

The transition of the power sector in north Poland

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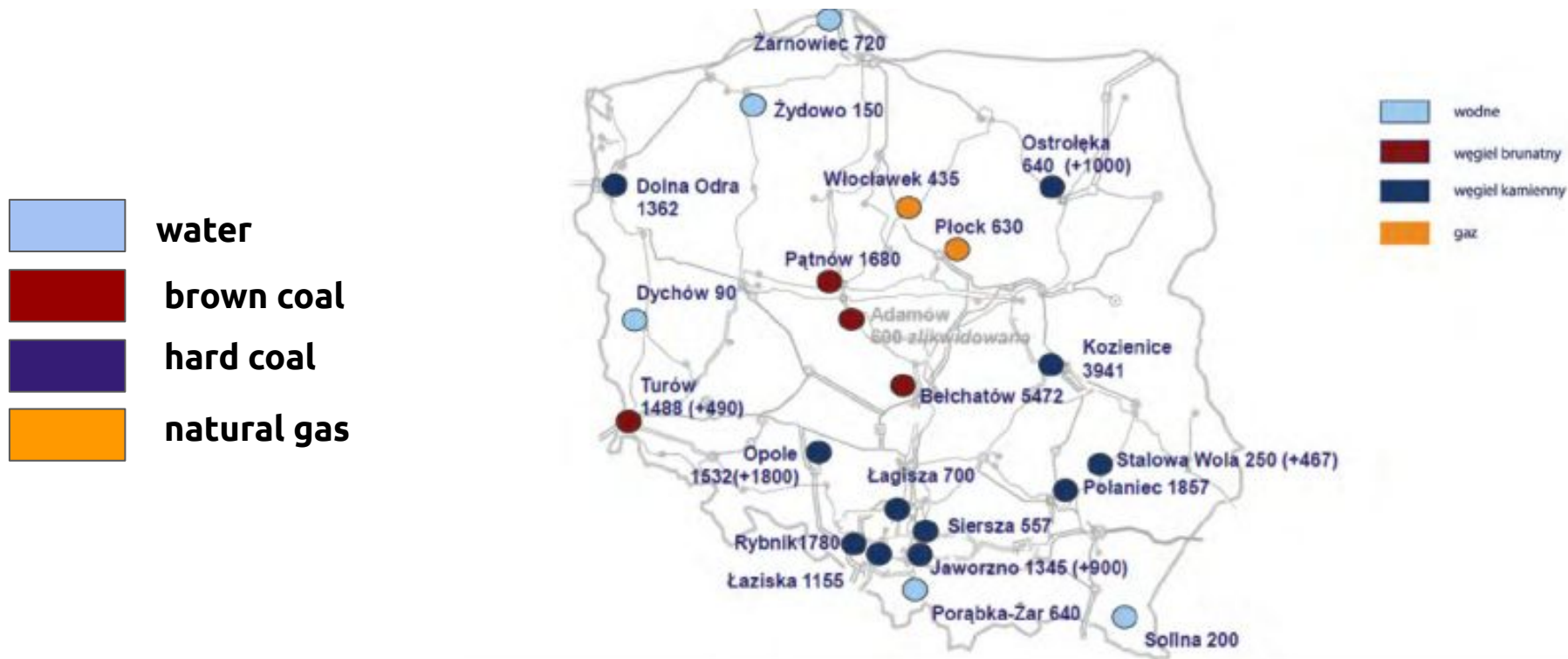
Plan of presentation

- infrastructural conditions
- development dilemmas
- development plans

Infrastructural conditions

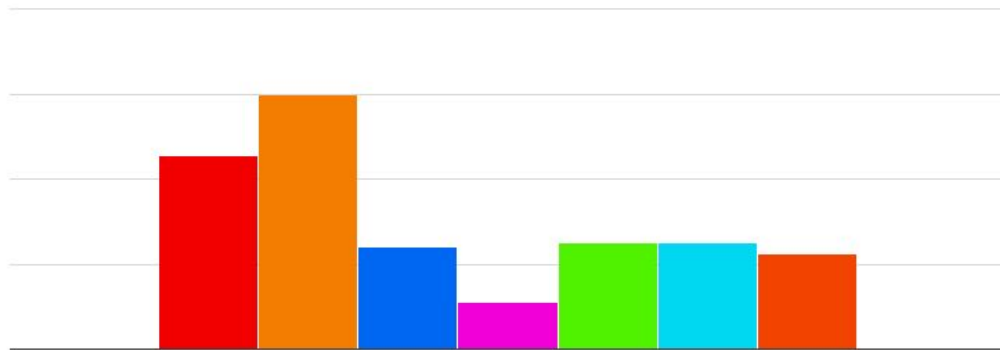
- generation sources
- condition of power grids / areas of poor in transmission networks
- main operators / types of power plants
- conditions of power lines
- location of renewable energy sources
- latest investments

Location of system generation sources in Poland

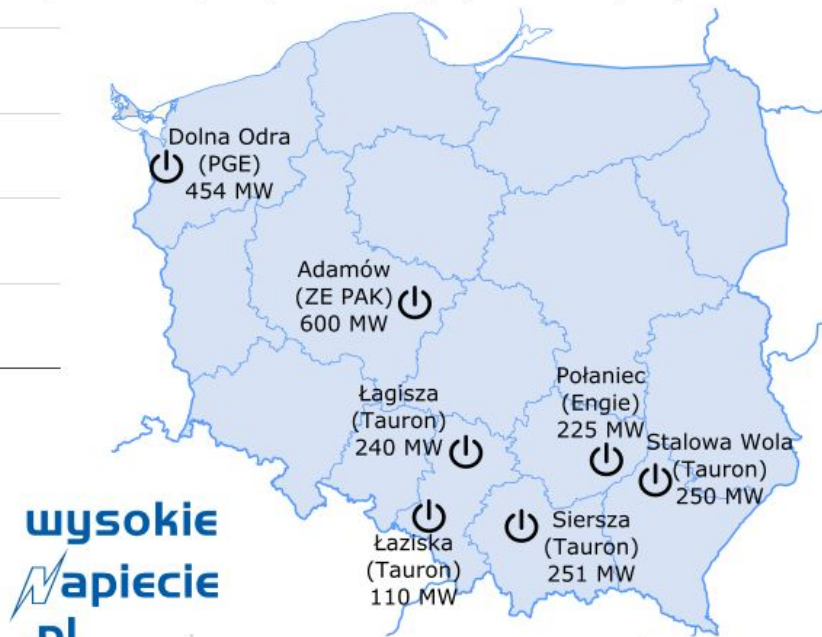


The largest power units planned for shutdown to 2023

Największe bloki energetyczne planowane do wyłączenia z powodu wyczerpania derogacji naturalnych (do 2023 r.)



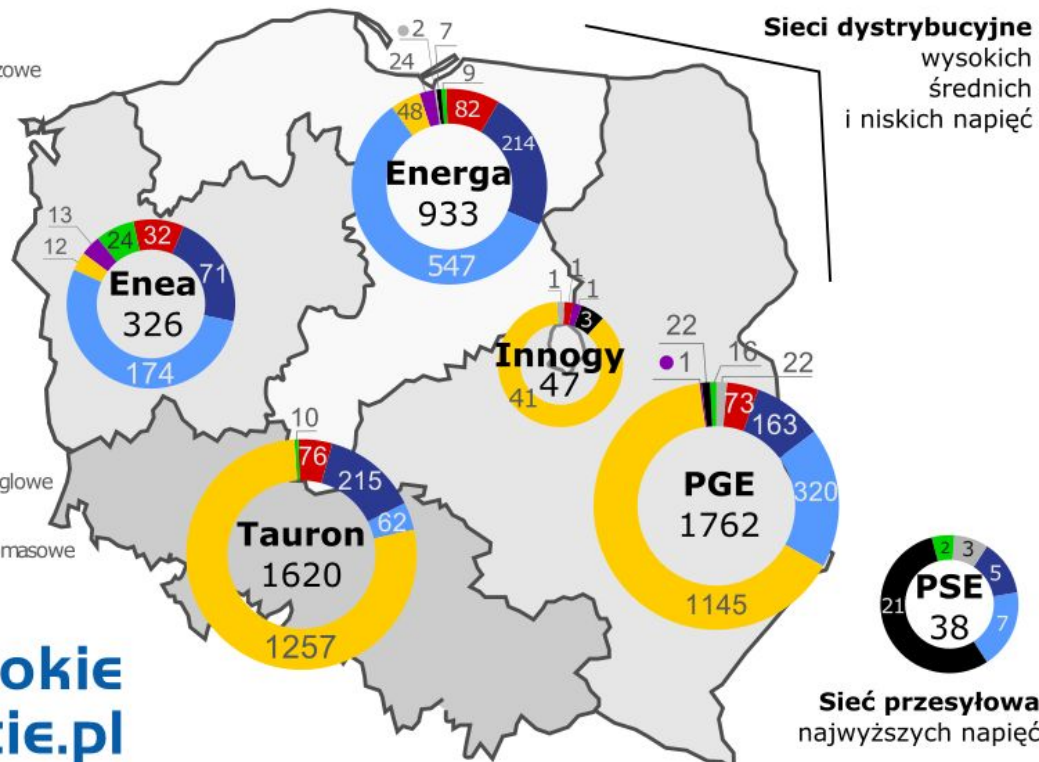
The largest power units planned for shutdown to 2023



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Number and type of power plants by main operators

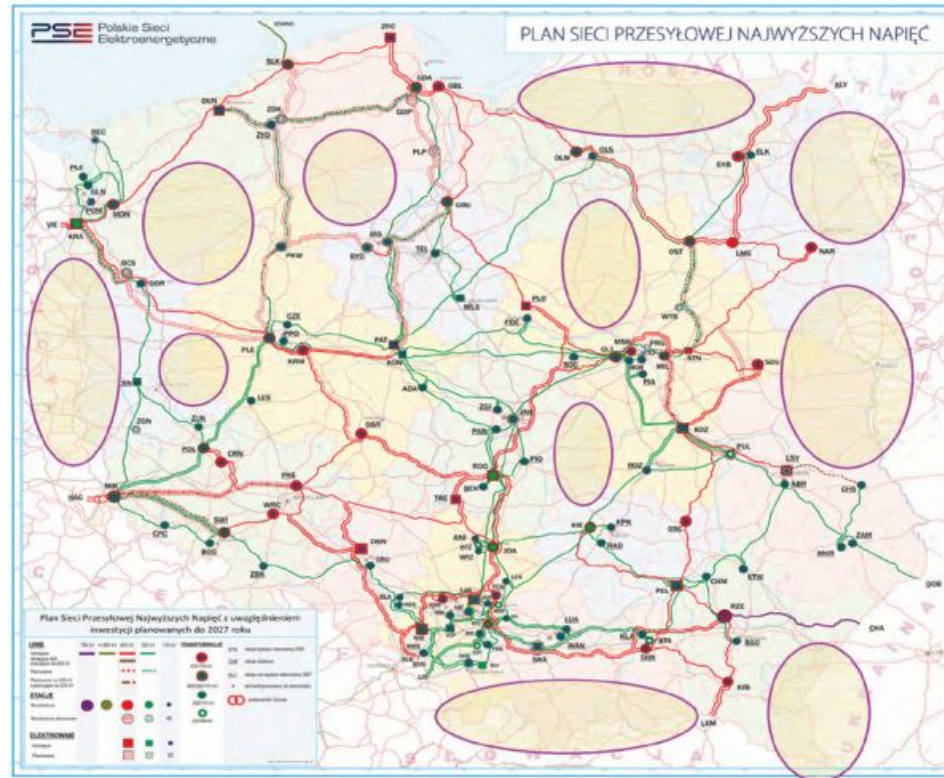
Power stations :



Condition of power lines

About 80% of 220 kV lines, 56% of 400 kV lines and 34% of substations in Poland are over 30 years old and requires significant investments. At the level of distribution networks, the situation is similar. The average age is 30 years, and depreciation reaches 75%.

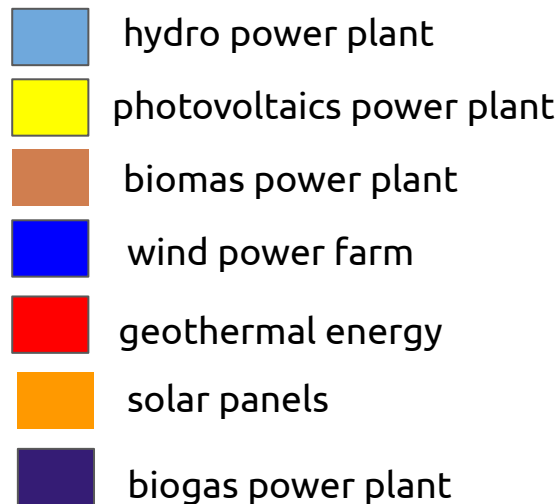
Areas poor in transmission networks and conventional power plant



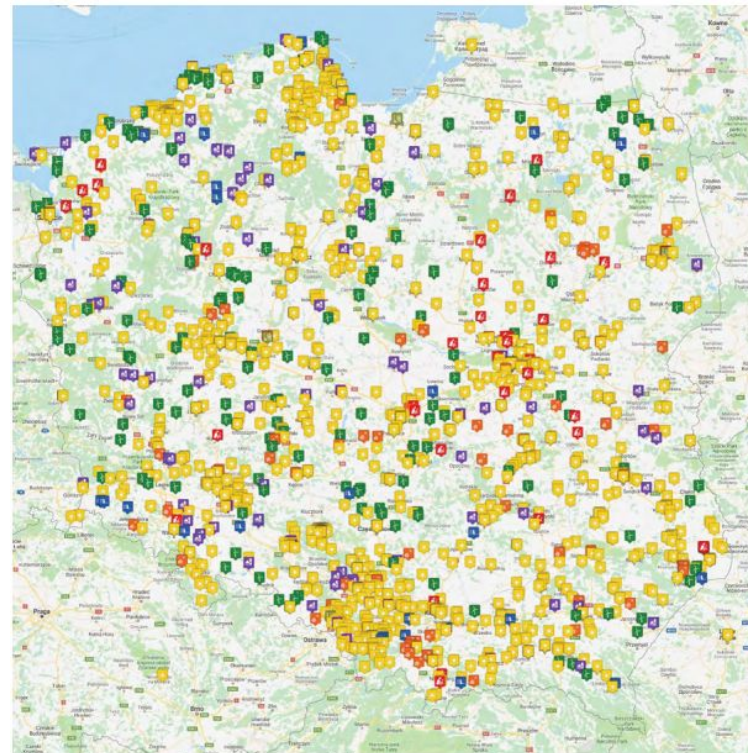
Source:

Polish Energy Networks

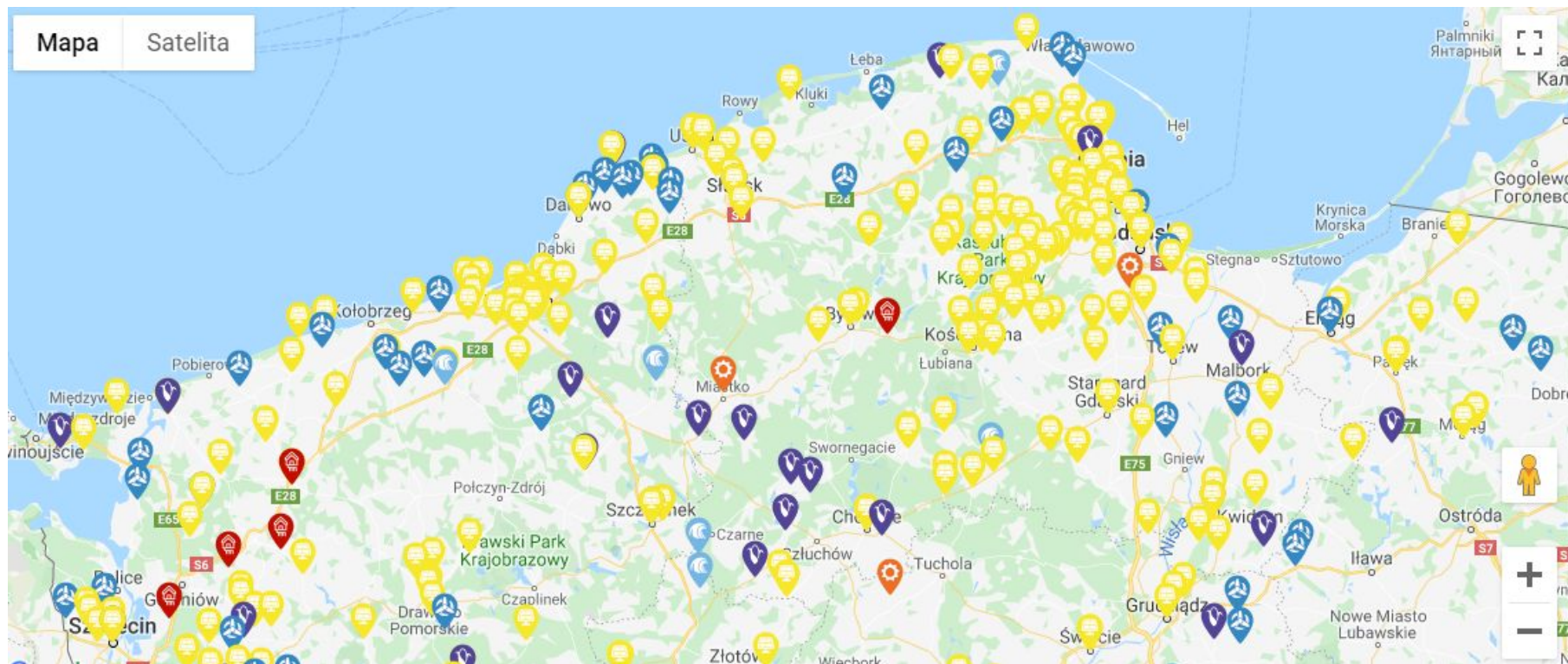
Location of renewable energy sources in Poland



Source: <http://gramwzielone.pl/mapa-instalacji-oze>



Location of renewable energy sources in north Poland



Source: <http://gramwzielone.pl/mapa-instalacji-oze>

Latest investments / central and north Poland

Several energy investments have been put into operation in recent years (3 from 4 are gas-fired or gas-steam). These include:

- ❖ gas-fired CHP plant in Toruń with a total thermal capacity of 357.6 MW and an electric capacity of 106 MW;
- ❖ 463 MW gas-steam block in Włocławek;
- ❖ gas-steam block with 596 MW electric and 520 MW thermal power in Płock
- ❖ coal block with 1075 MW w El. Kozienice

Development dilemmas

- regulations and projects
- balance of energy transmission on cross-border connections with neighboring countries
- electricity production in Poland by fuel type
- crucial issues
- trends
- tracks
- problems of power engineering in north Poland

Regulations and projects

Act on the power market (2018)

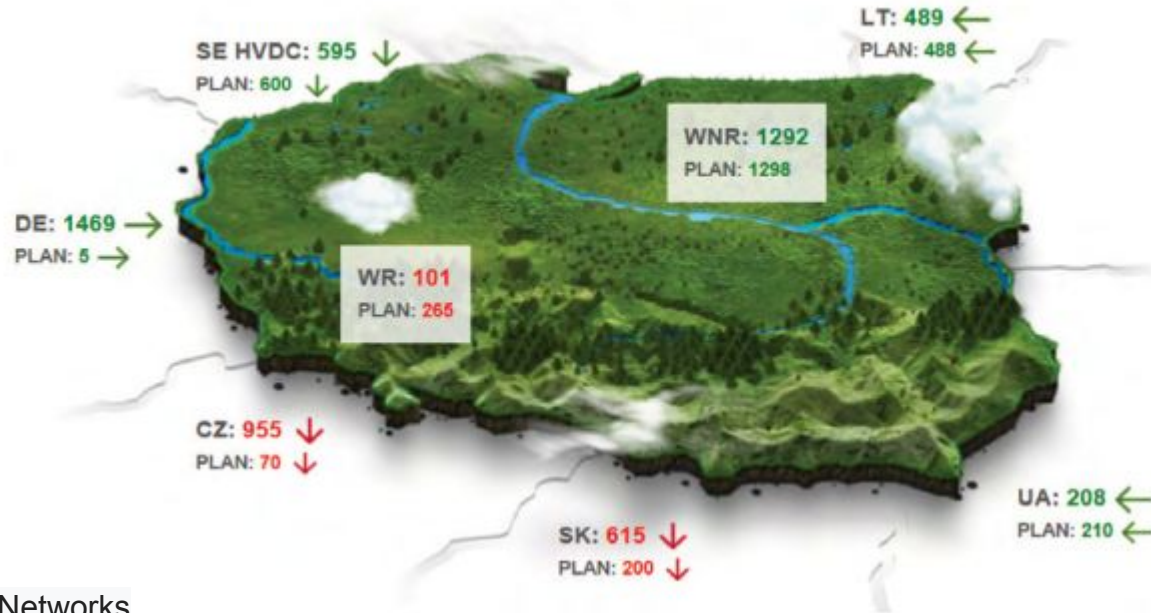
Act on the promotion of electricity from high-efficiency cogeneration (2018)

Act on electromobility and alternative fuels (2018)

Act on renewable energy sources (2019)

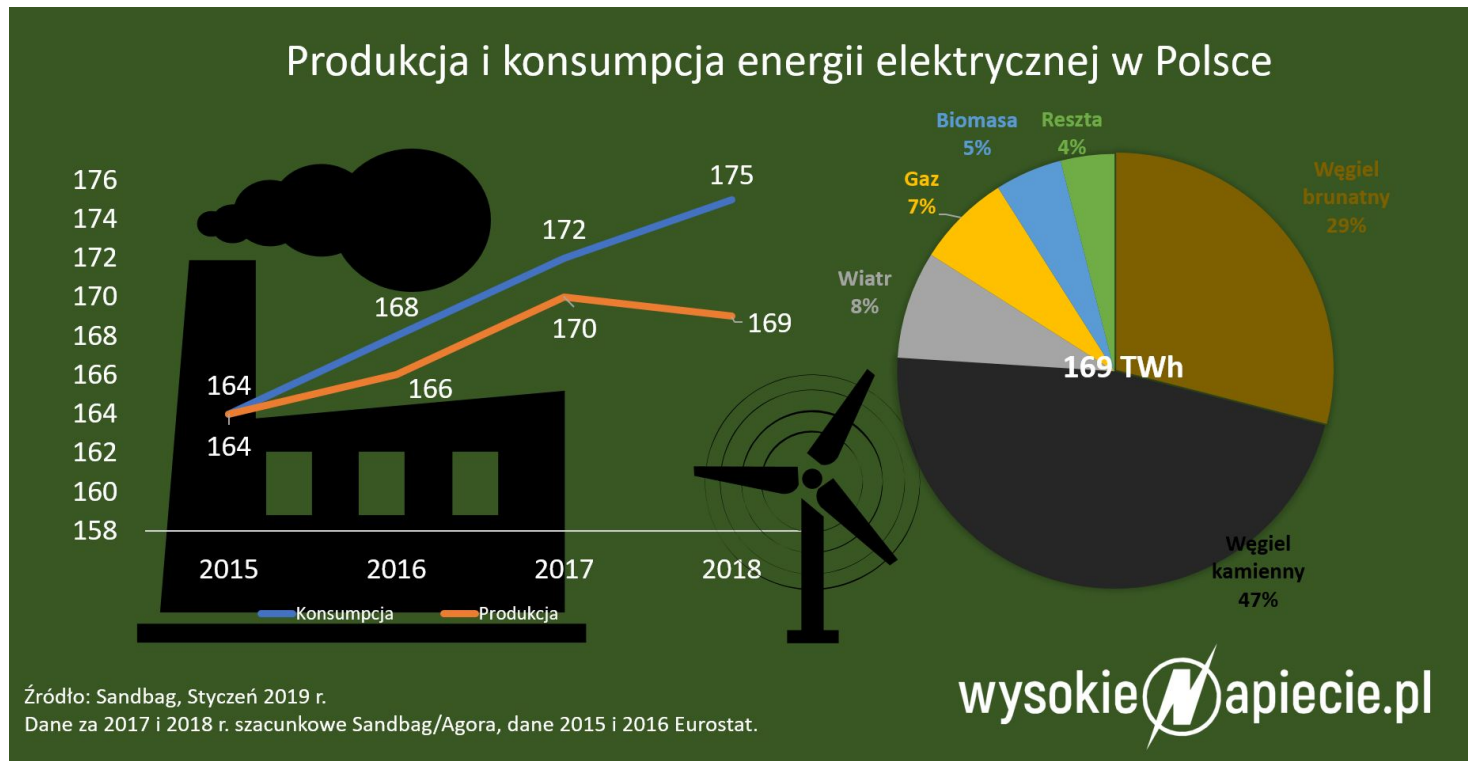
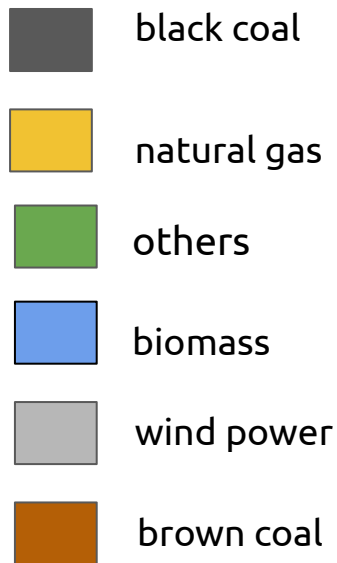
Polish energy policy until 2040 [PEP] (*project 2018*)

Balance of energy transmission on cross-border connections with neighboring countries



Source: Polish Energy Networks

Electricity production in Poland by fuel type



Crucial issues

The PEP 2040

- hasn't fundamental decision
- hasn't indicating territorial effects of future activity.

Instead, the project the PEP 2040 project ...clearly consolidates the traditional energy security system based on large coal-fired power plants.

This will lead to stiffening of the Polish energy system for decades, because in this way the possibilities of using a number of innovative solutions, which are not yet fully recognized, are limited. It is important because the Polish market can change in near future.

Selected trends

- industry 4.0
- international climate policy
- d3 (decentralization, digitalization, decarbonization)

Changes like digital revolution are coming we can't simply imagine in the energy sector...

Selected tracks

- progress in the field of energy storage
- integration with the power grid of an increasing number of renewable energy sources
- dynamic pricing programs
- electromobility
- digitization of processes and artificial intelligence
- internet of Things
- Big Data sensors and analysis
- implementing smart meters and building product and service offerings, including Demand Side Response
- clear air without smog



Enea.

Baczyna wind farm.

Selected problems of power engineering

- threats of stopping continuous electricity supply resulting from
- low density of transmission and distribution networks
- low density transformer-distribution stations and main power points making it impossible to construct and connect new sources of electricity production;
- a large increase in unstable sources of electricity production (energy from renewable sources), with new and significant peak energy sources not emerging; the problem of electricity balancing is growing
- insufficient scope of modernization of existing overhead lines and transformer-distribution stations and main power points

Development plans

- selected planned energy investments up to 2030 / Poland
- interconnections in north Poland
- scope of expansion of the transmission network
- infrastructure for offshore wind farms
- planned offshore wind farms
- growth of new PV installations
- vehicle charging points
- alternative locations of the nuclear power plant in northern Poland

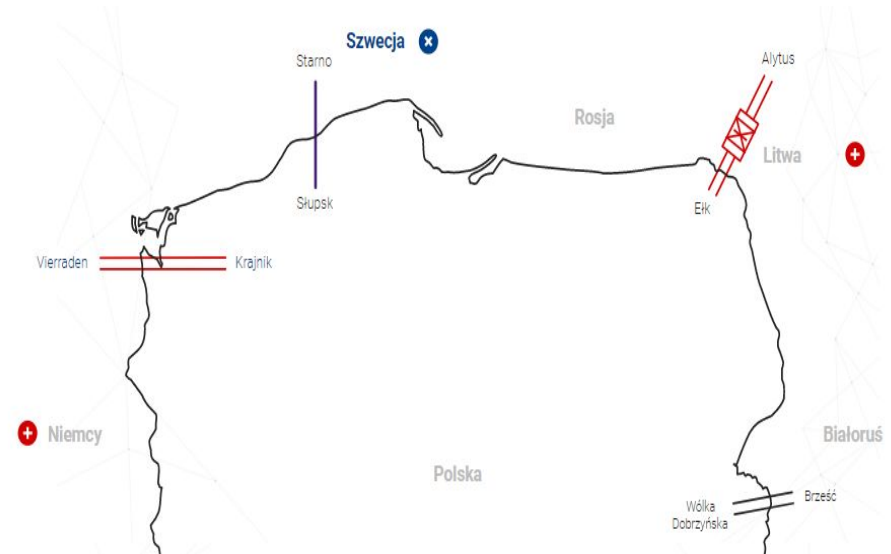
INWESTYCJE ENERGETYCZNE DO 2030 R.

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Interconnections in north Poland

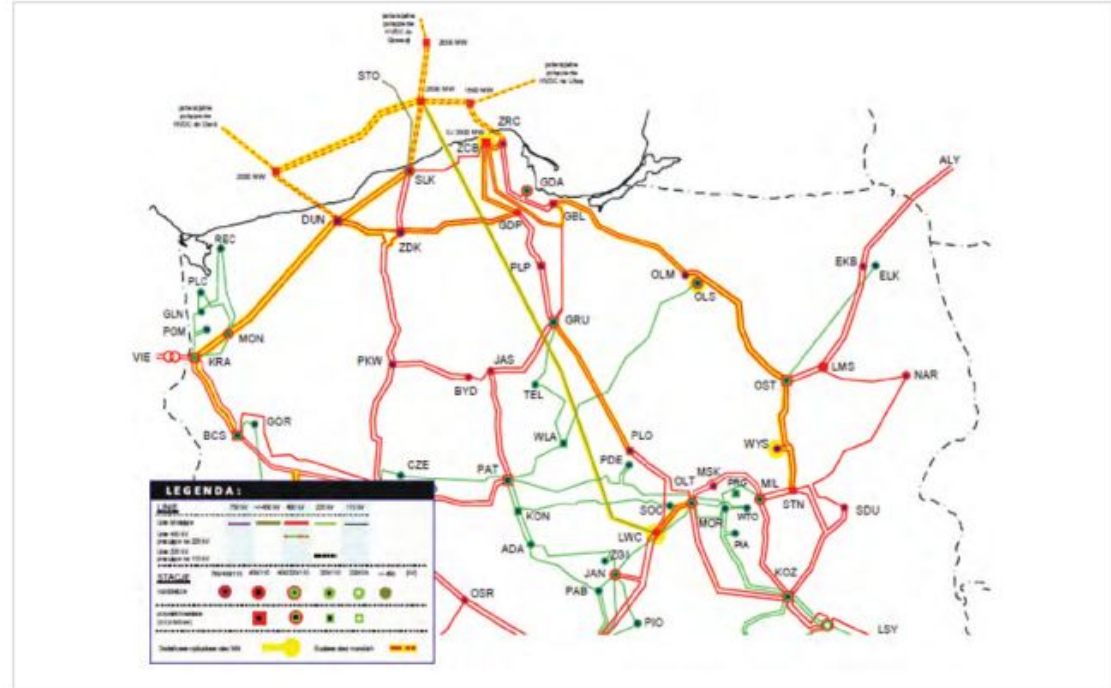
- HVDC Poland - Sweden interconnection + end station for submarine power DC HVDC cable
- Poland Lithuania Harmony Link



The scope of expansion of the transmission network

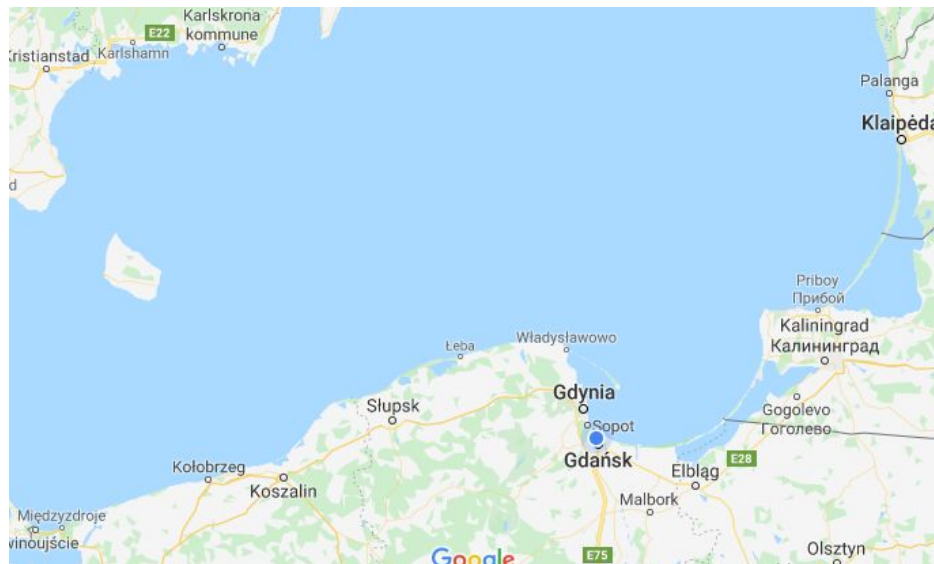
The scope of requirements for connection of a nuclear power plant with installed capacity 3.9 GW and wind farm (offshore) with a capacity of 8 GW.

Source: Polish Energy Networks



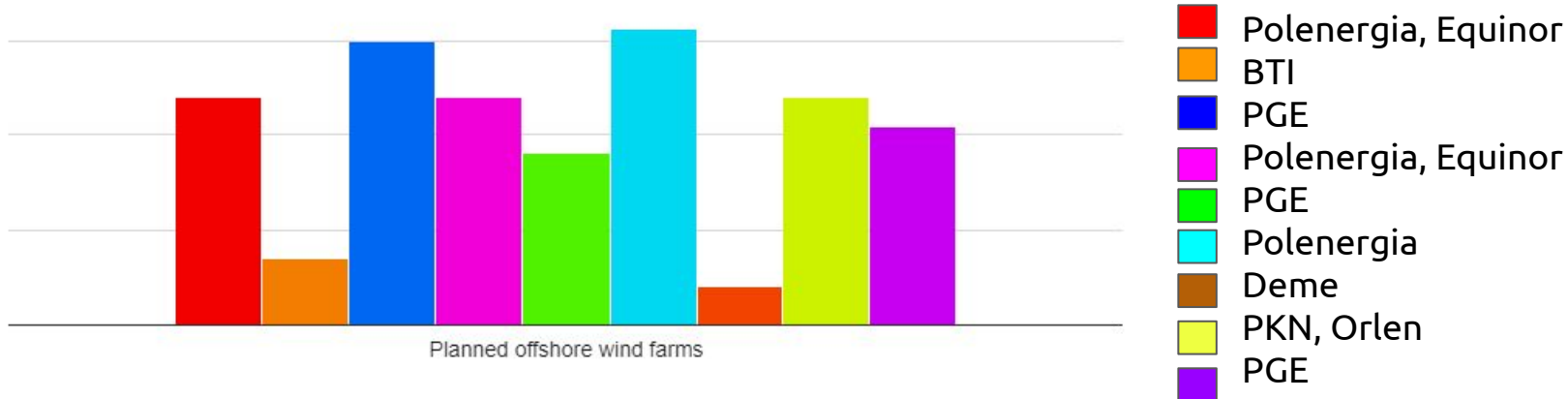
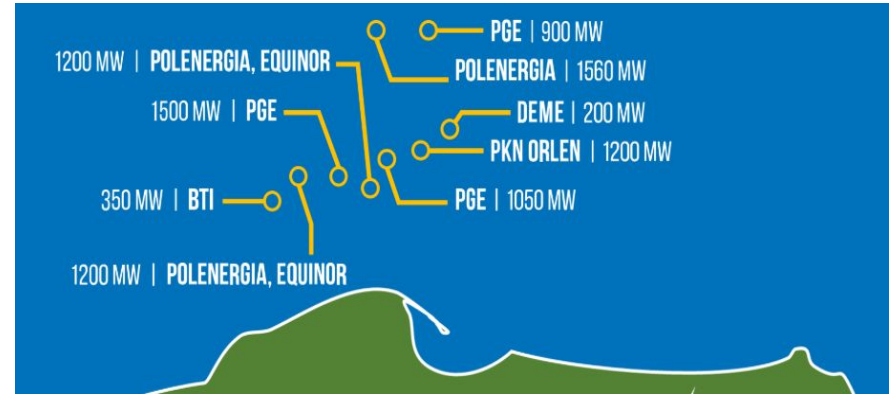
Infrastructure for offshore wind farms

- modernization of existing infrastructure for offshore wind farms
- construction of new infrastructure for offshore wind farms



Planned offshore wind farms

Potential investors can aggregate the potential projects at around 10,000 MW.



The growth of new PV installations

Poland has a chance to be in the 4th place in the EU in terms of annual increases in new solar power.

At the end of last year (2018) the total installed capacity in photovoltaic sources was about 500 MW, while in August this year it already exceeded 882,6 MW (in the end of 2019 - it will be probably 1 GW).



Source:

<https://pggeo.pl/Nasze-obiekty/Elektrownie-fotowoltaiczne/>

The growth of new PV installations / north and central Poland

Energa Group Enea Group are good examples. Nearly 16,000 micro-installations are currently working in the Energa Operator network. Only in the first half of this year there are more than 5,000 and by the end of 2019 there may be at least 9,000 micro-installations.

Enea Group plans to implement large-scale photovoltaic projects in the near future.



Electricity produced by a photovoltaic farm in Gubin connects to the Enea network (Gubin on the Odra river).

Source: www.peg.com.pl

Vehicle charging points

The total number of vehicle charging points by the end of 2020 may amount to 800 chargers. Only Polska Grupa Energetyczna (PGE) wants to launch 200 chargers.

Most chargers will be located on major roads and large cities, including in Tricity, Szczecin (eg. collaboration Gdynia and PGE).



Alternative locations of the nuclear power plant in northern Poland

According to the Ministry of Energy, after 2033 two nuclear power plants should be built - in the north of the country and in central Poland.

PGE EJ1 (consortium founded in 2010) composed of KGHM, Tauron and Enea.



Thank you for your attention