The Changing Impact of System Disturbance Events

ESIG

2022 SPRING TECHNICAL WORKSHOP

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Loews Ventana Canyon Resort
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Chair of System Operations Committee @ENTSO-E

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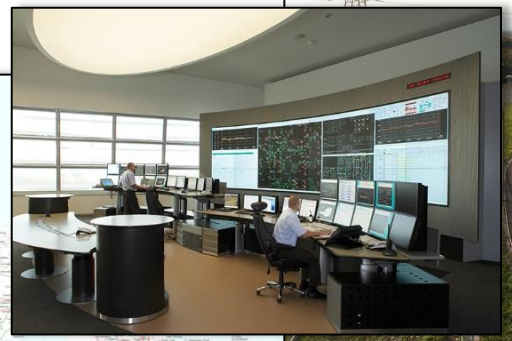
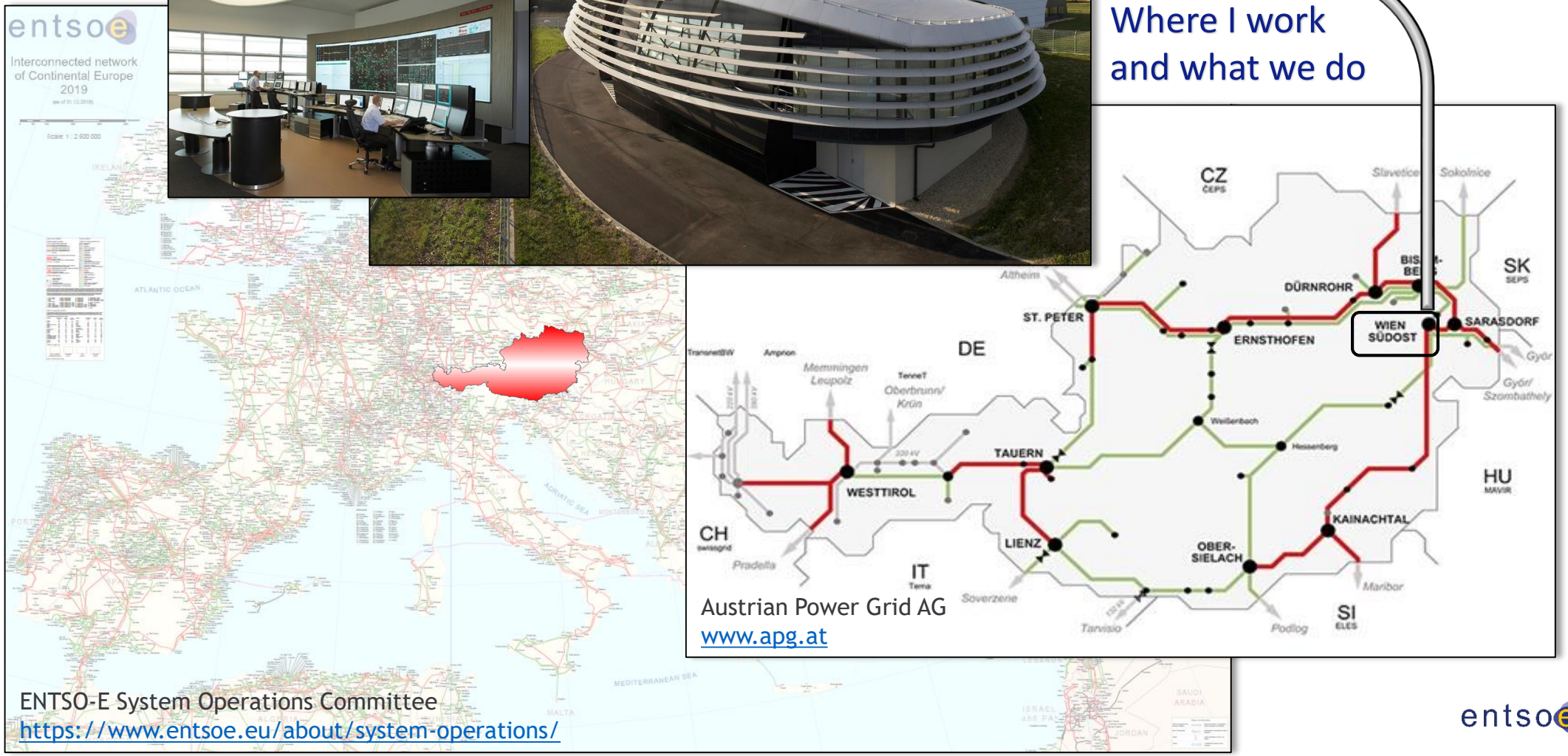
Welcome !

APG National Control Centre - Power Grid Control
https://www.apg.at/en/About-us/Control-centre



Where I work
and what we do



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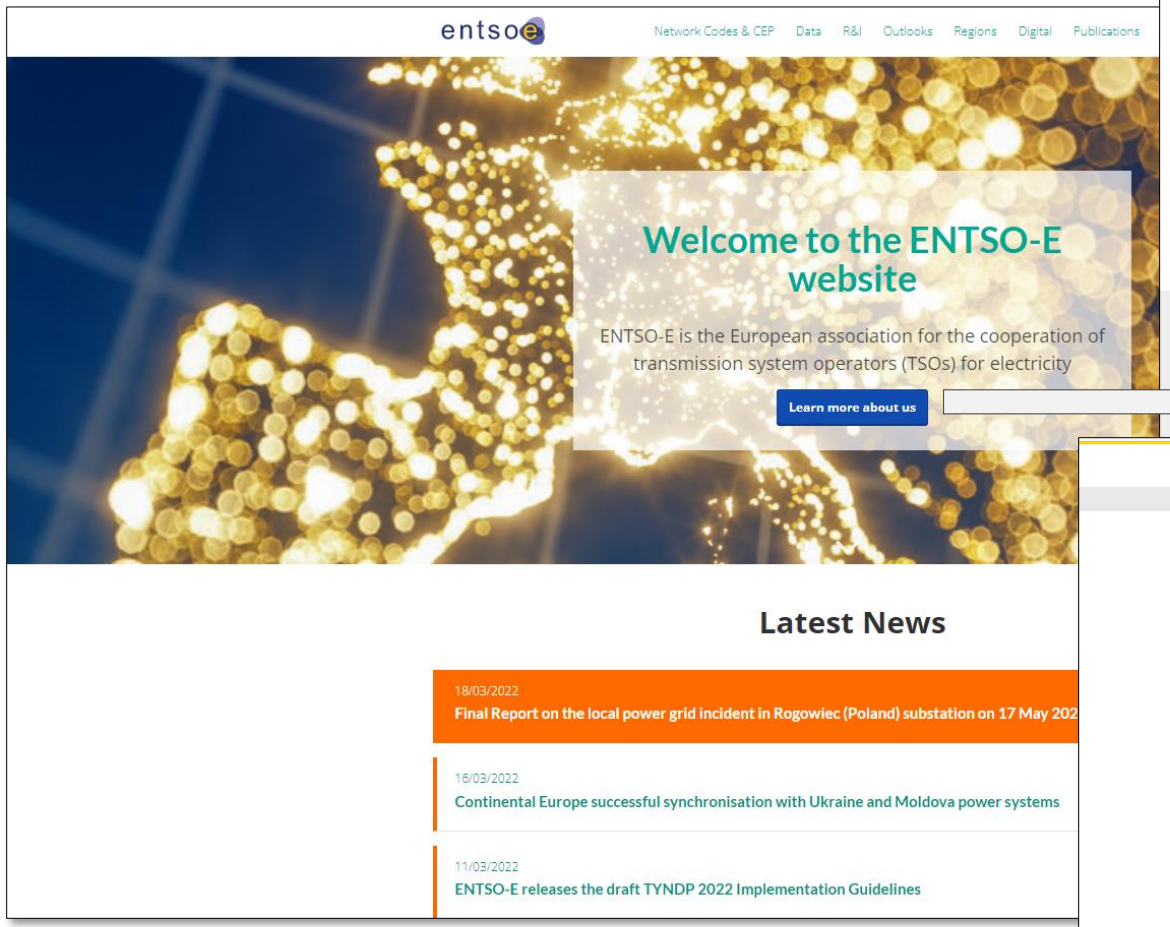

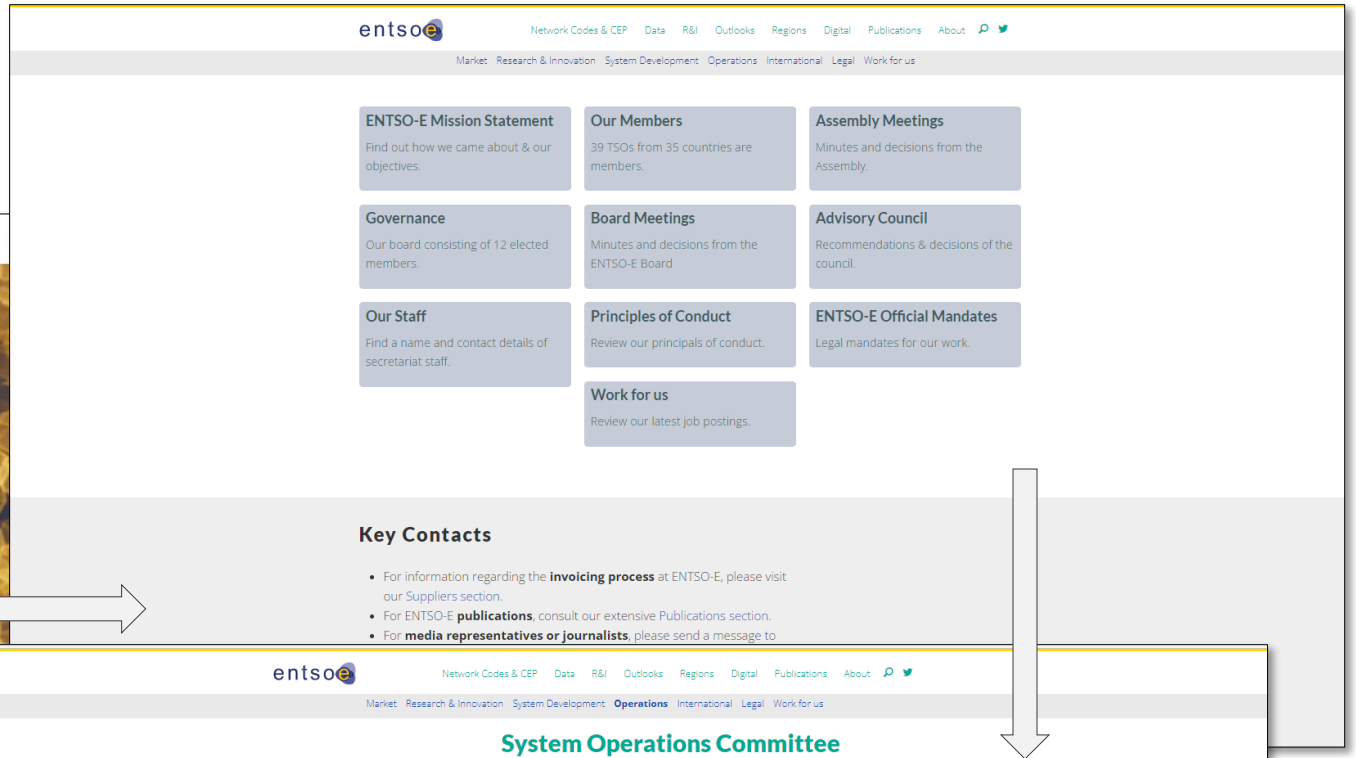

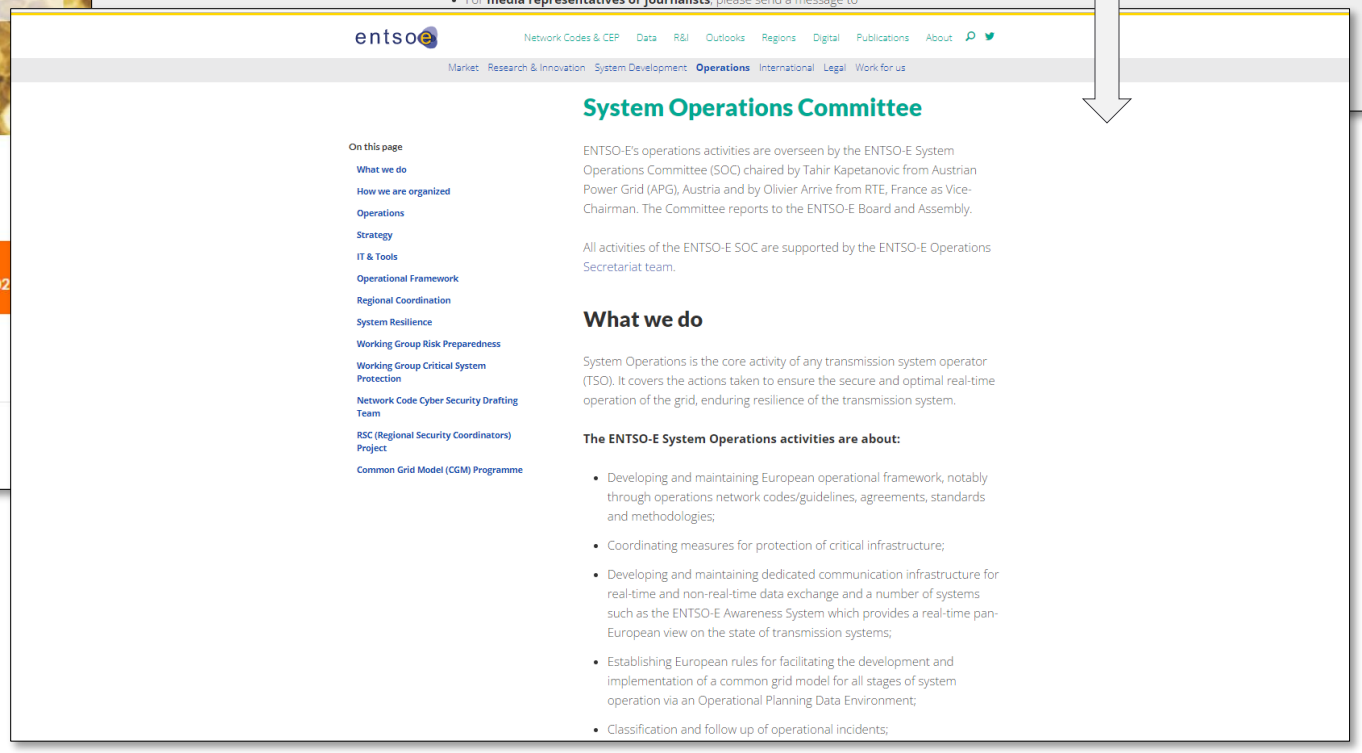

Highlights

- The Change *(„Energy Change“, „Energiewende“)*
- Recent incidents / disturbances
- Lessons learned & recommendations

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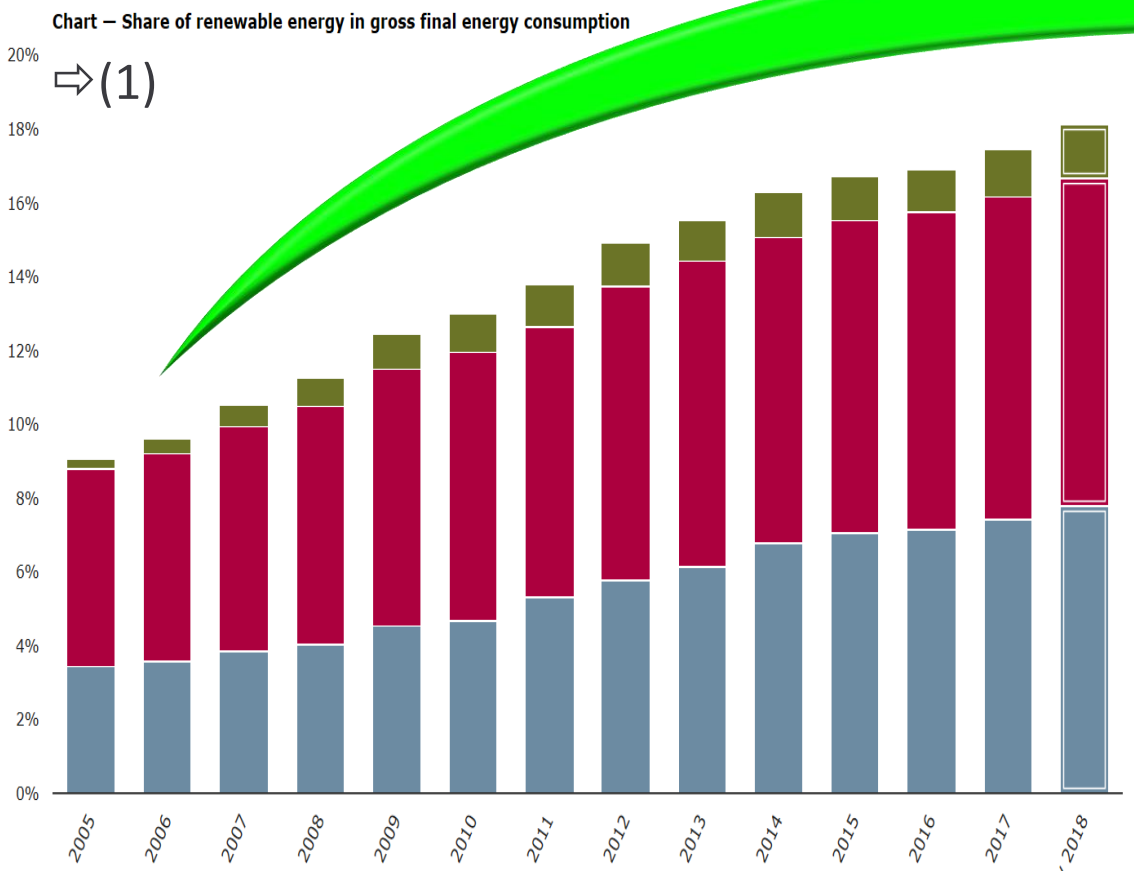
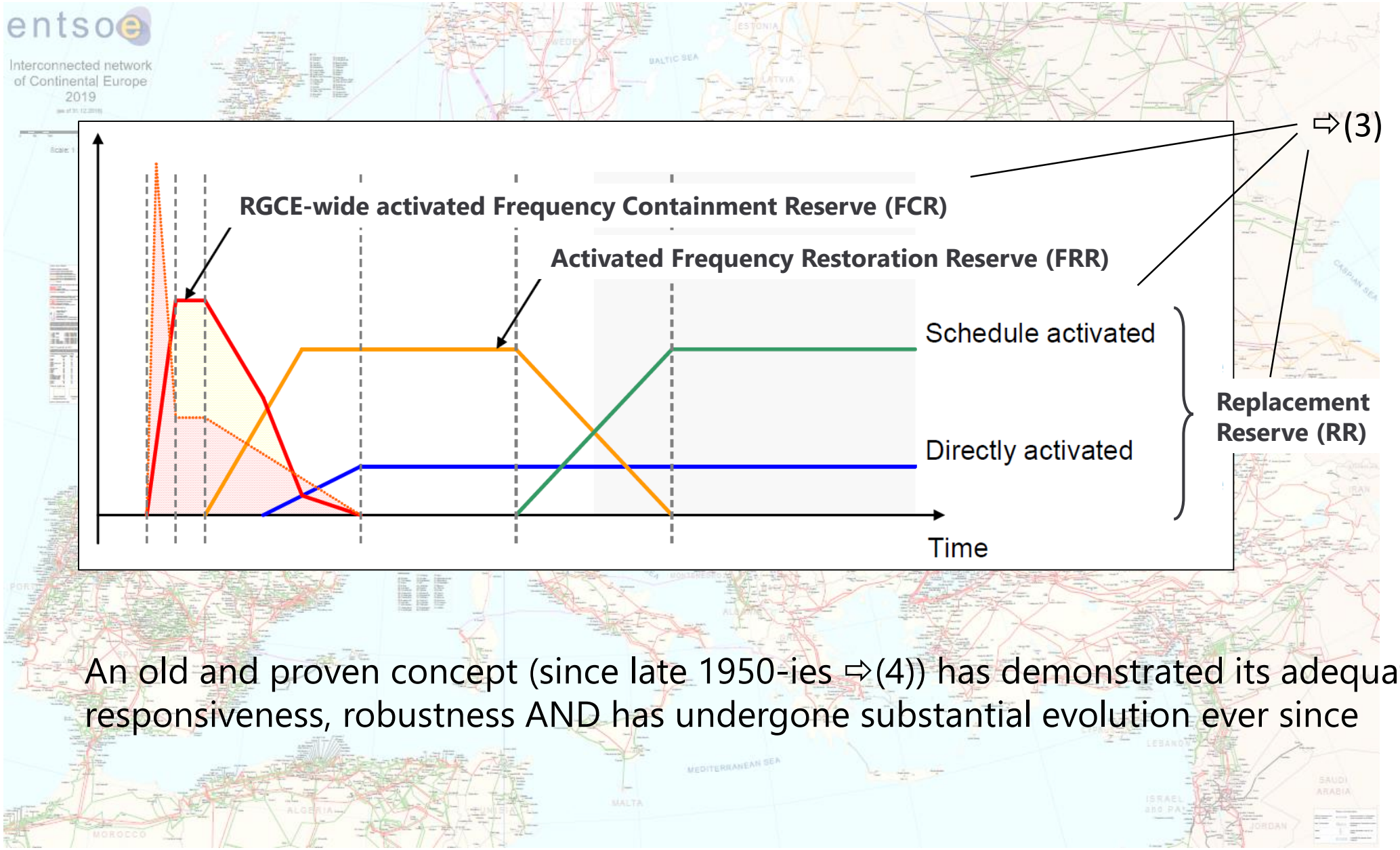
The Change and the European Green Deal



European Green Deal (2019)
⇨(2)

The roots: Continental European load-frequency control



An old and proven concept (since late 1950-ies ⇨(4)) has demonstrated its adequate responsiveness, robustness AND has undergone substantial evolution ever since

Highlights

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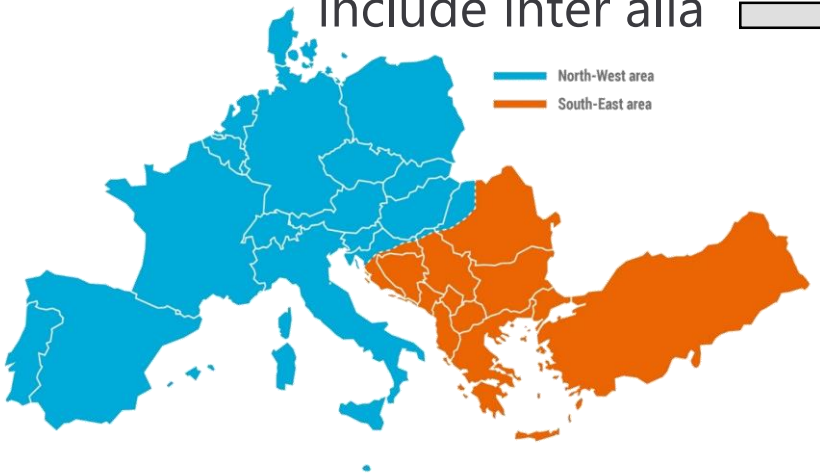
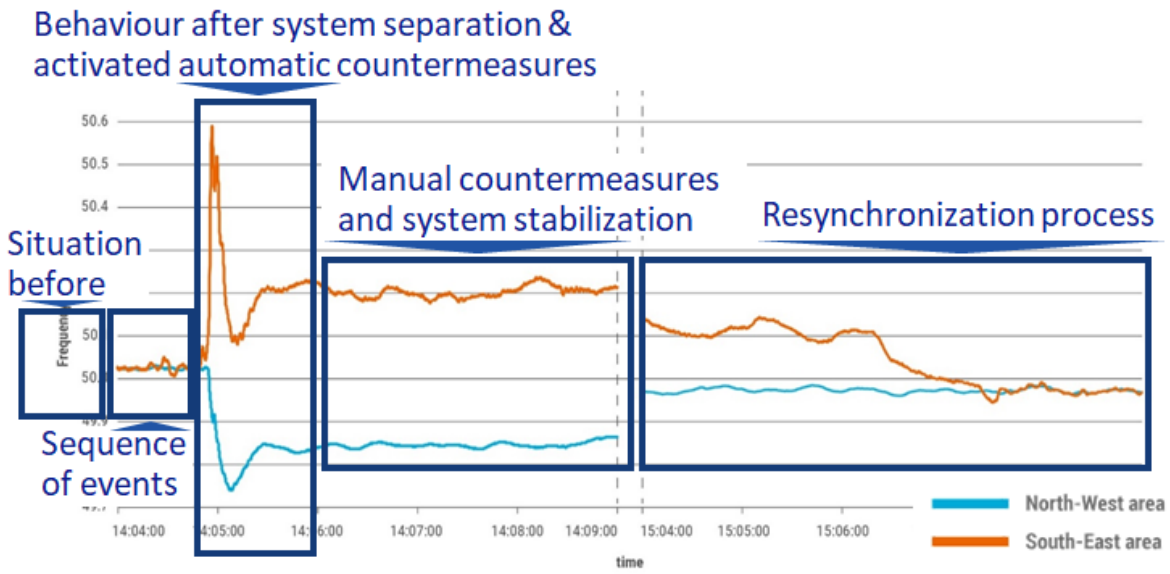
System separation & restoration 08. January 2021 ⇨ (5)

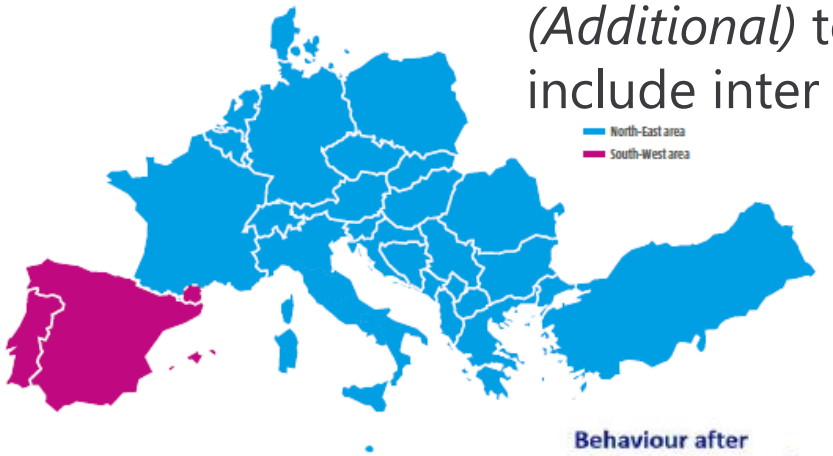
Topics of special interest include inter alia



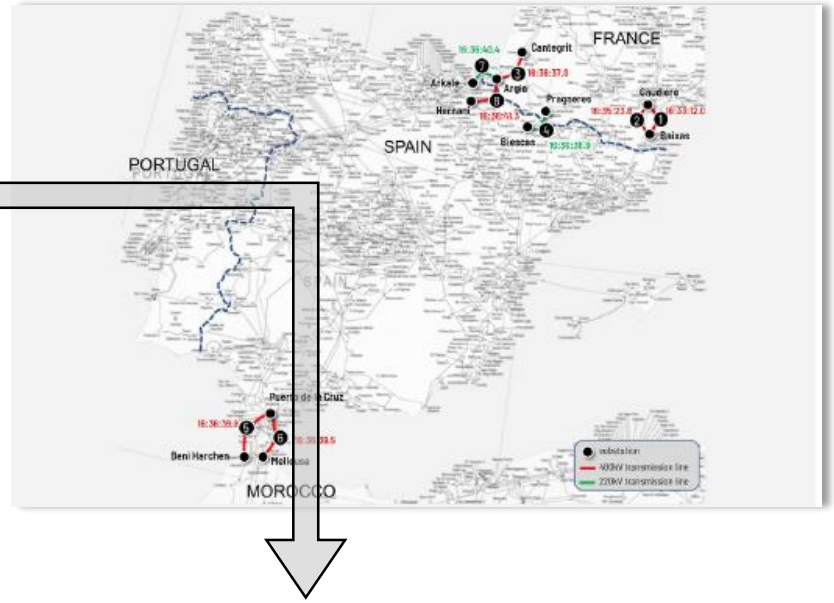


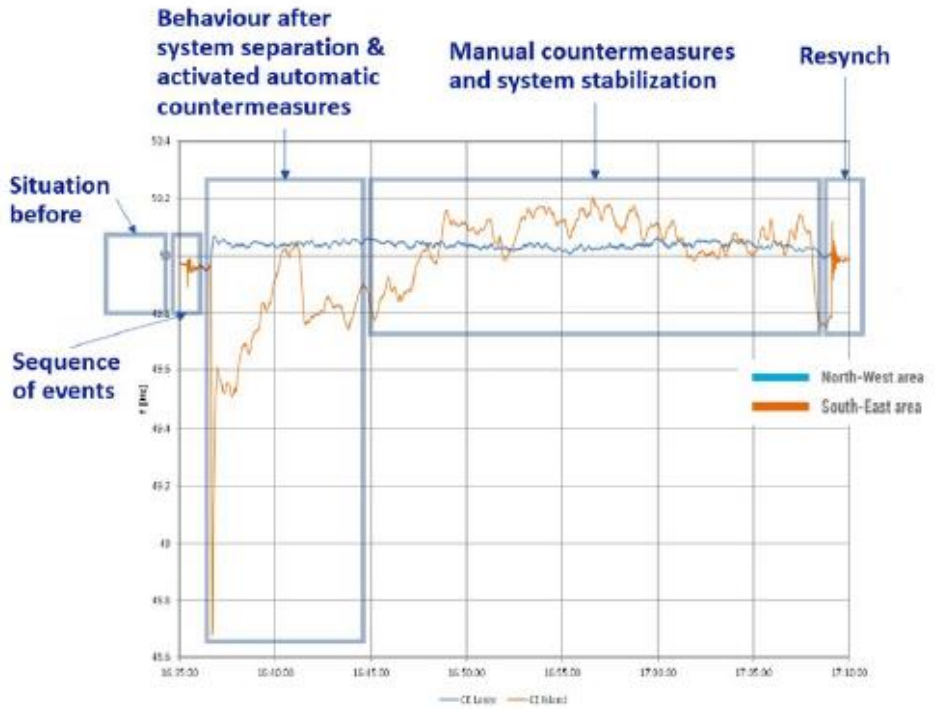
- Steady-state security / standards
- Angular stability
- Heavy continent-wide flows
- Grid (in)adequacy
- Regional coordination (security analysis & capacity calculation) in SEE

System separation & restoration 24. July 2021 ⇨ (6)



(Additional) topics of special interest include inter alia





- Communication in case of environmental hazards
- System defense including Special Protection Schemes
- TSO-DSO coordination,
- Fault-ride through for all (!)

Highlights

- The Change *(„Energy Change“, „Energiewende“)*
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Lessons learned

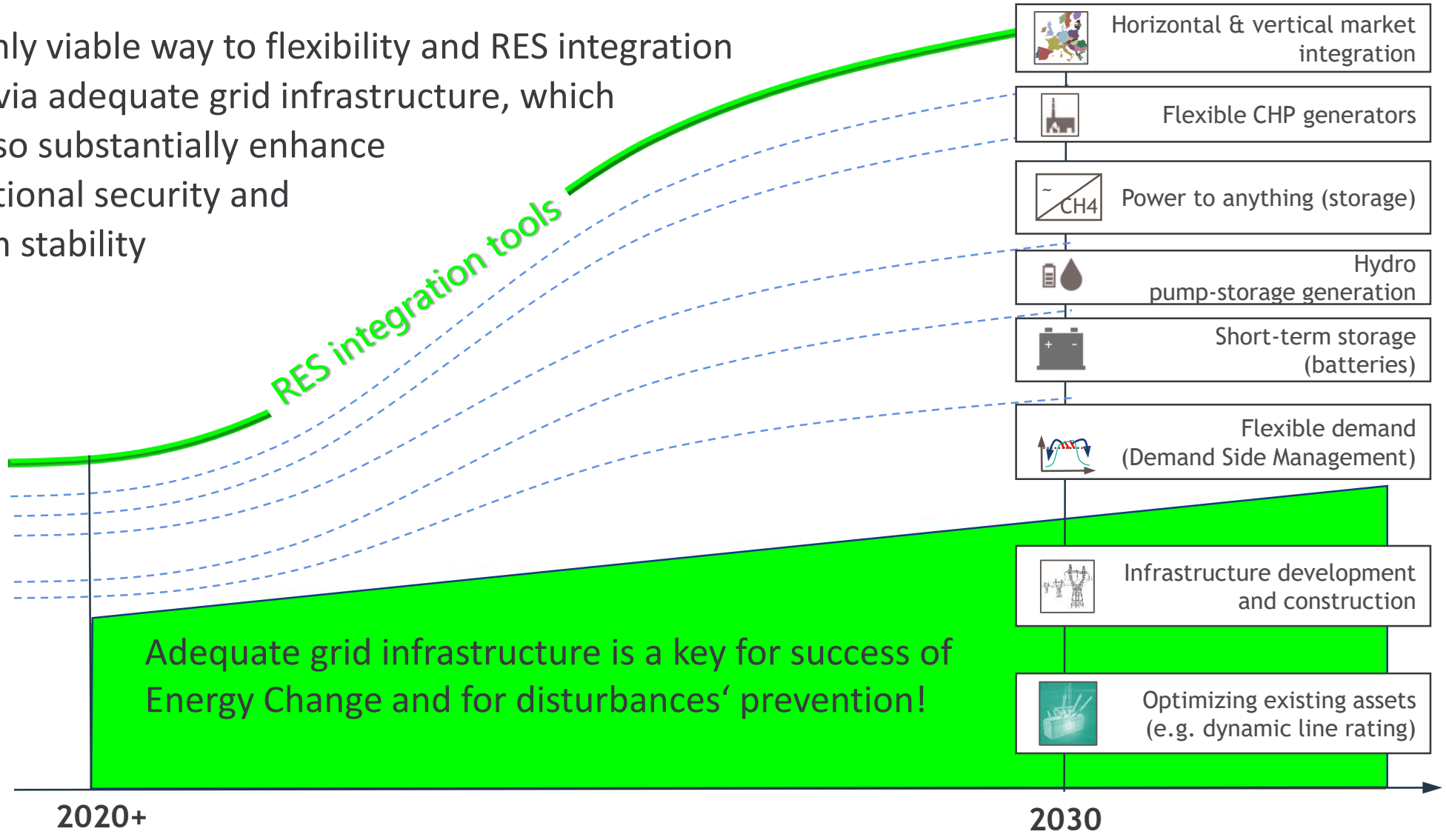
- Island-operation AND black-start capability
- Provision of all necessary restoration services must be evenly distributed and adequatly supplied throughout the synchronous areas, control areas and generation park
- No exemption of RES today, even less in the future („100%“)
- Stability / intertia is essential for system survival during disturbances and synchronous machines are indispensable for that
- Continent-wide flows & RES volatility must be counteracted by new ancillary services
- Timely information to TSOs in case of natual hazard / fire / others
- Fault-ride through capability / obligation for ALL generators connected to the grid

Good practice with RES …

- Equal rights AND equal obligations as conventional generation
  - Keep the balance at all times
  - Contribute to steady state system security ➔ balancing and redispatch
  - Contribute to system stability ➔ ensure / contract sufficient inertia
- Incentives AND competition for provision of all ancillary services
- RES support schemes with key features: market-friendly, supportive for the right technology, transparent, non-discriminatory, self-regulating, and above all favourable for market maturity
- Global goals, regional / national schemes and implementations
- No compromise in terms of operational security

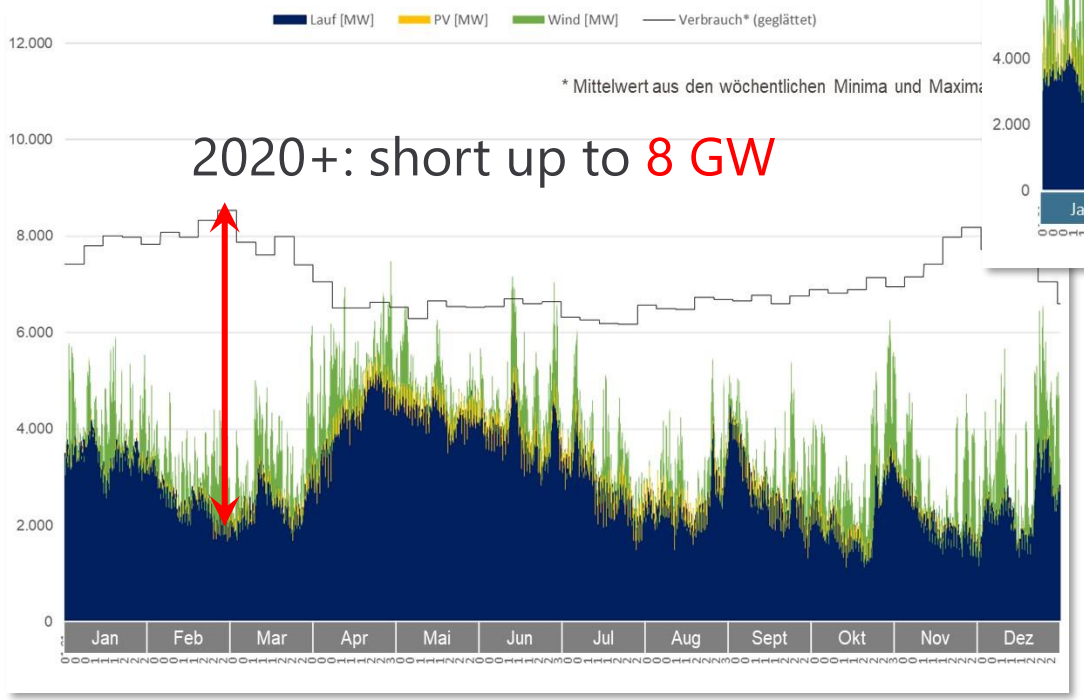
… and infrastructure!

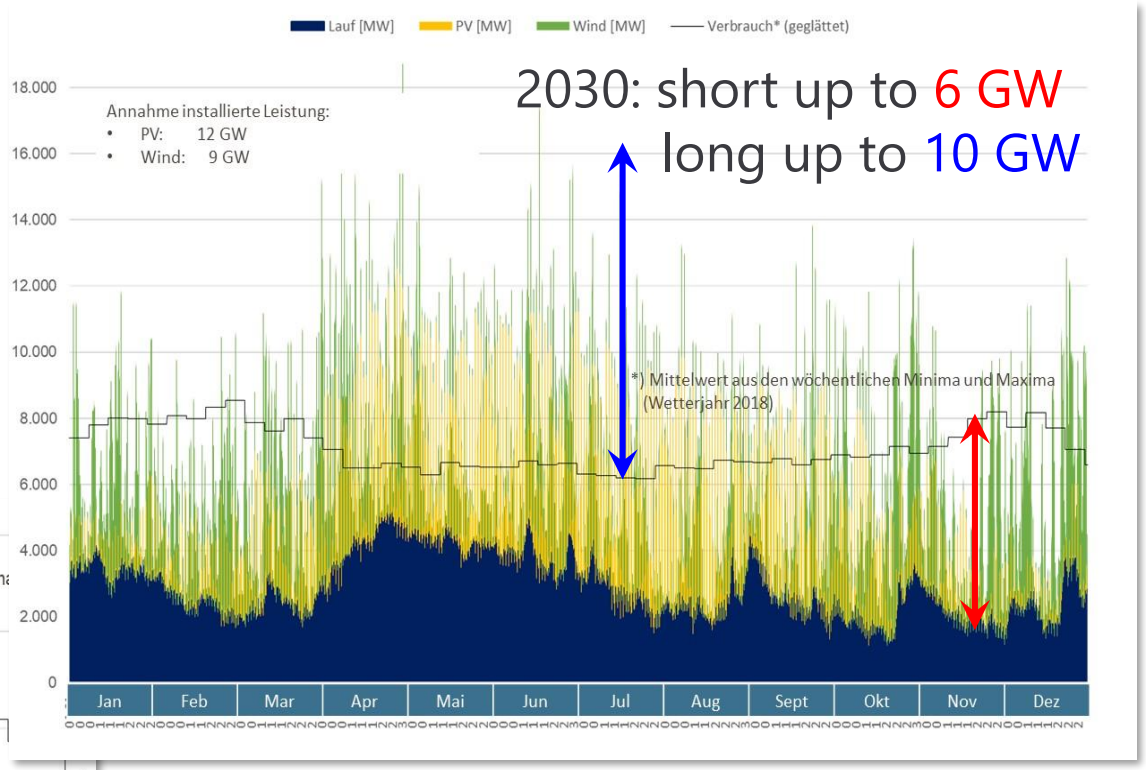
The only viable way to flexibility and RES integration leads via adequate grid infrastructure, which will also substantially enhance operational security and system stability



Add-on: a view from the centre of the Continent

Needed today in Austria to cover short positions and for operational security in the grid



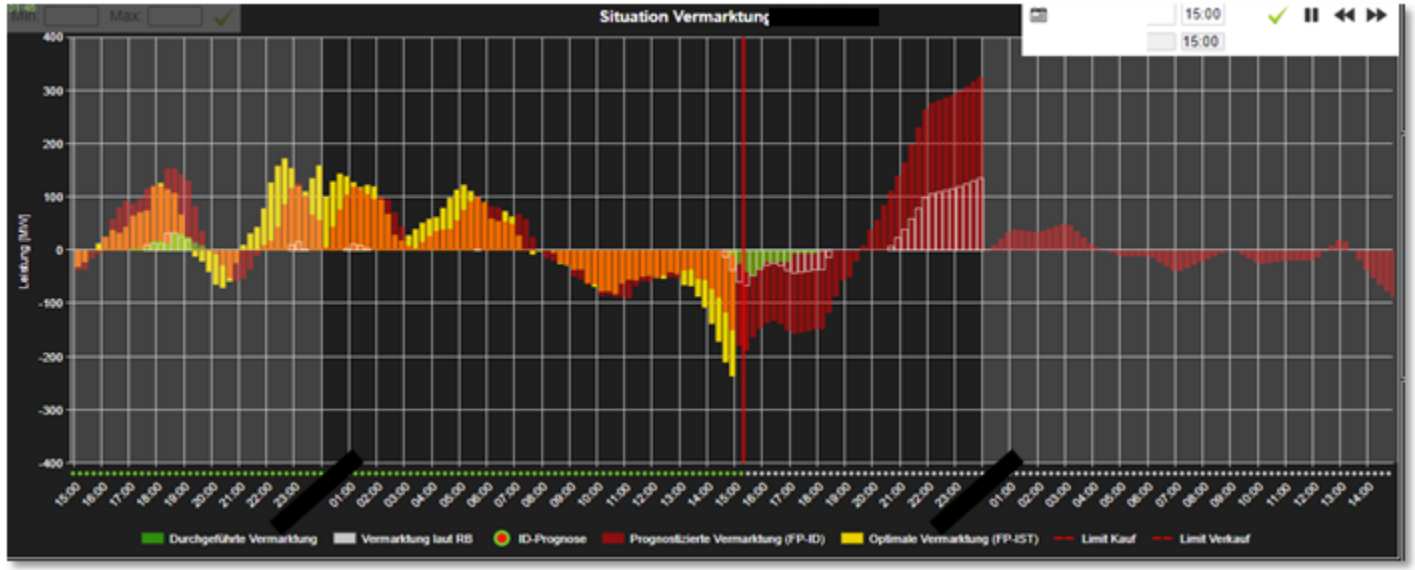


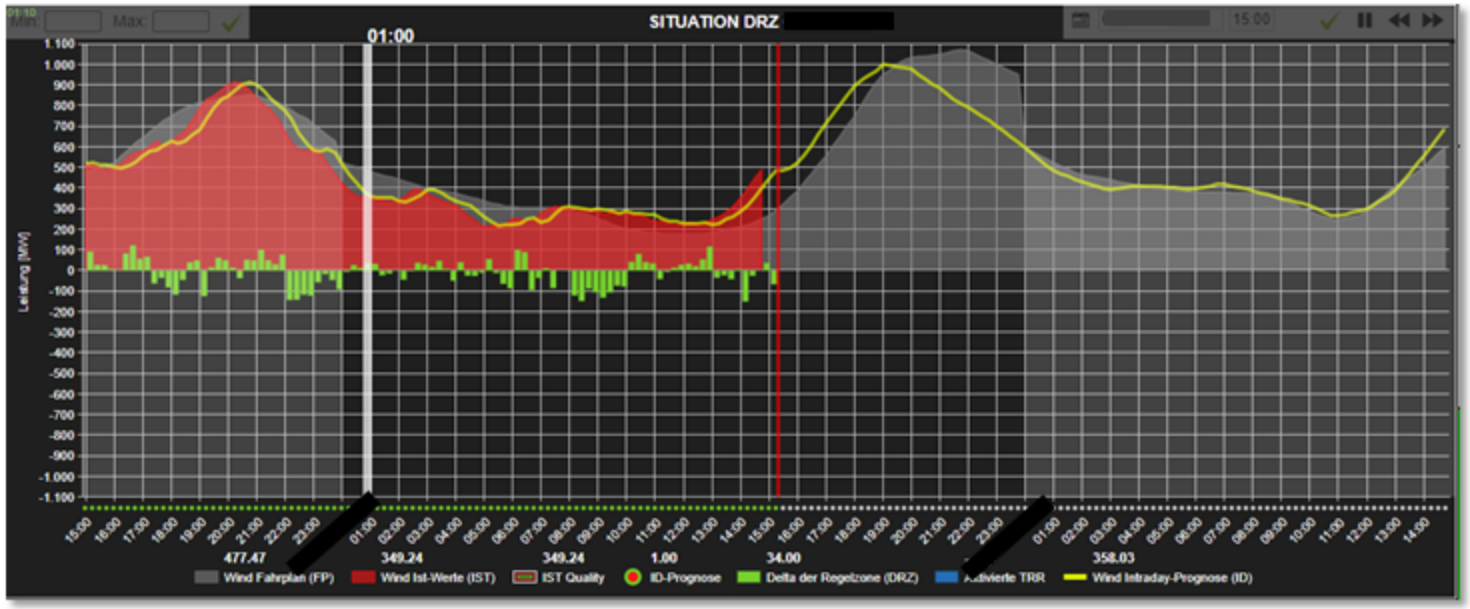
Needed tomorrow in Austria even more, to cover short AND long positions

Trading volatility away

The idea

- Trade-away differences between wind DA & ID forecast and (extrapolated) real-time infeed



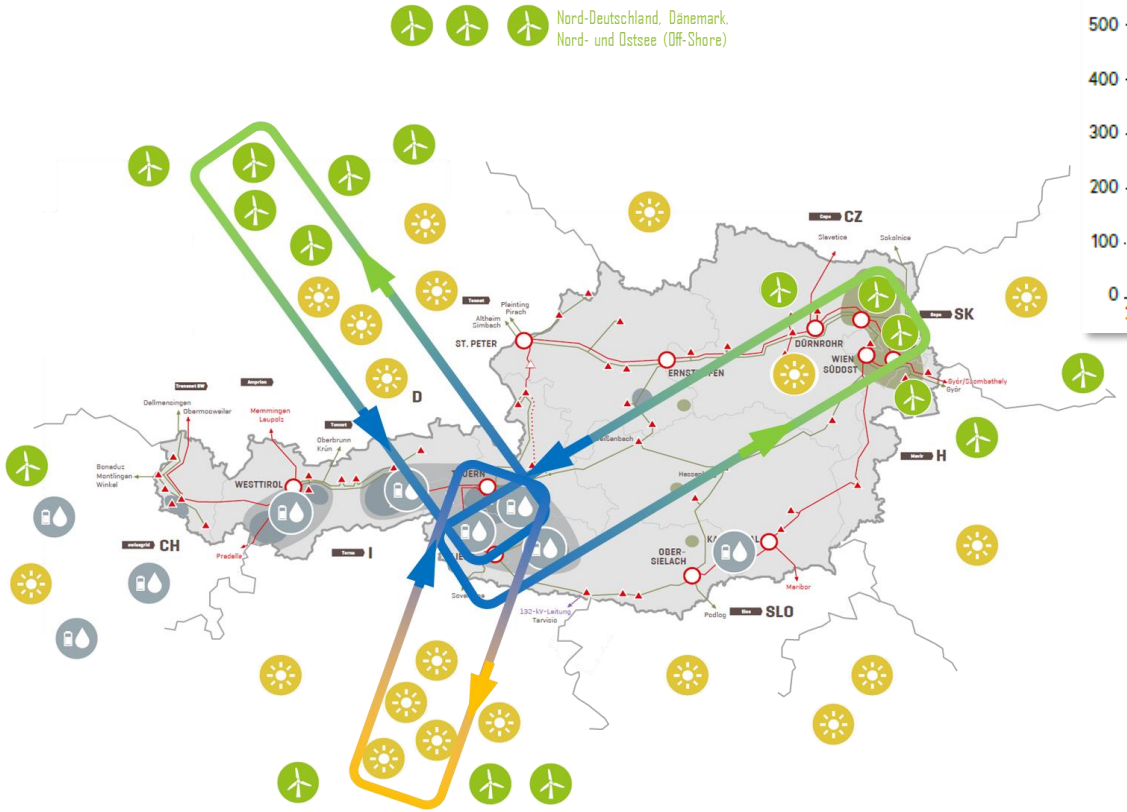


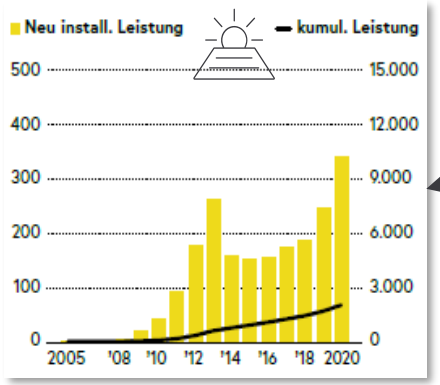
The realization

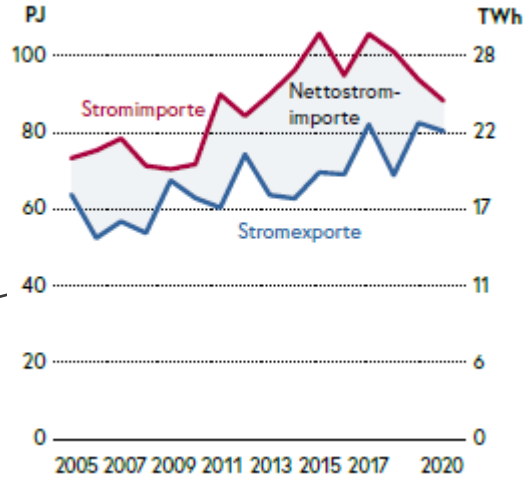
- 24/7 trade at PEX, automatically run (algorithm and heuristics), supervised by control-room staff

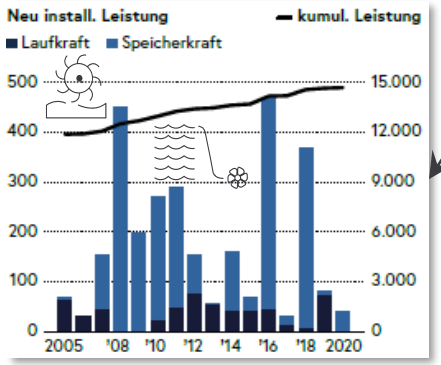
The future (!)

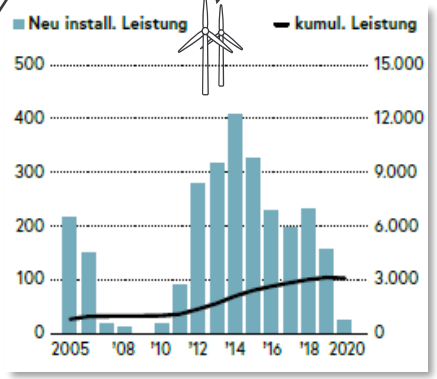
„Green battery“ of Austria (and … parts … of Europe) ⇨ (7)











References & further reading

(1) Share of RES in European consumption, https://www.eea.europa.eu/data-and-maps/indicators/renewable-gross-final-energy-consumption-4/assessment-4

(2) The European Green Deal 2019, https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

(3) Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation („System Operation Guideline“, SO GL), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R1485

(4) UCTE Operational Handbook (OH) Policy 1, https://eepublicdownloads.entsoe.eu/clean-documents/pre2015/publications/ce/oh/Policy1_final.pdf

(5) System separation of the Continental Europe Synchronous Area on 8 January 2021 – final report: https://www.entsoe.eu/news/2021/07/15/final-report-on-the-separation-of-the-continental-europe-power-system-on-8-january-2021/

(6) System separation of the Continental Europe Synchronous Area on 24 July 2021 – technical report, https://eepublicdownloads.azureedge.net/clean-documents/SOC%20documents/SOC%20Reports/entso-e_CESysSep_210724_211112.pdf

(7) Energie in Österreich 2021, BMK, https://www.bmk.gv.at/dam/jcr:bbe5cd73-a161-46fc-8c80-2eb5fc500acb/Energie_in_OE2021_UA.pdf

Thank you for your attention!

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