



GRUPO  **RED**
E L É C T R I C A

Climate induced power shortages in California and Texas: Lessons Learned

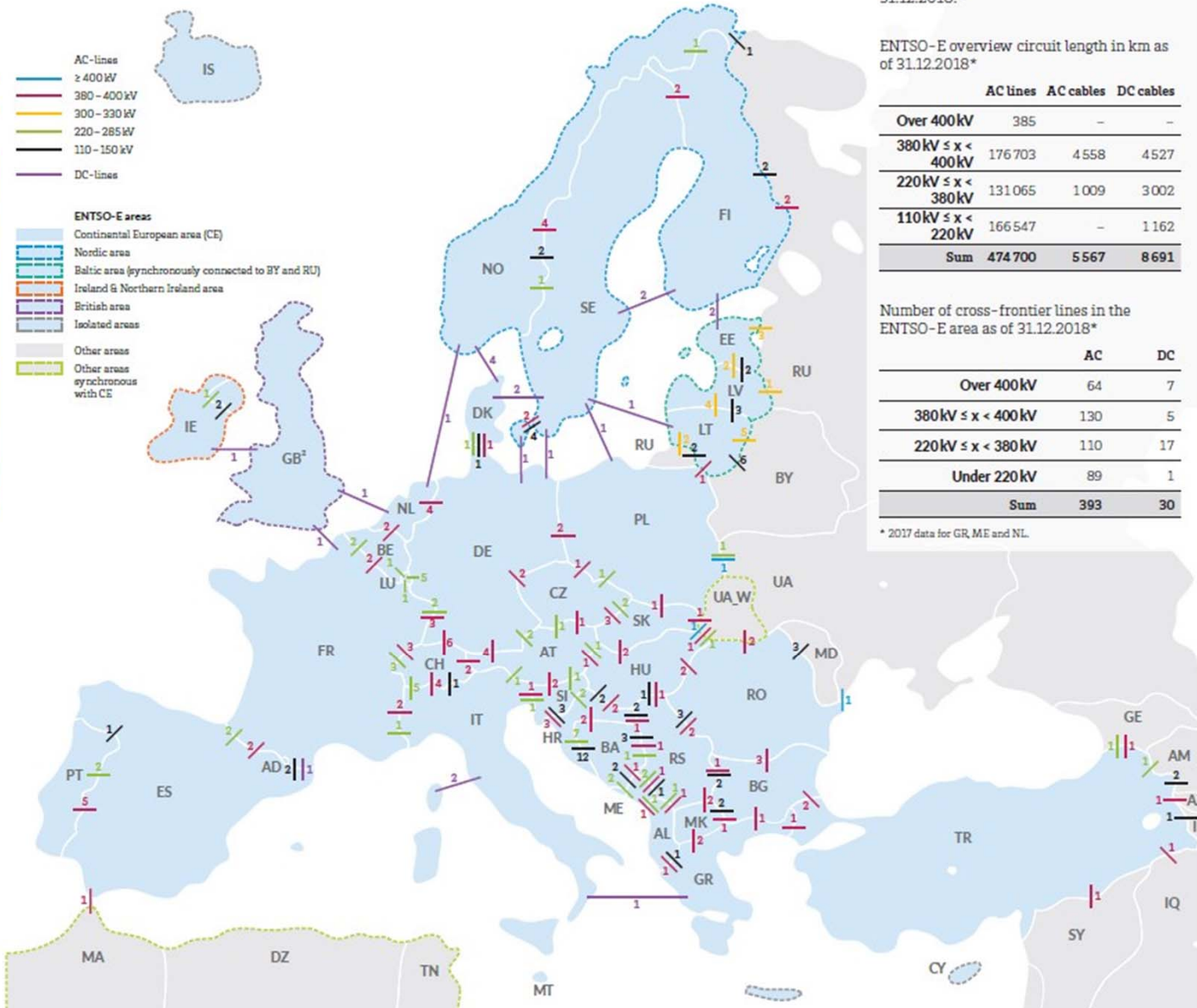
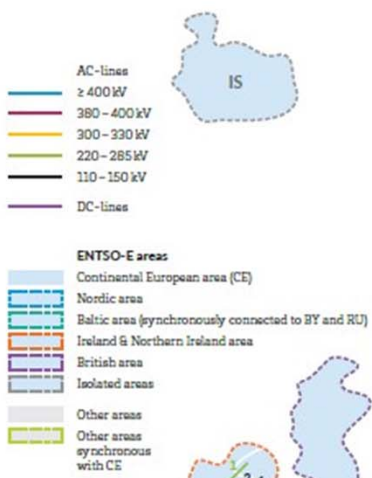
European case

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INFRASTRUCTURE USA vs. EUROPE

Grid information



Number of cross-frontier transmission lines (routes) operated by TSO as of 31.12.2018.¹

ENTSO-E overview circuit length in km as of 31.12.2018*

	AC lines	AC cables	DC cables
Over 400 kV	385	-	-
380 kV ≤ x < 400 kV	176 703	4 558	4 527
220 kV ≤ x < 380 kV	131 065	1 009	3 002
110 kV ≤ x < 220 kV	166 547	-	1 162
Sum	474 700	5 567	8 691

Number of cross-frontier lines in the ENTSO-E area as of 31.12.2018*

	AC	DC
Over 400 kV	64	7
380 kV ≤ x < 400 kV	130	5
220 kV ≤ x < 380 kV	110	17
Under 220 kV	89	1
Sum	393	30

* 2017 data for GR, ME and NL.



Trans

0 M)
0.000 km

CLIMATE INDUCED POWER SHORTAGES

Close cooperation in EU

Regulation/agreements

European Regulation that establishes common operation rules for all TSOs in EU

- Guideline on electricity transmission system operation (normal and alert state): *Commission Regulation (EU) 2017/1485*
- Network code on electricity emergency and restoration (emergency and restoration state): *Commission Regulation (EU) 2017/2196*

Synchronous Area Framework Agreement for each synchronous area in EU

- This agreement collects specific singularities of each synchronous area

Multilateral/bilateral agreements among TSOs

- Agreements among neighboring TSOs for assistance in case of emergency and restoration state

CLIMATE INDUCED POWER SHORTAGES

Close cooperation in EU

Regulation/agreements

- **Regulation (EU) 2019/941 on risk-preparedness** in the electricity sector lays down rules for cooperation between Member States with a view to preventing, preparing for and managing electricity crises in EU

Assessment of risks to security of electricity supply (already done)

- Rare and extreme natural hazards
- Accidental hazards going beyond the N-1 security criterion and exceptional contingencies
- Consequential hazards including the consequences of malicious attacks and of fuel shortages

Risk Preparedness Plans (in elaboration)

- Regional, bilateral and national measures

ENSURING THE ENERGY SUPPLY

Capacity mechanisms in European Union

The rules for establishing capacity mechanisms in the Member States of the EU are set in the Clean Energy Package (Regulation EU 2019/943)

- The eventual insufficiency of energy-only market for ensuring adequacy makes necessary the development of capacity mechanisms.
- Capacity markets must be authorised by the European Commission.
 - Maximum duration: 10 years
 - Non-discriminatory markets, with the possibility of cross- border participation
- The implementation of capacity markets shall be supported by [adequacy studies which detect a risk affecting the energy supply](#)
 - The adequacy studies will be performed annually by ENTSO-E
 - Additionally, each Member can perform a national adequacy assessment, approved by the NRA.

Gracias por su atención

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