



Bundesnetzagentur

Ensuring System Reliability and Security of Supply: the German Approach

Florian König

Texas-Germany Bilateral Dialogue

Austin, Feb 27, 2018

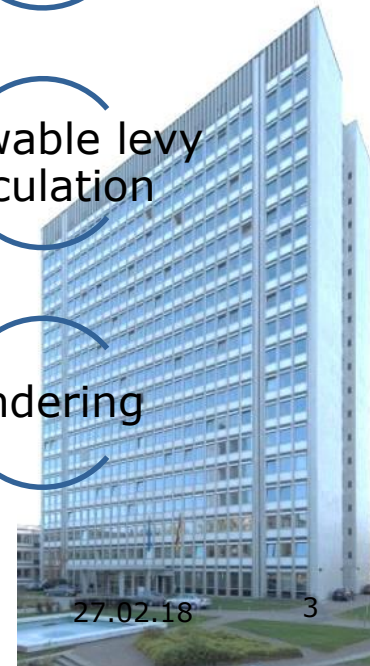
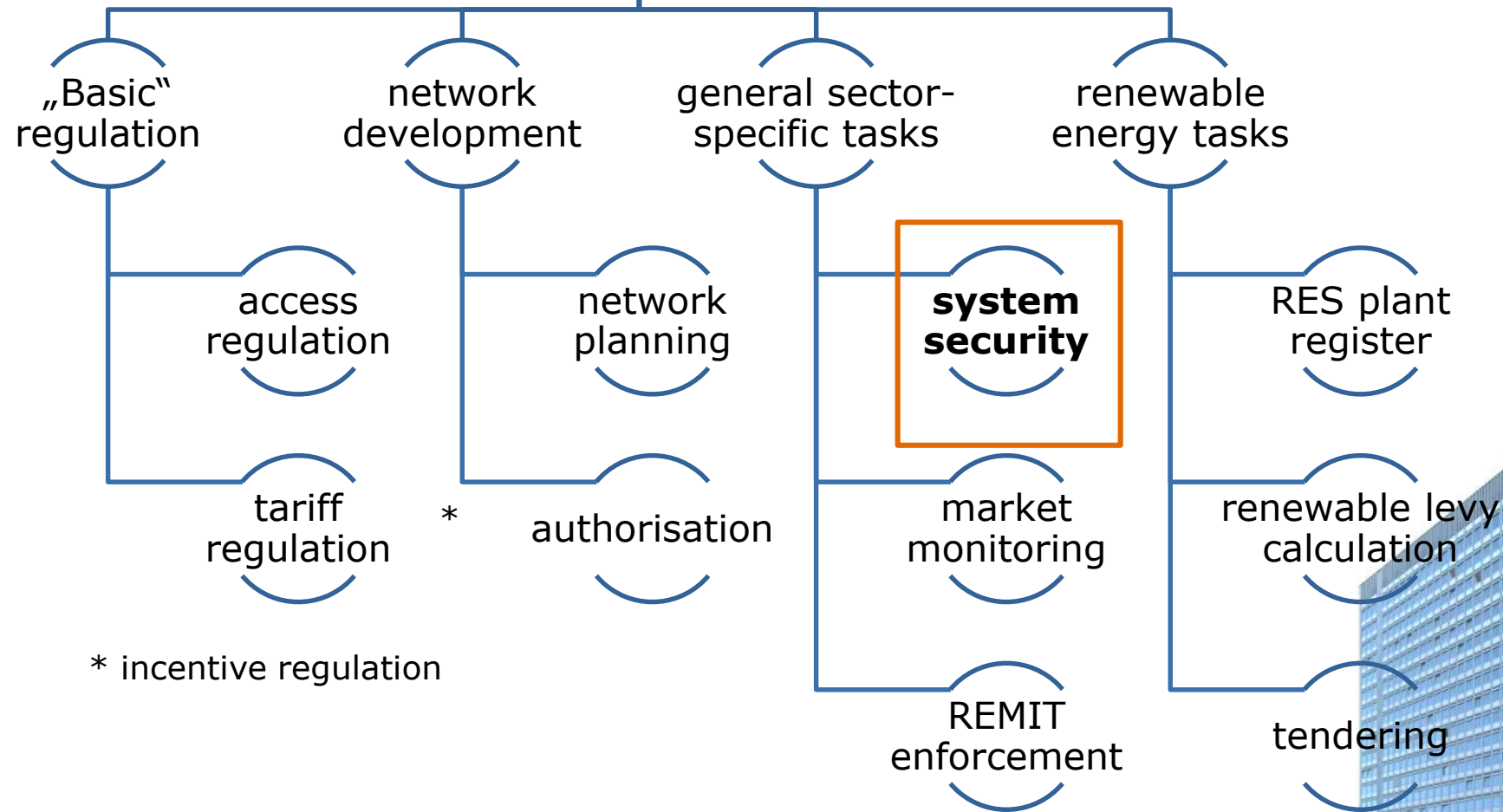


www.bundesnetzagentur.de

About the Bundesnetzagentur



Bundesnetzagentur Energy Department



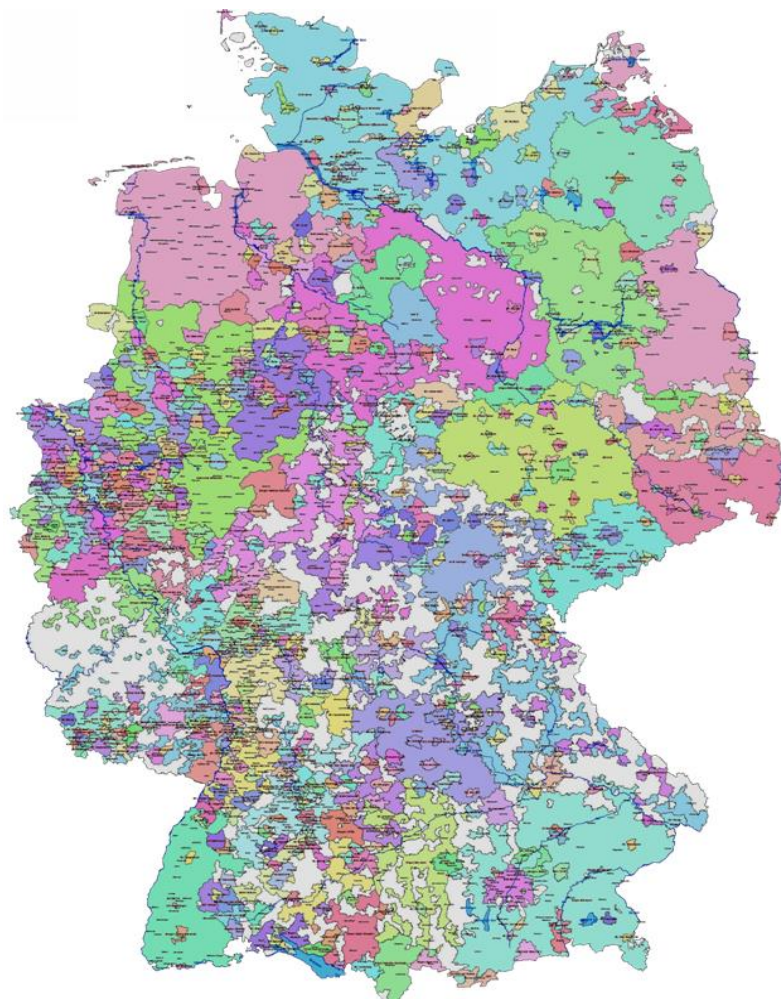
The German Energy Landscape



4 Transmission System Operators



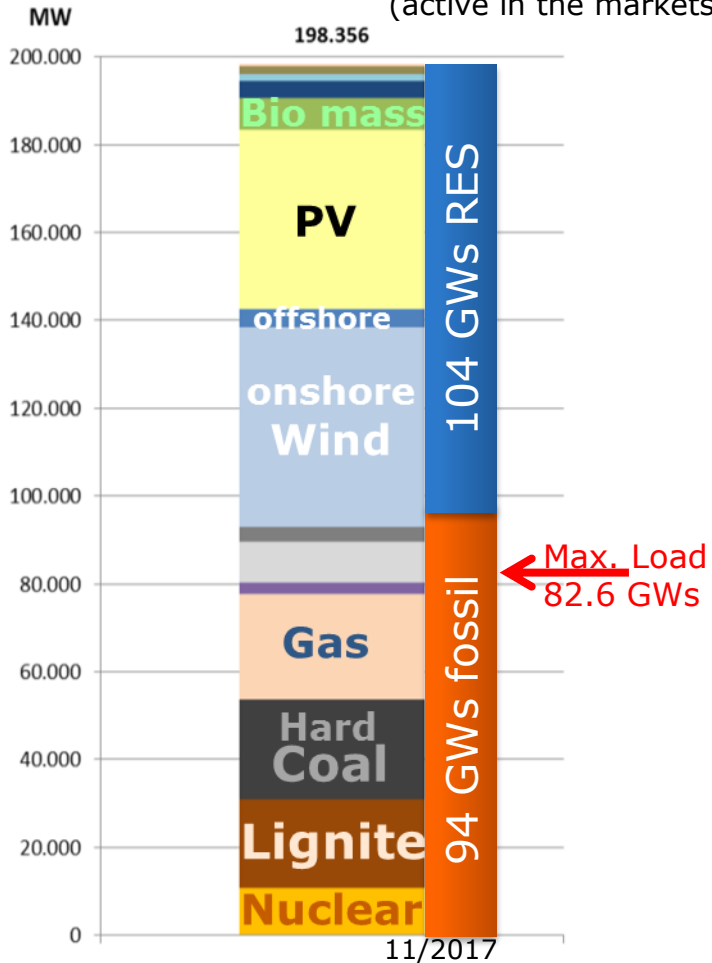
Ca. 800 Distribution System Operators





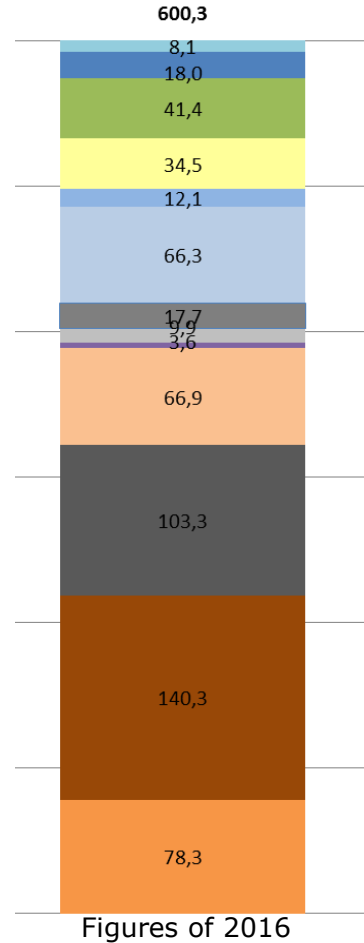
Installed power capacities: ~200 GWs

(active in the markets)

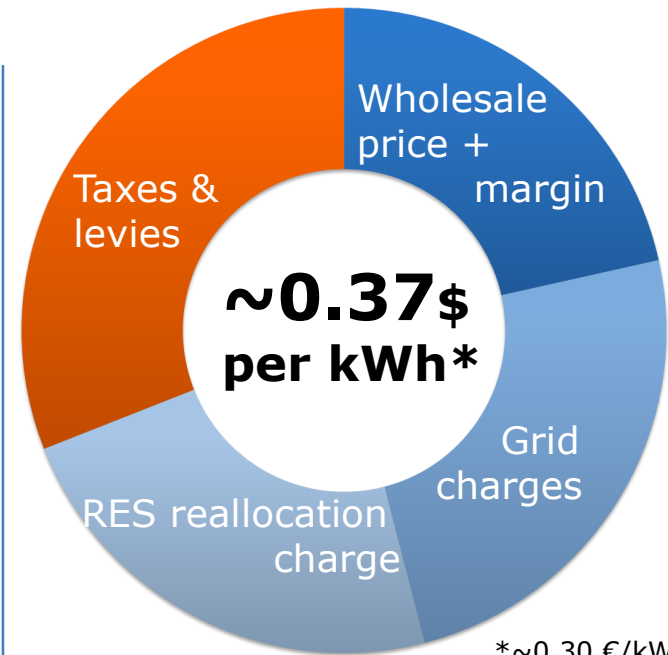


Annual Production: ~600 Terawatthours

(thereof 180 TWhs RES)



End-consumers' bill

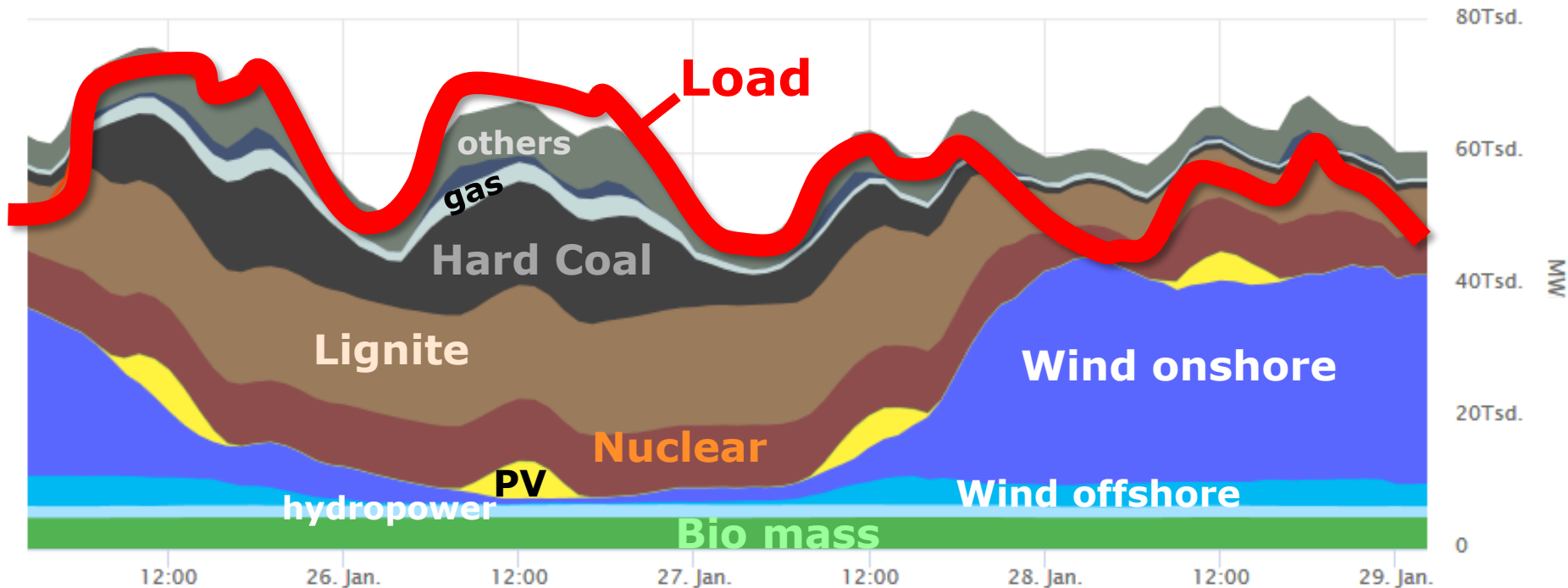


*~0.30 €/kWh, average German household in 2017
27.02.18 6

Electricity Supply & Electricity Transport



- January 26 and 27, 2018: notably low share of renewables in energy production
- Before and after: renewables almost match demand in GER



- Conventional Generation is not fully flexible
- High Volatility of feed-ins of renewable energy sources
- Challenge: further increase of renewable capacities...

Offshore wind power



Installed 2016:
4.1 GW
In 2030:
~15 GWs

Onshore wind power

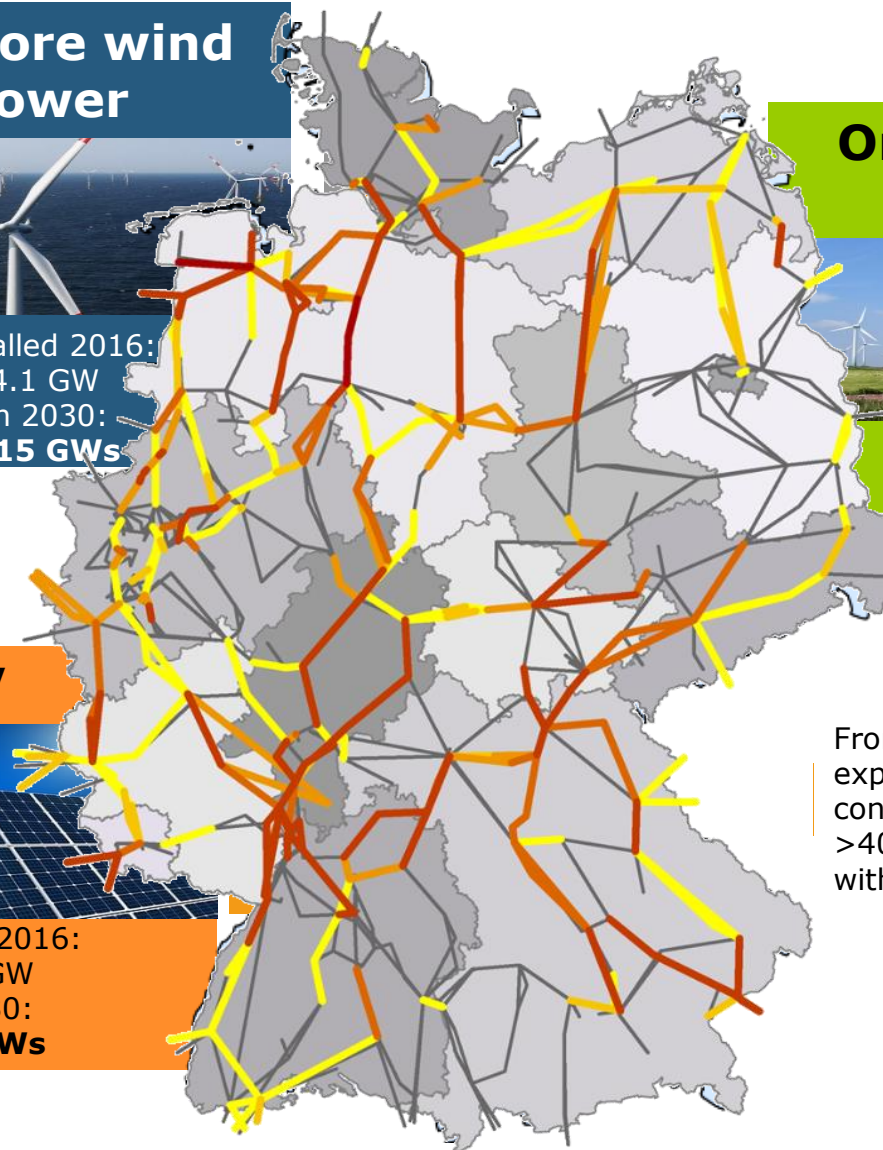


Installed 2016:
46.2 GWs
In 2030:
~60 GWs

PV



Installed 2016:
40.5 GW
In 2030:
~75 GWs



Figures for 2030 highly preliminary!

From yellow to red:
expected network congestions from <100 to >4000 hours p.a. in 2024 – without grid expansion



So there has a lot of work to be done – today and in future

- **Network expansion** is and will remain necessary.
- The energy transition involves large investments in transmission and distribution systems.
- However, as long as network expansion will not be completed, several **measures** are in place to solve **network congestions**.
- As well as with regard to the **energy generation** part, back-ups are needed for any highly unlikely occasion in which there is a lack of supply – however without distortion of the markets.

Ensuring Security of Supply & System Reliability in Germany



Two aspects of Security of Supply & System reliability

Transports via electricity grids have to be reliable, despite of high supply in the North and high demand in the South

Sufficient **capacity in generation** is necessary to meet the predicted future energy consumption

System Reliability

Electricity Grid Congestion Mgmt.

Redispatch

RES feed-in
Management

Grid
Reserves

Adaptation
Measures
(last resort)

Demand Side
Management

System Adequacy

Security of Supply

Energy-only Market &
Balancing Energy

Capacity Reserve

Back-up lignite power plants



Upcoming **EU Electricity Regulation** - **Binding law for all member states**

- In order to address **adequacy concerns** that cannot be eliminated by other (regulatory) measures, Member States may introduce **capacity mechanisms**, subject to the provisions of the Electricity Regulation and to EU State aid rules (-> Treaty of the Functioning of the EU).
- Capacity mechanisms are **temporary** measures. After a specific period, renewed adequacy assessments are needed.

Capacity mechanisms can have various **designs**:

- (de-)centralized
- Technology-neutral vs. -specific
- Part of the market vs. back-up solutions (e.g. reserves)

Current and future challenges



Regulatory targets

- **Security of supply and system reliability** call for proper regulation of the grids. Grid operators are in charge to implement effective measures.
- **Costs** of security of supply measures and of network development must be limited as far as possible.
- **Liberalization** is a high achievement. Prior accomplishments in liberalization must not be compromised. Measures to restrict competition should be avoided.

System Adequacy

- **Free price** formation is of utmost importance for the energy-only market in order to have **right incentives**.

Electricity Transport

- **Grid expansion** has a high **priority**.



Thank you for your attention

Florian König

Bundesnetzagentur – Section 601, Energy Economics

Tulpenfeld 4, 53113 Bonn, Germany

+49 228 14 5788

florian.koenig@bnetza.de

Back-up



Grid operators are legally authorized and obliged to take certain measures to maintain the **safety and reliability of the electricity supply system.**

- **Redispatch:** Reduction and increase of the power supply of power plants on request of grid operators, by legal obligation, *with* reimbursement of costs
- **Grid reserves:** use of power plants to procure missing redispatch power from the grid reserve by contractual agreement, *with* reimbursement of (total) costs
- **Feed-in management:** reduction of electricity supply from renewable energy and CHP plants at the request of the TSO, *whilst maintaining granted RES feed-in payments*
- **Adaptation measures:** Adjustments of power supplies and / or power take-offs at the request of the grid operator, if other measures are insufficient, *without* compensation (last resort)



Every producer and consumer in Germany is included in a “**balancing group**”. Within a balancing group, demand and supply have to match, otherwise penalties apply. By this, the energy-only market provides incentives to contribute to security of supply.

Despite very careful planning, it may happen that the actual consumption in a balancing group does not match generation. In that case, TSOs adopt different types of measures:

- **Balancing (or control) energy:** energy (MWh) activated by TSOs to maintain the balance between injections and withdrawals.
- A new **capacity reserve** in Germany is **intended as backup** in case of **unforeseeable events** in the electricity network and if market-based options are not available anymore.
- So-called “**climate reserve**”: Select **lignite power plants** with a total capacity of 2.7 GWs will be **phased out** of the market step by step. Each one serves as a back-up reserve for 4 years before its final shutdown.