in these conurbations. This is a huge undertaking, requiring pioneering solutions and a fundamental change in the approach to providing thermal comfort to customers.



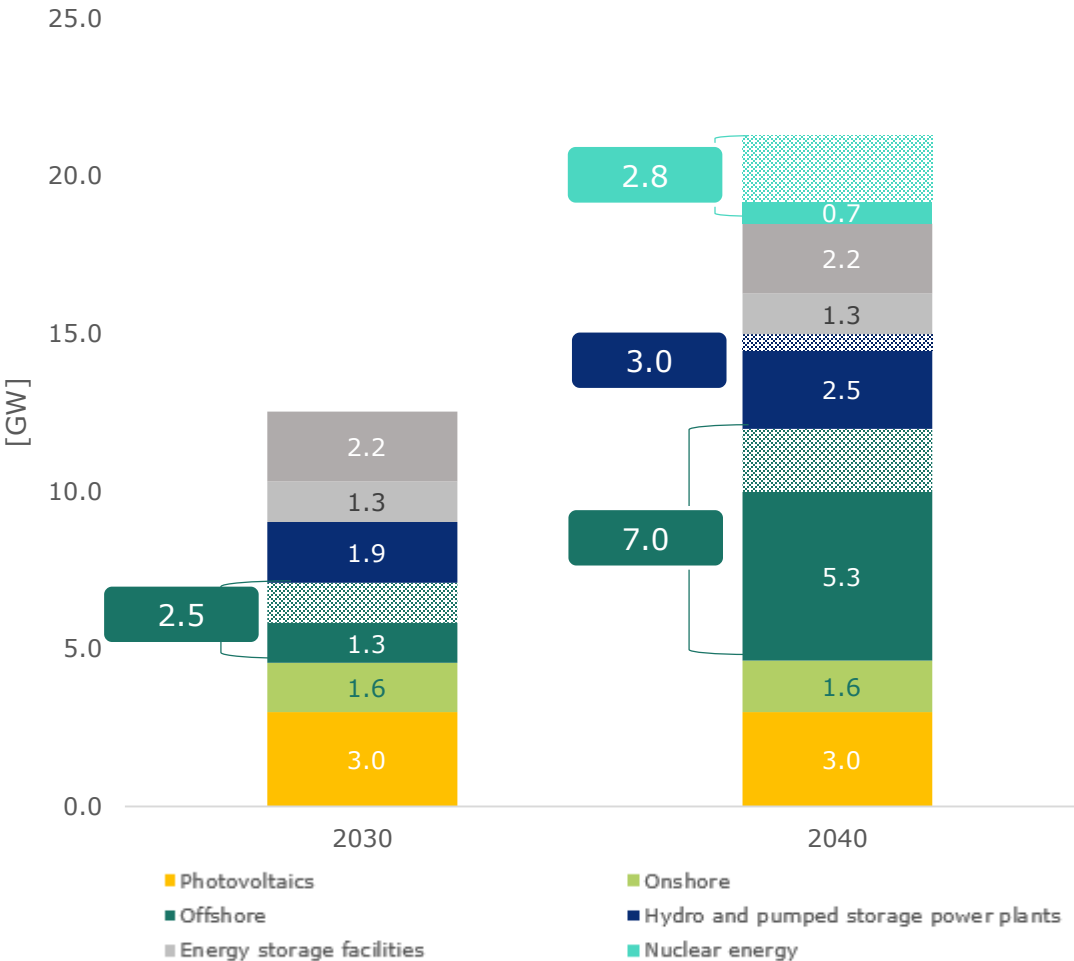
The strategic aspirations  
of the PGE Group

Climate-neutral district heating

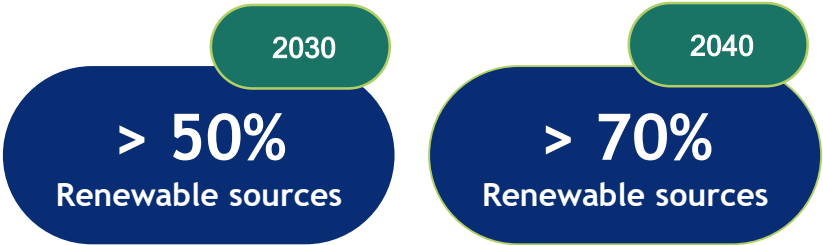
# Implied portfolio development towards net zero emissions



PGE Group capacities



PGE Group production



PGE Group to regain its position  
as Poland's largest electricity  
generator in 2035

# Respecting the social face of decarbonisation



PGE Group's energy transition carries out the interests and needs of the local communities affected by the process taking into account the creation of new jobs for the employees of today's coal sector.

Regardless of the process of separating coal assets – PGE Group will remain active in today's coal regions and locations, both as an experienced **investor in the energy transition** process and as an **initiator of activities** supporting the economic development of these areas

## Lignite regions – Bełchatów & Turów

- Transition projects implemented by PGE Group in the Łódź and Lower Silesia regions are part of the process of changing Poland's energy mix towards low- and zero-emission energy.

## Hard coal power plants' locations

- Brown field investments to provide local stimulus and jobs
- Construction of Dolna Odra & Rybnik CCGT units

## Hard coal in District Heating

- Brown field investments to ensure use of local resources and infrastructure,
- Social responsibility of ensuring local heat supply

## Comprehensive Retraining Programmes

- Provide new competences for the workforce of today's coal assets and
- Human capital guarantee for zero- and low-carbon power generation

## Local communities involved

- Social dialogue and partnership with local communities
- Participation in the process of securing transition funding and preparing local and national Just Transition plans



# Just Transition in Bełchatów until 2030



## Key Projects in implementation

- **Wind farm** projects of up to 50 MW (by 2030)
- **PV farms** with a capacity of up to 150 MW (by 2030)
- **Energy storage** systems with a capacity of up to 200 MW (by 2030)
- Establishment of a **Renewables Technology Centre** (in 2022) on the basis of today's conventional energy support companies, which will be re-focused to implementing renewable projects: production, renovation and recycling and recovery of end-of-life raw materials from renewable sources,
- „**Virtual Power Plant**” program – harnessing IT competences



Further potential increase  
in RES and storage  
capacities **beyond 2030**

## Competence Development Centre in Bełchatów to support vocational training

- The Centre since 2021 is a place that **provides an opportunity for training and qualification development** for employees in the energy sector, re-training of employees in the conventional energy sector and residents of the Lodz region interested in changing or gaining new qualifications.
- The course covers a wide range of issues concerning renewable energy sources, their resources, acquisition, design and use in the area of solar, wind, geothermal and hydropower, as well as issues concerning renewable energy technologies, the ecological effects of energy conversion, the legal basis for environmental protection and the development of renewable energy in Poland and worldwide.

# Disclaimer



This presentation has been prepared by the management of PGE Polska Grupa Energetyczna S.A. (the "Company" or "PGE") and other entities. This presentation does not constitute or form part of and should not be constructed as, an offer to sell, or the solicitation or invitation of any offer to buy or subscribe for, securities of Company, any of its subsidiaries in any jurisdiction. No part of this presentation, nor the fact of its distribution, should form the basis of, or be relied on in connection with, any contract or commitment or investments decision whatsoever.

We operate in an industry for which it is difficult to obtain precise industry and market information. Market data and certain economics and industry data and forecasts used, and statements made herein regarding our position in the industry were estimated or derived based upon assumptions we deem reasonable and from our own research, surveys or studies conducted at our request for us by third parties or derived from publicly available sources, industry or general publications such as newspapers.

This presentation and any materials distributed in connection with this presentation are not directed to, or intended for distribution to or use by, any person or entity that is a citizen or resident or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or which would require any registration or licensing within such jurisdiction.

This presentation includes "forward-looking statements". These statements contain the words "anticipate", "believe", "intend", "estimate", "expect" and words of similar meaning. All statements other than statements of historical facts included in this presentation, including, without limitation, those regarding the Company's financial position, business strategy, plans and objectives of management for future operations (including development plans and objectives relating to the Company's products and services) are forward-looking statements.

The decarbonisation pathway provides for the decarbonisation of assets from the Group's structures - as envisaged in the, adopted by the government, document "Transformation of the electricity sector in Poland"- assuming coal assets carve-out from utilities in Poland. The timetable for implementation of the governmental plan for coal assets is beyond direct control of the company and the future of the coal assets is dependent on the national transformation plans. Therefore, the company cannot refer to the pace of decarbonisation of these assets in this document.

The document is basing on the assumptions and targets set in "PGE Group 2030 Strategy with 2050 perspective" and projects implemented and planned by the Group, according to the company's current knowledge of the market environment.