System adequacy from a European perspective

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ElCom Forum 2018
29 November 2018

ENTSO-E IN FIGURES

43 TSOs

operating electricity systems & facilitating power markets in

36 countries

(EU + 8)

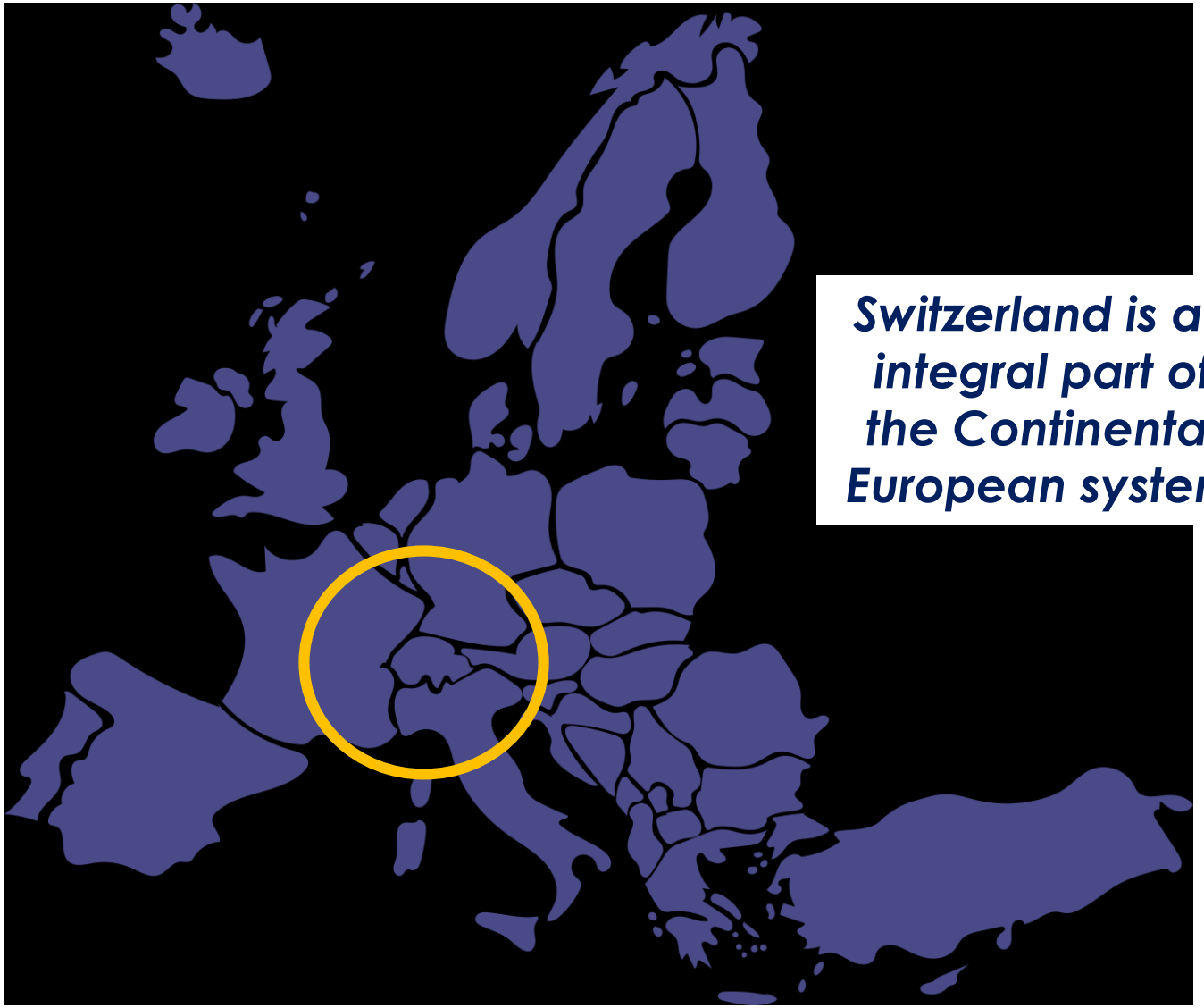
± 435 TWh of electricity exchanged across borders

± 480,000 km of interconnections

This is more than the distance between the Earth and the Moon

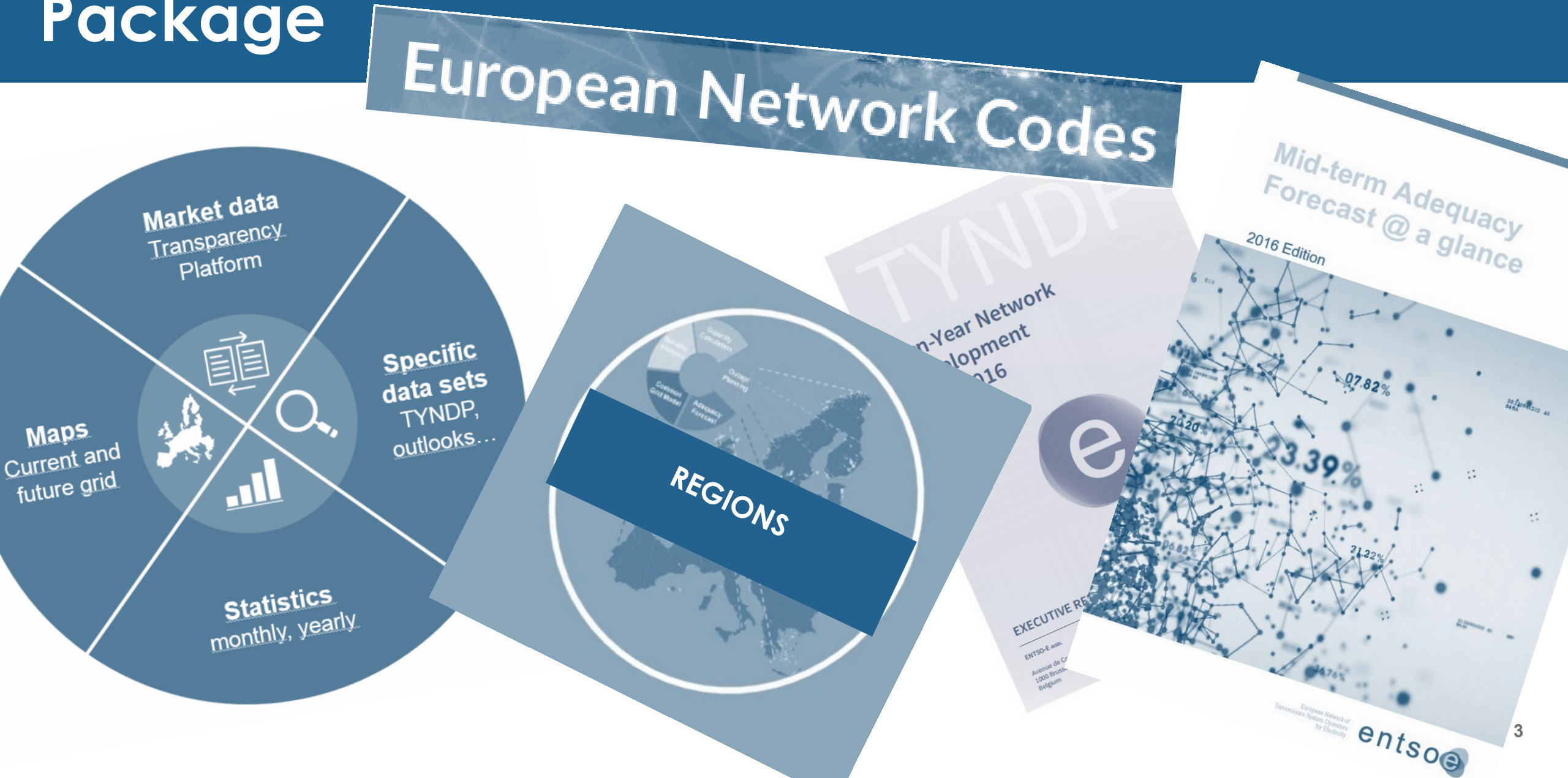
Highest load **581 TW** 18/1/2017

Lowest load **265 TW** 11/6/2017



Switzerland is an integral part of the Continental European system

ENTSO-E: Implementing the 3rd Energy Package

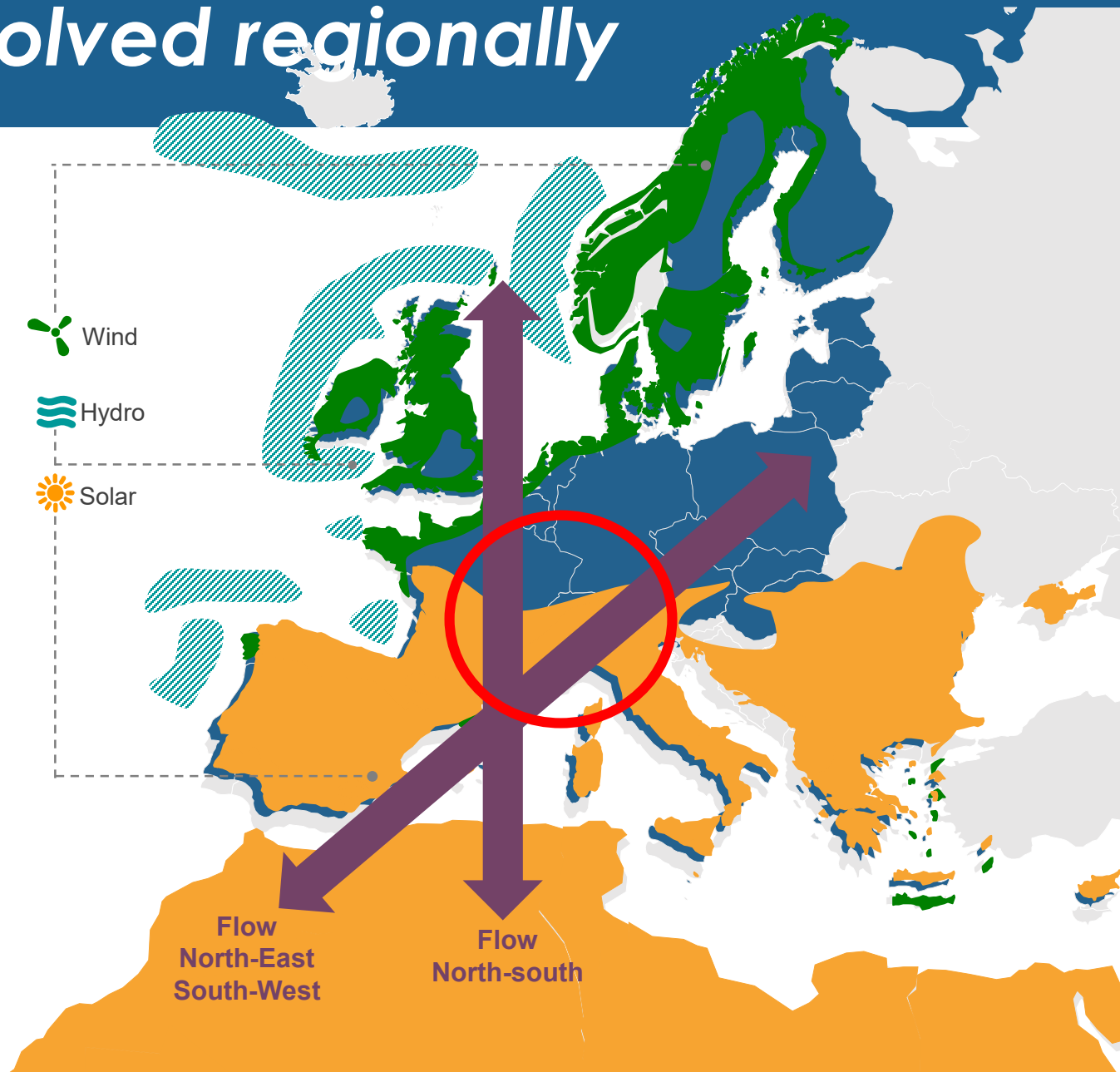


The Energy Transition:
A European challenge solved regionally

27% renewables by 2030 =
+/- 45% for the power system

CHALLENGES

- System stability & inertia
- Growing interconnections
- Changing power flows & congestions
- Unlocking prosumer flexibility together with DSOs
- New Digital Orchestration



Different (types of) regions, but ONE system:
Importance for Switzerland to participate in all processes

PLANNING

Regional planning used in the EU 10-year network development process

TYNDP used as basis for the EU Projects of Common Interest

MARKETS

Internal Energy Market developed voluntary & regionally

EU guideline on capacity allocation & congestion management

OPERATIONS

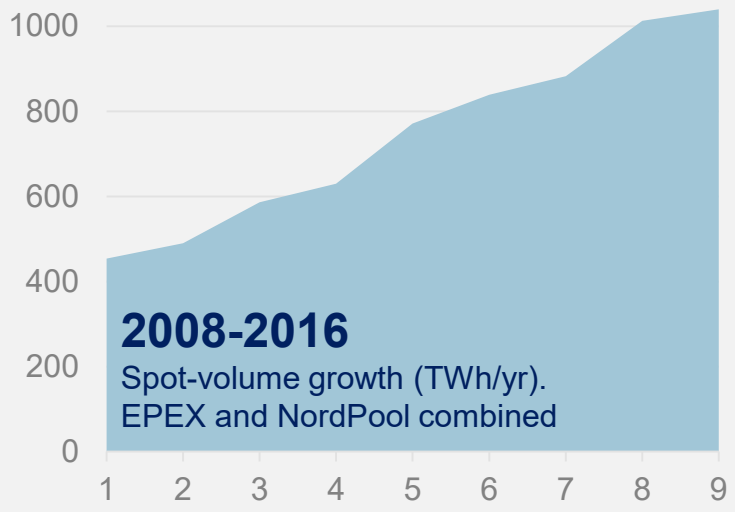
Regional security coordinators created on a voluntary basis

Registered in the EU system operation guideline

The benefits of market integration:
the need for Switzerland to be included in all markets

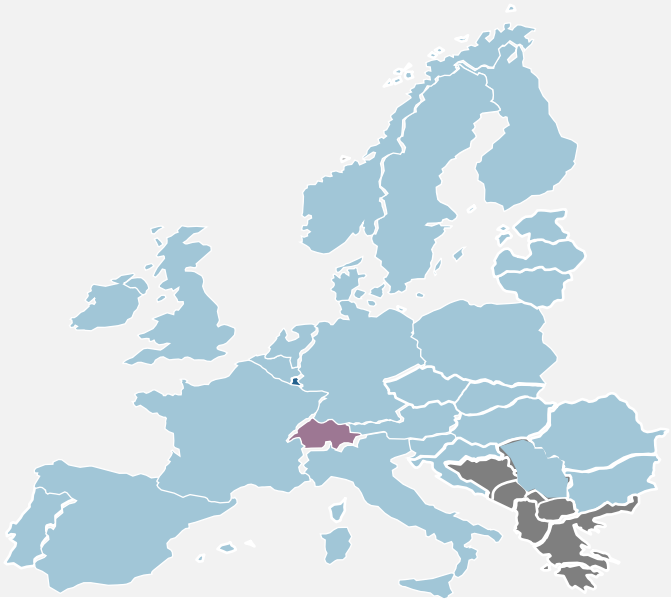
DAY-AHEAD MARKETS

- 1500 TWh traded on exchanges, 60% market share
- 1 B€ in social welfare, yearly



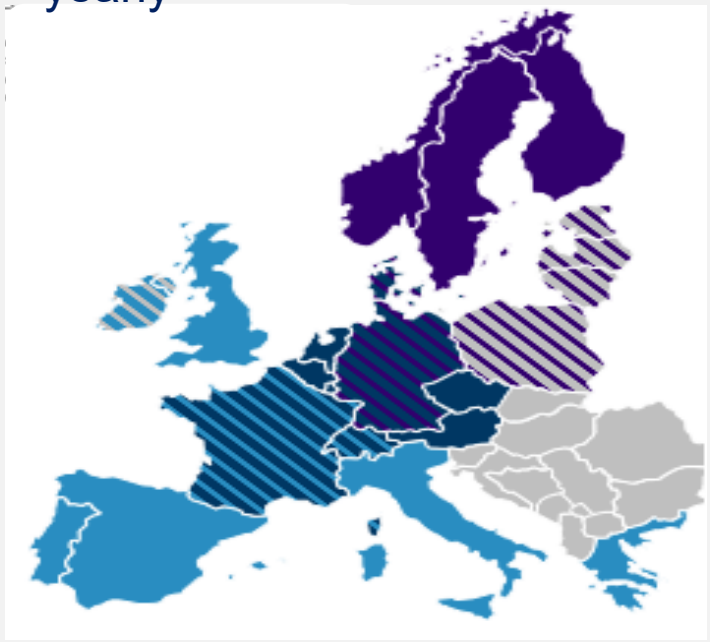
INTRADAY MARKETS

- 120 TWh traded 2016
- New European platform 2018
- Next steps: real-time auctions



BALANCING MARKETS

- Several European projects ongoing
- 3B€ in operational cost savings, yearly



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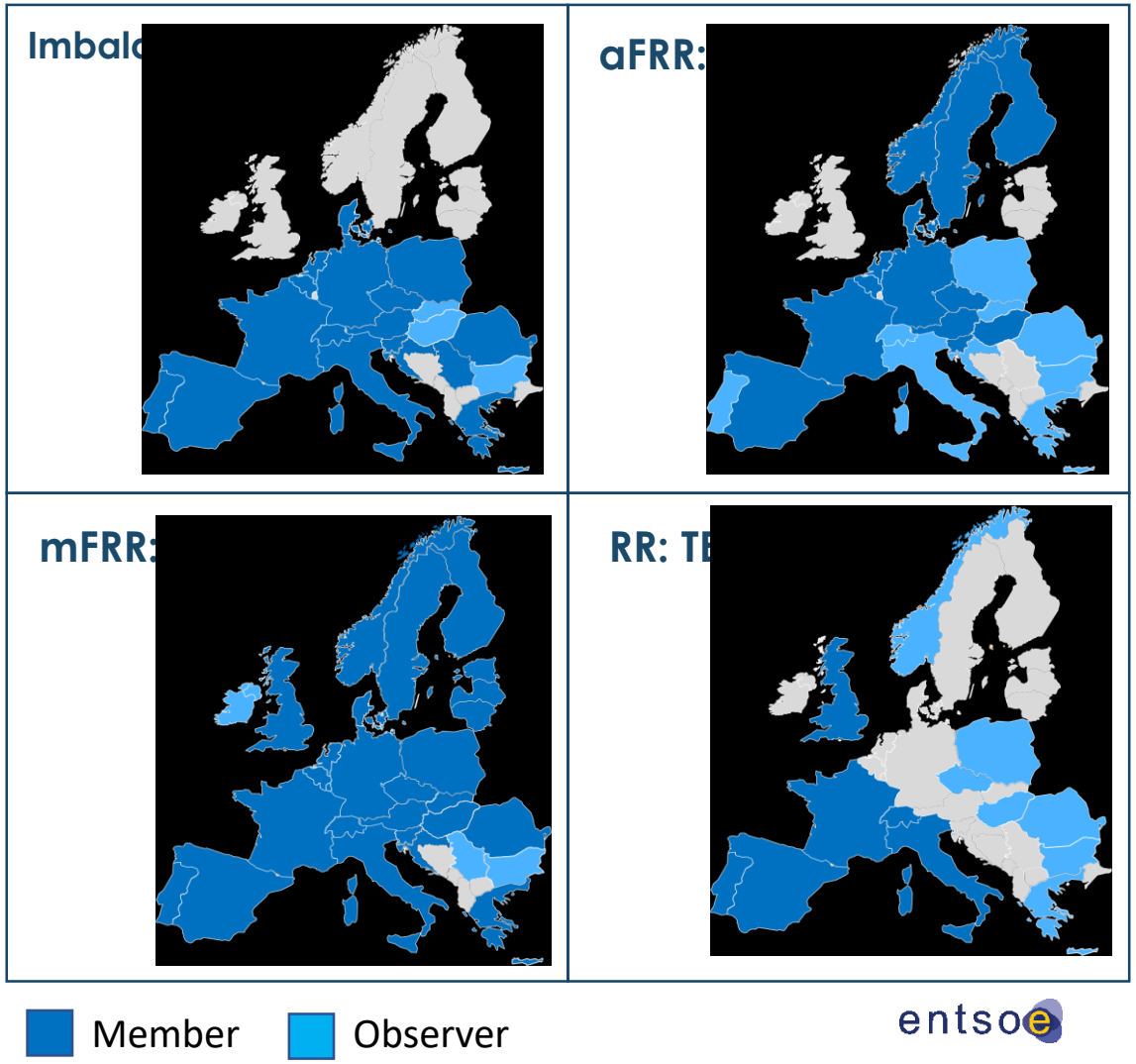
Realizing the potential of regional cooperation for Switzerland and the EU: still lots to do!

Energy markets to mirror physics

- Switzerland to be included in day-ahead and intraday markets
- Bidding zone delimitation to reflect physical congestions

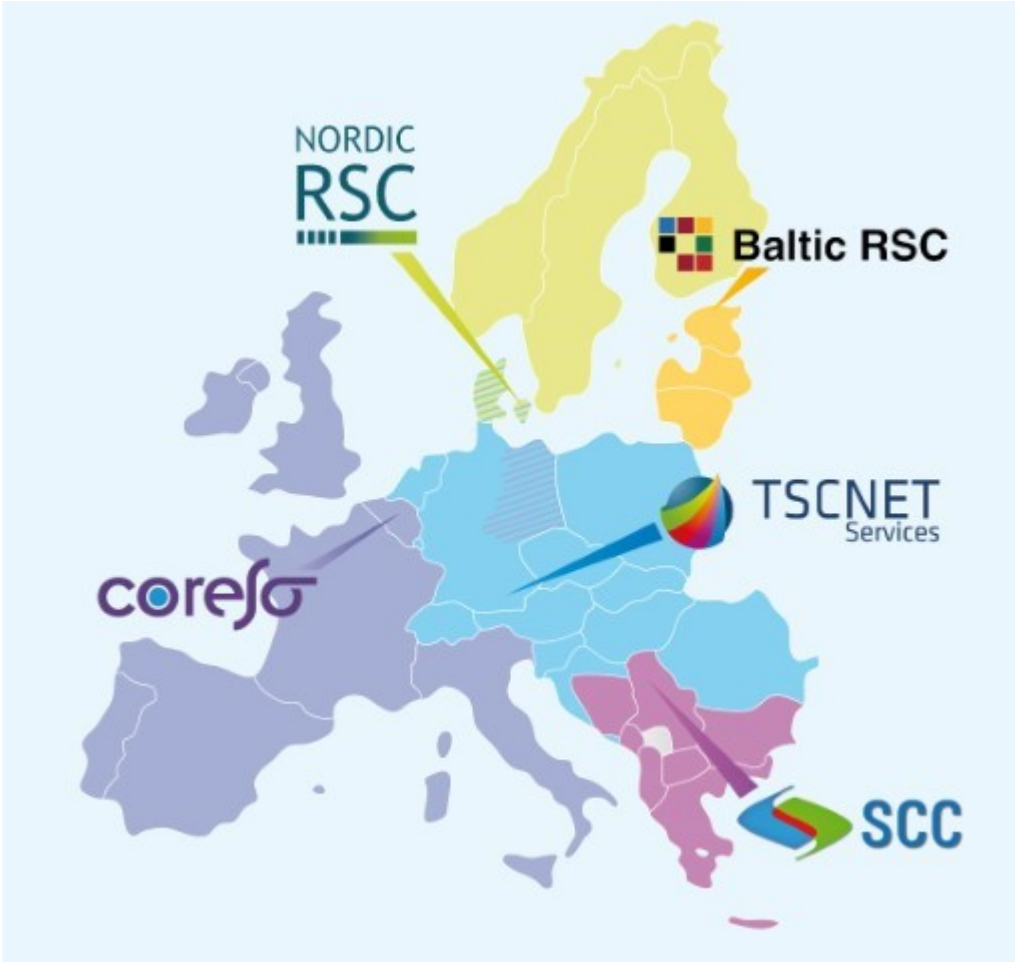
Integrating balancing markets

- All four balancing markets are to be operational by 2022



The benefits of regional coordination

- CORESO (2008)
- TSC (2008)
- SCC (2016)
- Nordic RSC (2016)
- Baltic RSC (2016)



Started voluntarily in 2008

Extended voluntarily in all Europe as of 2015

Mandatory through EU Network Codes since 2017

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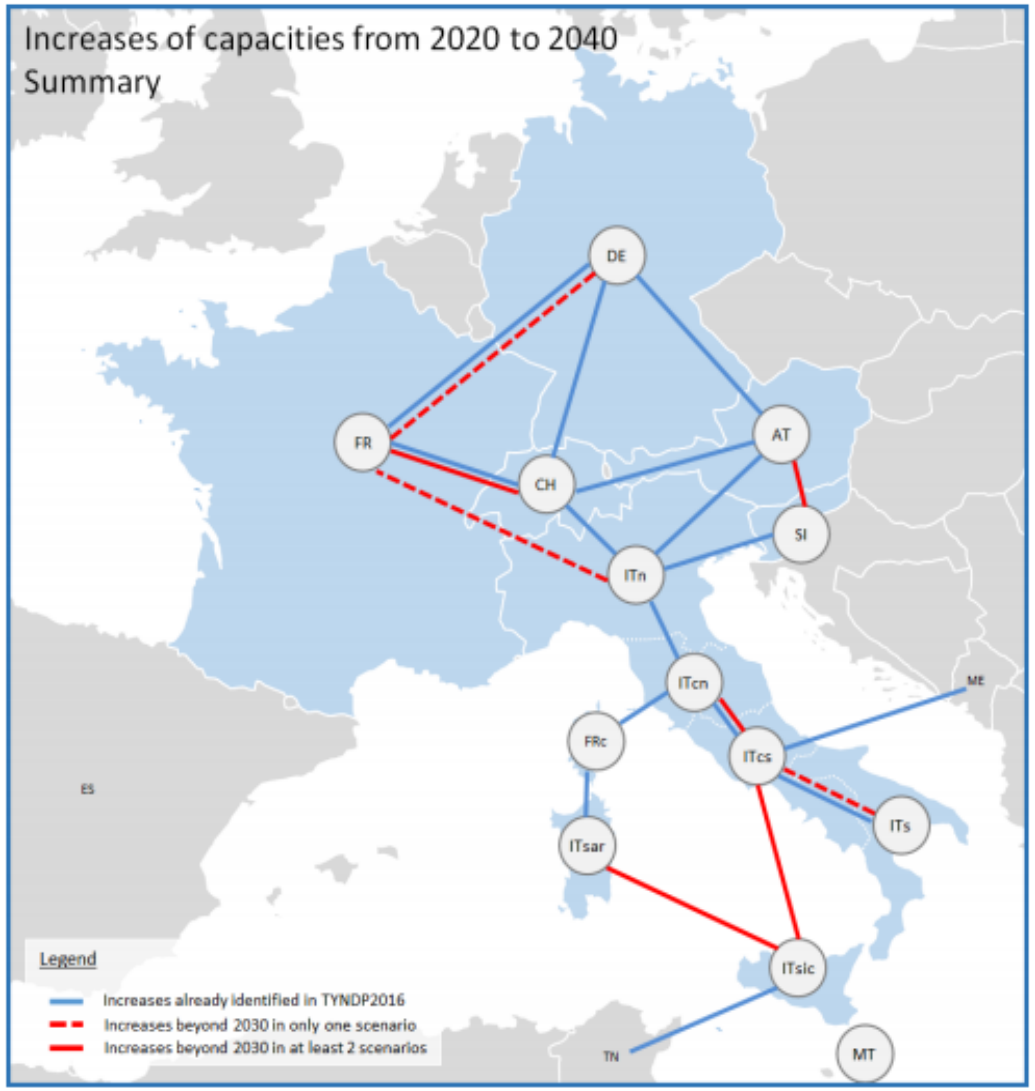
Realizing critical grid investments for sustainable security of supply



Drivers behind grid investments

- RES integration
- Phase-out of thermal
- System stability and security of supply
- Integration of storage
- Thermal mothballing
- Power flows

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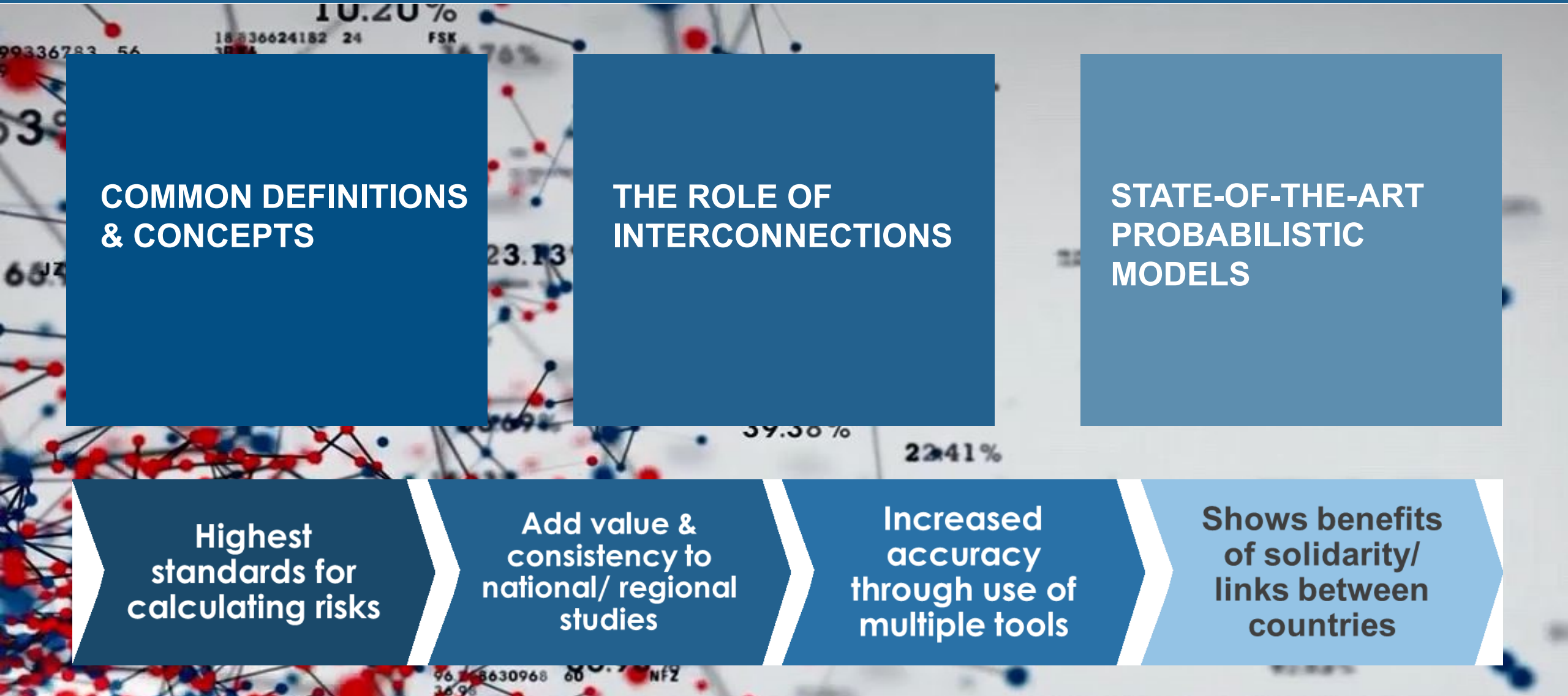
Complementing National Security of Supply outlook with Pan European



COMMON DEFINITIONS & CONCEPTS

THE ROLE OF INTERCONNECTIONS

STATE-OF-THE-ART PROBABILISTIC MODELS

- Highest standards for calculating risks
- Add value & consistency to national/ regional studies
- Increased accuracy through use of multiple tools
- Shows benefits of solidarity/ links between countries

Assessing resource adequacy risks in different timeframes

Several years | 1 year | Several months | 1 week | 1 day

Pan European

Regional*

Mid-Term Resource Adequacy

Update inputs

Seasonal Outlook

Update forecast

Short-Term Adequacy

optional

Mid-Term regional sensitivity

optional

Seasonal regional sensitivity

when risk detected

Intra-week regional adequacy

***Regional/national studies focus on detailed modelling of a region while:**

- **keeping large European geographical perimeter,**
- **retaining a global pan-European probabilistic methodology**

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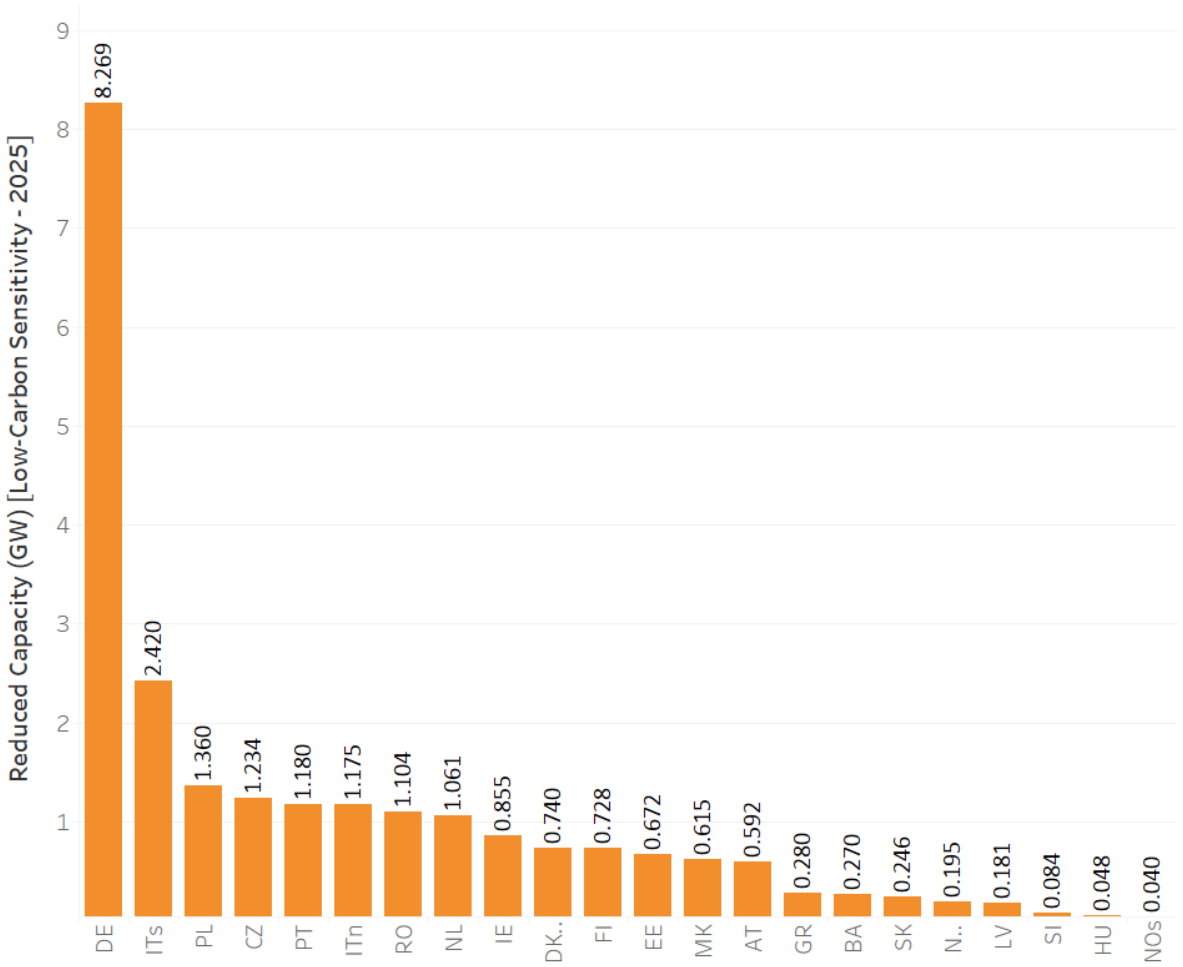
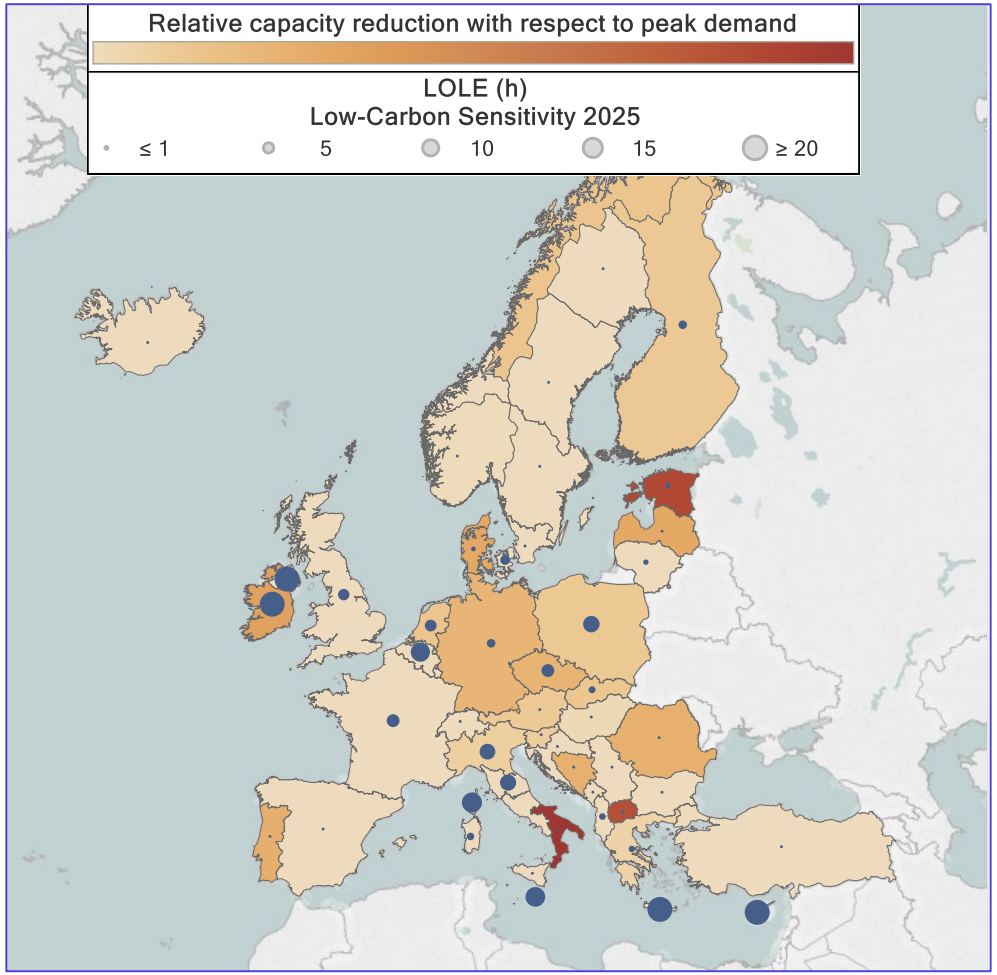
The Low-Carbon Scenario for 2025

Switzerland and the EU need each other to meet successfully the energy transition challenges





Need to adjust the resource mix in case an “accelerated carbon phase-out” takes place

THANK YOU FOR YOUR ATTENTION

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