



Presented by Grégoire BENONIE Operation Engineer

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Coreso: a centralized vision of the coordination between TSOs

- 5 shareholders today (Elia, National Grid, RTE, Terna, 50HzT.) and open to new TSOs
- Independent company (SA) with its own employees
- Created December 2008 in Brussels
- Operational since 16<sup>th</sup> February 2009
- Round the clock operations since 29<sup>th</sup> June 2009





### 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 manage 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 with the TSOs** 

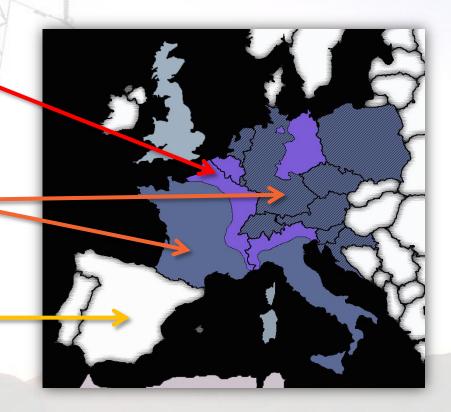


Support service in case of large disturbance

- Main objective of Coreso: avoid large disturbances.
- But it could still happen in case of a series of unforeseen events.
- Coreso operators have:
  - a unique vision of real-time European flows.
  - a unique knowledge of many grids in West of Europe.
- Coreso will provide its shareholders with valuable information in case such large disturbance occurs.
- This service has been in place since Dec 2011.

Coreso's area of activities

- Interest Area : the grid of its participating TSOs impacted by cross-border flows
- **Observability Area:** security analysis on a larger area including neighbouring grids
- Data of the full Continental Europe grid thanks to DACF files.



### Process & tools





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## **Business Challenge :**

Need an overview of European grid.

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Large scale renewable generation

High variability – geographical concentration

Development of the european grid and of cross-border capacities AC & DC

> Market development Flexibility - Intraday

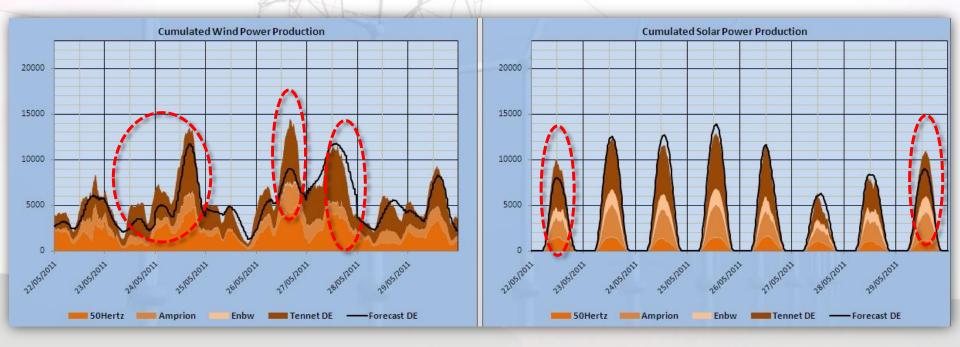
Growing influence of distant electrical systems on local flows More uncertainties Increased stress for operations

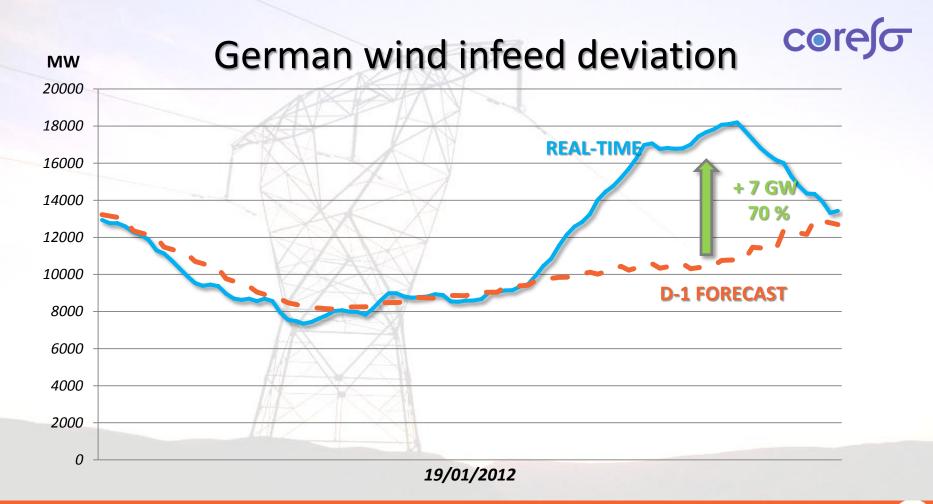


Need for a **coordinated management** of flows at international level to guaranty security of supply



# The Renewable Energy Sources are one of the major source of uncertainty in the grid.

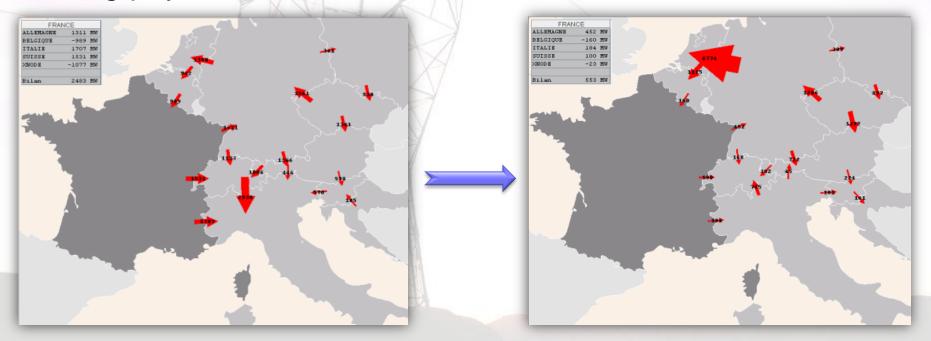






### Need to follow D-1 study deviation

### Big physical flows deviation in 24 hours



## **Business Challenge :**



### Many data were available

- TSOs already exchanged TASE 2 real time data between them
- Our day-ahead simulator tool was able to provide forecast data
- Wind and solar infeed forecast
- Commercial exchanges programs on tie line

### And we needed:

- Acquisition and storage of large amount of data coming from several sources
- Possibility to calculate new data from acquired data coming from different sources
- Dynamic displays
- Dynamic reporting tools
- Many notification/alarm criteria
- Evolvable and easy-to-configure system

### **Solution :** <u>Use a Real-time data infrastructure to</u> <u>store data and display critical information</u>



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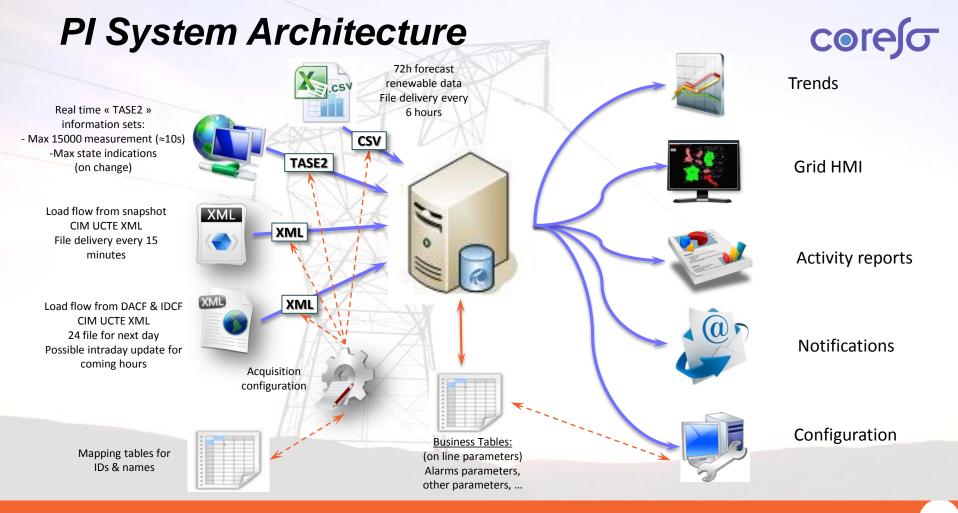
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## **PI System Architecture**



- Last year Coreso upgraded to <u>PI Server 2012</u>
- Coreso uses:
  - PI AF (Asset Framework) to manage data
  - **PI ACE** (Advanced Computing Engine) for Calculation and Analytics
  - PI COM Connector to interface with data sources
  - PI Interface for Universal File and Stream Data (UFL), to store Day-ahead data
  - PI Notifications to inform us about changes on the grid, leading to stress situation
  - PI ProcessBook for real-time monitoring
  - PI DataLink to use data in Microsoft Excel (Engineering analysis and reporting)
  - OSIsoft vCampus (To develop Coreso needs)



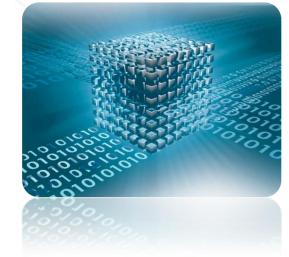
### Information about stored data

Collected real time and forecasted data are :

- Voltages
- Frequencies
- MW and MVAR values :
  - Generations
  - Transmission lines
  - Transformers
- Circuit Breaker and switch statuses
- Phase shifter transformer (PST) taps

Currently use over 30,000 tags

Request lot of calculation (sum, average, min, max, gradient, ...)







### **PI AF architecture**

Coreso operators create their own displays ⇒ Need to use templates to increase efficiency for design and maintenance

PI AF architecture is very important for us to work in that way:

- Enable to create templates
- Allow rollup calculations
- Create graphical templates in PI ProcessBook
- Used notifications templates in PI Notifications

Combined with an Excel mapping table, lots of data could be added very quickly in the PI System.

#### Data organization is one of the keys for achievement !

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## How we use the PI System

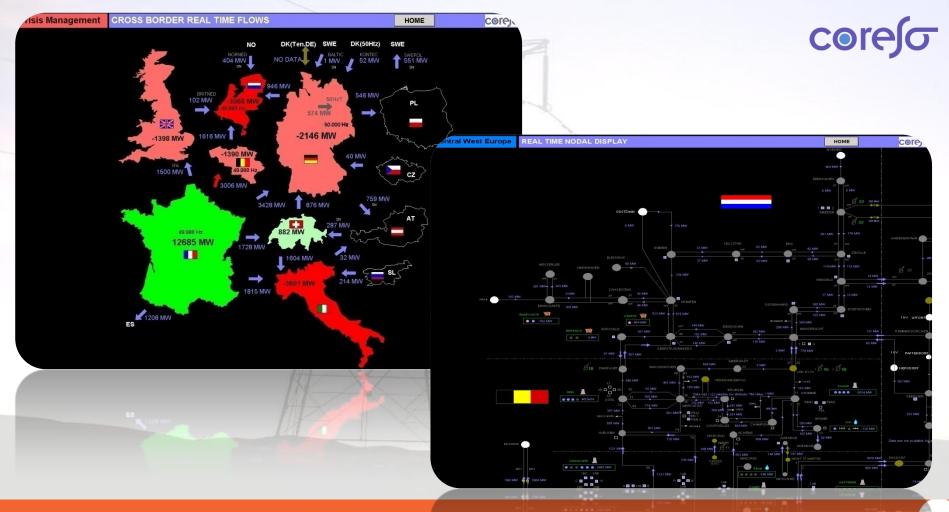


### **PI ProcessBook**

### Generation overview:



HVDC cables overview:





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### Internal development by using OSIsoft vCampus

PI Notifications is used for alerts for when special events on the grid occur.

Needed a better display than the basic one, to monitor real time notifications :

- Chronological sort
- Priority level
- Several audible notifications
- Acknowledgment strategy

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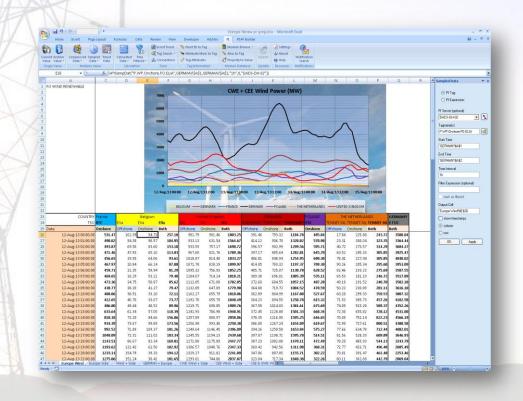
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### PI DataLink automatic report

- Frequency monitoring needs reactivity.
- Develop a specific report to inform TSO about the deviation (first analysis). This should be sent within a few minutes after the detection.
- Example :
- Frequency monitoring report
- Renewable energy forecast report
- Also used for post analysis

PI DataLink



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### **Future Plans and Next Steps**

We need to improve our tool to give more services to TSO's by detecting stress situation, and being quicker.

#### Examples of development :

- Loopflow influence (exchanges effect from each border in %)
- RT Imax load grid (rainbow colors to see stress area)
- Commercial exchanges schedule (Vulcanus data integration)
- Voltage supply chain on the border (backbone of the grid for blackstart)
- Renewable energy in Europe









#### **Actions planned for improvement :**

- Increase the use of « PI DataLink » for automatic report
- Thanks to data storage, Coreso creates more statistical analysis
- Add more TSO's real time data for a better overview
- Create grid stress indicators
- Design new objects like angular gauge to display indicators (not included in PI ProcessBook)
- Continue to make suggestions to OSIsoft to improve the tool (PI ProcessBook, PI DataLink, ...)



## Conclusion



The Use PI System Real-time data infrastructure provides Coreso the following:

- Ability to integrate all kinds of data
- Simplicity to create global overview displays (No IT department)
- Real time monitoring
- Comparison between day-ahead forecast and real time situations
- Store data for long durations
- Automatic reporting
- PI System is more suited for Coreso business than a SCADA (Supervisory Control And Data Acquisition) system

# www.Corefo.eu

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