CORESO

a successful example of centralised coordination between TSOs

François BOULET, CEO

Agenda

- What is Coreso?
- The first results
- Next steps

Why a regional coordination?

Large scale renewable generation

Intermittent – geographical concentration

More interconnections

AC & DC

Market development

Flexibility - Intraday

More international flows
More uncertainties
Need for more operational efforts

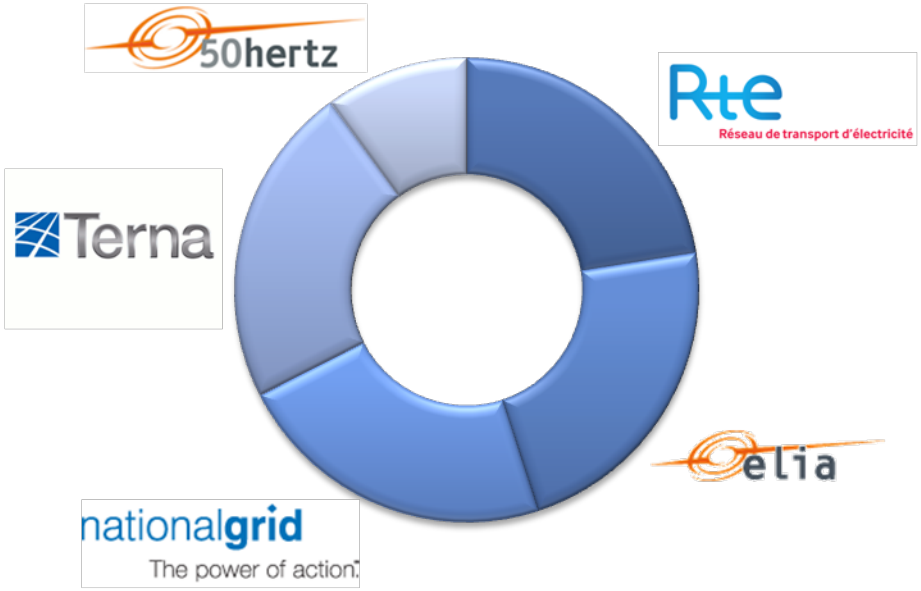
Need for a coordinated management of flows at international level to guaranty the security of supply

Coordination initiatives

- **TSC** (TSO Security Cooperation)
  - Decentralizes Coordination between 11 TSOs in Central Europe
  - Panel of Experts = regular meeting to share knowledge
  - Common tool called CTDS (in operation since January 2011)
- **SSC**
  - Cooperation agreement between Amprion and TenneT
  - Centralized cooperation that will use the TSC tool
- **Coreso**
  - Centralised coordination in western Europe
  - First Regional Coordination Service Centre

Coreso: a centralized vision of the coordination between TSOs

- Independent company (SA) with its own employees
- Created december 2008 in Brussels
- Operational since 16th February 2009 7d/7 (afternoon shift)
- Round the clock operations since 29th June 2009
- 5 shareholders today (Elia, National Grid, RTE, Terna, 50Hertz) and open to new partners



coreso

Employees of Coreso

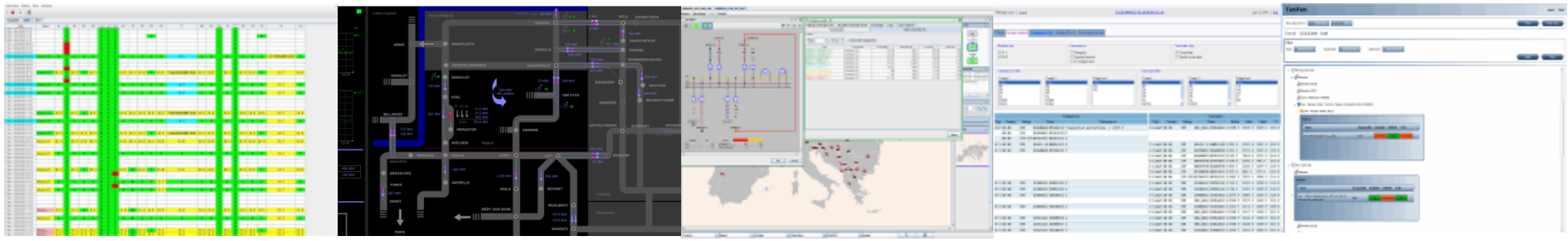
- CEO: François Boulet
- COO: Olivier Bronckart
- 15 Security and Coordination Engineers
  - Coming from parent TSOs' staff
  - Will go back to the TSOs after their job in Coreso
  - Training received within the shareholders + internal training in Coreso (minimum 3 months of initial training)
  - Regular exchanges with TSOs' operators
- Shift organisation (24/7)
  - Morning: 1 SCE
  - Afternoon: 2 SCE
  - Night: 2 SCE

Coreso: a service provider to TSOs

- Coordination services (to shareholders)
  - Relaying significant information between TSOs
  - Pro-active assessment of the security level of the network (day ahead, intraday and close to real time forecast)
  - Proposing coordinated actions to TSOs to master the risks
  - Coordinating the agreement on remedial actions
  - Contributing to ex-post analysis and experience reviews of significant operating events for the appropriate area
- Data/IT management (to TSOs of the CWE area)
  - Merging of D-2 files for the Market Coupling
  - Hosting of the common system of TSOs for the Market Coupling

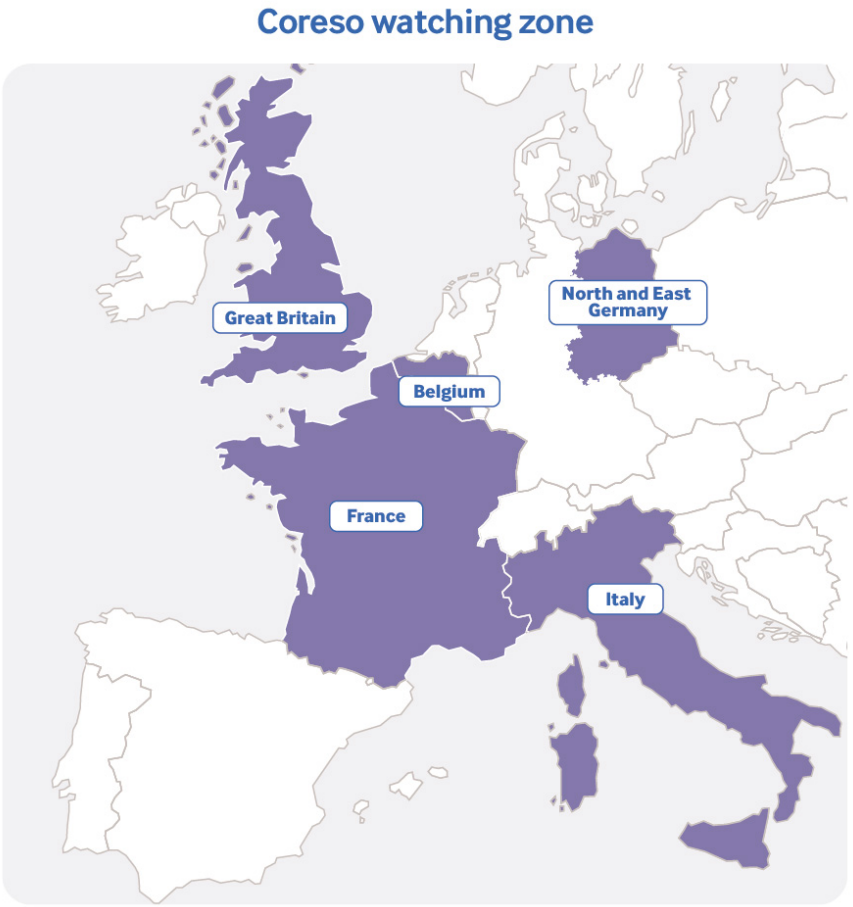
Operational decisions remain to the TSOs

Process & tools



Coreso's area of activities

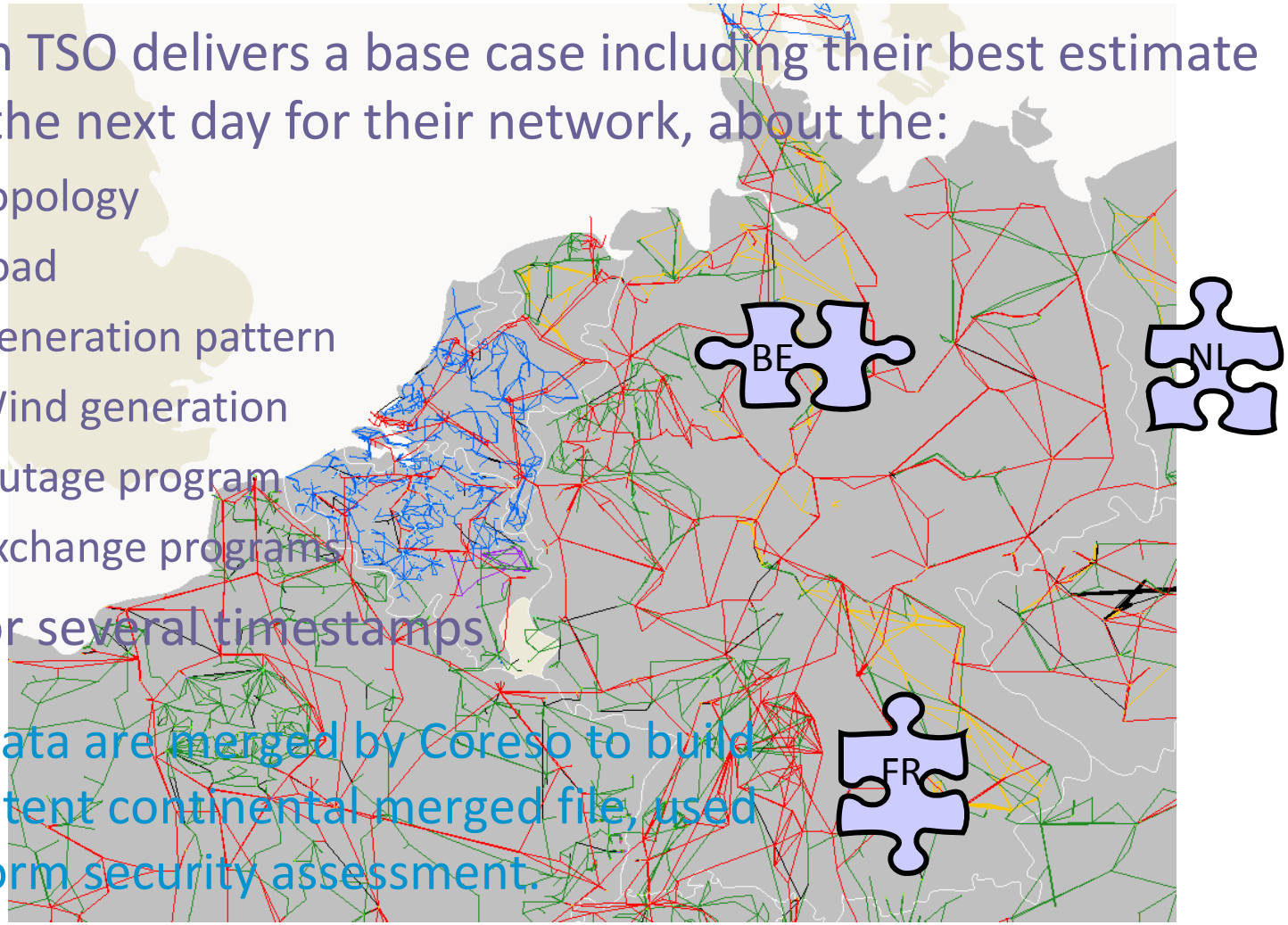
- **Initial objective**: improve the security of supply, as a response to the CWE MoU signed in 2007
- **Interest Area** : the grid of its participating TSOs
- **Preventive security analysis** on a larger area including neighbouring grids
- **Observability** of the full Continental Europe grid, thanks to the data exchanged between TSOs



Data used: DACF files

- Each TSO delivers a base case including their best estimate for the next day for their network, about the:
  - Topology
  - Load
  - Generation pattern
  - Wind generation
  - Outage program
  - Exchange programs

… for several timestamps



These data are merged by Coreso to build a consistent continental merged file, used to perform security assessment.

Data used: snapshots

- For intraday and close to real-time security assessments, Coreso needs up-dated data.
- TSOs can provides real-time snapshots in the same format than DACF files.
- TSOs of CWE area are providing snapshots every 15 min.
- Terna and swissgrid will provide them soon.

- Every 15 minutes Coreso merges theses snapshots and performs a systematic security analysis automatically.
- Missing files are replaced by the relevant DACF file.

Service to National Grid today

- As National Grid was not part of UCTE, the data exchanges (DACF files) are not yet in place.
- Services to NG are:
  - Knowledge sharing about system operation rules in different TSOs
  - Daily phone calls + reports to share relevant information about the system operation state in France, Belgium, UK, Italy and Germany especially about reserves.
  - Dedicated intraday calculations to assess the impact of possible IFA 2000 intraday flows on the continent grid and proposition of remedial actions if needed.

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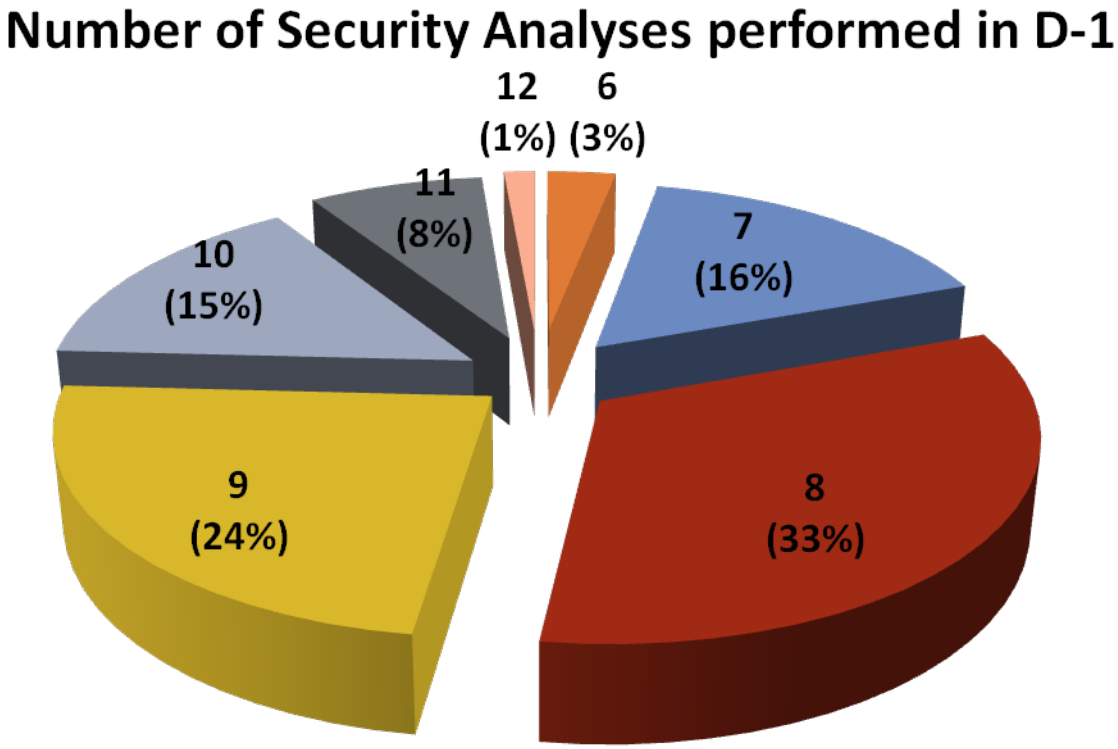
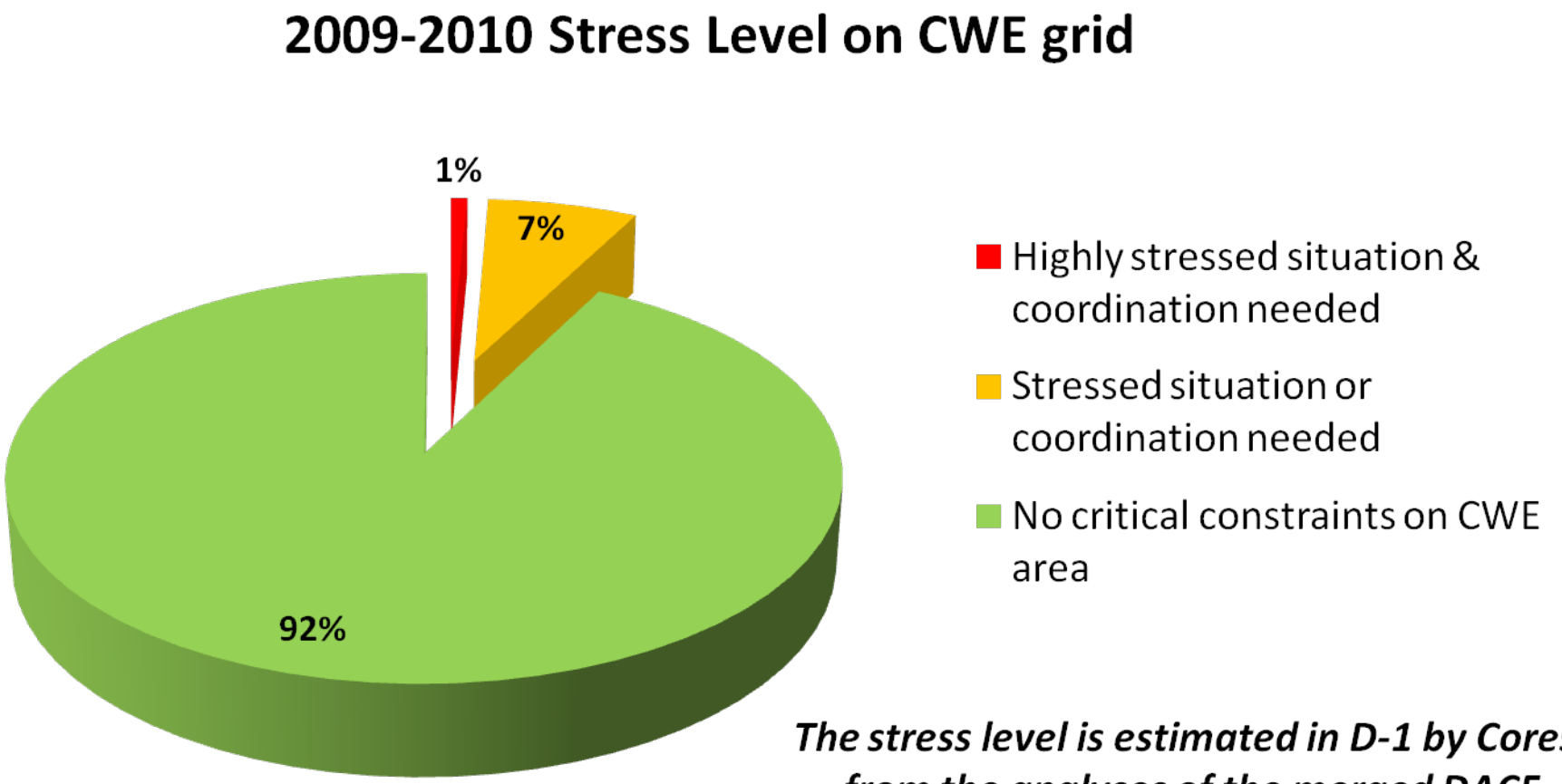
Day-ahead process Performance figures

- Every day Coreso produces 24 merged DACF files
- Coreso performs between 6 and 12 security analyses on its observability area in day-ahead



Day-ahead level of stress



The stress level is estimated in D-1 by Coreso from the analyses of the merged DACF.

Complementary operational visions

TSOs

- Perfect knowledge of operation rules but only on its own territory
- Study for peak time
  - Influence of consumption or generation patterns
  - 1 to 3 deep analyses
- Full description of national grid but only limited vision of neighbouring grids

Coreso

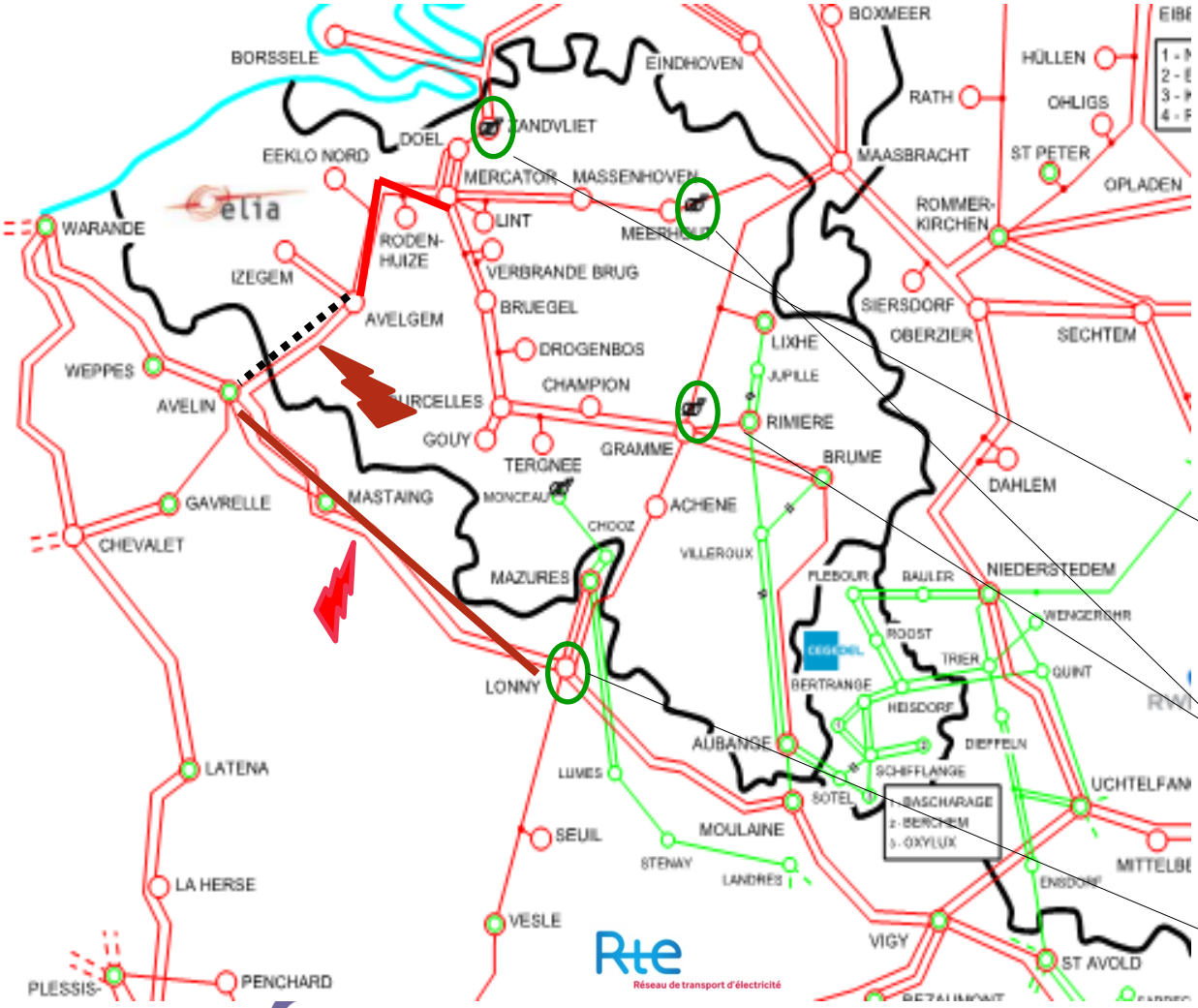
- Knowledge of operation rules of several TSOs and ability to speak to each using its own technical culture
- 24 hours vision
  - Influence of exchanges
  - 6 to 12 deep analyses
- Full continental grid description but simplified and limited to EHV

Example of coordination

5th May 2010

- One of the 5 days where coordination was an absolute necessity since the beginning of Coreso's operation
- Context:
  - PST of Zandvliet not available for loop flow control
  - Outage for maintenance of 400kV line Avelgem Avelin
  - Low temperatures
  - High commercial and physical flows North to South

Stressed situation foreseen in day-ahead



N-1 Avelin – Lonny
=> 130% Avelgem-Mercator

N-1 Mastaing-Avelgem
=> 90% 1' Avelin-Lonny

=> NOT ACCEPTABLE

Need of cross -border preventive actions:

Special topology in Zandvliet in order to isolate BE-NL tie-lines on 400kV transformer

Change tap position of Van Eyck transfomer (from 18 to 16) in order to reduce N-S flows

2 nodes topology in Lonny in order to balance Avelin-Lonny and Lonny-Vesle flows

Efficient coordination during the night

- These actions were coordinated by CORESO with RTE and ELIA
  - Impact on neighbouring grids was evaluated, discussed and validated with TenneT and Amprion during the night
  - Impact on 225 kV french grid was evaluated, discussed and validated with both National and Regional Control centres of RTE during the night
    - Special topology in Avelin 400 kV in order to manage 225 kV flows
- These actions allowed TSOs to avoid very expensive remedies like redispatching of nuclear generation

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Better intraday operation

- Acquisition of a new tool called DADS
  - Data-historian based
  - Comparison of real-time data and DACF/snapshot files
  - Objective: detect trends or events that may trigger new intraday studies
- Reinforced collaboration with TSOs to exchange updated data during the day
- Increase of knowledge and skills of Coreso engineers
  - better understanding of typical risks
  - More relevant variant studies

Integration of renewable power

- Wind generation is one of the major factor that lead to differences in flows between day-ahead studies and real-time.
- An error in forecast has an impact far away in the European grid:
  - 3000 MW more wind generation in Germany creates 150 MW more physical (loop) flows across Belgium
- Coreso uses data published by TSOs to integrate this risk in its studies by:
  - Checking the consistency of wind forecast with DACF data
  - Performing special wind variants when there is a risk of major error in forecasts (large ramps in wind generation)

Further perspective

- The collaboration with National Grid aims at preparing the development of future projects:
  - new HVDC cables across the Channel and the North Sea,
  - future HVDC supergrids between off-shore wind farms on the Channel and the North sea,
- The objective is to be able to modify the physical flows in a coordinated way using all controllable devices:
  - HVDC links
  - Phase Shifter Transformers

Further perspective

- Coreso is involved in the Twenties project.
  - The aim is to significantly develop the testing and implementing of new technologies in order to increase a safe wind power generation within the European electricity system.
  - Gathering 26 partners (TSOs, electrical companies, institutions) from 10 different member states, the Twenties project will last 3 years.
- New partners…
- New services to TSOs at a regional level…

Questions

See our Web site: www.coreso.eu