

Modeling and Optimization of Nodal Energy Markets

Joining Artelys

Artelys is specialized in mathematical optimization, quantitative decision-making, and scientific modeling. Relying on its high level of expertise in quantitative methods, Artelys delivers efficient solutions to complex business problems. They provide services to numerous industries: Energy, Transportation, Telecommunications, Manufacturing, etc. Artelys is an international company with offices in France (Paris, Lyon, Nantes), Canada (Montréal), Belgium (Brussels), Spain (Madrid) and the USA (Chicago).

Artelys offers several products and services, including software solutions (mathematical optimization software, business specific customized and custom solutions), studies, consulting, training, etc. In particular, within the Artelys Crystal suite, Artelys has developed an optimization engine specialized in energy systems that includes, among other things, algorithms for simulating and sizing large electrical systems. This computing engine is capable of solving large problems by relying on advanced Operational Research techniques, implemented with a strong emphasis on numerical efficiency and using parallel computing.

Internship subject

As part of the global energy transition, optimizing power systems is a key challenge. There are several approaches to set up electricity markets. In North America, the market model is locational and encompasses network security constraints. This is a so-called nodal market where electricity prices vary based on geographic location of the assets due to transmission constraints and local resource availability. The clearing of such market is a complex process requiring an integrated optimizer combining Optimal Power Flow models (DC/linearized/AC), AC Power Flow, sensitivity analysis and sometimes, contingency analysis.

The goal of this internship is to model such a market by relying on and extending existing models from Crystal Optimization Engine and to implement the iterative workflow necessary for such optimization.

The intern will have to:

- Study nodal energy markets mechanisms and modelling
- Model optimal power flows
- Understand calculations performed for assessment of network security
- Implement the solution inside the optimization engine
- Benchmarks the developed solution on realistic instances

Required and valued skills

The candidate must be in his/her last year of master's degree in computer science and/or applied mathematics and/or power systems and/or operations research.

Required skills:

- Mathematical optimization
- Programming in Python

Valued skills:

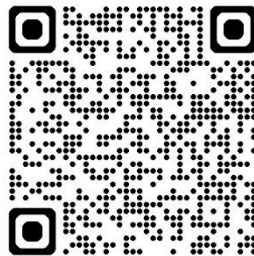
- Practical experience with optimization solver for mixed-integer and nonlinear optimization
- Power Systems knowledge (Power Flows and Power System Economics)
- Energy Market knowledge
- Programming in C++
- Benchmarking methodologies
- Fluent in French

Conditions

The duration of the internship is 6 months. The internship will take place in our Paris or Lyon offices. The internship may lead to a long-term job offer.

Candidature

Send us your application on our website: <https://www.artelys.com/careers/>



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