



4 June 2020

Climate services in support of RTE's activities

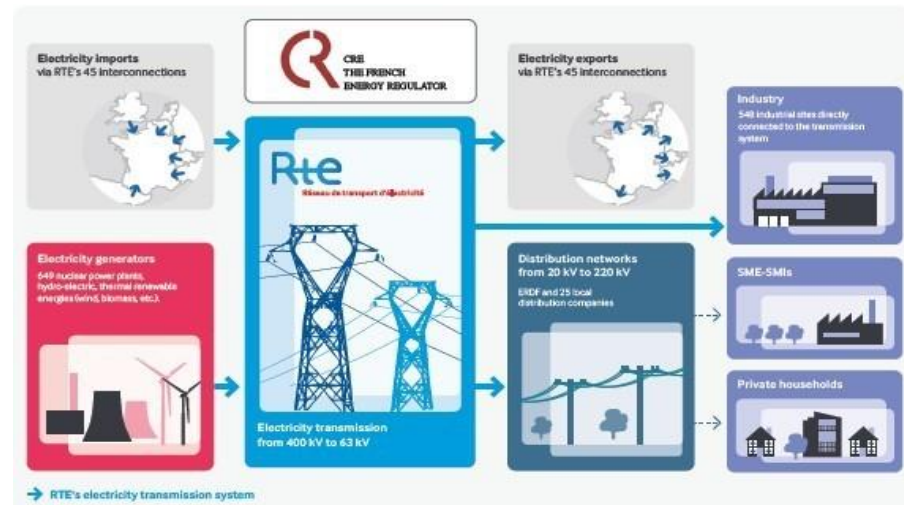
Laurent Dubus

ESIG 2020 Meteorology & Market Design for Grid Services Workshop



RTE, the French transmission system operator, ensures independent and neutral access to the French electricity grid to all power utilities

- 1. Optimising the operation** of the French power system, second by second.
- 2. Ensuring the security of supply** for customers, with access to economical, reliable and clean electricity, now and tomorrow.
- 3. Adapting the transmission system** to facilitate the energy transition.



32 interconnected countries (28 EU Members)

- security of the power system in real time
- economic optimisation
- security of supply

5 synchronous zones

Scandinavia, United Kingdom, Ireland, Continental Europe, Baltic countries

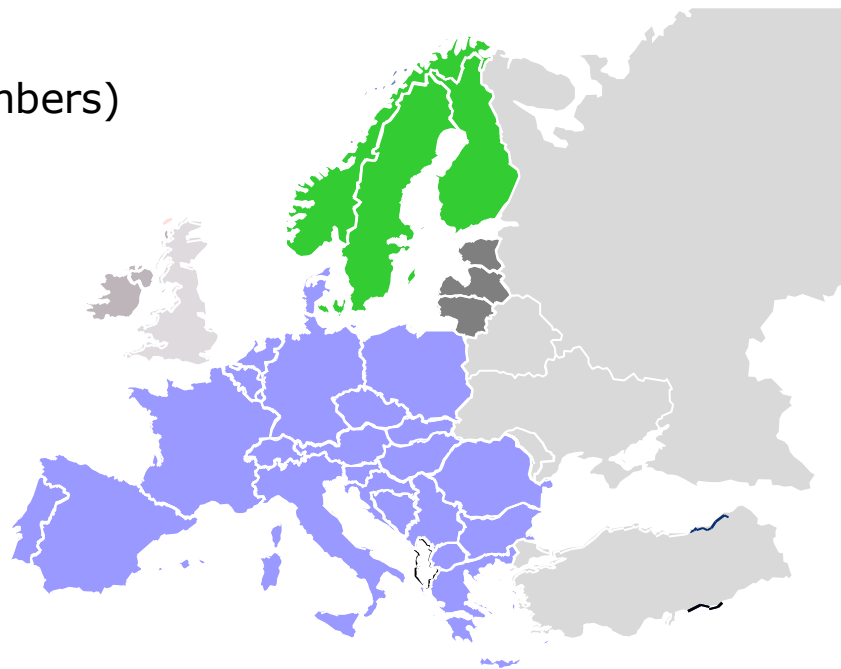
Installed capacity : **850 GW**

Consumption : **3,400 TWh/year**

Peak Load : **500 GW**

Physical exchanges : **400 TWh/year**

Population : **500 Million**



Climate data in support of a wide spectrum of problems

- **Infrastructure**

- What will be the consequences of climate change on maximum line rating?
- How many times a power station is likely to be flooded during its lifetime?
- What maximum ambient air temperature is to be considered when dimensioning new equipments?
- etc...



Bilan prévisionnel

de l'équilibre offre-demande
d'électricité en France

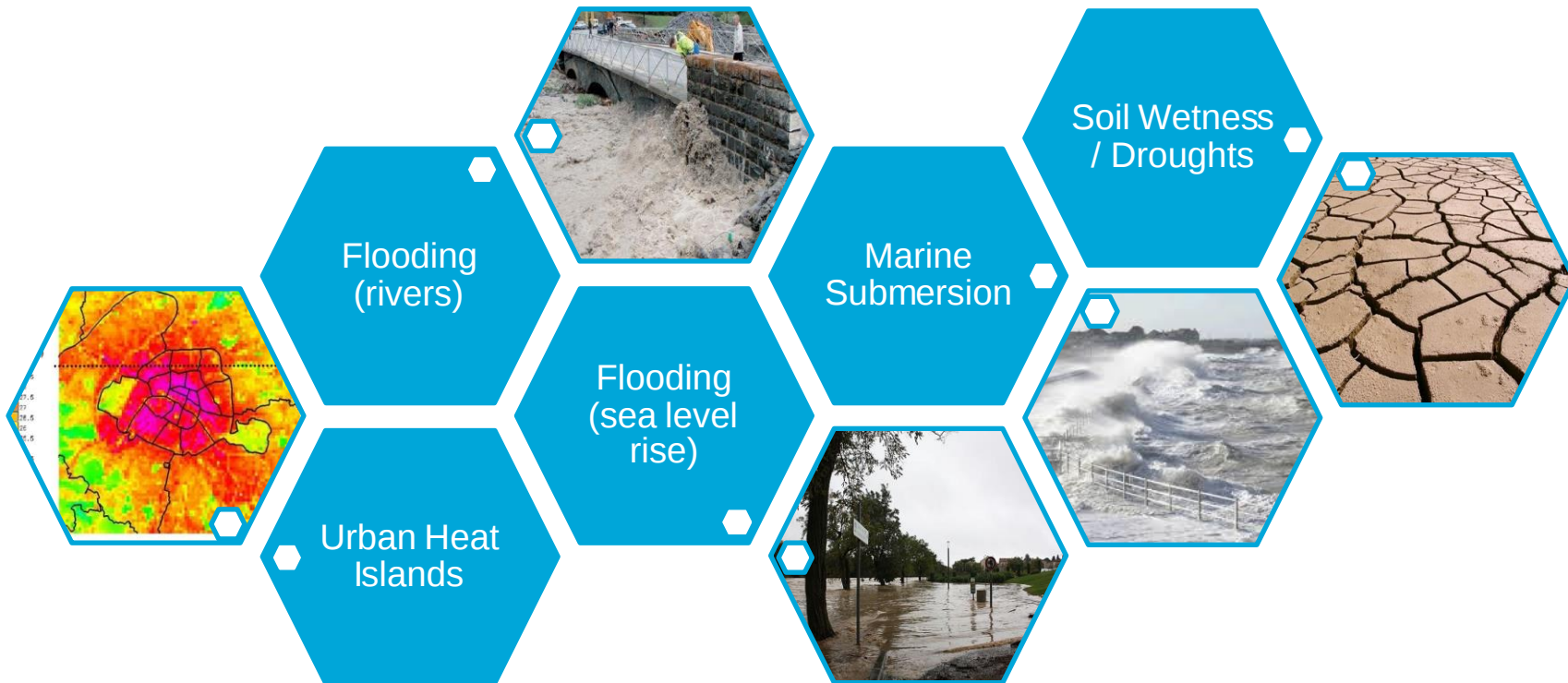
EDITION 2017

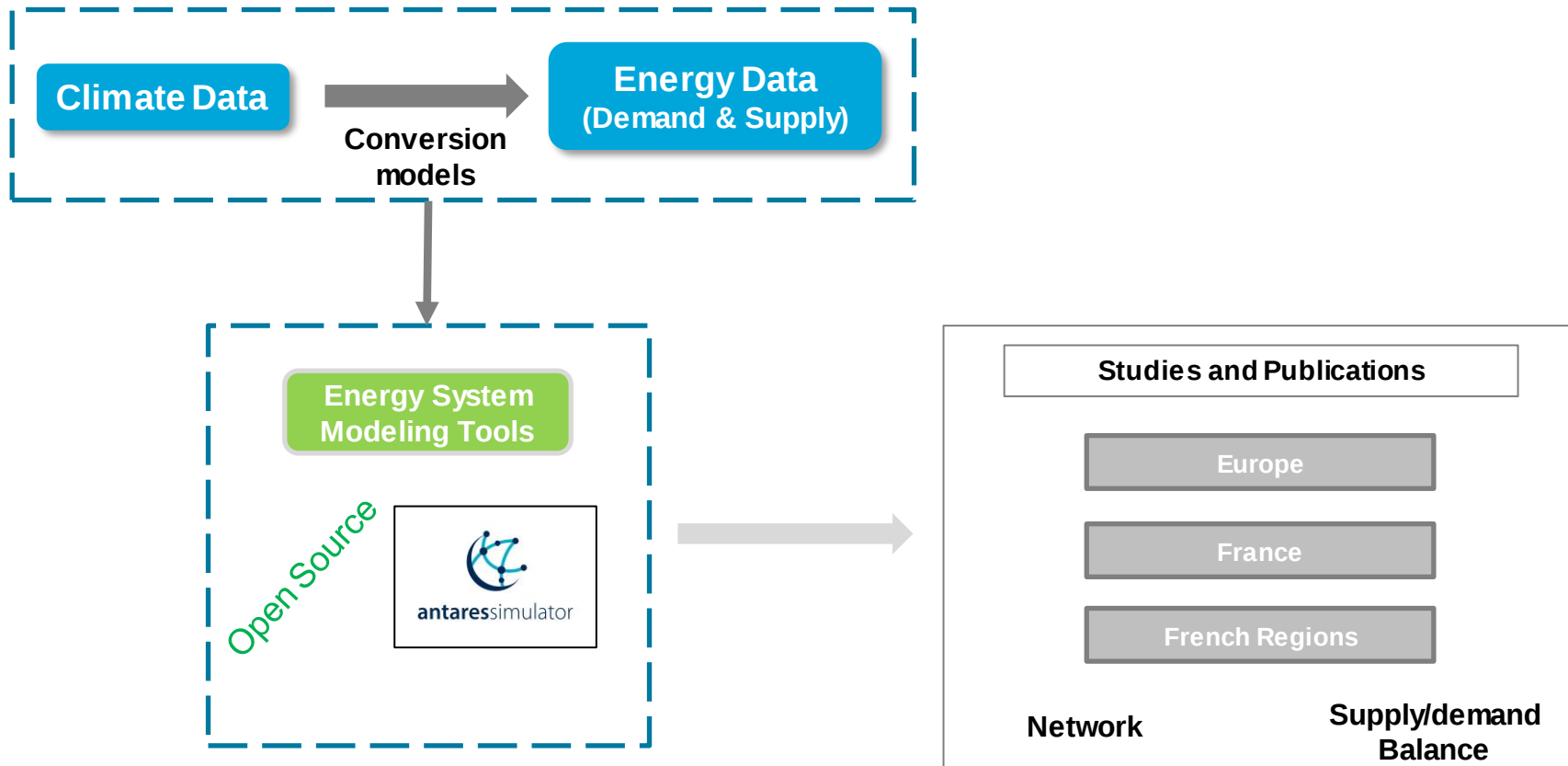
SYNTHÈSE

- **Supply / Demand balance**

- What will be the impacts of climate change on the availability of thermal power plants? On generation from hydropower, wind and solar power?
- How will peaks in demand evolve in cold (heating) and hot (cooling) periods?
- What will be the availability of wind & solar generation during cold events (high demand) and heat waves (potentially decreased thermal and hydro production)?
- etc...

Infrastructure specific Hazards that need to be evaluated in face of climate change





Power System models have specific needs...

... to allow a realistic modeling of the power system and plausible results

➤ Correlations between climate variables
(e.g.: wind & temperature)

➤ Spatial Correlations between climate variables

➤ Hourly time resolution

➤ Good representation of meteorological situations, including extremes

➤ Fine spatial resolution (~ 20 km or less)
for the whole Europe

➤ Recent Past & Current climate + future climate (climate change impacts)

Available data



Temperature



Cloud Cover



Wind Speed



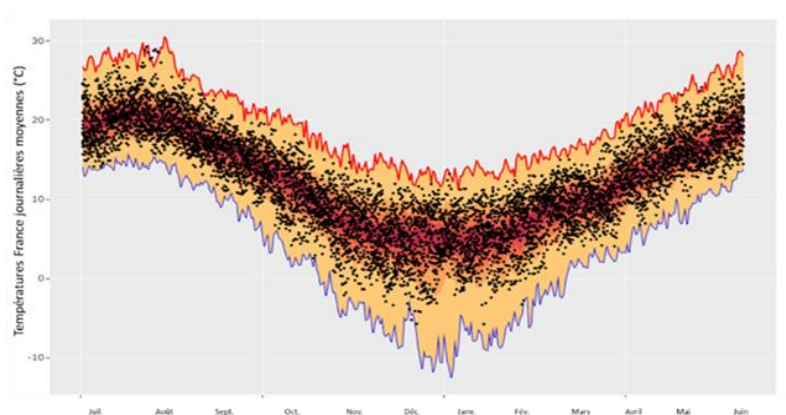
Solaire Irradiance



Precipitation & river flow



200 years, hourly time resolution
37 000 points over Europe



Black dots represent the actual observations over the last 33 years

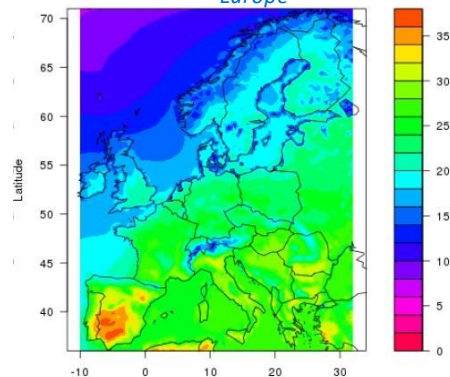
Bias correction with Hirlam Reanalysis

Extrapolation of extreme temperature values

3 simulations sets with « constant climate »

- ☐ 200 years « climate 2000 »
- ☐ 200 years « climate 2050 » RCP4.5
- ☐ 200 years « climate 2050 » RCP8.5

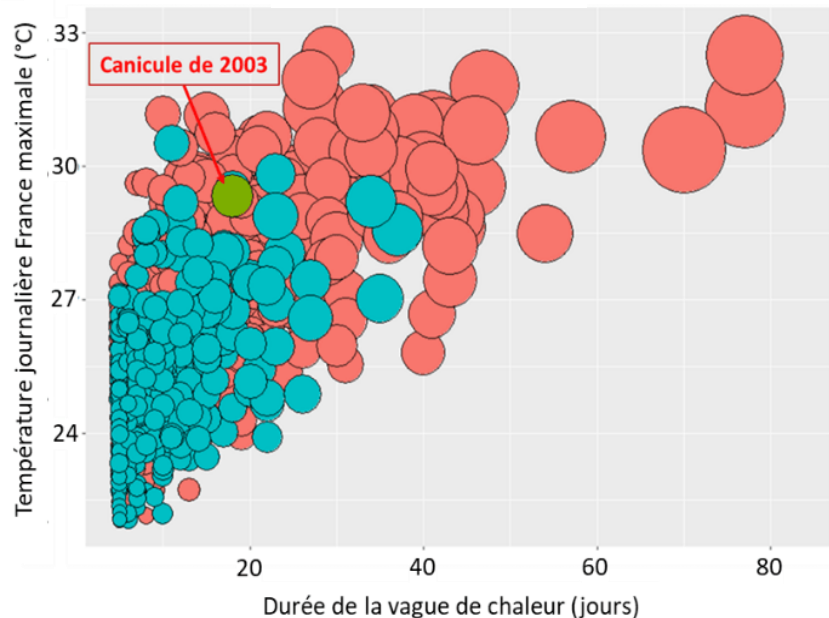
Data on more than 37,000 grid points over Europe



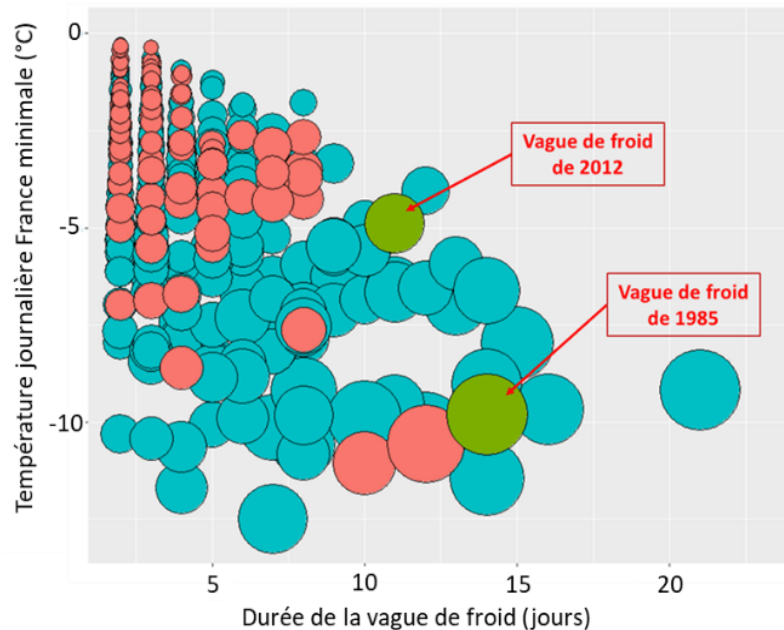
Source Météo-France

Heat and cold waves change dramatically with climate change

Heat Waves



Cold Waves



Climate
2000

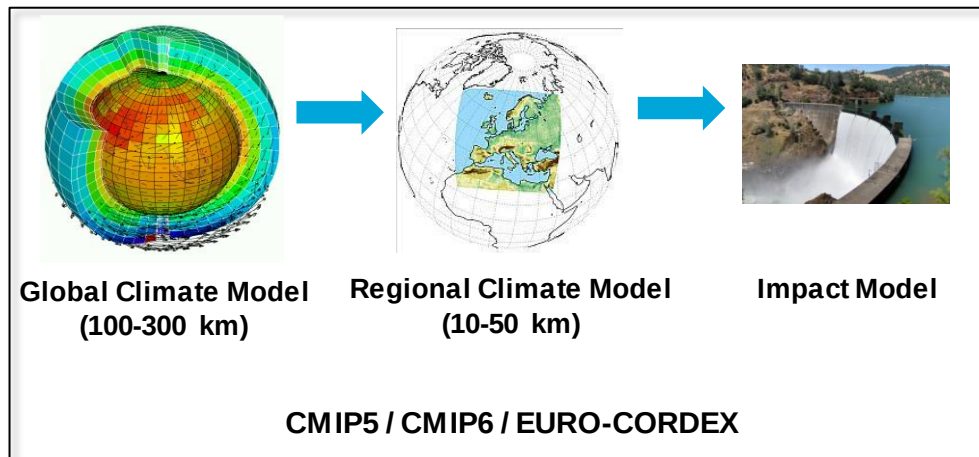
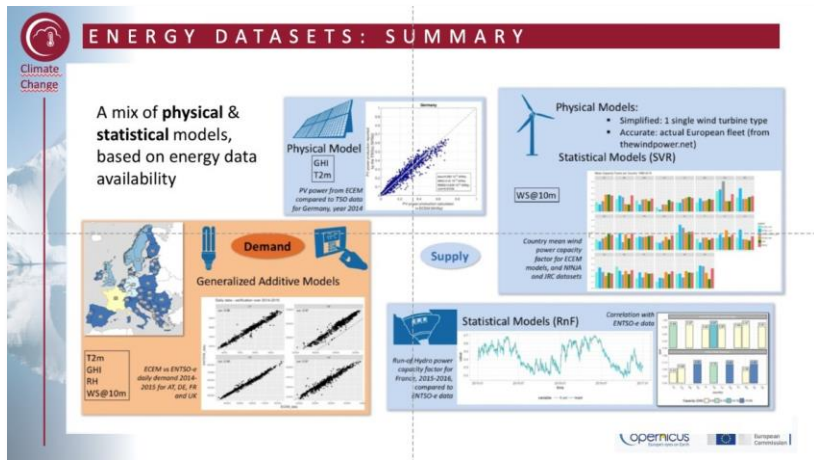


Climate 2050
RCP8.5



Observations

Our current climate reference datasets need to be complemented by other data sources and different approaches, to increase the robustness of our models, and consider various sources of uncertainty



Take away messages

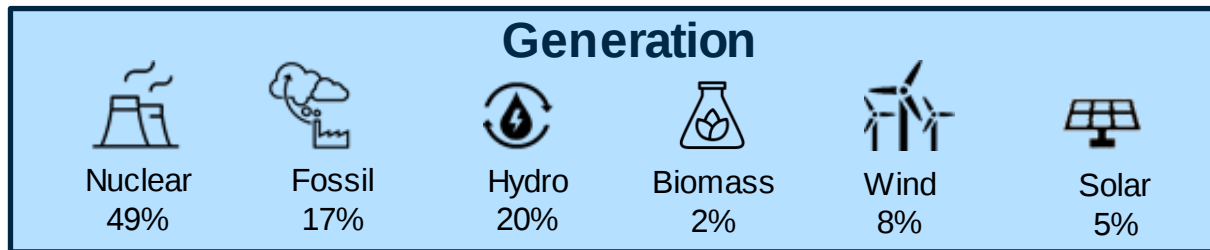
- Climate impacts RTE's 2 main activities: network & supply/demand balance
- We have specific needs and expectations regarding climate data (EU-wide, fine space & time resolution...)
- RTE wishes to develop cooperation at EU level for power system studies (open-Source & Open- Data) The logo for ELF ENERGY, featuring a blue square icon followed by the text 'ELF ENERGY' in blue.
- Climate services for the energy sector are key for the energy transition & RTE is willing to contribute to their development



Thanks for your attention

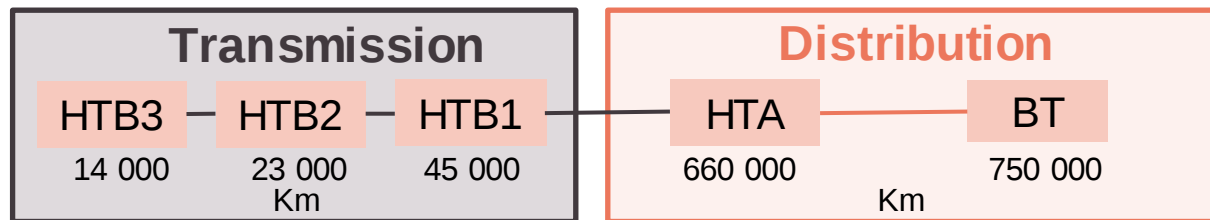
Rte Relevant partners





**129
GW**

**At the
heart of
Europe**



**1,5
Million
s km**



**37
Million
s sites**

