Bundesnetzagentur

The role of the Bundesnetzagentur for the energy sector in Germany

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Overview

- Insights on grid regulation in the context of the „Energiewende“
- German grid development plan(s) – coordination of cross-country grid infrastructure planning
- Grid investments and grid fees
- Power system cybersecurity
- Q&A, open discussion

Overview

Before we start: Brief introduction of Bundesnetzagentur (Federal Network Agency)

Brief introduction to BNetzA

Independent higher federal authority
in the scope of business of the Federal Ministry of Economic Affairs and Energy

Mission: promote **effective competition in the regulated areas** and **ensure non-discriminatory access to networks**

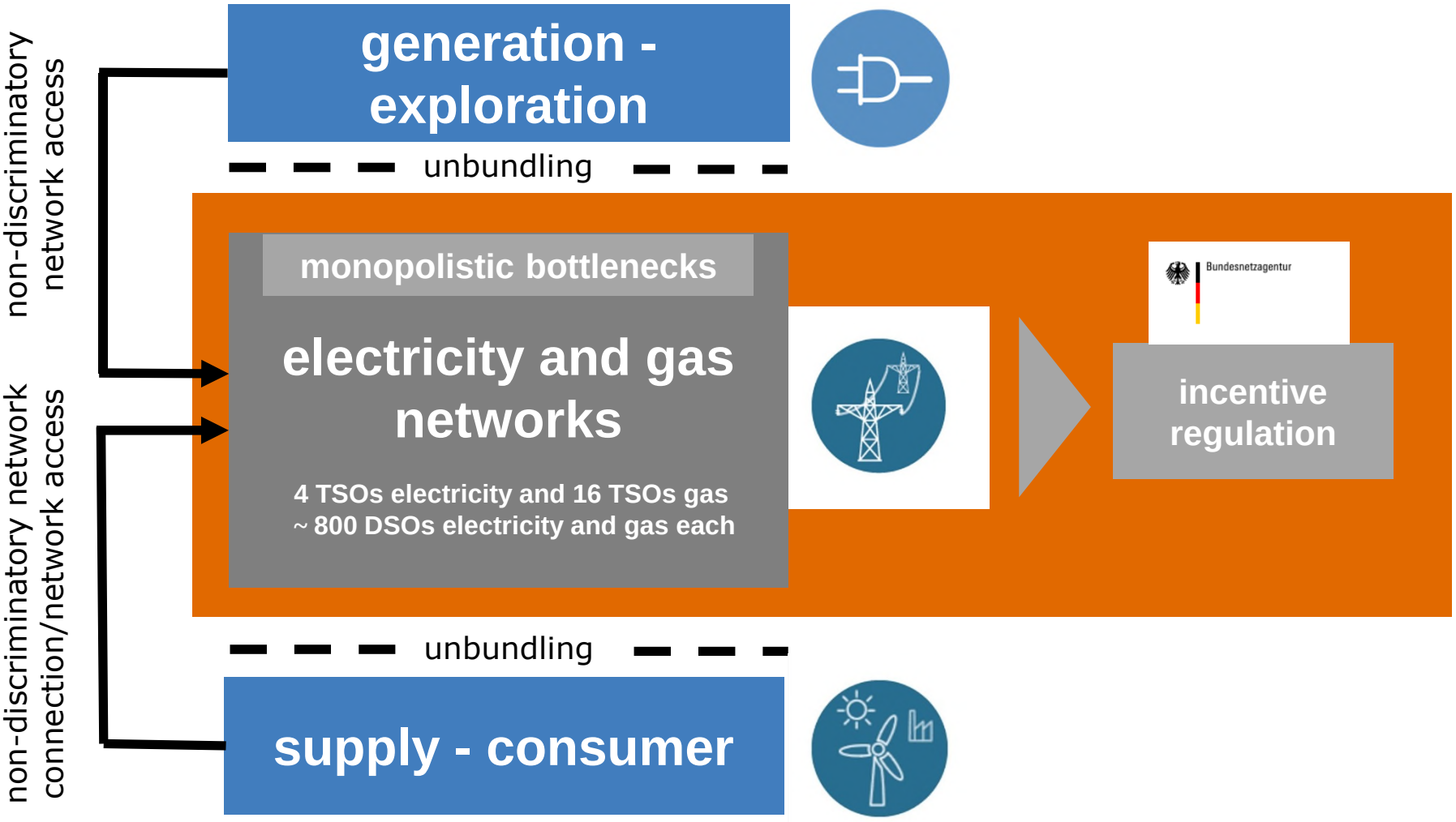
- Telecommunications and Posts (since 1998)
- Electricity and Gas (since 2005)
- Railways (since 2006)
- Electricity and Gas network planning (since 2011)

Ruling Chambers (Beschlusskammern) competent for regulatory decisions and enforcement

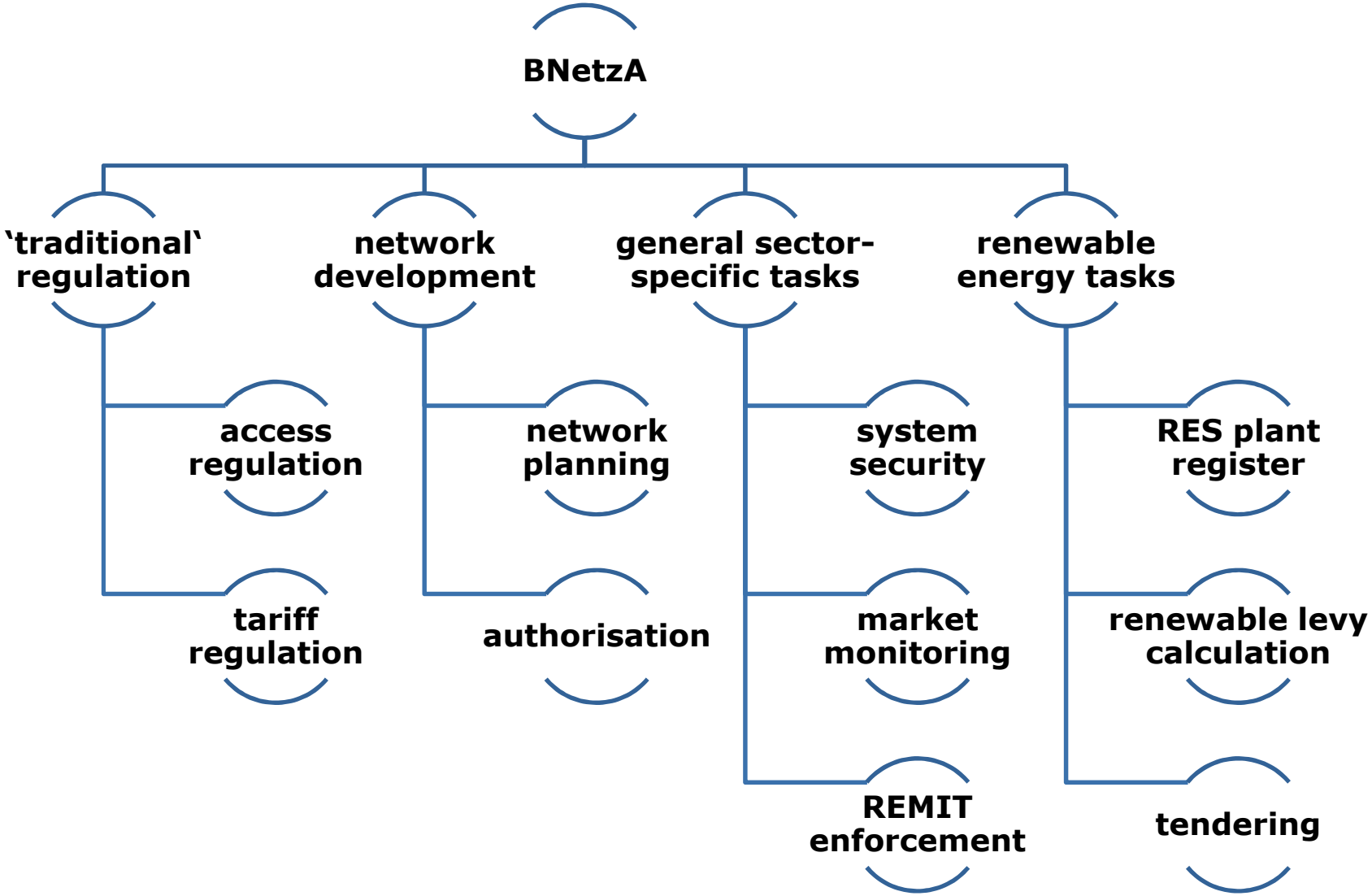
Overall headcount for all sectors: ca. 2700 staff

- 200 staff in energy regulation
- 240 staff for network planning & expansion

BNetzA's tasks in energy regulation (1)



BNetzA's tasks in energy regulation (2)



Regulation and federalism

Bundesnetzagentur (Federal Network Agency)

- Competent authority for all large (≥ 100.000 connected customers) and trans-regional network operators
- Benchmarking for all network operators (except DSOs in simplified procedure)

State Regulatory Authority

- Competent authority for DSOs with less than 100.000 customers connected
- Bnetza acts on behalf of the authorities of five federal states (“Organleihe”)

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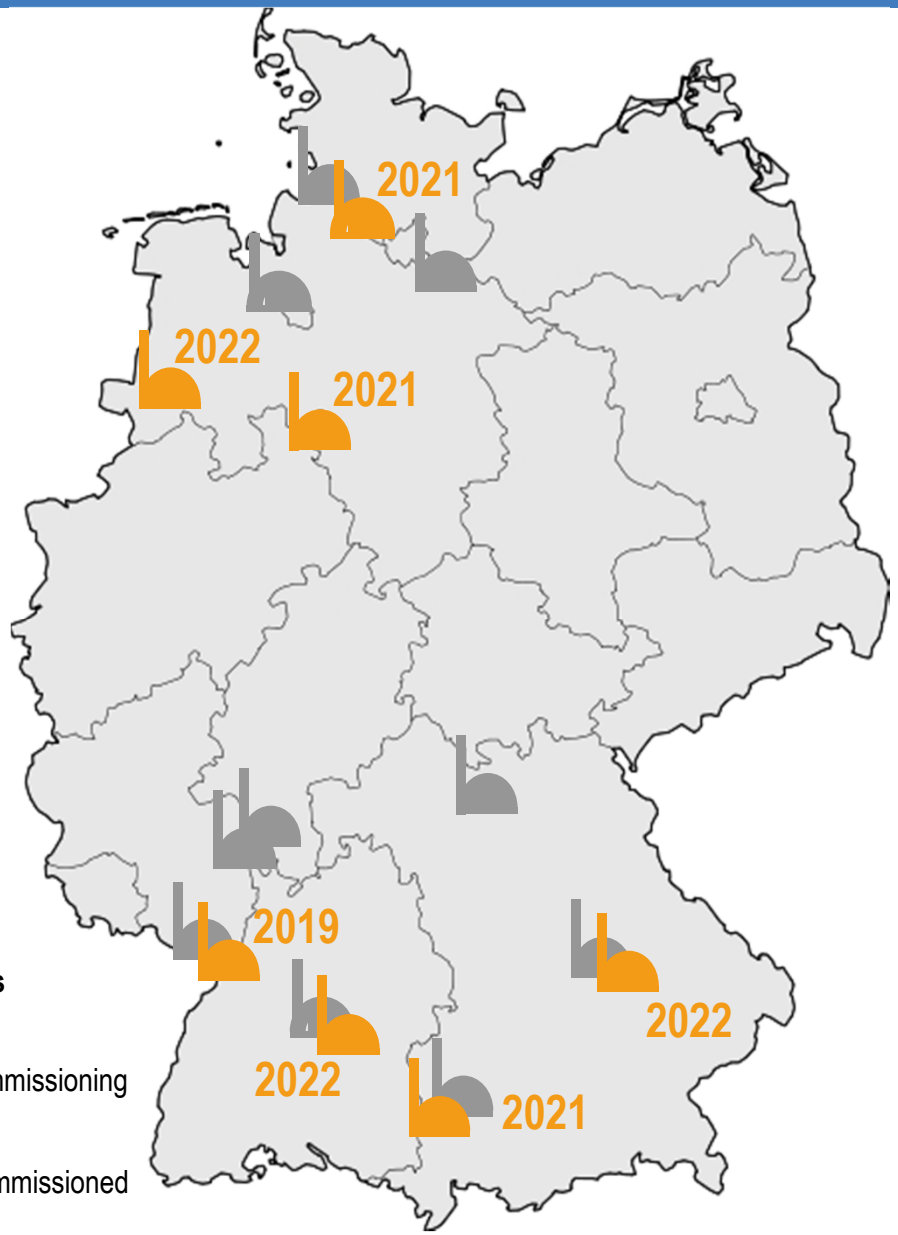
Changes in the German energy mix

Offshore wind

5,4 GW in 2017
Growth until 2030:
11,6 -14,6 GW

Photovoltaic

42,4 GW in 2017
Growth until 2030:
30,5 – 62,1GW



Onshore wind

50,5 GW in 2017
Growth until 2030:
23,8 – 35,0 GW

- Nuclear phase-out by 2022

Congestion Management

Already today: bottlenecks in the grid need to be actively managed to ensure security of supply

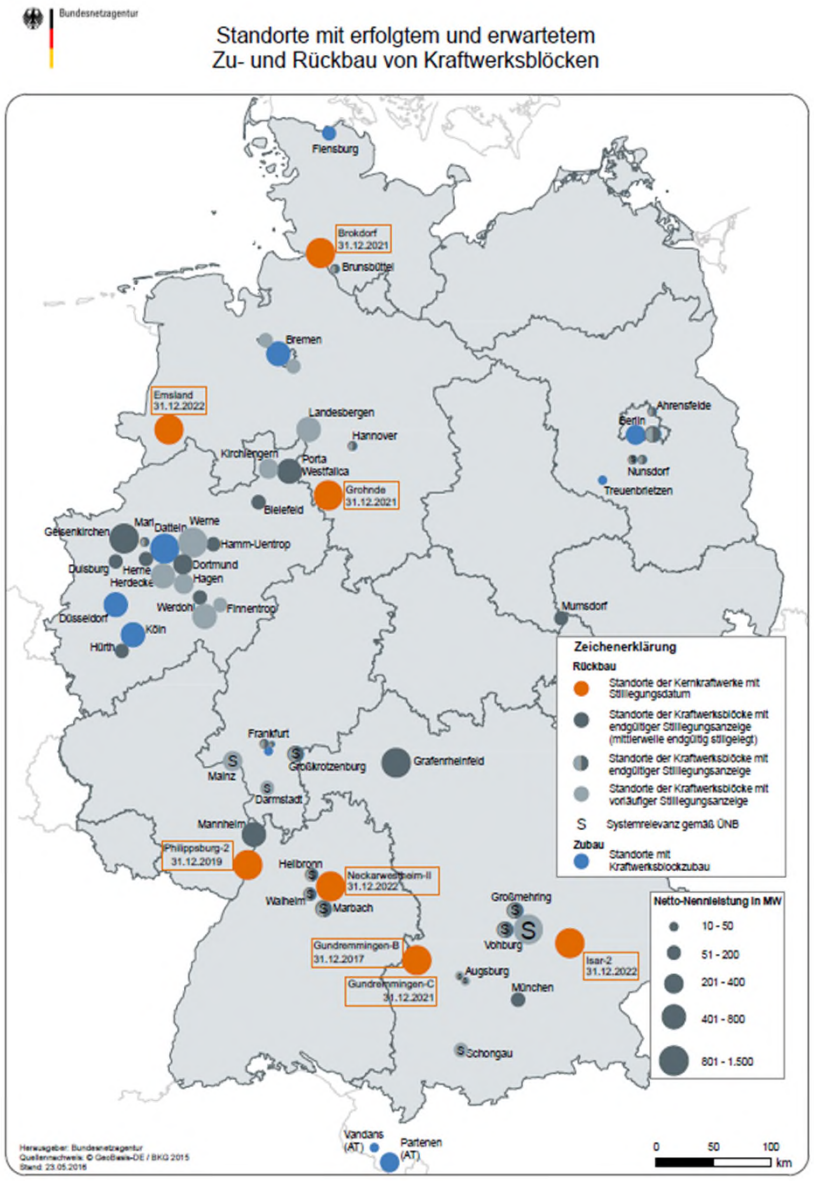
- Redispatch and/or feed-in management required in order to stabilize the grid if feed-ins and loads do not balance out due to bottlenecks.
- If regular redispatch capacities are insufficient, activation of network reserve power plants secure supply at a frequency of 50 Hz.

Network and system security 2016 to 2017 (excl. Network reserve)

	Redispatch		Feed-in management	
	Reducing and increasing electricity feed-in from power plants by TSOs (in GWh)	Costs	feed-in from renewable energy sources and combined heat and power plants blocked by TSOs and DSOs (in GWh)	Estimated claims for compen-sation (in Mio. Euro)
2016	**11.475**	**222,6**	**3.743**	**373,0**
Q 1	3.895		1.524	149,1
Q 2	1.939		534	54,4
Q 3	1.452		551	56,0
Q 4	4.189		1.134	113,2
2017	**18.456**	**396,5**	**5.518**	**610**
Q 1	8.470	172,1	1.412	141,9
Q 2	3.192	70,7	1.364	146,4
Q 3	2.144	59,3	435	47,5
Q 4	4.649	94,5	2.307	274,1

- ➢ To add: appr. 415 mio Euro for the Network Reserve
- ➢ Costs for congestion management are rising (**more than 1.4 bn Euro in 2017**)

Shutdowns



78 announcements of shutdowns of power plants, capacity in total **14.7 GW** (as of March 2018)

- Shutdown can be prohibited if shutdown creates systemic risks
- Prohibition of shutdowns: 20 power plant units (3.8 GW)
- Still enough power capacities
- **BUT: insufficient grid capacities**
  - ➢ Network Development

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Grid development plans

Two very basic questions:

- **What** do we need regarding the energy infrastructure?
- **How** are we going to achieve the set targets?

These questions apply to both, the national and European level

European level – TYNDP and TEN-E Regulation

- Bi-Annual calculation of the TYNDP by ENTSO-E
- Identification of Projects of Common Interest (PCI)

National level – Grid expansion in Germany (transmission)

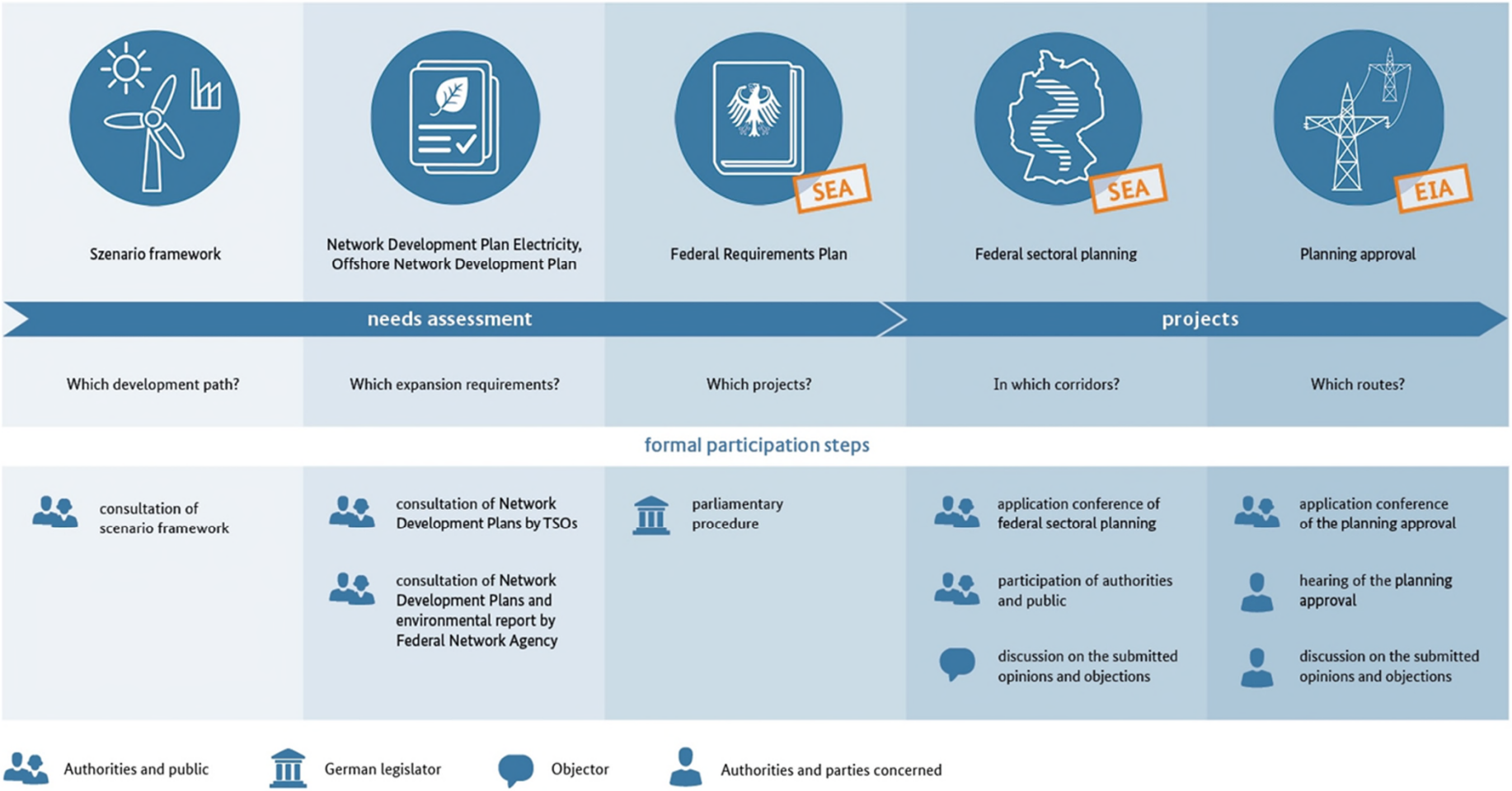
- Network Development Plan
- Federal Requirements Plan Act (BBPlG)
- Grid Expansion Acceleration Act (NABEG)
  - Federal Sectoral Planning procedure (BFP)
  - Planning Approval Procedure (PFV)

TYNDP – CBA (Benefits)

- Improved **security of supply** (SoS) is the ability of a power system to provide an adequate and secure supply of electricity under ordinary conditions
- **Socio-economic welfare** (SEW) or market integration is characterised by the ability of a power system to reduce congestion and thus provide an adequate GTC so that electricity markets can trade power in an economically efficient manner
- **RES integration**: Support to RES integration is defined as the ability of the system to allow the connection of new RES plants and unlock existing and future "green" generation, while minimising curtailments
- Variation in **losses** in the transmission grid is the characterisation of the evolution of thermal losses in the power system.
- Variation in **CO2 emissions** is the characterisation of the evolution of CO 2 emissions in the power system (unlock of generation with lower carbon content)
- Technical **resilience/system safety** is the ability of the system to withstand increasingly extreme system conditions (exceptional contingencies)
- **Robustness/Flexibility** is the ability of the proposed reinforcement to be adequate in different possible future development paths or scenarios, including trade of balancing services

National grid development

Overview of the process



Network Development Plan – 5 steps

biannual process TSOs: Proposal BNetzA: Approval

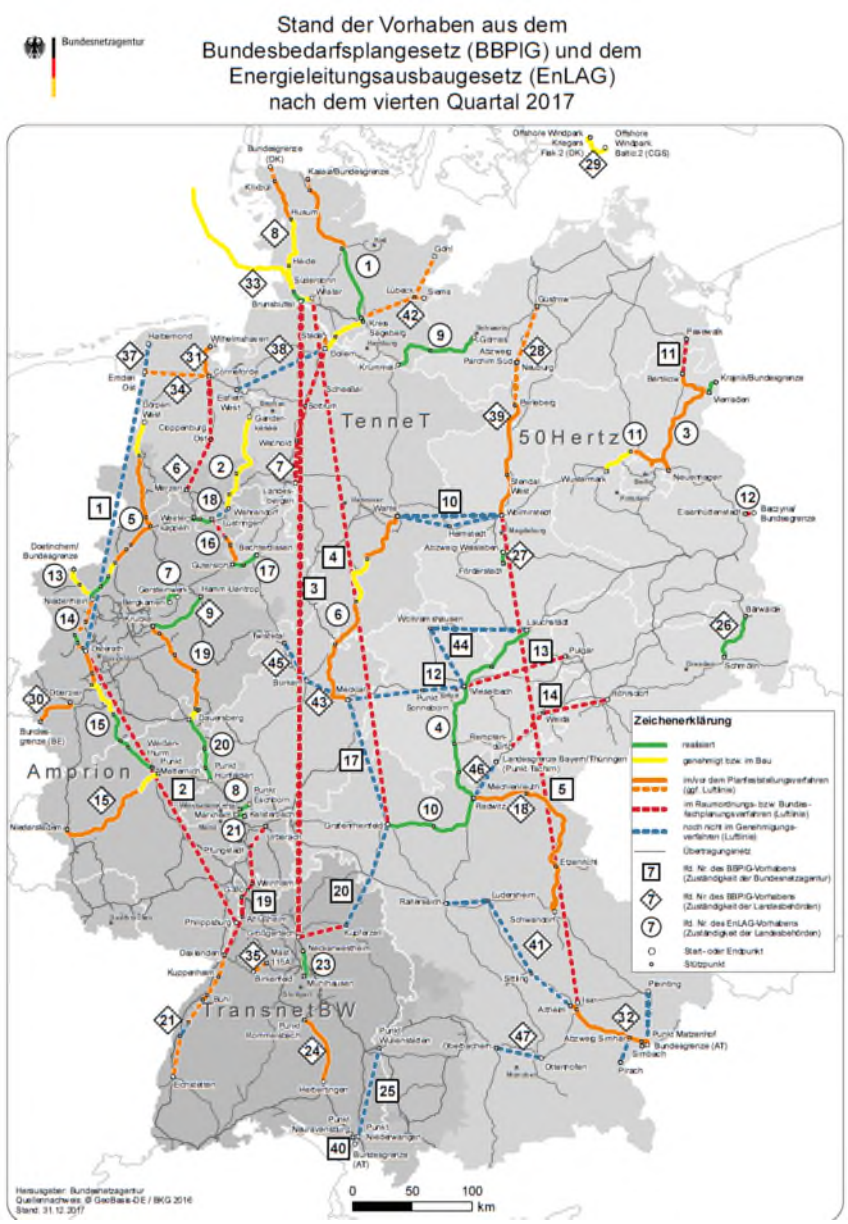
I SCENARIO FRAMEWORK	II REGIONA-LIZATION	III MARKET MODELLING	IV POWER FLOW CALCULATIONS	V GRID EXPANSION ASSESSMENT
Scenario A Scenario B Scenario C (10-15 years) Scenario B (15-20 years)	Regional allocation of generation and consumption	Simulation of generation and consumption per hour in each electrical network node	Calculation and analysis based on the start network	Definition of adequate grid reinforcement and expansion projects
How will the development of renewable energies be? (RES-share)	Where will renewable energies feed into the grid? (north migration)	Which conventional power plants will cover the remaining load? (fossil fuel mix)	Where and when will the grid be overloaded? (grid bottlenecks)	What are the right measures? (NOVA-principle, technology selection)

Right now: scenarios!

A few numbers from our newest scenario development report (June 2018)

	2017 (Reference)	Scenario B 2030
Conventional Generation (GW)	103,5	73,2
Wind Onshore (GW)	50,5	81,5
Wind Offshore (GW)	5,4	17,0
PV (GW)	42,4	91,3
Consumption (TWh)	530,1	543,9
Electric Vehicles (# in Mio.)	0,1	6,0

Network Development Plan 2030



Status of the network expansion as established in the Energy Line Extension Act (Energieleitungs-ausbaugesetz, **EnLAG**) and the Act of the Federal Requirement Plan (Bundesbedarfsplangesetz, **BBPlG**)

Network Development Plan 2017 for the year 2030:

- 96 measures approved by BNetzA
- Network reinforcements: 3700 km
- Network expansion: 2550 km
- Costs of all measures 30-33 Bln. €

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Main features of German regime (1)

- objective: enhance the monopolist's focus on **efficiency** and **quality of supply** and provide for an **adequate investment environment**
- **revenue-cap-regulation (not price cap)**
- **no volume risk,** instrument of 'regulatory account' captures significant changes in volumes transported
- regulatory periods of **five years**
- **equity return** on capital invested is based on a regulatory decision, determined by the Ruling Chamber 4 based on transparent and sound methodology
- incentive regulation **reform** as from 3rd regulatory period with CAPEX true up*, efficiency bonus*, more transparency

* only for DSOs

Main features of German regime (2)

- **benchmarking**
  - **compare efficiency** among network operators
  - **mimic competition**
  - **"x ind" as individual efficiency target** (catch up to best in class)
  - inefficiencies must be reduced within five years
- „x gen" as **general productivity factor** to reflect technological progress and sector specific price developments in the network industry

3 building blocks of incentive regulation

1

cost approval

CAPEX substraction

as from 3rd regulatory period

2

benchmarking

3

determination of revenue cap (budget for TOTEX)

as from 3rd regulatory period

annual CAPEX true up

CAPEX in period top up

budget only for OPEX

network operator sets network charges (method codified in ordinance)

1 Cost approval (key elements)

TOTEX

OPEX

based on income statement*

non-controllable costs | generally controllable costs

CAPEX

\+ **imputed depreciation**
based on regulatory asset base
generally controllable costs

\+ **imputed rate of return on equity**
based on regulatory asset base and capital structure
generally controllable costs

\+ **imputed trade tax**
based on imputed ROR on equity
generally controllable costs

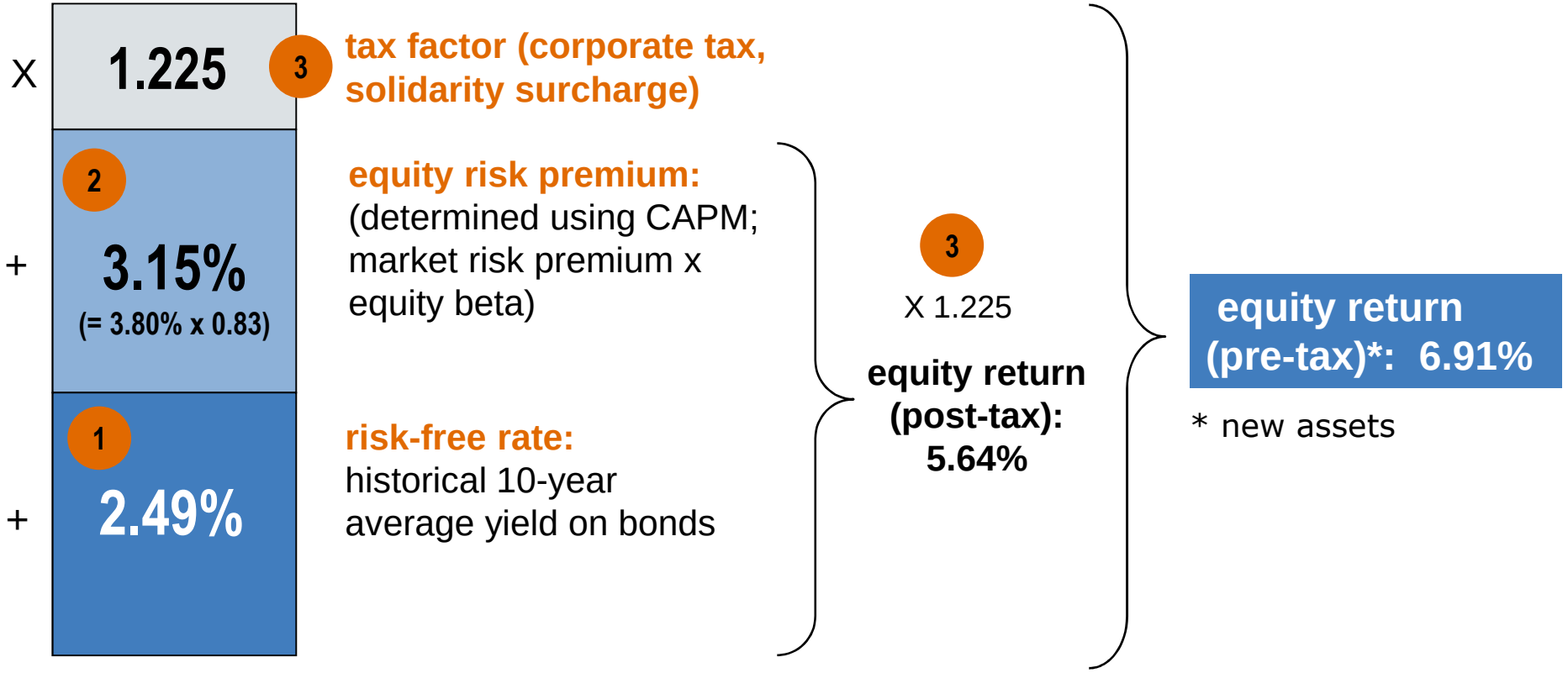
– **income apart from network tariffs**
based on income statement

* cost of debt classified as OPEX

Determination of the equity return

Determination from 05.10.2016 for the 3rd regulatory period.

Determination for electricity and gas.

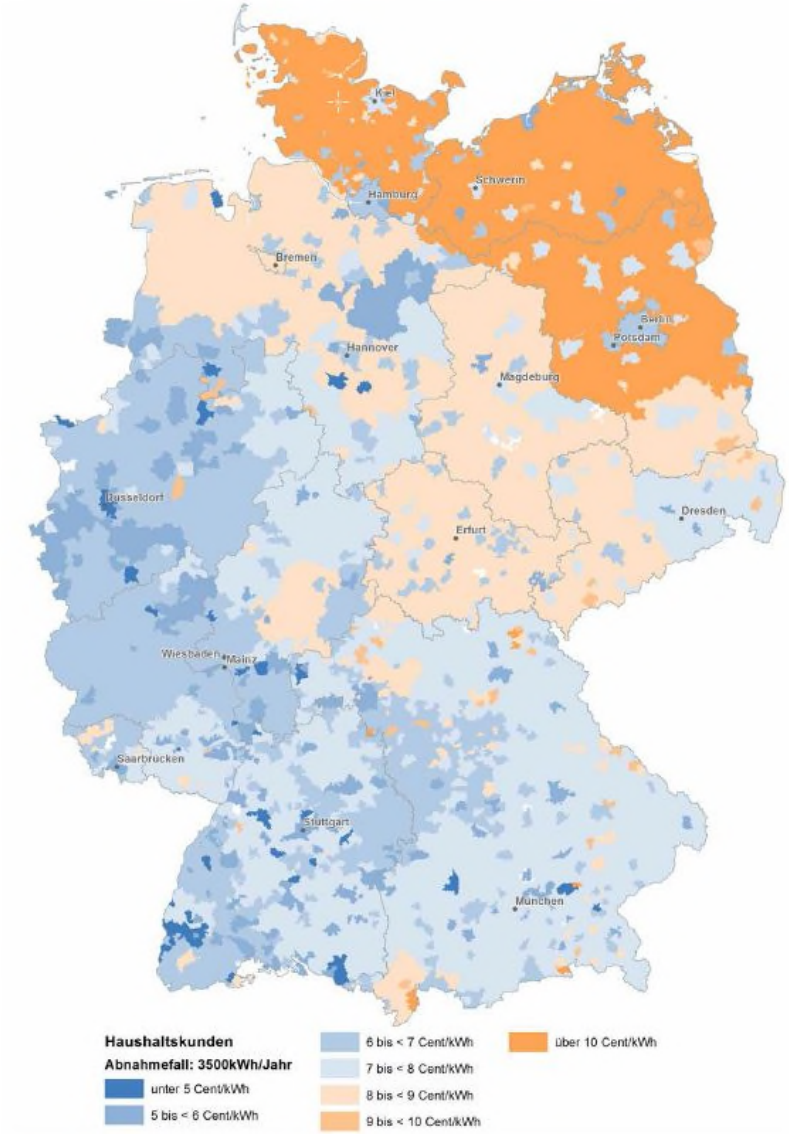


Grid Fees

Overview regional distribution of grid fees for household customers

Differences may be based on:

- Fewer customers
- More/less RES
- Age of the network
- Efficiency of the operator
- Quality of the network
- Different TSO-tariffs



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Power System Cybersecurity

- German Act to Increase the Security of Information Technology Systems (the "IT Security Law")
- obligates critical infrastructure providers to implement minimum IT-security standards, to designate a contact point and to report cybersecurity incidents
  - energy, information technology, telecommunication, transport and traffic, health, water, food, finance, insurance.
- Within the energy sector, requirements are set and overseen BNetzA
- Two IT security requirements catalogues ("IT-Sicherheitskataloge") in consultation with BSI: one for energy grids and one for energy plants
- The IT security requirements catalogue for energy grids was published in August 2015 (following step: implementation and certification process)
- The catalogue for energy plants is still in progress

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Q&A – Possible Topics

Challenges include

- Congestion managements costs will continue to increase.
  - ➢ Technical and regulatory answers?

- Network expansion is and will remain necessary, but public resistance against new lines (TSO).
  - ➢ Public Participation?
  - ➢ Underground cables?

- Getting incentives right (TSO and DSO level) in a context of high investment needs.
  - ➢ Regulatory Framework?
  - ➢ Innovation?

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Thank you for your attention

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