

## Post-doc offer 2019

### MODELING OF SHORT-TERM ELECTRICITY MARKETS

#### Context

Since the beginning of the 2000s, the organization of the European electricity sector is in constant evolution following the liberalization of the markets and the desire for harmonization between the different countries.

EDF, as a player in the electricity market, must anticipate changes in the functioning of the electricity system and model the associated effects, both for the short-term planning of the French energy sector and for long-term investment decisions.

#### Description of the project

The research will focus on the study of electrical markets and in particular the architecture of short-term markets and the balancing of the electrical system.

The methodological approach will be based on the use and extension of an existing short-term power market modeling tool (multi-level optimization model) [1]. The candidate will have to learn to use this tool and make it evolve to be able to answer the main questions of the project. In particular, the model will need to be expanded to simulate several interconnected market areas. A long-term investment model will also be developed incorporating a simplified version of the short-term model.

The candidate will be in charge of the modeling and evolution of the tool. He will also participate in studies using the tool. The research will address current topics on the harmonization of market rules in Europe (balancing, reserves, settlement of imbalances), and investment support mechanisms (subsidies for renewable energy).

This work will be carried out in the framework of a partnership between EDF R&D and the CREST laboratory of ENSAE and École Polytechnique. The results will be presented to EDF teams and in scientific seminars / conferences and will be published in industry and academic journals (energy economics, electrical systems).

The post-doc will have the opportunity to build a know-how on the operation of the electrical system and, in particular, the balancing markets. He will also have the opportunity to develop his scientific skills in modeling and computer science.

#### Candidate background

PhD in applied mathematics / optimization or quantitative economics, ideally with a specialization in electrical systems modeling.

Good knowledge in optimization and computer programming (python language). Capabilities for rigorous data management and

code management (Git) would be appreciated.

Knowledge of the basic operation of the electrical system. An understanding of how balancing works (reserves, adjustment mechanism, imbalance settlement) would be a plus. Good writing and synthesis skills, including scientific articles in English.

#### Software tools

Python, Git, Cplex, usual office software.

#### Administrative details

12-month postdoctoral contract with ENSAE, with possibility of renewal.

#### Contacts

Marie PETITET

Tel : 01 78 19 32 80

E-mail : [marie.petitet@edf.fr](mailto:marie.petitet@edf.fr)

Peter TANKOV

Tel : 01 70 26 68 73

E-mail : [peter.tankov@ensae.fr](mailto:peter.tankov@ensae.fr)

#### Work place

CREST, ENSAE, Institut Polytechnique de Paris  
5 Avenue Henri Le Chatelier  
91120 Palaiseau

EDF Lab Paris-Saclay  
7 Boulevard Gaspard Monge  
91120 Palaiseau

Post-doc time will be shared between CREST and the Economics of Electrical Systems Group of EDF Labs.

#### Bibliography

[1] Mathieu, S., Petitet, M., Perrot, M., Ernst, D. and Phulpin, Y., 2017. SiSTEM, a model for the simulation of short-term electricity markets. Working paper n°30 of the Chaire European Electricity Markets. Paris-Dauphine Foundation.

[2] Petitet, M., Perrot, M., Mathieu, S., Ernst, D. and Phulpin, Y., 2019. Impact of gate closure time on the efficiency of power systems balancing. Energy Policy, 129, 562-573.