

Resiliency of power grids to climate change & extreme weathers

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Resiliency of electricity grid infrastructures



RTE transmission grid infrastructure



270 000 towers
105 000 km of lines
2 600 substations
40 000 disconnectors
12 000 breakers







Impact of extreme weather

Lothar & Martin storms (1999)

Winds > 150 km/h
➢ Destruction of 400 kV towers with a major impact of cascading effects
➢ Destruction of 63 – 90 kV towers mainly due to falling trees

0.4% of RTE towers impacted 4% of customers impacted







Actions taken for an increased resiliency



Preparation

Creation of regional teams able to restore an heavily damaged line in less than 5 days Reserve of 400 kV transportable infrastructures

Reduction of extreme weather consequences

Installation of anti-cascading towers (every 5-10 km) Review of wind maps for new infrastructures Limitation of falling tree consequences

Program of 2.4 billion € (2000-2017)

And also

Logical infrastructure redundancy R&D on new monitoring tools









Resiliency of european power systems



European power system

entsoe

34 interconnected countries

- ✓ Security of the European power system
- ✓ Economical optimization

4 synchronous areas

- ✓ Installed capacity ~ 880 GW
- \checkmark Annual consumption \sim 3 200 TWh
- ✓ Annual exchanges ~ 380 TWh
- ✓ 300 000 km of lines
- \checkmark ~ 530 millions inhabitants

41 Transmission System Operators

Fast and continuous increases of cross-boarder interactions and exchanges



Development of renewable energy





More than 180 GW of installed capacity in Europe for wind and solar production

Accurate RES forecasts and monitoring are fundamental for the management of the power system taking into account extreme weather resiliency

Recent European projects on these issues: Twenties, Safewind...





Climate change & long-term planning



ENTSO-E Ten Year Network Development Plan

Development of electricity grid infrastructures based on possible future European weather scenarios
- impacts on European electricity load
- impacts on European production (wind, solar but also thermal and hydro generation)





Four keys for the building of a resilient power system in the context of the European energy transition





Develop new mechanisms for a more intelligent power system (software)

taking into account extreme weather and future climate scenarios





THANKS FOR YOUR ATTENTION!

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