



HOW TO FILL THE COAL GAP

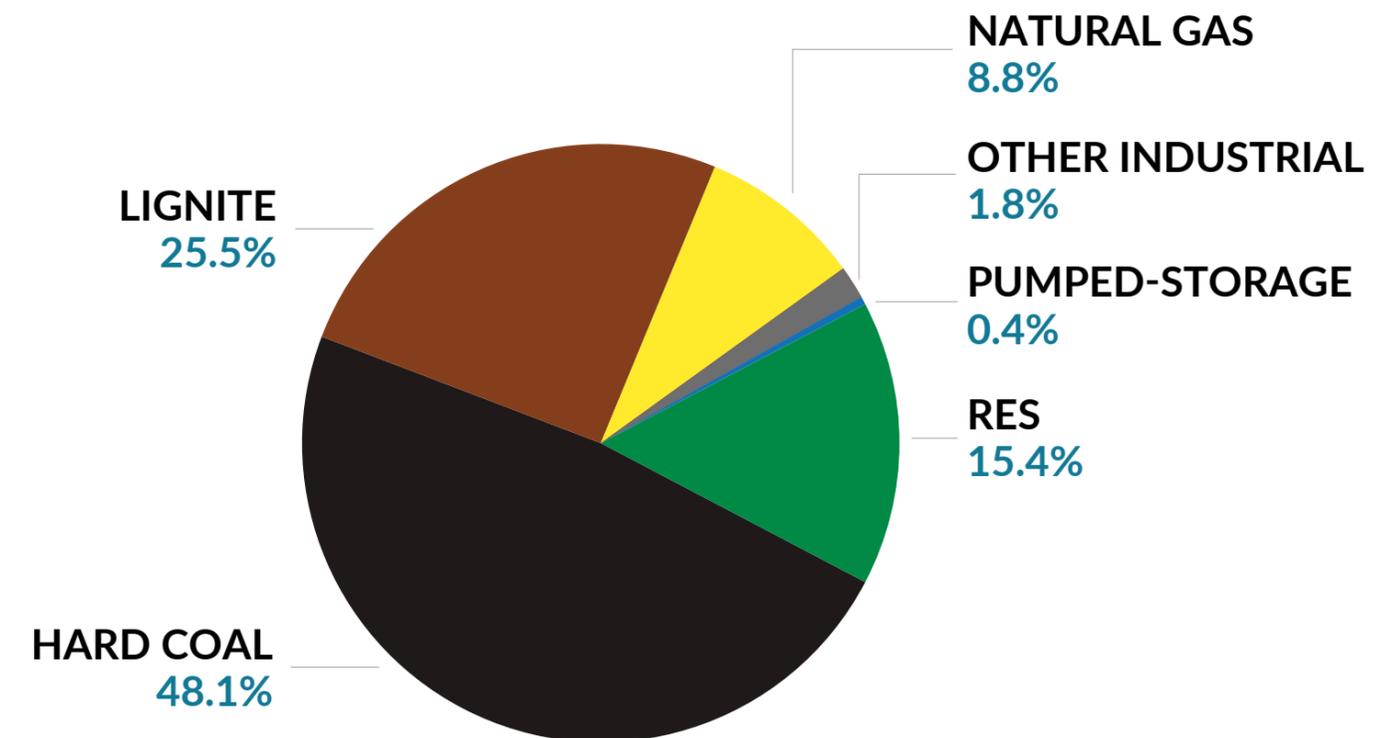
43% RES BY 2030

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Background

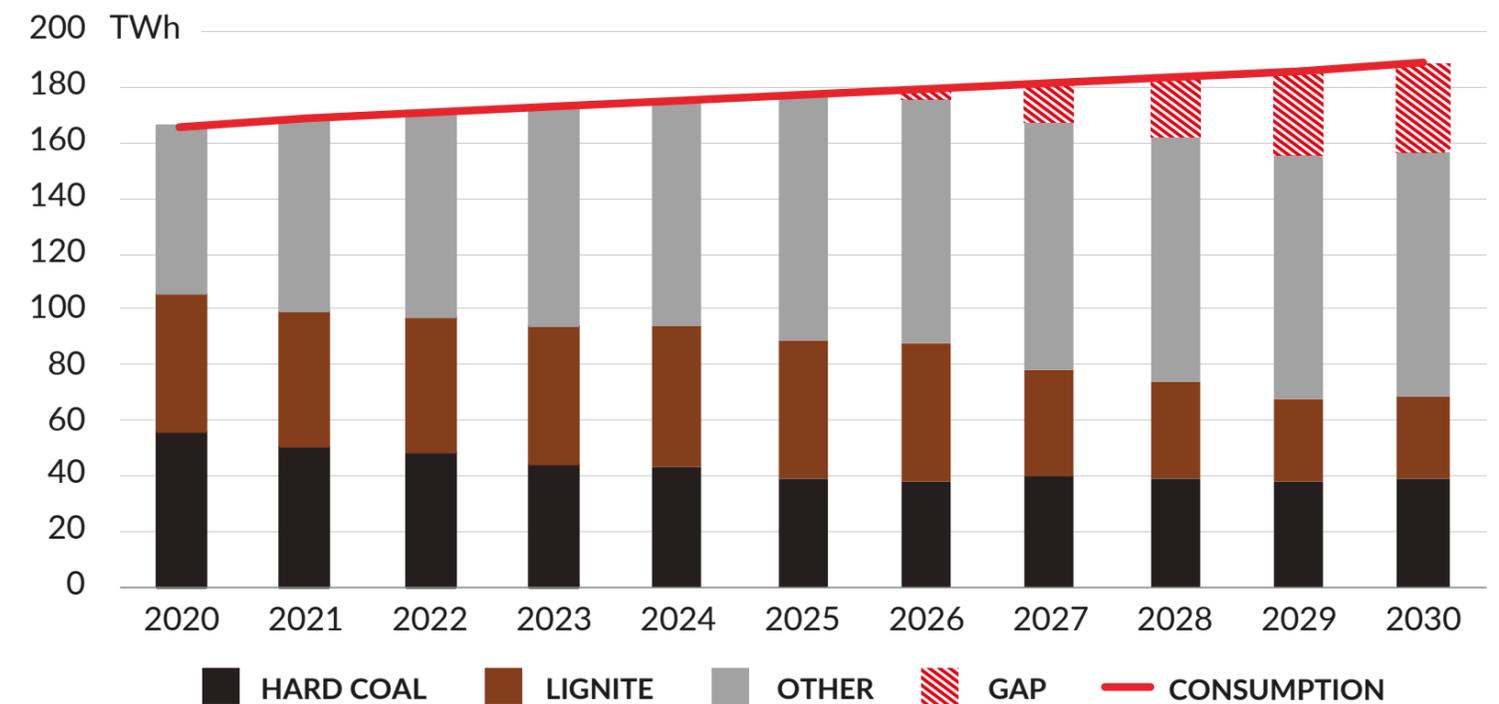
- In 2019 the share of RES in electricity production was only **15.4%**
- Target for 2020 – **19%**
- Target for 2030 – **32%**



Coal gap

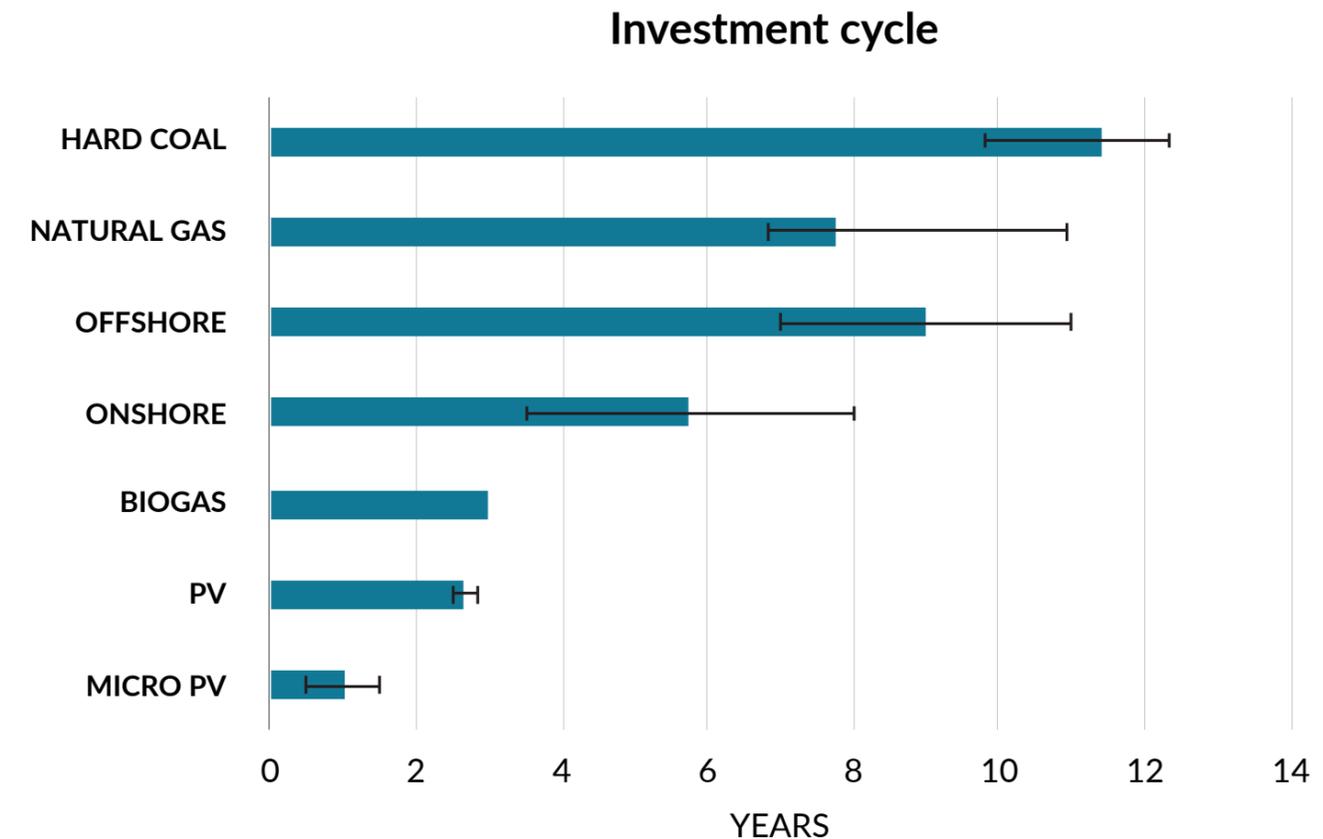
- Both dispatchable power and generation from coal power plants will decline.
- Power and generation coal gap will have to be filled.

Visualisation of the generation gap problem



Power unit construction time

- Investment process of gas power plants is over 7 years.
- PV can be built in 6 months to 3 years.
- Wind farms can be built in 3 to 9 years (onshore and offshore).



Challenge

End of the capacity market for coal + rising CO₂ allowance prices. Increasing competitiveness of RES.

Pressure for energy transition.



Withdrawal (faster than assumed by NECP) of coal units. Concerns about the "variability" of RES.



Generation gap in the national power system.



Availability of options in the 2030 perspective.



Report *How to fill the coal gap?*
43% RES by 2030, prepared by
Forum Energii in cooperation
with the Institute of Power
Engineering, Gdańsk Division.

Objective of the analysis

- **Objective 1:** How much RES in the power system until 2030?
Assumed high level of security of supply.
- **Objective 2:** How much gas/new conventional units do we need by 2030?

Approach

Methodology

- Different power mixes of different technologies have been modelled to ensure that demand is adequately covered.
- Determined dispatchable capacities in 2030:
 - Hard coal: **12.9 GW**, lignite: **4.1 GW**, gas: **4.4 GW**
 - Optimisation of production from RES

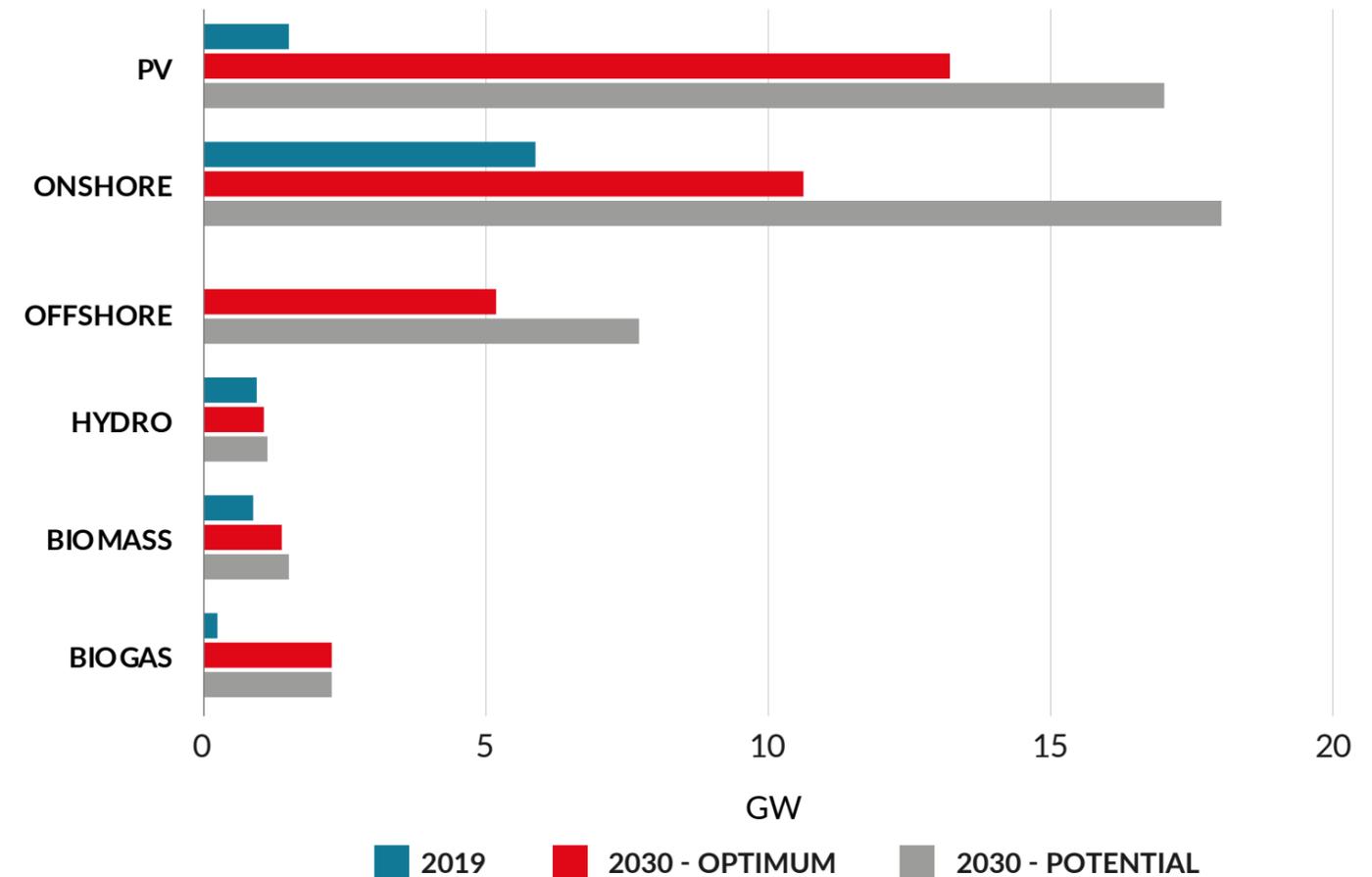
Assumptions

- High level of security of supply (reliance on national sources, appropriate level of reserves, "must run" dispatchable capacities)
- Maximising RES production
- Minimising installed capacity of new conventional units
- Maximum use of regulatory resources for balancing
- Conservative approach

RES potential by 2030

- Photovoltaics – **13.2 GW**
- Onshore wind power – **10.6 GW**
- Offshore wind energy – **5.2 GW**
- Hydropower (without pumped storage power plants) – **1.1 GW**
- Solid biomass – **1.4 GW**
- Biogas – **2.25 GW**

Current and projected renewable capacity in 2030 against the deployment potential

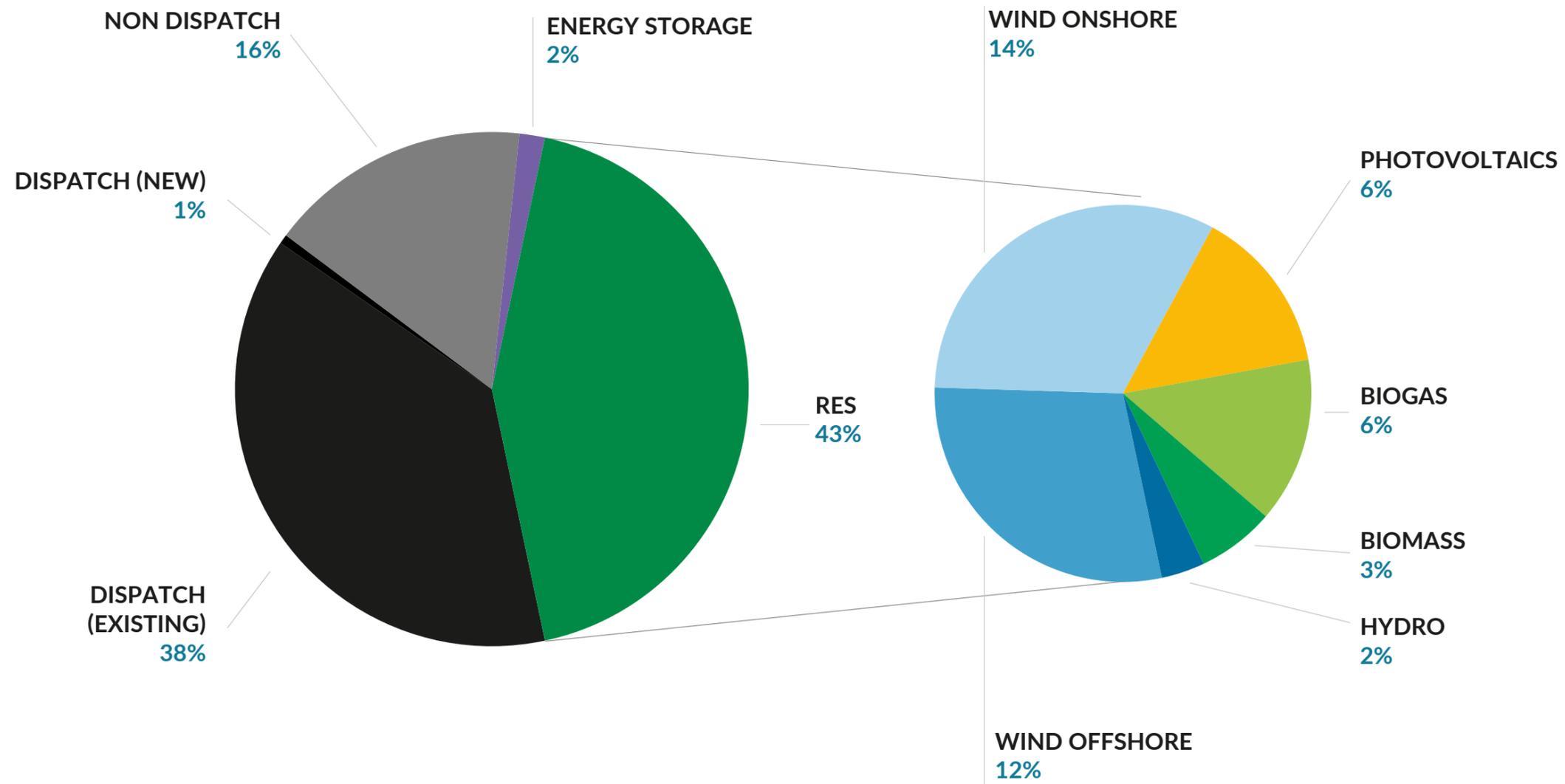


The role of flexibility

- System with a high share of RES cannot rely solely on generation sources.
- It must make use of the potential of such sources of flexibility as DSR, heat pumps and electric cars.
- **Assumed levels of ancillary services**
 - Heat pumps: up to 1 million – **2.57 GW**
 - Electric vehicles: 680 000 units – **1.36 GW**
 - Energy storage – **5 GW** including pumped storage
 - Power to heat – **3.2 GW**
 - DSR – **2.8 GW**
 - Cross-border connections – **2.36 GW**

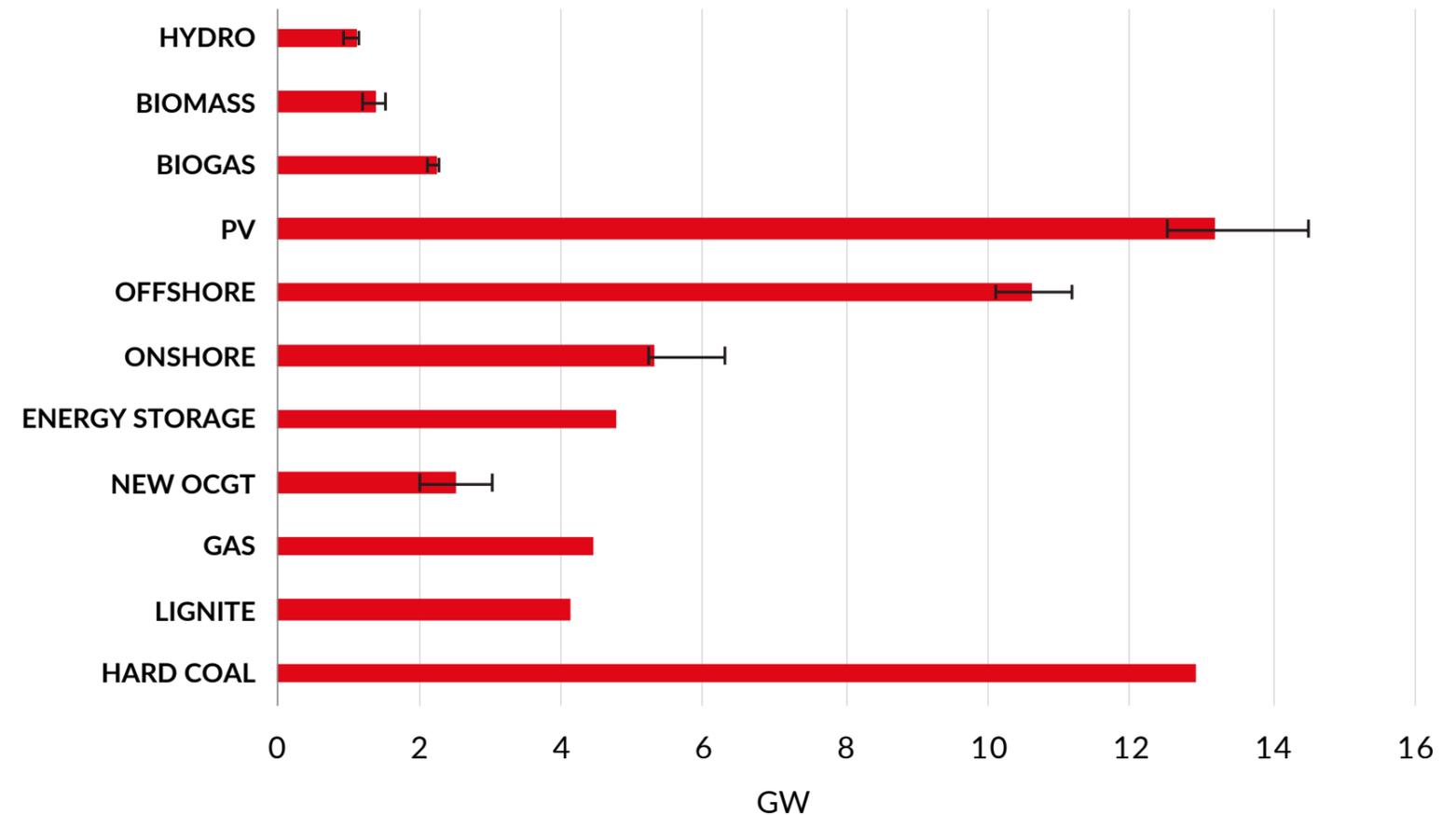
Results

Optimal energy mix in 2030 (1)



Optimal energy mix in 2030 (2)

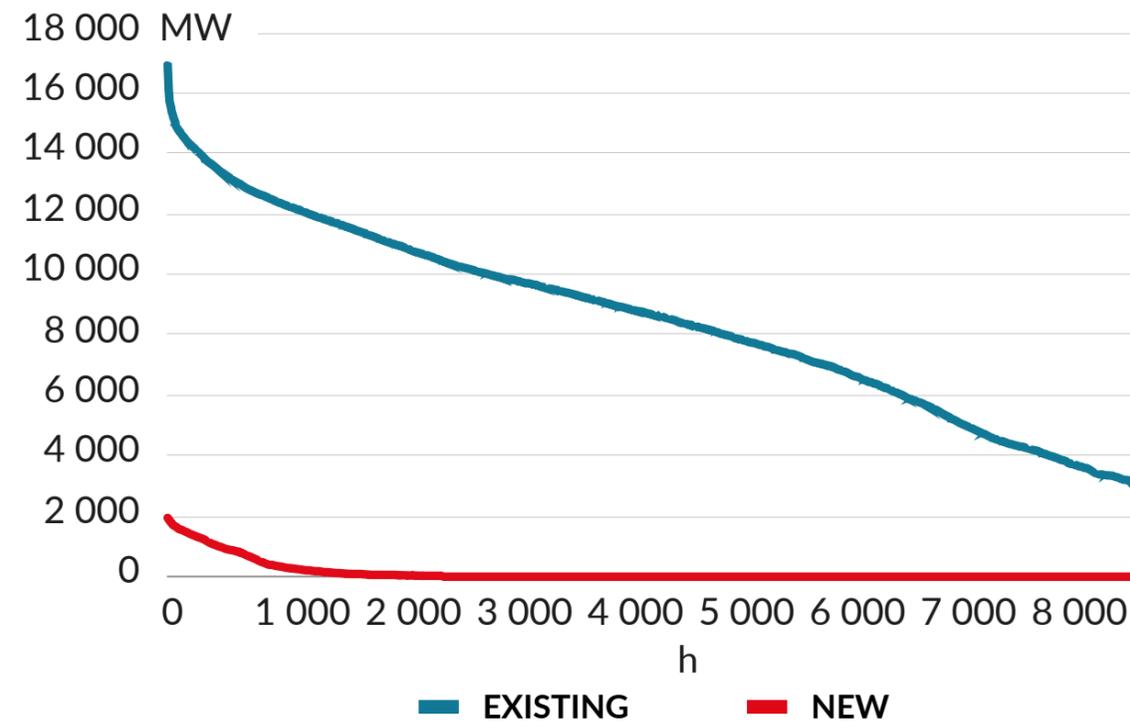
- **43% of electricity from RES** in 2030 is achievable
- Security of supply will be assured
- Wind and solar energy – approx. **32–33%**
- CAPEX **136–168 billion PLN**



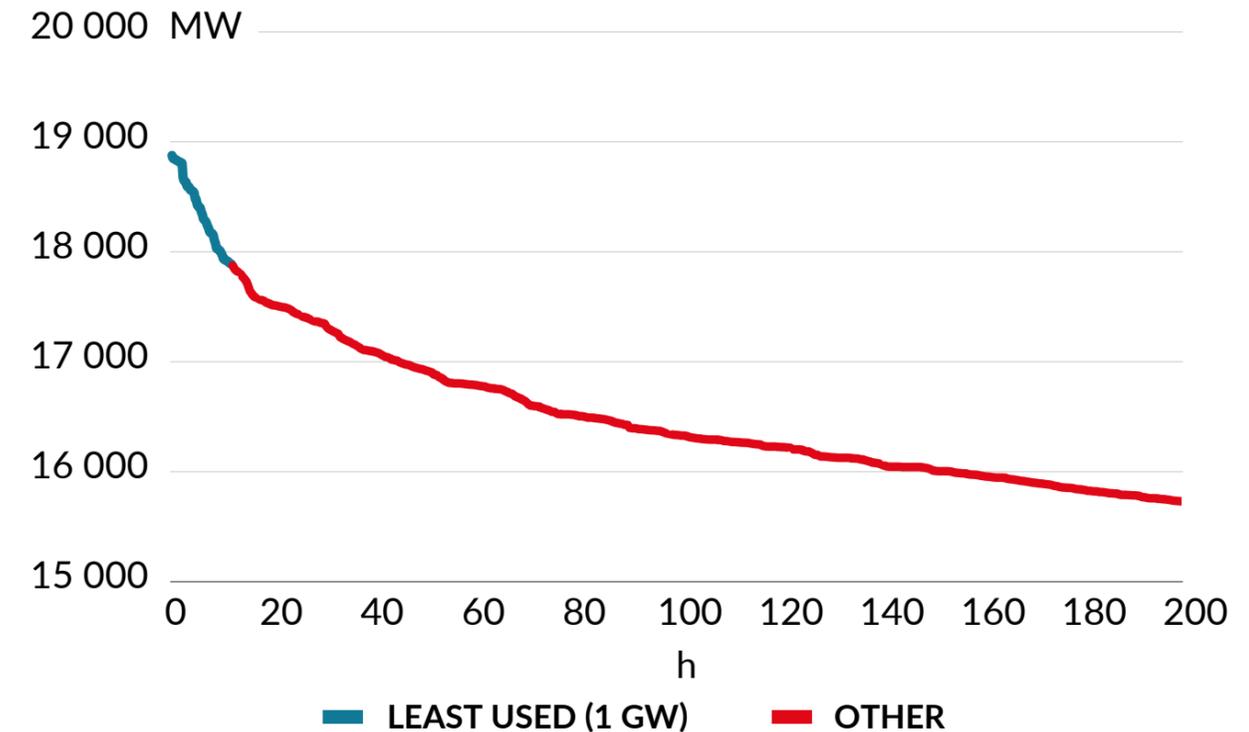
Gas demand

- Maximum 3 GW of new gas generation capacity – OCGT
- The last, third GW of capacity, will work only several hours per year on average

Annual power demand dispatchable generation



Annual demand dispatchable generation (new and existing)



Balancing the power system – step 1

Overcapacity:

- Approx. 1 300 h annually
- Oversupply 3 TWh

Capacity shortage:

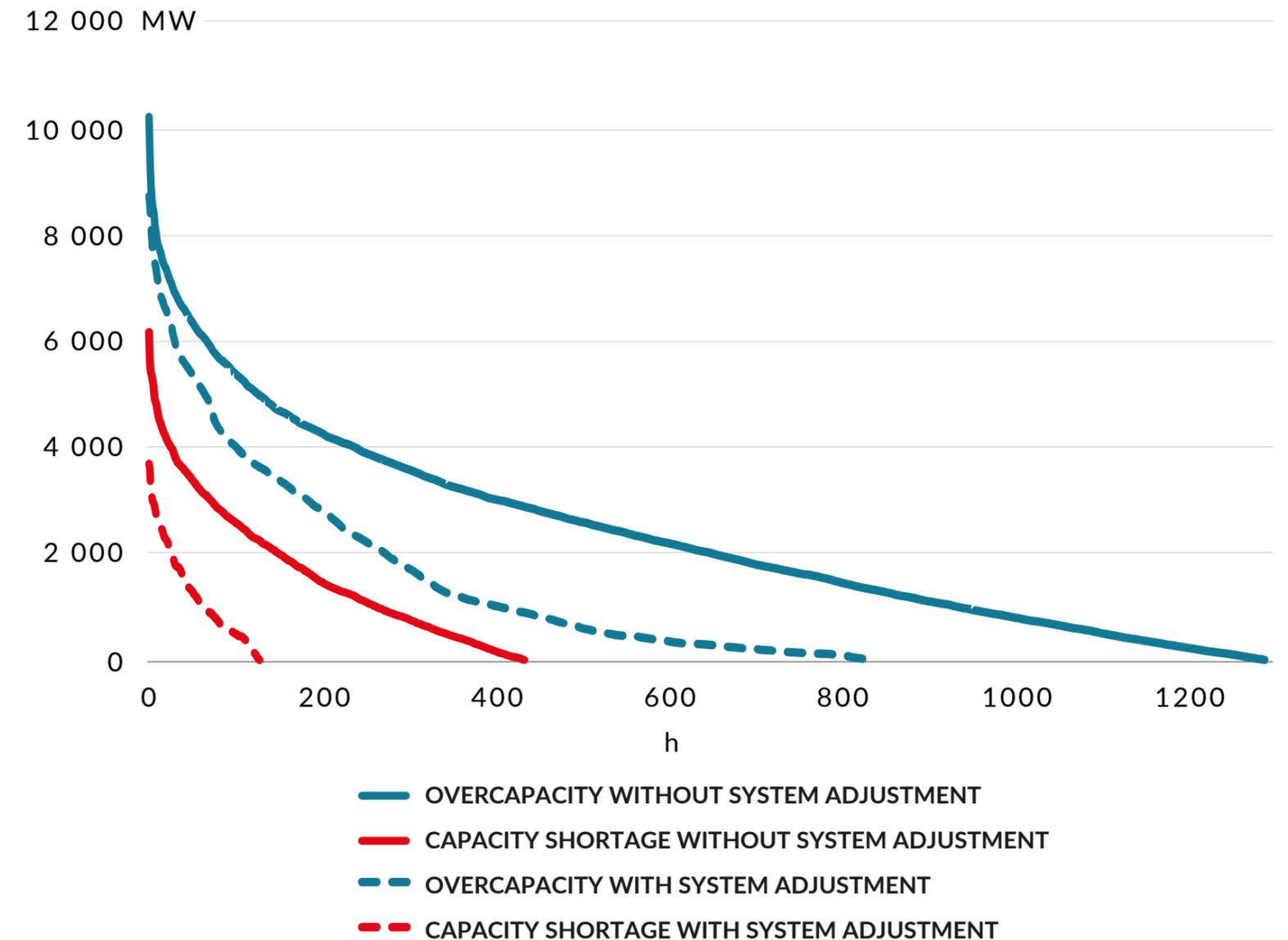
- Approx. 430 h annually
- Power reserve not covered
- Maximum deficit – 6 GW

Adjusting supply and demand:

- Electric vehicles
- Heat pumps
- Energy storage

Result:

- Overcapacity periods reduced from 1 300 h to 800 h
- Capacity shortage periods reduced from 430 h to 120 h



Balancing the power system – step 2

Overcapacity management:

- Power To Heat
- Export
- Green hydrogen production
- RES curtailment

Result:

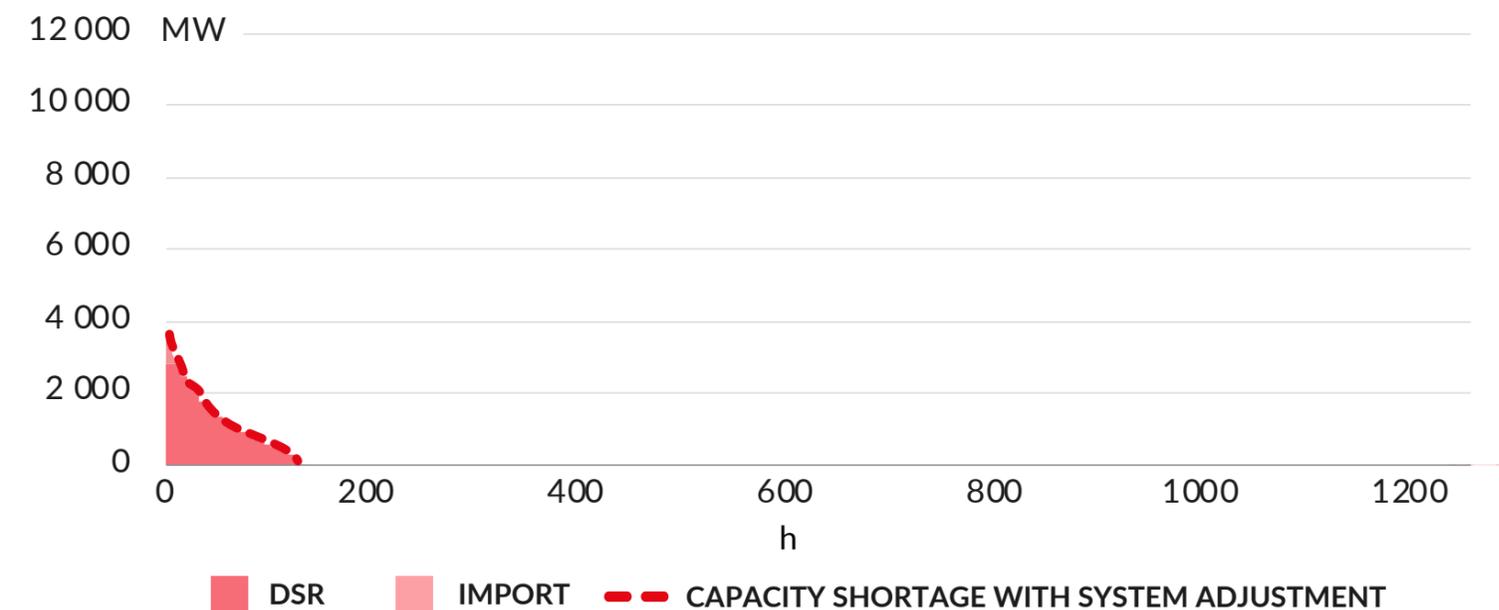
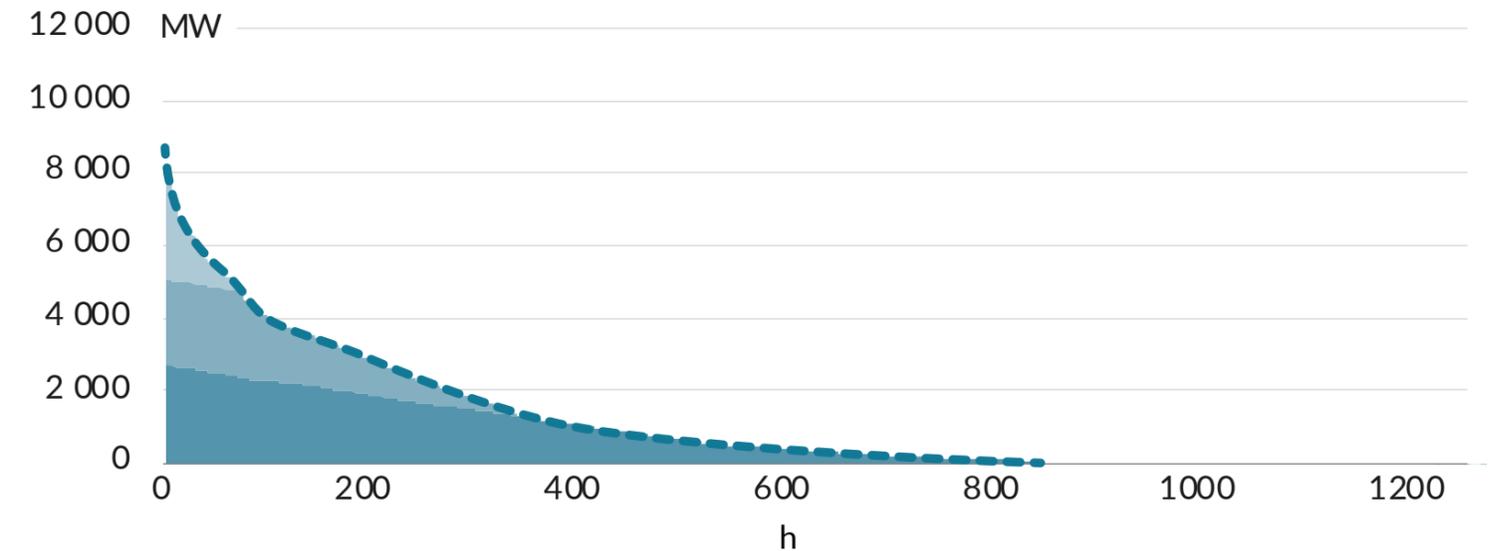
- Overcapacity periods reduced from 800 h to 0 h

Covering the power reserve:

- DSR
- Import

Result:

- Capacity shortage periods reduced from 120 h to 0 h



Key results

- By 2030 in Poland there will be the problem of power balancing (generation gap).
- Taking into account the length of investment processes – Poland can choose:
 - RES and gas – on the side of new generation units
 - greater market flexibility and energy efficiency
- The potential of natural gas is limited due to economic and environmental reasons.
- RES can fill the coal gap. RES share in electricity production in 2030 **may amount to 43%.**
- To balance the power system we need an additional **max. 3 GW of flexible gas units.**

Recommendations

Three key actions need to be taken:

- Increase the development of RES by 2030. Outline objectives and mobilize the market.
- Take into account the potential for electrification of transport and heating.
- Further transform the electricity market towards greater sector coupling and flexibility.

THANK YOU FOR YOUR ATTENTION



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