



CORESO, A SUCCESSFUL INDUSTRIAL COOPERATION FOR A BETTER EUROPEAN SECURITY OF ELECTRICITY SUPPLY

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I. CORESO, A REGIONAL TECHNICAL COORDINATION CENTRE OPERATIONAL FOR MORE THAN ONE YEAR

- *Coreso, an increased cooperation of TSOs in answer to new stakes*

Coreso (Coordination of Electricity System Operators) is a regional technical service centre shared by several Transmission System Operators (TSOs) in Europe. It fits in the framework of increased operational coordination between TSOs, as recommended by the European Commission and market players, in order to strengthen the **operational security of the grids and the reliability of power supplies in Europe**.

The centre also contributes to a number of EU objectives, namely the **operational security of the electricity system**, the integration of large-scale **renewable energy** generation (wind energy) and the **development of the electricity market** in the Central-Western European (CWE) region, comprising France, Belgium, the Netherlands, Germany and Luxembourg (coordinated market mechanisms and extension of market coupling).

This area is characterised by major energy exchanges and the co-existence of classical generating facilities and new means of renewable generation, more intermittent by nature. Optimised management of electricity systems and corresponding grid infrastructure, specifically interconnections between power grids, are very important in this context.

As an example illustrating the importance of this issue: a change in wind speeds in Germany, which has considerable wind power capacities, can have an immediate impact on cross-border electricity flows right across the western European network. The flows on some lines can change dramatically even if no new commercial exchanges have been declared.



Coreso, a concrete approach within the Central Western European region



- **Coreso, a company established by TSOs more than one year ago**

Coreso was incorporated on 19th December 2008 by **RTE** and **Elia**, respectively the French and Belgian transmission system operators (TSOs), and was joined by **National Grid** in May 2009. Each of the three TSOs now equally owns **1/3 of the capital** of Coreso.

Dominique Maillard, Chairman of the RTE Executive Board, is Chairman of the Board of Directors of Coreso. Each shareholder TSO is represented by two directors in the Board of Directors. The centre is managed by CEO François Boulet.

The Coreso operational team works in shifts around the clock, and is composed of 12 people of several nationalities, speaking Dutch, English, French and German.

- **Day-ahead activity has been operational since 16th February 2009**

Since the start of its operational activities on 16th February 2009, Coreso has been providing forecasts of electricity flows in the **five countries: France, Belgium, Germany, the Netherlands and Luxembourg**.

Every day, seven days a week at 18:00, TSOs exchange between them the updated data of their own grid (e.g. generation schedules, international electricity flows and unavailability of power stations and grid components).

Every day, seven days a week at 19:00, the Coreso engineers, based on this data, supply the national control centres of their parent TSOs with forecasts about the security of the regional European grid for the following day (day-ahead activities). Aside from data from the CWE area, Coreso also analyses data from a total of 28 TSOs to build up a picture of power flows across Europe.

Coreso works on grid situations which are the best estimates of all individual TSOs and has knowledge of the procedures used by them. Coreso's modelling is therefore much **more precise than those of the individual TSOs** when looking at cross-border constraints.

In this way, Coreso **assesses the security of the grids**, simulates various scenarios, such as the sudden unavailability of an interconnecting line, and then anticipates the **remedial measures** that need to be taken to control the potential consequences. Proposed corrective measures are submitted to the TSOs' national control centres which take operational responsibility for secure operation of their respective grids.



- *Round-the-clock services have been operational since 29th June 2009*

Since 29th June 2009, Coreso has provided Transmission System Operators (TSOs) with permanent network security analyses and monitoring of the CWE grid on a continuous basis (every 15 minutes, 24/7).

This extension of activities to a continuous basis has significantly increased the security of supply in a context characterized by a high variability of power flows due to the development of renewable energy and cross-border exchanges in the European electricity market.

Coreso updates its **studies on the basis of real time data** (snapshots) of the Central-Western European grid, provided by the TSOs. Coreso delivers them in return the consolidated analyses it performs, with computational models providing results every 15 minutes.

This close to real time scale is especially relevant in the current operational context in the European grid, with a constantly increasing proportion of renewable energy, which is intermittent by nature, and the further growth of cross-border exchanges in the European electricity market.

The analyses provided by Coreso allow assessing the security of the European electricity system, and help the TSOs to take the proper decisions regarding security of supply. The data and results are directly relayed to the operators of the TSOs' national control centres.

- *Services around the intraday capacity assessment on the France-UK interconnector*

Since 29th June 2009, Coreso has been providing its parent TSOs with **assessments of the impact of France-UK intraday capacity** on the security of supply on the French and Belgian grids.

With the results of these daily security analyses RTE and National Grid can optimize the capacity offered to the market on the interconnector during the day.

- *Services for the 7 TSOs of Central West Europe (CWE)*

In the context of the Coupling project in the Regional Market of Central Western Europe, Coreso is providing two services to all the TSOs of this region.

The first is the daily provision of European-wide merged files based on national forecasts made by the TSOs. These 2 days-ahead congestion forecast (or "D2CF") merged files are provided for two timestamps every day of the week.

The second service is the hosting of the common system that will be used by the TSOs for performing their common tasks when the Regional Market Coupling is in place. This IT system is hosted in two locations by SSC and by Coreso.



II. CORESO HAS SHOWN ITS ADDED VALUE FOR THE EUROPEAN SECURITY OF SUPPLY

- *Operational benefits and contribution to prevent major incidents are confirmed in the CWE region*

On three occasions, **Coreso has detected constraints** that could only be identified by a wide view beyond the national boundaries of the grids of each country. With a national view, even enlarged by a rough description of neighbouring grids, these new constraints are not detectable with enough precision. If these situations had not been corrected, a critical fault might have eventually led to a blackout. This view "from above" by Coreso improved the level of security of supply of the Central Western European region. Coreso's view on the grid is complementary to the view of each individual TSO.

Coreso has **offered efficient coordinated responses** whenever constraints having an impact on a number of countries have been detected.

Coreso **ensured that multilateral coordination involving a number of TSOs** was provided with a view to resolving certain delicate grid situations, thanks to its broad centralised view of the grid and the expertise of its operators.

On a daily basis and thanks to its wide view of the grid, Coreso has been able to propose **coordinated actions that were less costly than the solutions foreseen by individual TSOs**. This aspect of Coreso's input is also of great value to its parent TSOs and their customers.

After more than a year of daily operation, Coreso shows mature procedures and has proved time and again the value of centralised coordination between TSOs.

- *A very high availability of Coreso services (day-ahead and round the clock)*

Coreso has achieved very high availability of its systems and processes.

Each day since "go-live" on 16th February 2009, Coreso has been able to provide a complete day-ahead report to the control centres of its parent TSOs . **This service for the next day (day-ahead) has proved an availability rate of 100%**.

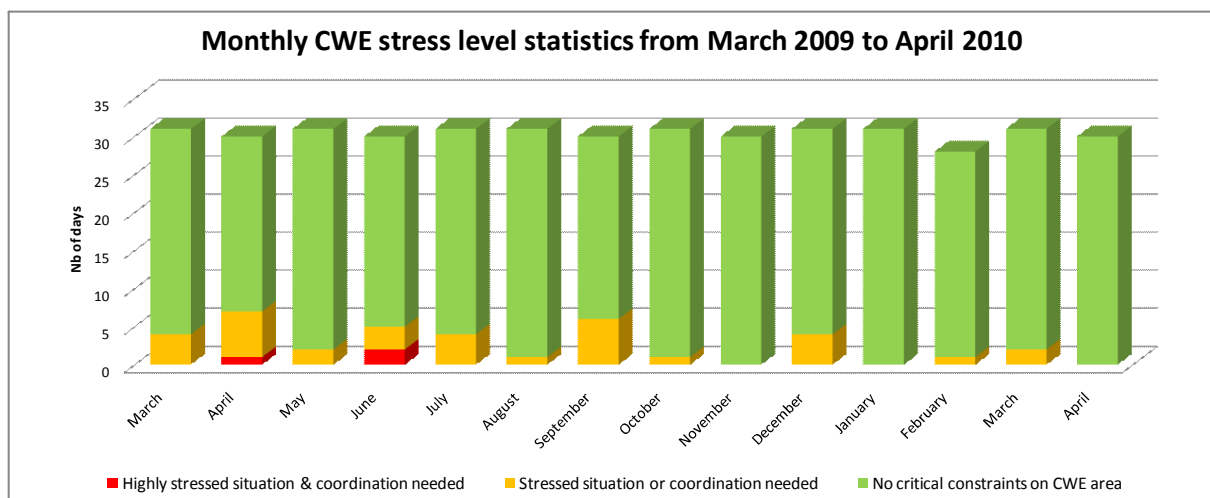
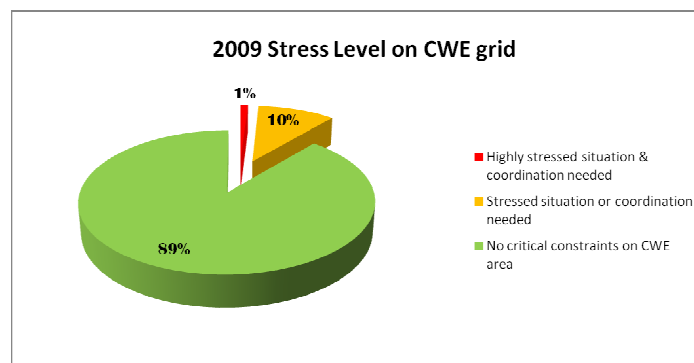
Since its start on 29th June 2009, this **round the clock service** has shown an availability rate of **more than 99%**.

- *Coreso monitors the stress level of the national grids*

Coreso developed an indicator to **monitor the stress level on the CWE regional grid** from a day-ahead perspective.

In 2009, Coreso observed that the CWE grid has been highly stressed 1% of the time and has needed an increased coordination to prevent any major incident.

For more than 10% of the days in 2009, Coreso's expertise proposed coordinated remedial actions that were more efficient than the actions foreseen by individual TSOs. Each coordinated remedial action that Coreso has proposed has been validated and implemented by the TSOs.



- **Some examples of added value of the security analysis provided by Coreso**

The cross-border analyses carried out by Coreso for the whole day or on the day-ahead basis has shown on several occasions that it has significantly contributed to improve the level of security of supply of the CWE grids.

The constraints are detected by Coreso with better precision than the TSOs thanks to the centralised view which merges the grid data files provided by the TSOs. Coreso offered solutions which were implemented by the TSOs and thus contributed to maintaining operations completely under control.

For example, **on the 30th April 2009** a busbar fault on a French substation could have led to major constraints in Belgium. Neither RTE nor Elia had detected that this contingency was so critical. Only Coreso with its broader view was able to assess the level of severity of that



- *Key figures*

- Capital of the company: 1.0 M€
- Operating income: 3.5 M€ shared by the parent TSOs
- 3 TSOs involved + grid data of the whole continental Europe (28 TSOs)
- 14 engineers + powerful IT systems
- Operation 24h/7d
- Numbers of systematic security analyses based on merged files performed per day.
 - Total forecast: more than 30 each day
 - 2 days ahead congestion forecast (or D2CF): 2
 - Day ahead congestion forecast (DACF): 24
 - Intraday: from 3 to 10
 - Real-time: $24 \times 4 = 96$ (every 15 minutes)
- Complete day-ahead analysis: 6 to 10 complete studies to assess the efficient remedial actions for the whole day (horizontal view)
- The DACF files are provided by all Continental Europe TSOs around 18:00 and Coreso needs less than 45 minutes to perform systematic security analyses for around 1500 contingencies for each of the 24 timestamps studied.



III. TOWARDS EXTENSION AND NEW INNOVATIONS

- *A centre with a mission to expand, and include other TSOs*

Elia, RTE and National Grid are further looking forward to close cooperation with other European TSOs. Several TSOs have already indicated their interest.

Coreso is a concrete step towards regional cooperation. It is an answer to the increased and renewed stakes for real time operation of the European electricity system.

- *Improvement of the services on the UK*

The full integration of UK grid data via National Grid is a main area for future development. Using this data, Coreso will be able to run security analyses on the UK Grid and therefore offer better support to National Grid.

Moreover, Coreso will be able to factor in all future DC links between continental Europe and the British Isles, meaning that it can provide coordinated management of those links with the other controllable devices in the grid (phase-shifting transformers). An overall view is needed to use these various devices in an optimal and coordinated fashion.

- *Enhancement of intraday processes*

Many innovations are still in the pipeline. The first of them is intraday process enhancement by improving data processing and acquiring a new tool which will enable real-time data to be compared with the forecast data. Since Coreso's main objective is to detect risk situations upstream, any improvement in intraday forecasts will be a positive development.

- *Wind energy assessments*

Coreso has worked on wind energy data to understand the impact that wind energy has on electricity flows across the networks of Central Western Europe. Coreso will continue to focus on that subject to improve its understanding and therefore improve the services it offers to the TSOs.

APPENDIX. LEADING-EDGE CONTROL ROOM AND TECHNICAL EQUIPMENT

At Coreso, the workstations face the huge video board that covers the whole of one wall of the operation room. It displays the real-time data that engineers need to get a general overview of the situation of the European electricity system. These include electricity flows on the grids, commercial exchanges between countries and power generation (specifically wind energy).

At their workstations, the engineers have powerful computational models installed on their computers, meaning that in a matter of a few seconds they can obtain the results of simulation models. In this way, they will know the impact of events and failures on power lines and in generation units, fluctuations in the generation of wind energy, etc. which may affect the operation and security of the electricity system and thus are able to anticipate them.

Being linked to the European system operators' dispatching centres via dedicated phone lines and secure communication systems, they can efficiently relay the important data and facilitate the coordination of measures taken on power grids that are in some cases thousands of kilometres apart.

As a coordination centre for system operators, Coreso, therefore, has both the data and the leading-edge tools for data processing to make an efficient contribution to safe long-term operation of the European electricity system.

