ENTSO-E
Ten-Year Network Development Plan

Trends in the European Energy Industry
TOP EXPO CZ, 24th May 2011 Prague

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Highlights from the Pilot TYNDP

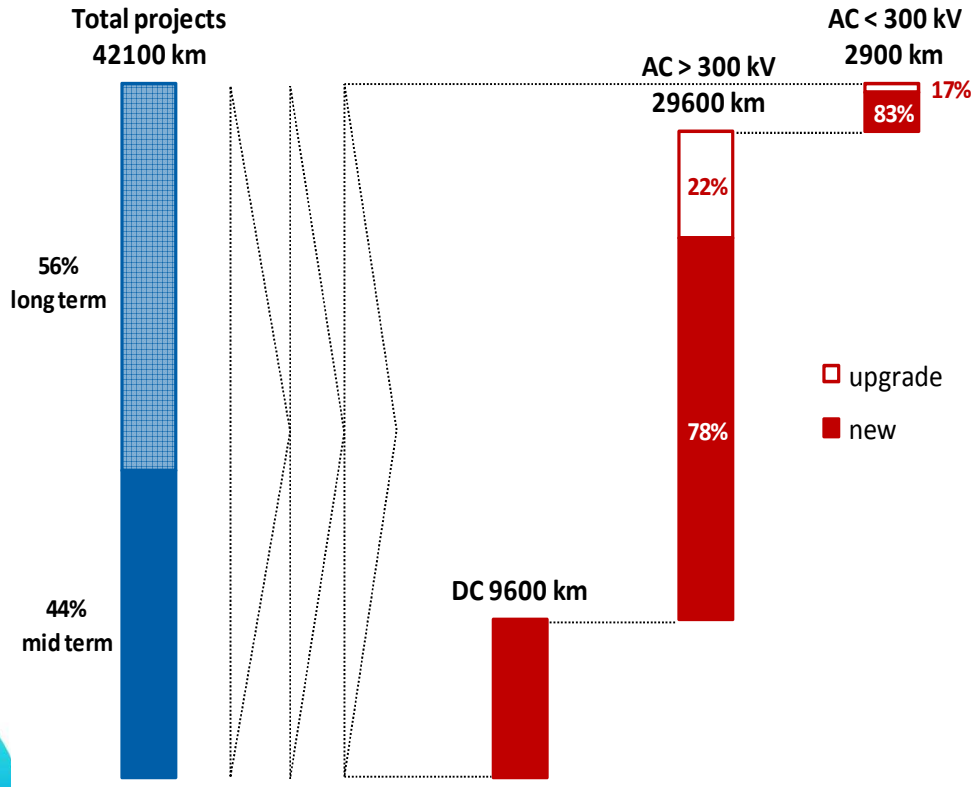
ENTSO-E Tasks defined by Regulation (EC) 714/2009

- A non-binding Ten Year Network Development Plan incl. a European generation adequacy outlook, every 2 years.
- Annual summer/winter generation adequacy outlooks.
- And R&D Plans, common network operation tools, and of course drafting network codes.

Main drivers highlighted from the Pilot TYNDP

- Connection of new generation: RES in the North, conventional generation in the Northern and Eastern part
- Pumped storage in the South
- Security of supply in the global CEE region
- Ageing and obsolescence of the current grid infrastructure

Pilot TYNDP delivered



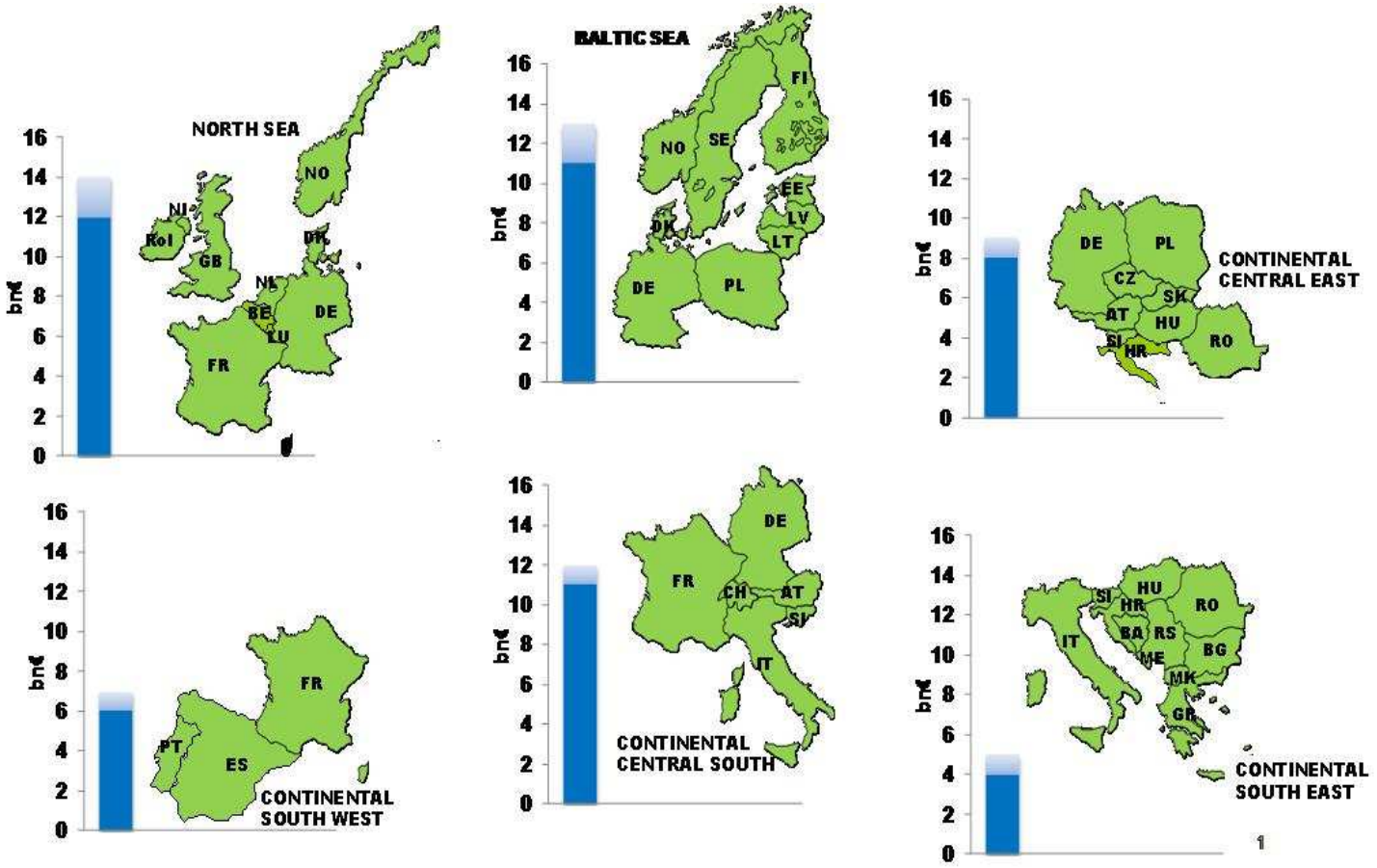
~14% of existing transmission line km

Main drivers for investment in
new or refurbished power lines

Pilot TYNDP delivers

… an impressive investment effort ….

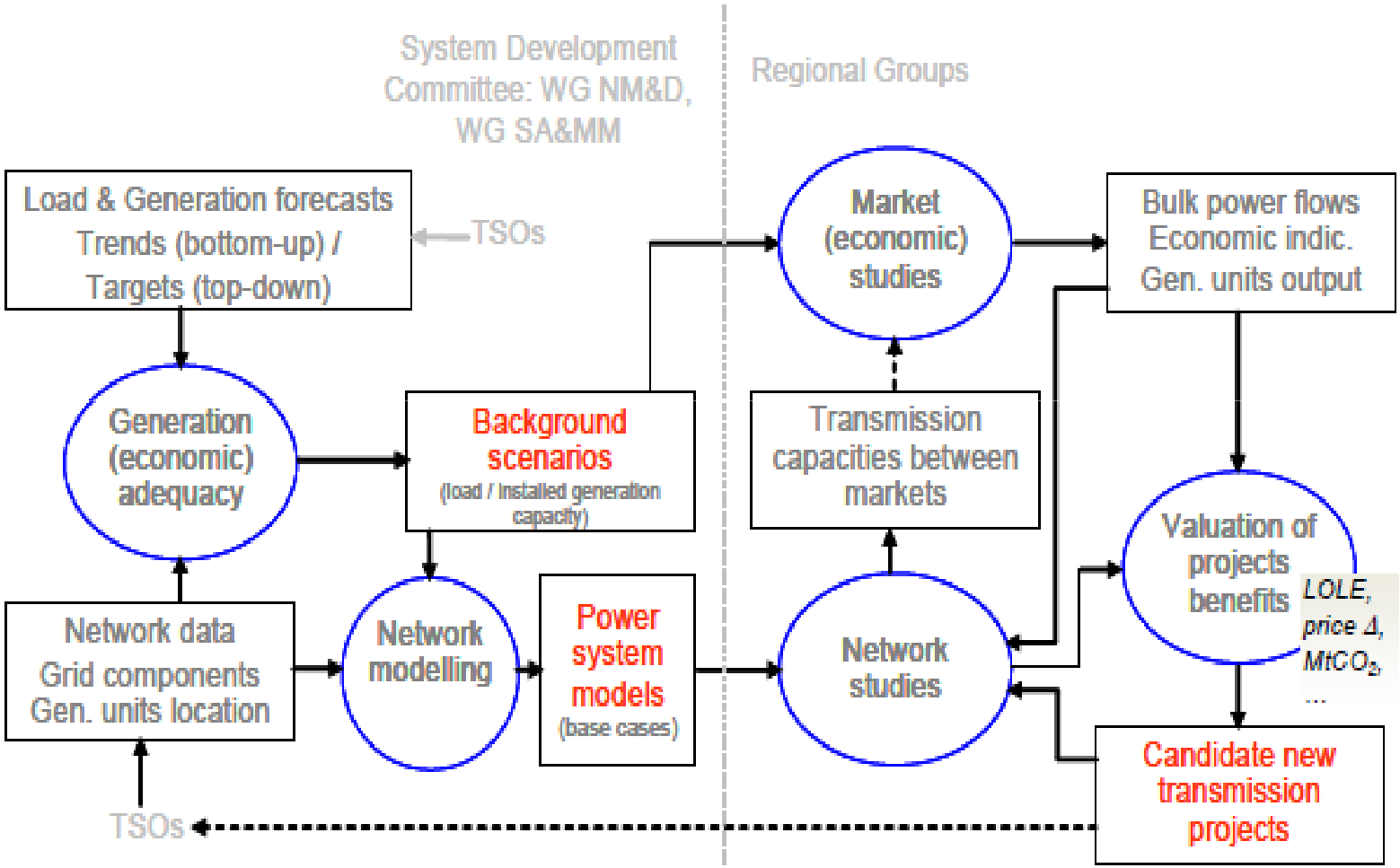
Investment costs of transmission projects of European Significance, period 2010 - 2014



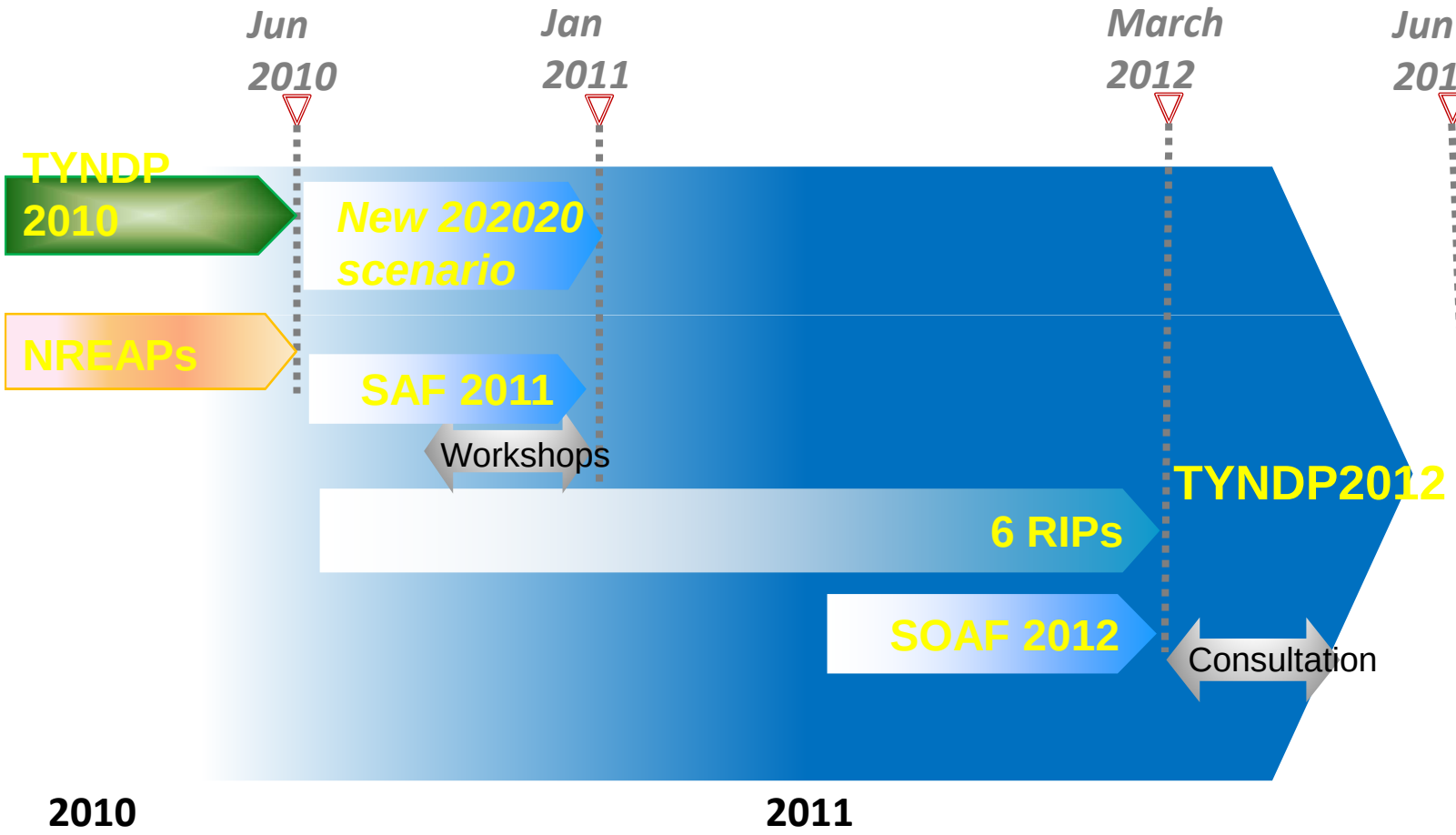
Total ENTSO-E 23 to 28 bn€

2012 TYNDP Process

2012 TYNDP process



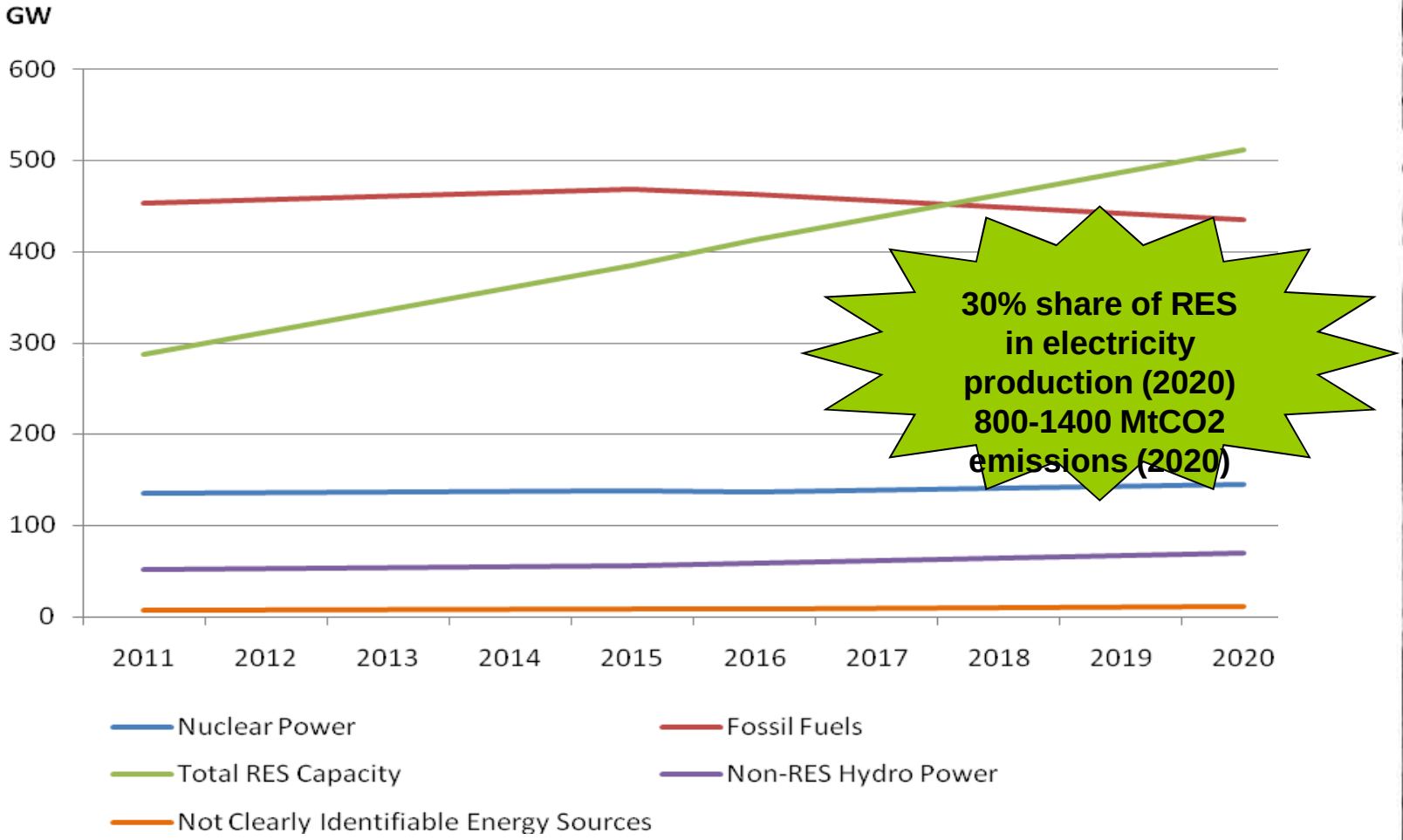
RgIP & TYNDP 2012 Deliverables



Scenario outlook & Adequacy Forecast (SO&AF) 2011

SO&AF EU2020 scenario shows RES increase and beginning decrease of fossil fuel generation

Net generation capacities, all ENTSO-E, January 7 p.m. forecasts



SO&AF EU2020 scenario shows also Load increase at the average rate of 1,5%

[GW]	2011	2015	2016	2020	2025
January	531	557	565	600	637
July	425	450	457	489	523

Table 2.3:
ENTSO-E load forecast for Scenario B

[%]	2011 to 2015	2015 to 2020	2020 to 2025
January	1.2	1.5	1.2
July	1.5	1.7	1.4

Table 2.4:
ENTSO-E average load increase rate for Scenario B

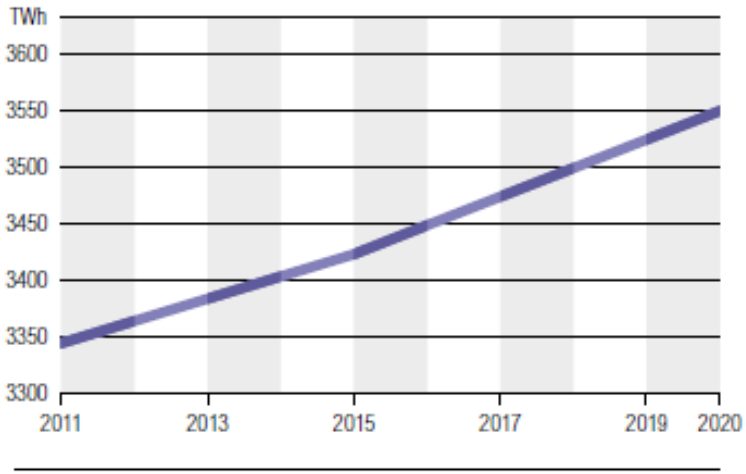
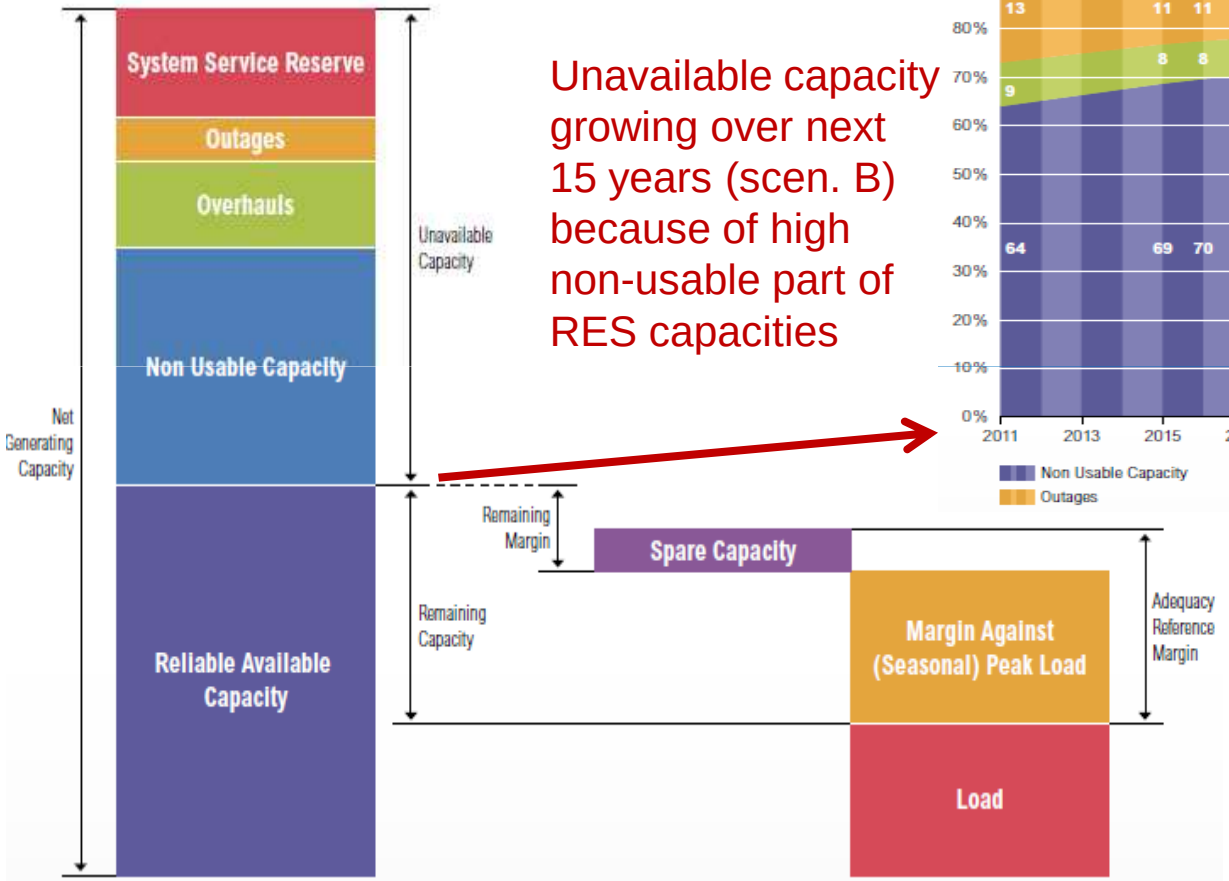
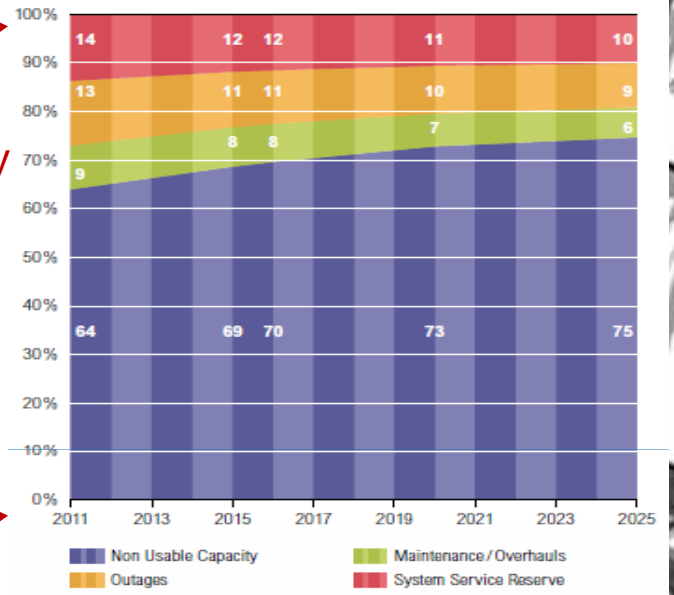


Figure 2.1:
ENTSO-E consumption forecast for the Scenario EU 2020

Adequacy methodology – RES effects on non-usable capacity



Unavailable capacity growing over next 15 years (scen. B) because of high non-usable part of RES capacities



System effects of shutting down several power plants

ENTSO-E LEVEL

- Generation adequacy may or may not be maintained depending on the number of plants shutdown simultaneously (even for short period of time)
- In any case, the generation/demand adequacy margins are reduced

REGIONAL LEVEL

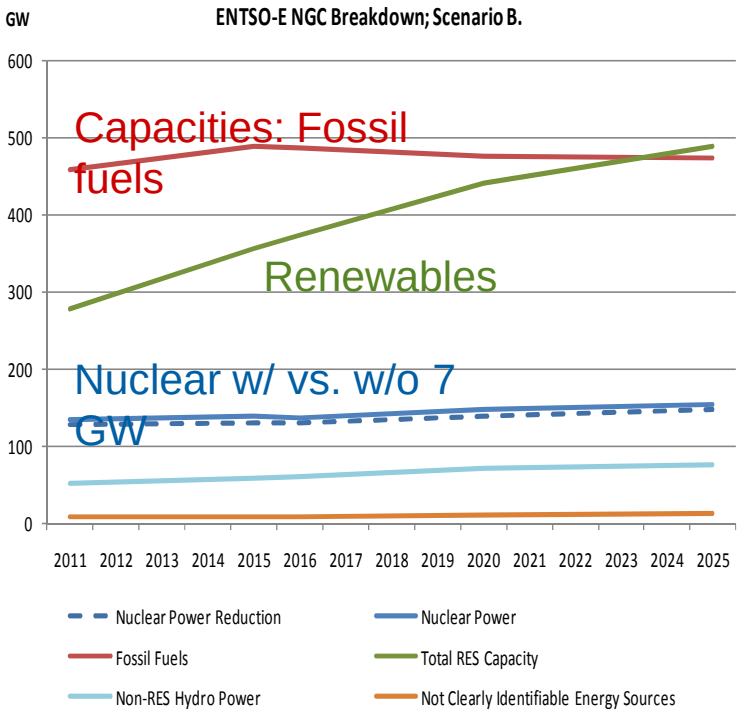
- Specific problems could occur
  - Changes in congestion on interconnections
  - Changes in regional balances
  - Changes in regional energy flows

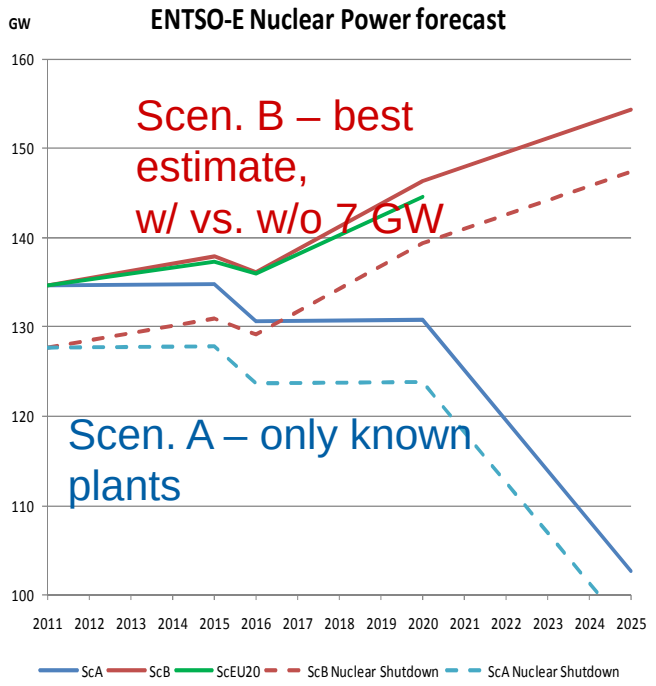
COUNTRY LEVEL

- Problems in operations could emerge due to the stretched network situation
  - Voltage level management will be a challenge in some countries
  - Internal congestion may become more frequent or more difficult to handle
  - International exchange capacities could be affected
  - Routine maintenance of grid components will be more difficult to schedule securely
  - Stability problems could arise
  - The necessary transmission grid reinforcements could be different from prior plans

SO&AF – based sensitivity assessments of German moratorium

ENTSO-E nuclear forecasts under Scenario A and B with 7 GW less





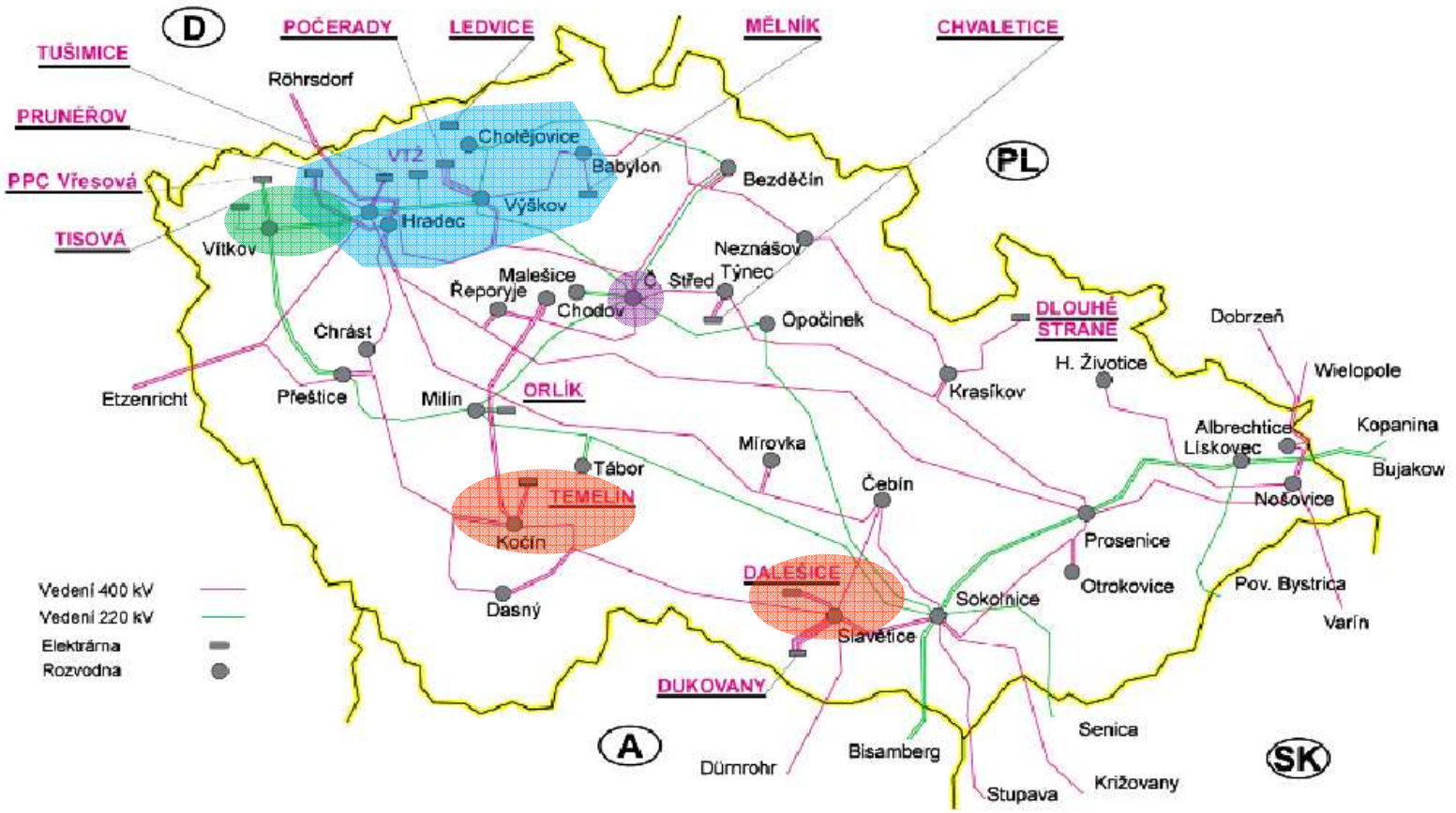
Taking into account the entire ENTSO-E generating capacity, the difference is slight.

Data extracted from: https://www.entsoe.eu/system-development/soaf-2011-2025/

ČEPS grid development investment plan

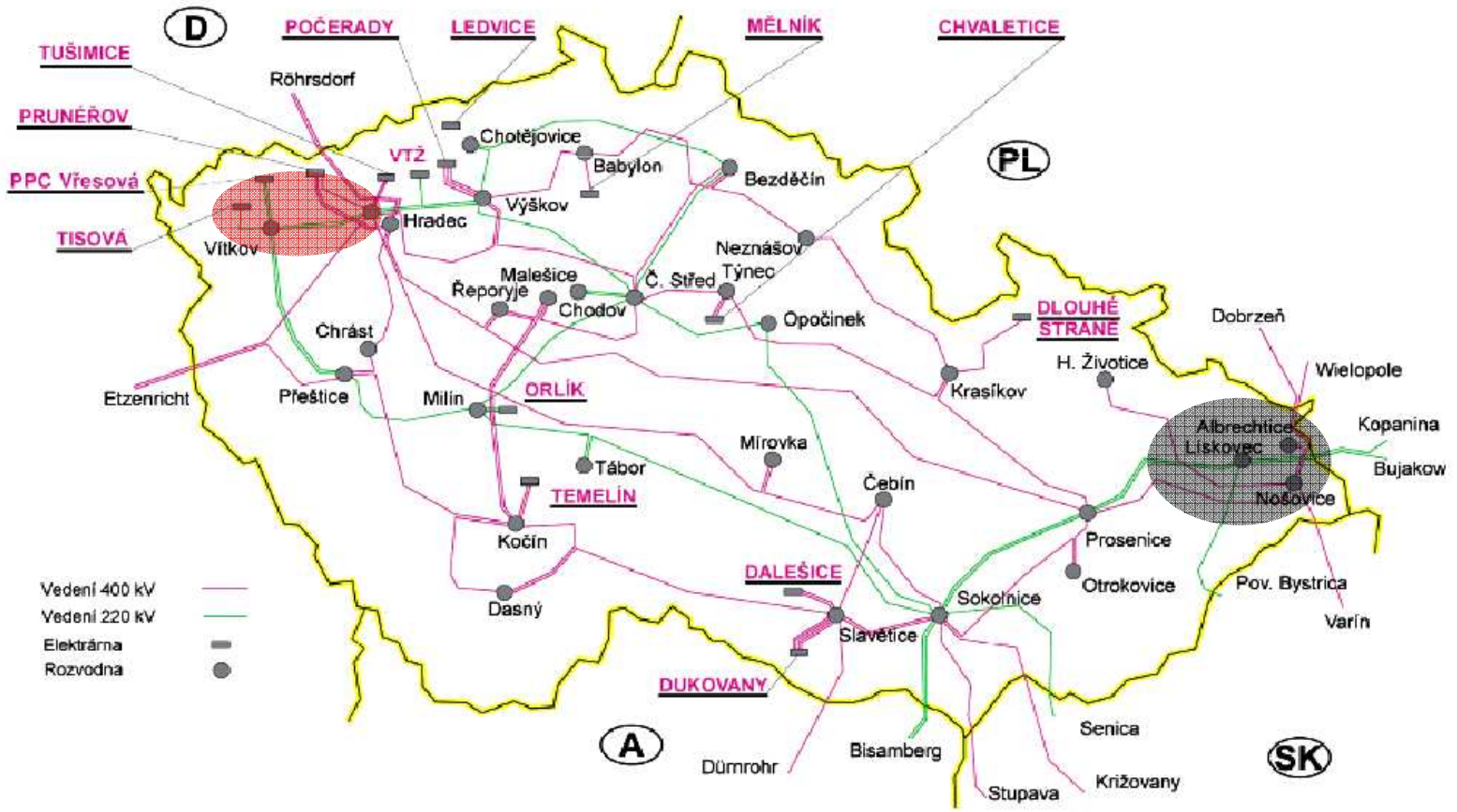
Factors influencing Grid Development (1)

- **Power plants**
  - Modernization of the power plants in the north-west part of the country
  - New nuclear power plants (ETE, EDU)
  - New CCGT power plants – substation VYS, EME, CHT and CST
  - Connection of RES (Wind park into the TS) + PV units into the DS



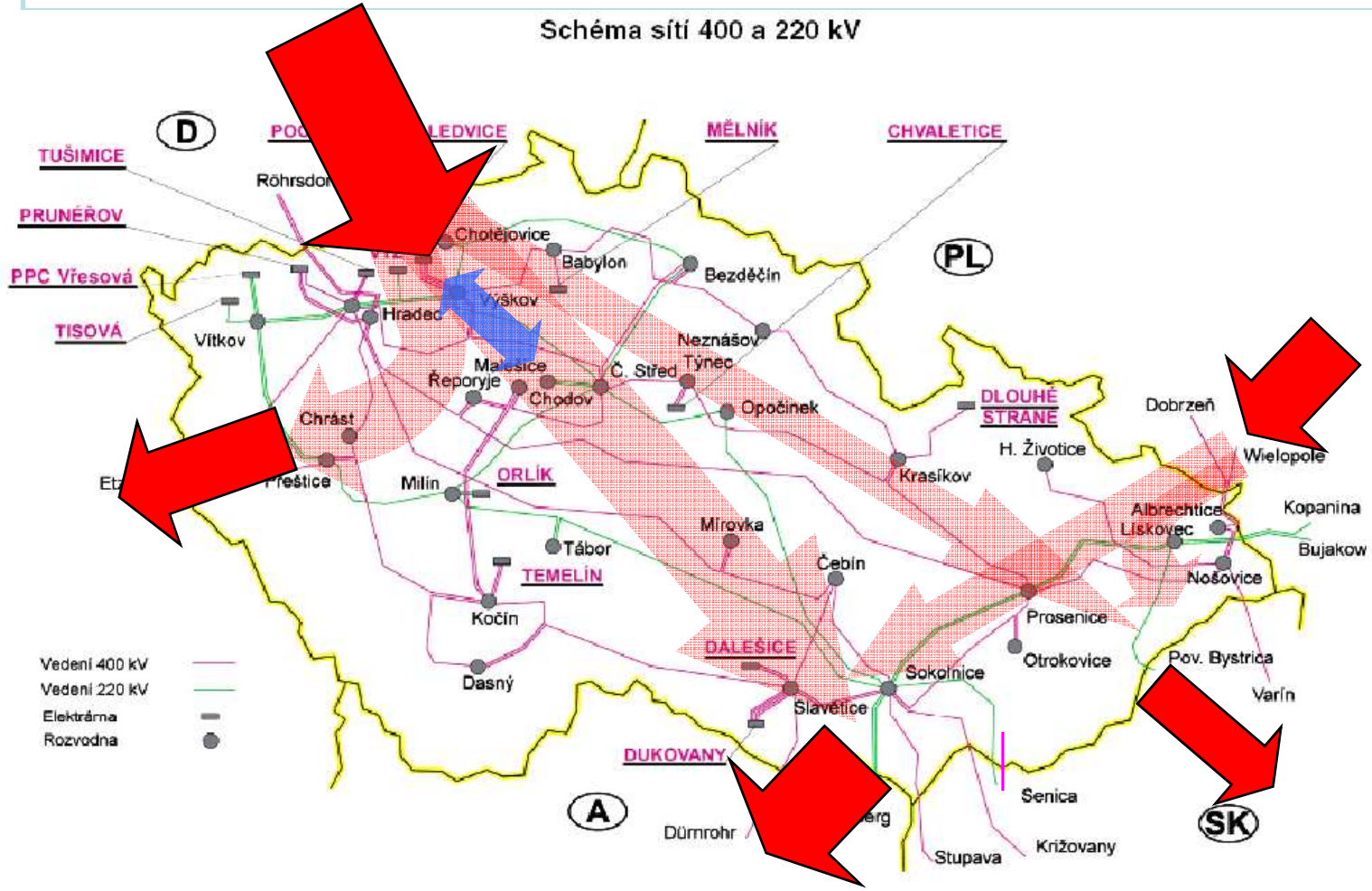
Factors influencing Grid Development (2)

- **Distribution Companies**
  - Significant consumption growth – new node (Ostrava region)
  - Increase of consumption (existing nodes)



Factors influencing Grid Development (3)

- **External influence**
  - Support of European Internal Market
  - Integration of RES – Germany, transits and loop-flows
  - Coordination of grid investments in the region, installation PST “DE-PL”



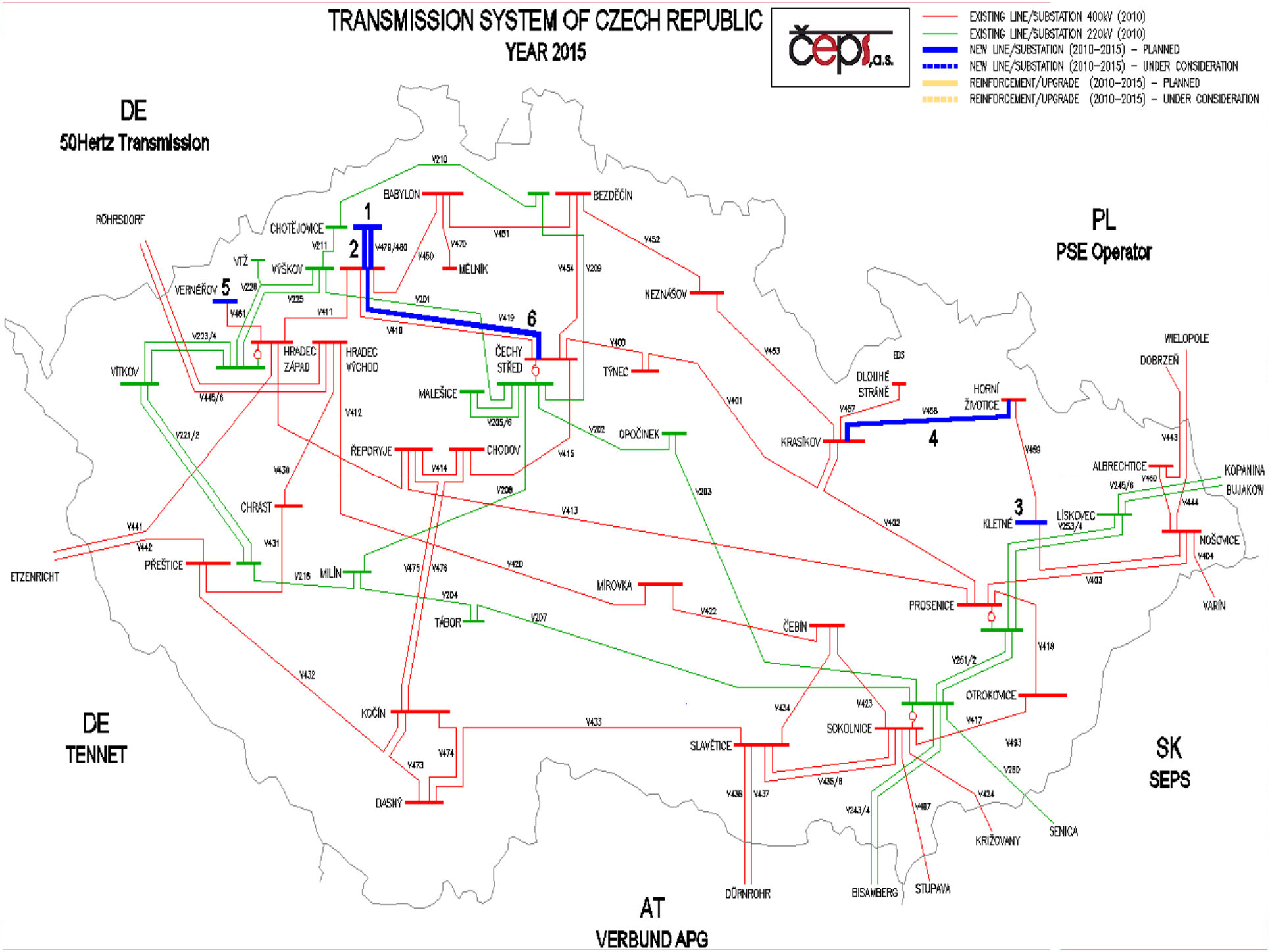
Grid connection applications till 2030

Increase of power generation

- Nuclear power plants: up to 5100 MW
- Lignite power plants: 2024 MW
- CCGT: 4585 MW
- Wind power plants: 140
- Pump storage hydro power plants: 1000 MW
- Photovoltaic units: 41 MW

Σ 12890 MW

Increase of consumption: 1834 MW


TRANSMISSION SYSTEM OF CZECH REPUBLIC
YEAR 2015
ČEPS, a.s.
EXISTING LINE/SUBSTATION 400kV (2010)
EXISTING LINE/SUBSTATION 220kV (2010)
NEW LINE/SUBSTATION (2010–2015) – PLANNED
NEW LINE/SUBSTATION (2010–2015) – UNDER CONSIDERATION
REINFORCEMENT/UPGRADE (2010–2015) – PLANNED
REINFORCEMENT/UPGRADE (2010–2015) – UNDER CONSIDERATION
DE
50Hertz Transmission
PL
PSE Operator
DE
TENNET
SK
SEPS
AT
VERBUND APG
RÖHRSDORF
ETZENRICHT
DÜRNROHR
BISAMBERG
STUPAVA
KRIŽOVANY
SENICA
VARÍN
NOŠOVICE
KOPANINA
BUJAKOW
WIELOPOLE
DOBRZEŇ
ALBRECHTICE
LÍSKOVEC
KLETNÉ
PROSENICE
OTROKOVICE
SOKOLNICE
ČEBÍN
MÍROVKA
SLAVĚTICE
KOČÍN
DASNÝ
TÁBOR
MILÍN
PŘEŠTICE
CHRÁST
ŘEPORYJE
CHODOV
OPOČINEK
MALEŠICE
ČECHY STŘED
HRADEC ZÁPAD
HRADEC VÝCHOD
VÍTKOV
VERNÉŘOV
VTŽ
VÝŠKOV
CHOTĚJOVICE
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V431
V445/6
V412
V205/6
V202
V221/2
V414
V415
V208
V203
V430
V413
V432
V441
V442
V431
V216
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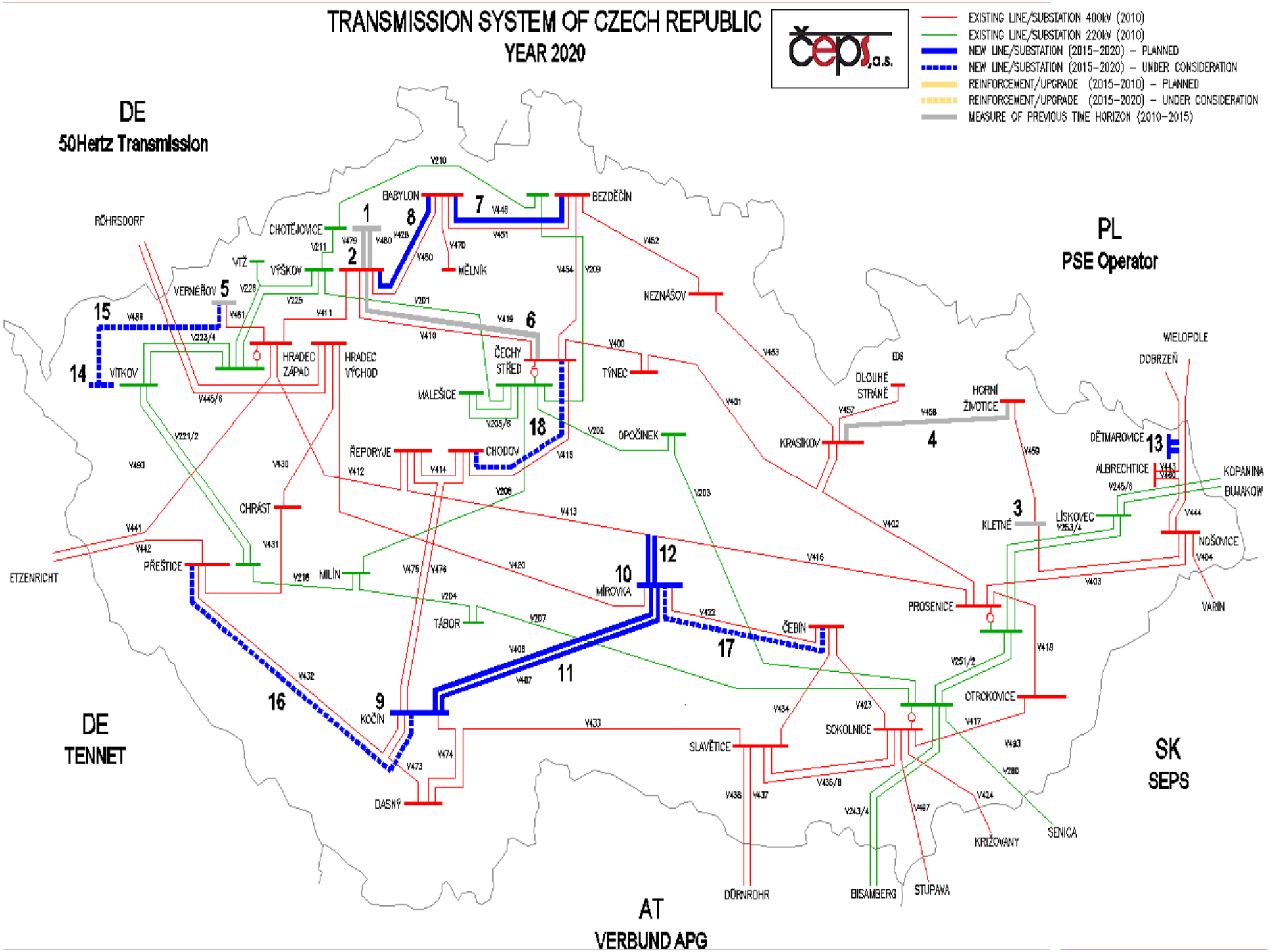
TRANSMISSION SYSTEM OF CZECH REPUBLIC
YEAR 2020
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EXISTING LINE/SUBSTATION 220kV (2010)
NEW LINE/SUBSTATION (2015–2020) – PLANNED
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REINFORCEMENT/UPGRADE (2015–2010) – PLANNED
REINFORCEMENT/UPGRADE (2015–2020) – UNDER CONSIDERATION
MEASURE OF PREVIOUS TIME HORIZON (2010–2015)
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50Hertz Transmission
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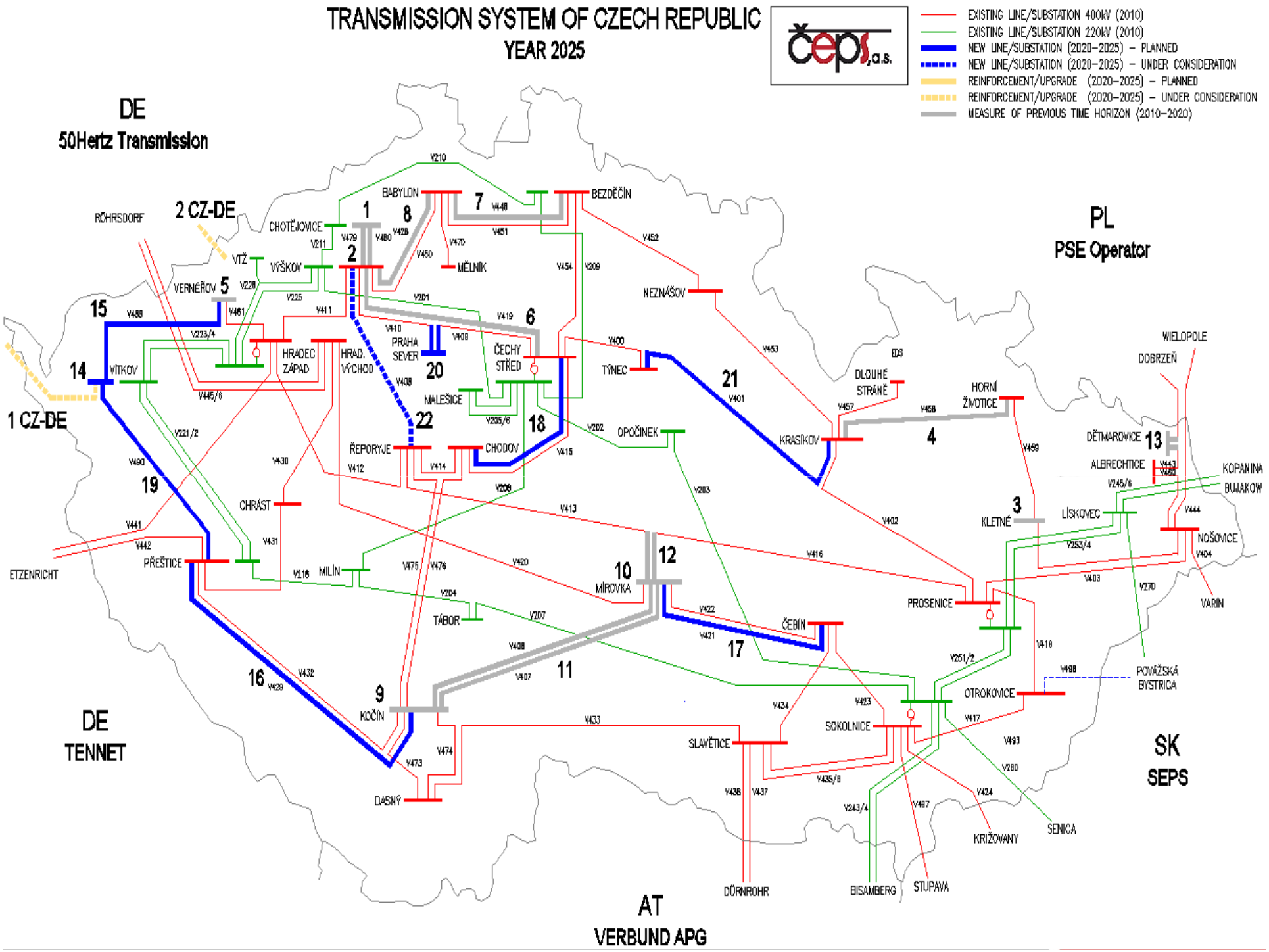
TRANSMISSION SYSTEM OF CZECH REPUBLIC
YEAR 2025
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EXISTING LINE/SUBSTATION 400kV (2010)
EXISTING LINE/SUBSTATION 220kV (2010)
NEW LINE/SUBSTATION (2020–2025) – PLANNED
NEW LINE/SUBSTATION (2020–2025) – UNDER CONSIDERATION
REINFORCEMENT/UPGRADE (2020–2025) – PLANNED
REINFORCEMENT/UPGRADE (2020–2025) – UNDER CONSIDERATION
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Conclusions

Conclusions:

- Harmonization of generation evolution with grid infrastructure reinforcements plans.
- Legal and Regulatory frameworks.
- ENTSO-E investment costs within next four years ranging from 23 to 28 bn€. Only CCE region about 8 bn€.
- In the time horizon 2011 – 2030 ČEPS has to invest more than € 2.6 billions in new infrastructure.
- Coordination of planning and operational measure needed.
- All relevant stakeholders should take part in the process (mitigate uncertainties, harmonize the legal and regulatory framework, and enhance social acceptance of transmission assets).

Well unbundled connectivity

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