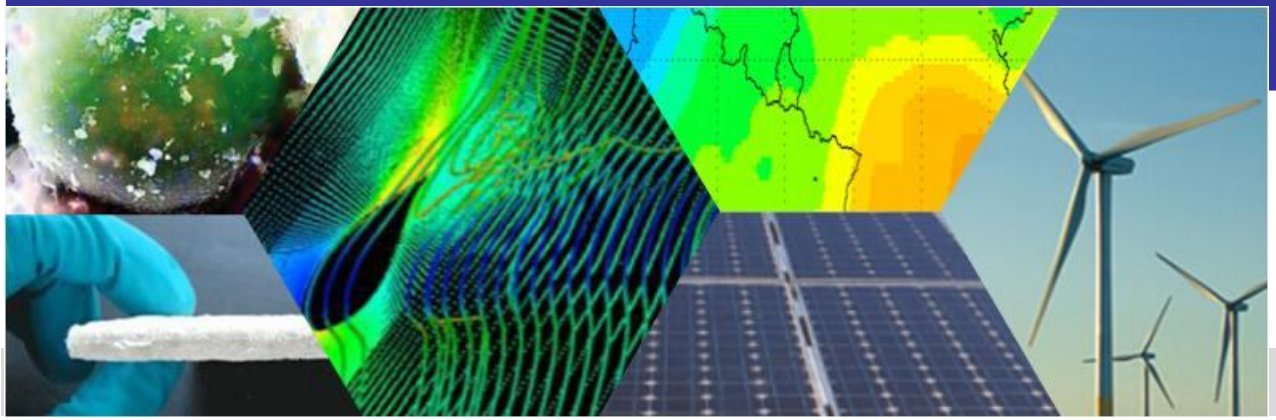
MINES ParisTech

Department Energy and Processes:

- 160 persons, involved in Education and Research
-
- 4 Research Centers:

✓ *Centre for Energy efficiency of Systems (CES, Paris/Palaiseau)*
✓ *Centre Thermodynamic of Processes (CTP, Fontainebleau)*
✓ *Centre Observation, Impacts, Energy (OIE, Sophia-Antipolis)*
✓ ***Centre for Processes, renewable energies and energy systems (PERSEE, Sophia-Antipolis)***



MINES ParisTech

PERSEE

PERSÉE

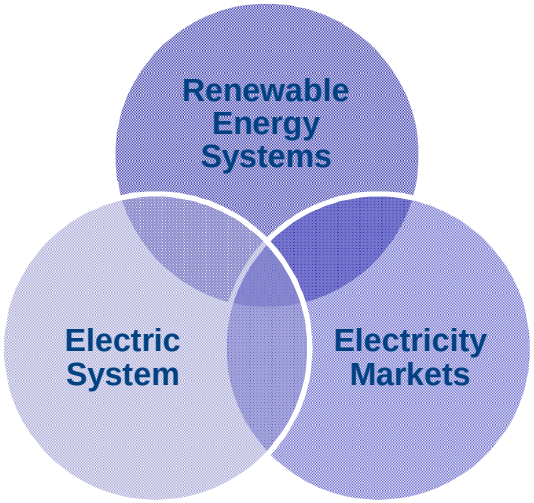
70 persons

- **Research: 36**
  - **18 Permanent researchers**
  - **8 PhD**
  - …
- **Education: 2 "Advanced Masters"**
  - 19 Mastère ALEF
    (International Energy Management)
    (2ble diploma with Tsinghua University)
  - 15 Mastère EnR
    (Renewable Energy)
- **2 Groups:**
  - MATPRO: Processes and Materials
  - ***ERSEI: Renewable Energy and Intelligent Electric Grids***

ERSEI: Renewable Energy and Intelligent Electric Grids

PERSÉE

- Scientific Project:
  - An original approach, multidisciplinary
  - Close collaboration with main stakeholders



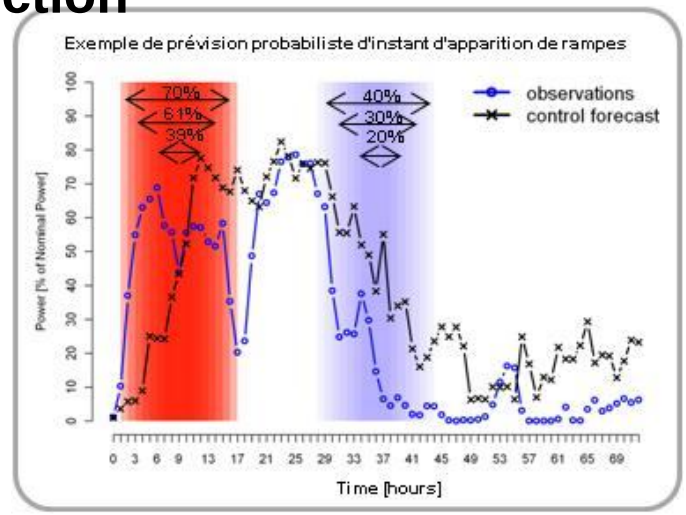
- A long experience on RES integration:
  - Since > 30 years
  - +60 research projects including big EU projects (Dispower, Microgrids, More-Microgrids, Anemos, Grid4EU…)

ERSEI: Renewable Energy and Intelligent Electric Grids

PERSÉE

❑ Prediction ofRenewable Energy Production

- Wind
- Solar

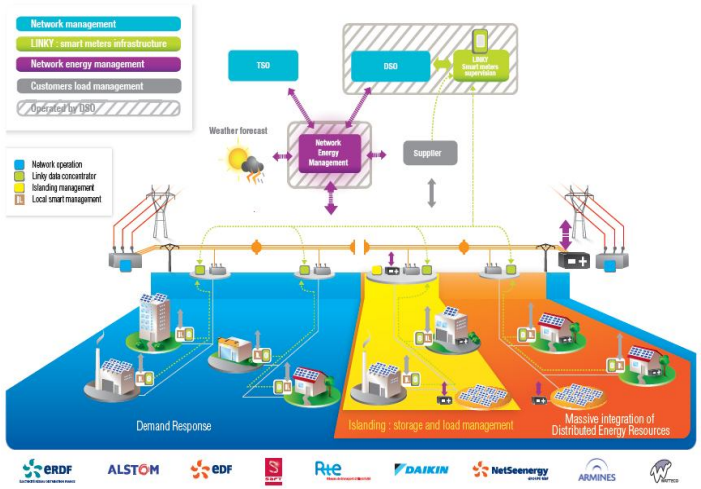


❑ Multi-Energy Hybrid Systems

- Simulation/Design
- Optimization

❑ Intelligent Electric Systems

- Simulation/Design
- Predictive Control
- Planning
- Integration of Renewable Energy in electricity markets



Multi-Energy Hybrid Systems

- Specific interactions Storage/RE systems/Electric Grid
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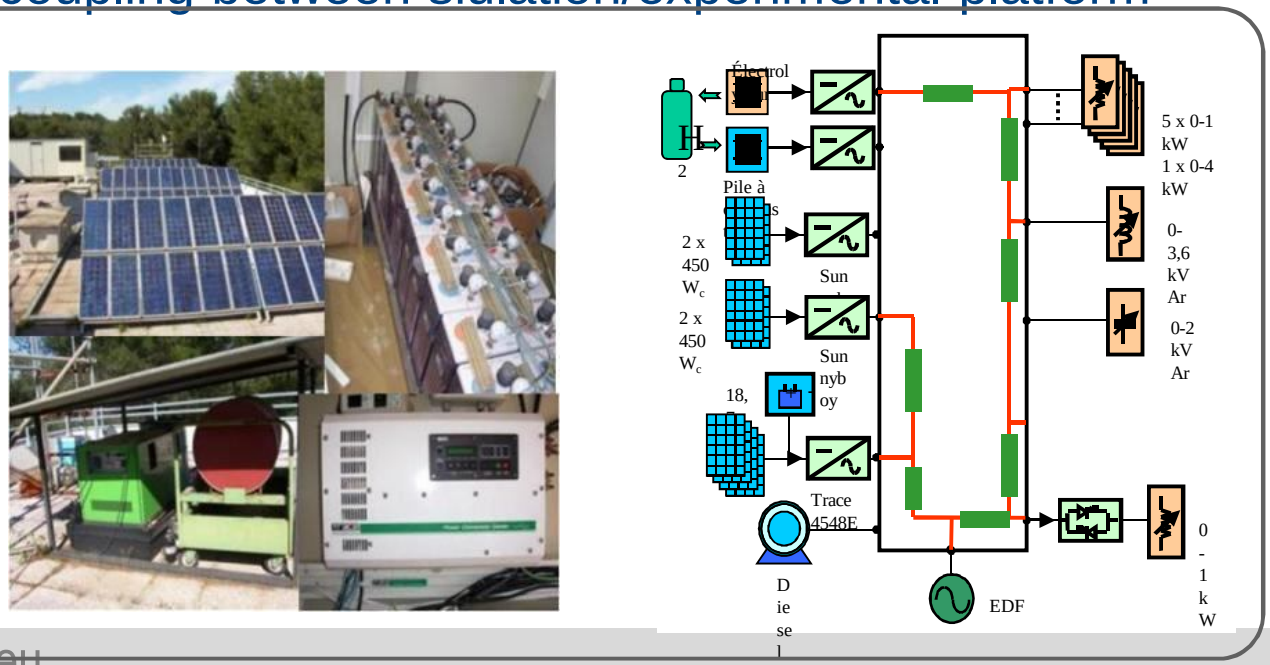
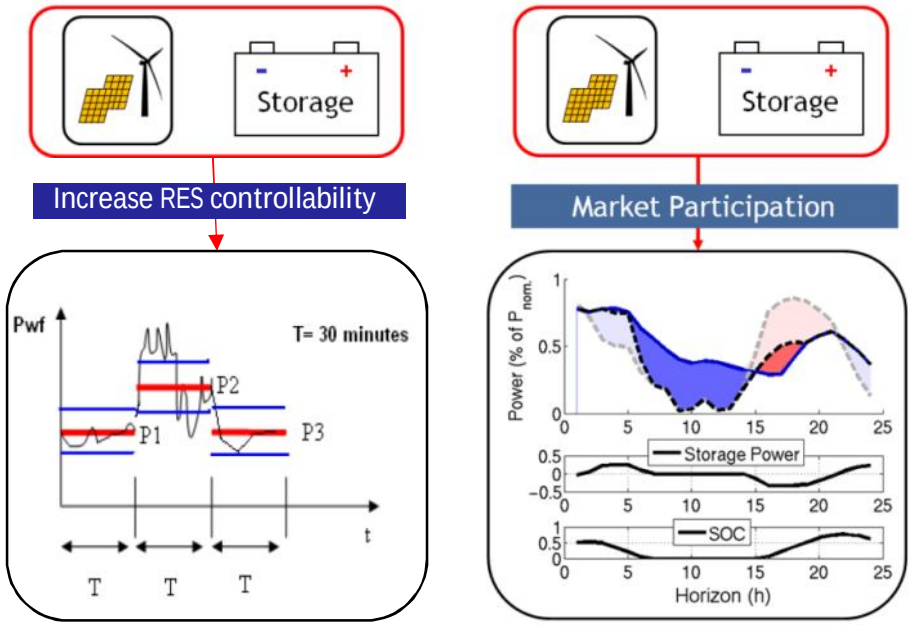
- Large scale simulation techniques
- Virtual coupling between siulation/experimental platform



Intelligent Electric Systems

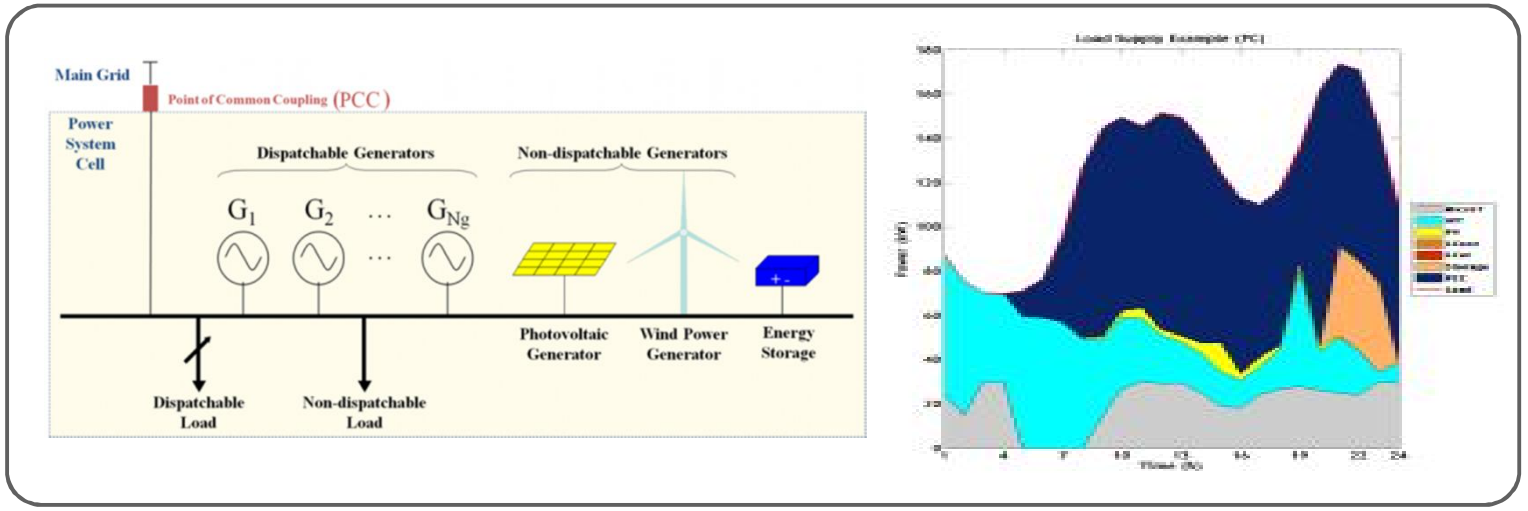
- Spatio-Temporal Characteristics of RE production
- Design and management of PV plants / Storage systems
- Virtual plants (physical and financial aspects)
- Local prices of electricity
- Insular systems
- …



Ongoing R&D projects

- Modelling of storage valorization in an urban context: Optimization of {size/location/control} for {voltage, reserve, market integration} (PhD with CSTB)

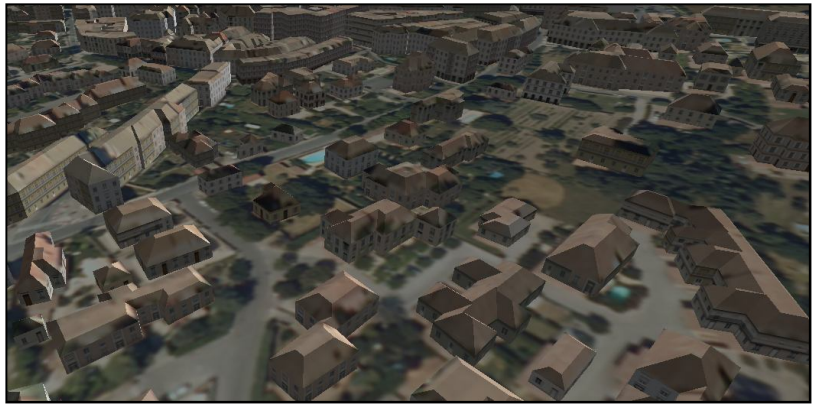
- Predictive control of grids integratind RES, storage, and load management (NiceGrid, Grid4EU)



Smart Grid Simulator project (1/3)

- Smart Grid bottom-up simulator (PREMIO demonstrator)

- Creation of a virtual village
  - Lambesc
  - "Atomistic" modelling



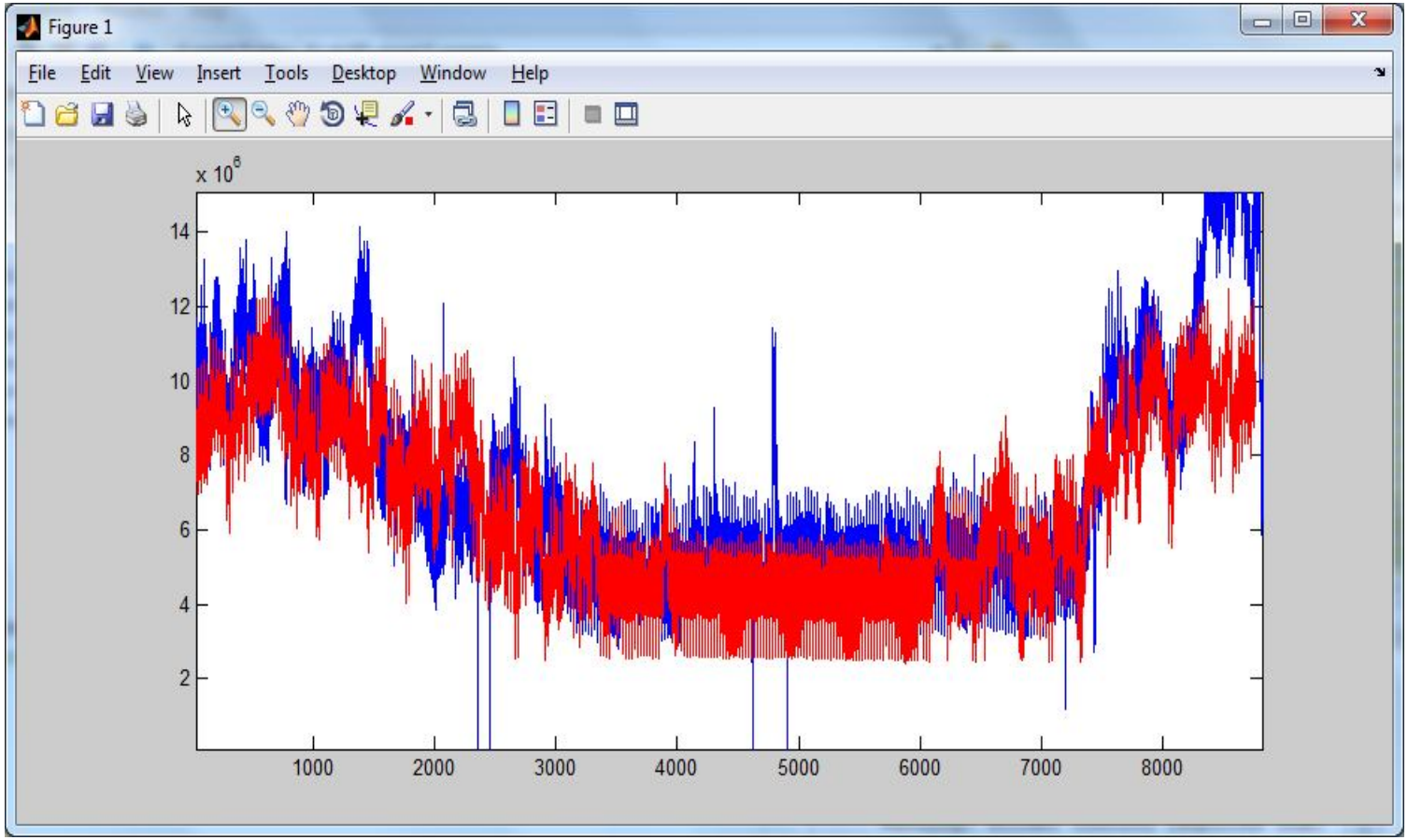
- ~4000 dwellings (use of a 3D database existing today for the whole France and soon for Europe)

- 17 electricity usages (washing, lighting, heating, …)

- Atomistic modeling: stochastic simulation of each usage in each dwelling

Smart Grid Simulator project (2/3)

- Building of a realistic load curve for the city (agregation of the 4000 x 17 individual load curves)

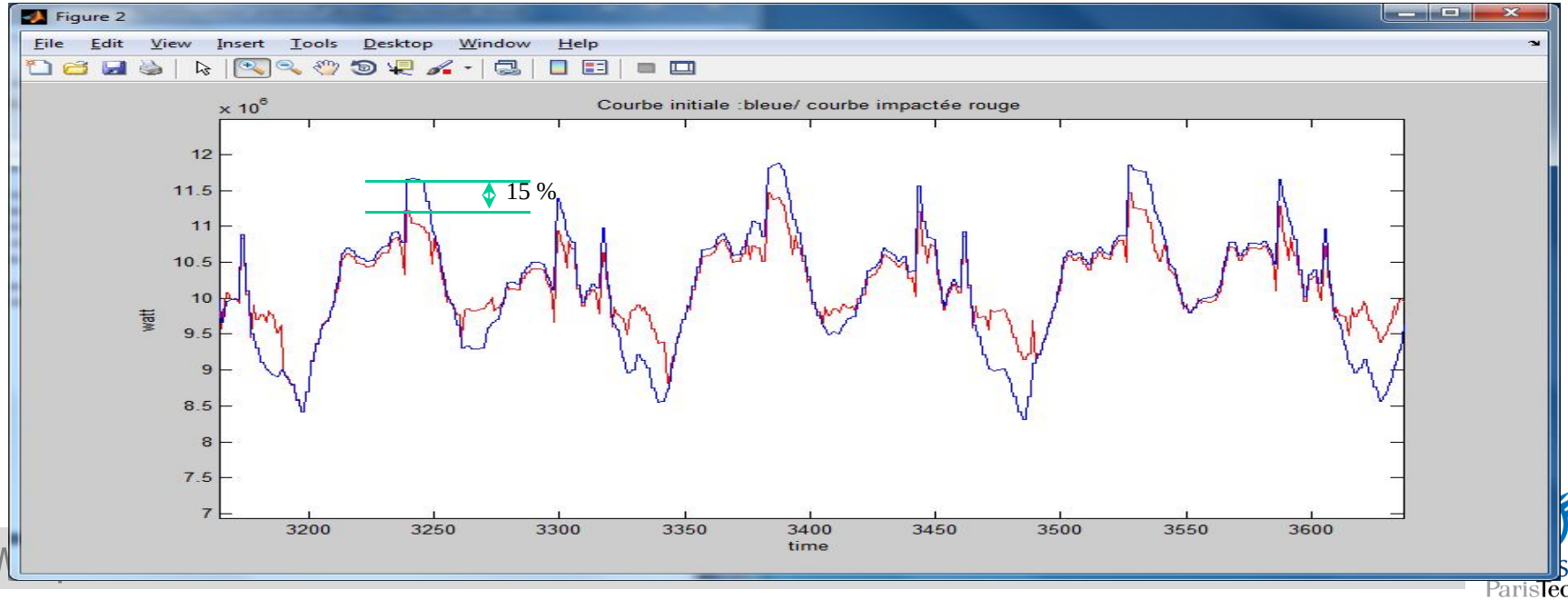


Measured

Simulated

Smart Grid Simulator project (3/3)

- Evaluation of the impact of large use of smart grid technologies
- Implementation of 900 electrochemical batteries:
  - *Capacity: 4 kWh*
  - *Max discharge power: 700 W*
  - *Max charging rate: 900 W*
- Up to 15 % reduction of peak load



Possible Interactions with the Work Plan

- Subtask A: Team "CES" in Paris (D. Marchio/P. Riviere)
- Subtask B:
  - Predictive control?
  - Smart Gird Simulator?
  - …
- Subtask C: ? (China?)
- Subtask D: ?