The challenges of "big data" technologies for the French Transmission System Operator

Big Data Paris

Summary

→ **Presentation of RTE**

→ **Potential needs for big data tech**

→ **Big data at RTE:**

- present
- perspectives

# The European power system

34 interconnected countries

✓ Security of the European power system

✓ Economical optimization

4 synchronous areas
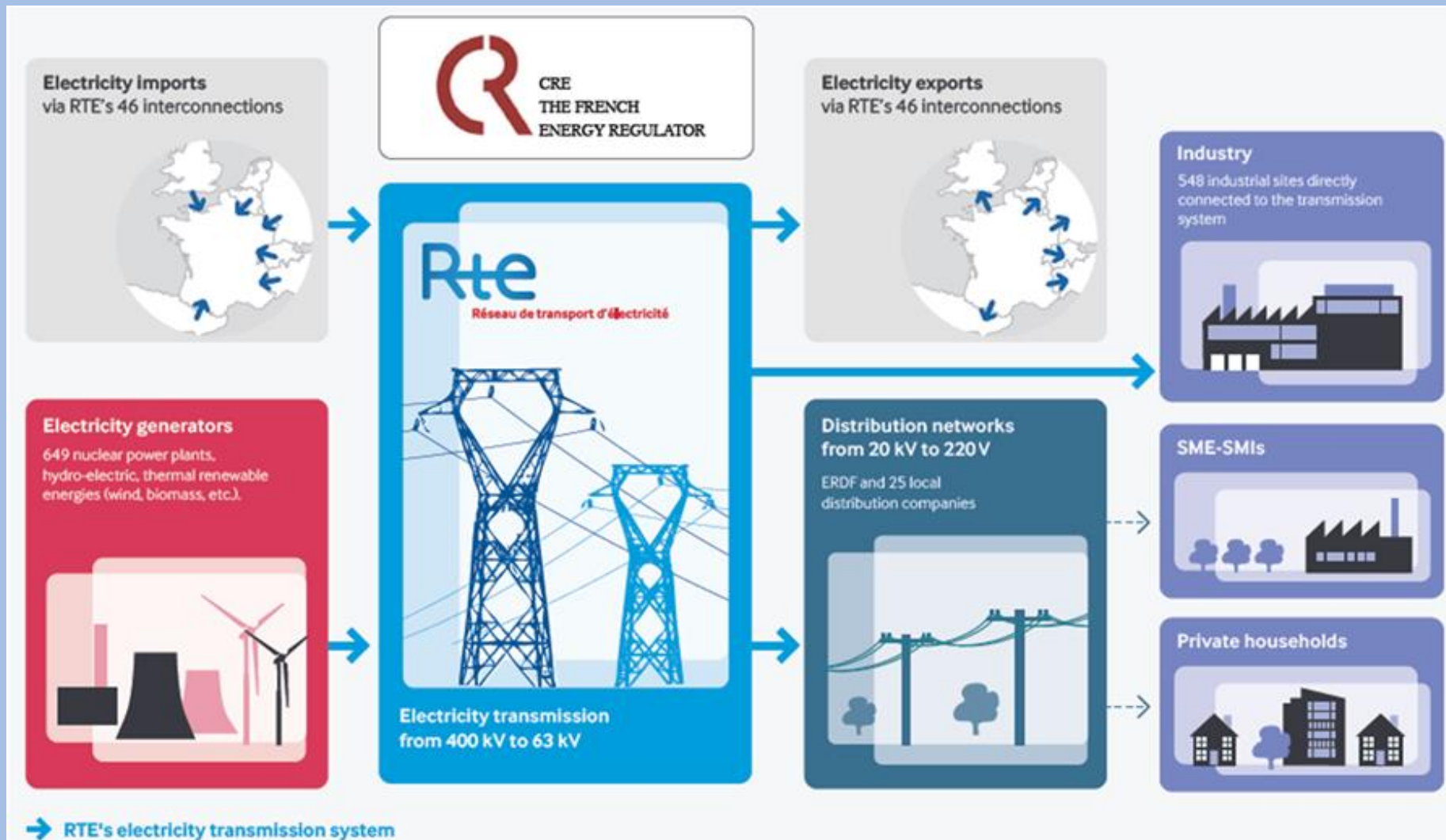
✓ Installed capacity ~ 880 GW
✓ Annual consumption ~ 3 200 TWh
✓ Annual exchanges ~ 380 TWh
✓ 300 000 km of lines
✓ ~ 530 millions inhabitants

41 Transmission System Operators

Fast and continuous increases of cross-border exchanges and interconnection capacities
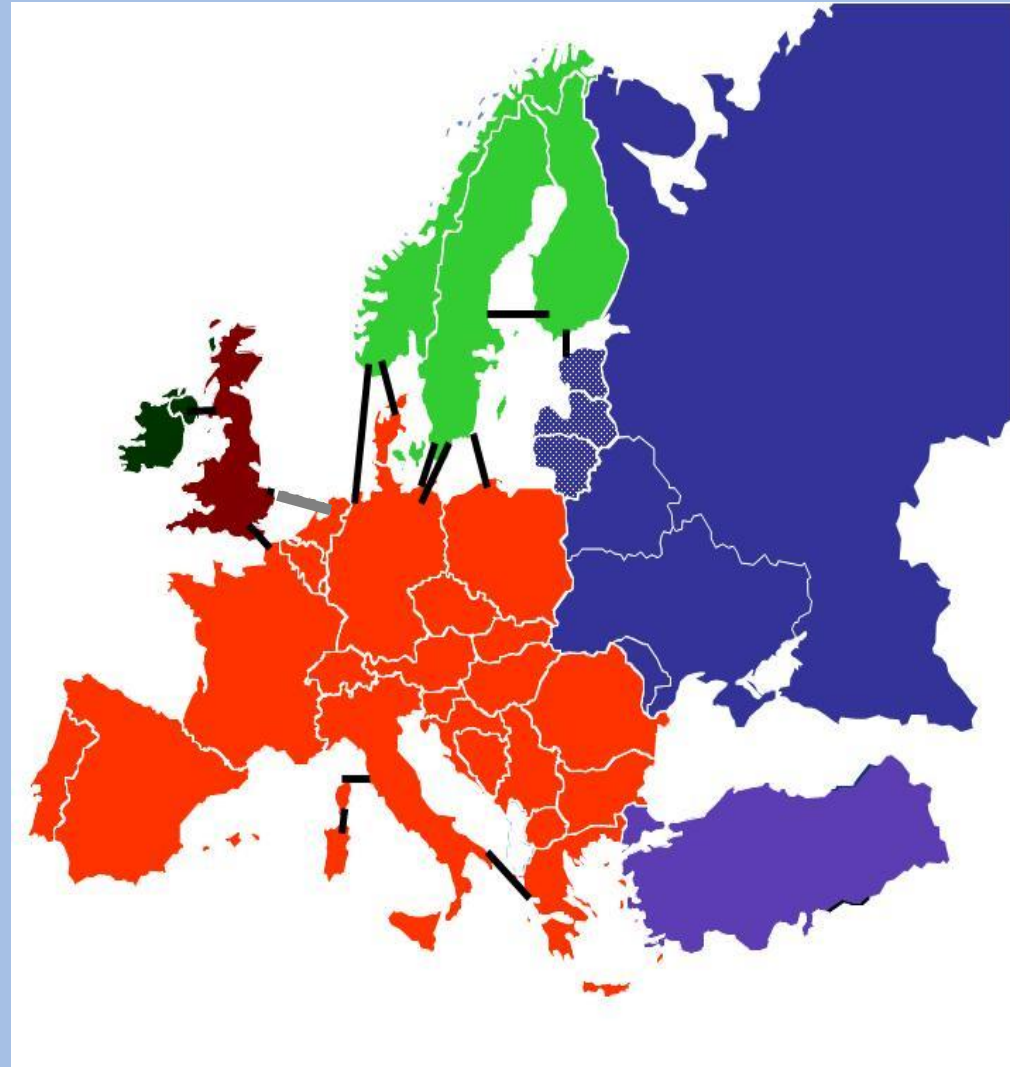
The French electric system

RTE's electricity transmission system

RTE: overview

RTE is the French transmission system operator.

RTE owns and operates the largest electricity grid in Europe:

- **100 000 km of EHV and HV lines**
- **2600 substations**
- **Peak load served > 100 GW (60+ millions inhabitants)**
- **8500 staff**

Financial figures

- **Turnover:** **4 702 million € (2013)**
- **Annual Investment: 1 446 million € (2013)**

Missions

- **Asset management**
- **Electricity flows management**
- **Grid Access management**

RTE: missions

✓ **Balancing electricity generation with consumption at all times**

✓ **Guaranteeing the secure operation of the power system (carrying electricity 24 hours a day, 7 days a week)**

✓ **Maintaining and developing the network to allow generators, distribution networks and consumers to be connected, as well as interconnection with neighbouring countries**

✓ **Guaranteeing non-discriminatory access to the transmission network, whilst ensuring that commercially sensitive information remains confidential**

✓ **Integrating transmission installations into the environment and ensuring the security of people and property**

… all at the most economical cost possible

Potential needs for big data

➔ **Management of customers? Definitively not:**

- 500 hundred customers (one of which accounts for more than 50% of turnover
- 2600 delivery points

➔ **Metering data? Probably not:**

- Less than 10 000 time series (period 10 mn)
- But, for some specific and delimited application, handling of household customer load curves

➔ **Simulation data? Likely:**

- Some Monte-Carlo simulations produce TB of data, difficult to analyze.

➔ **Exploitation data? Promising:**

- Currently 10 seconds time series, but potentially 20 ms time-series.
- Fine grained geographical data (Meteo…)

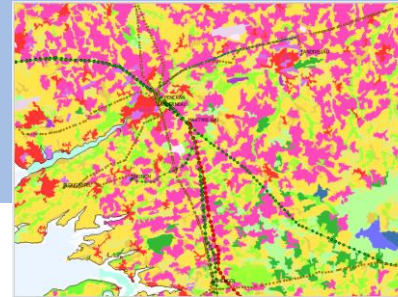# Big data at RTE: now

➔ **In operational process:**

- Widespread use of Monte-Carlo like distribution of computations.

- No big data as such (Distribution of both computation and data).

➔ **In expertise studies:**

- A data-lab has been created. Integration of data from various sources (exploitation, maintenance, patrimonial, meteorological, environmental) is on going.

- First studies showing links between exploitation events and geographical and meteorological data have been done without the big data architecture. Results are promising.

➔ **R&D:**

- Transversal analysis of exploitation data in the Itesla FP7 research project with big data techniques.

- Instead of analyzing all information for a given time, transversal analysis through time-series reconstitutions.

Big data at RTE: perspectives

→ **The development of the digital warehouse**

- *ENTSO-E transparency platform*[1] and *customer portal dashboard*[2]: improve power market efficiency

- *éCO$_2$mix*[3], national and regional electricity report: Informing the public debate
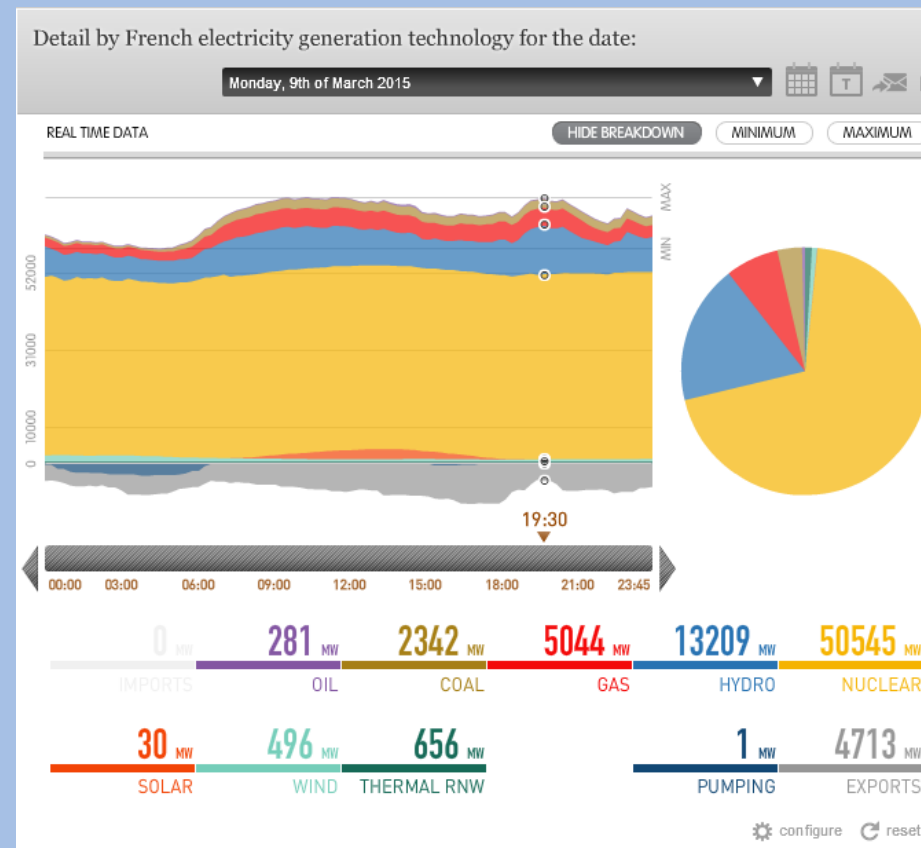
1 https://transparency.entsoe.eu/
2 http://clients.rte-france.com/lang/fr/visiteurs/vie/tableau_de_bord.jsp

Big data at RTE: perspectives

→ **Digital innovation through:**

- Data lab for expertise studies
- Collaborative R&D for European wide operational processes.
- Partnerships for cross-breeding innovations with other sectors.

→ **A digital ecosystem for the power system performance.**

Thank you for your attention.

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