

PhD Position – Flexibility Management of Multi-Energy Platforms

Context

This PhD position is proposed within the framework of the French national research program PEPR Future Energy Networks, dedicated to the operation of . The research will focus on the management and interoperability of multi-energy platforms integrating electricity and heat systems. The successful candidate will join a multidisciplinary research environment addressing the operational flexibility of integrated energy systems and their contribution to future low-carbon energy networks.

Research Objectives

The objective of this PhD is to develop advanced modeling and optimization methods for the management of multi-energy platforms integrating electricity and heat systems within. The research aims to characterize and valorize the flexibility potential of these systems by combining detailed operational modeling with decentralized decision-making approaches. The work will focus on:

- the development of generic multi-energy system models accounting for typical characteristics (conversion efficiencies, ramping limitations, and start-up/shut-down dynamics).
- the formulation of flexibility management strategies based on Stackelberg leader–follower games and equilibrium optimization approaches;
- the comparison centralized, decentralized optimization techniques and complementarity-constrained formulations while for non-convex problems;
- the design and assessment of flexibility products and services supporting power system operation, including frequency regulation, reserve restoration, congestion management, peak shaving, and load profile smoothing.
- The proposed methodologies will be validated using the platforms and pilot demonstrators of the project with the objective of contributing to the deployment of interoperable and flexible future

Candidate Profile

- Master’s degree in electrical engineering, energy systems, applied mathematics, operations research, or a related field.
- Strong background in mathematical modeling and optimization applied to power and energy systems.
- Proficiency in Python, with experience using optimization frameworks such as Pyomo or Linopy and optimization solvers.
- Knowledge of advanced optimization and decomposition techniques, including KKT conditions or ADMM algorithms, would be appreciated.
- Interest in flexibility management, game theory, equilibrium problems, or multi-energy systems.
- Strong analytical, research, and communication skills, with the ability to work in a multidisciplinary environment.

Details

- **Contract:** Fully funded PhD position (3 years). Gross salary 2100-2300 € / month
- **Location:** G2Elab, Grenoble, France.
- **Starting Date:** October 2026 – January 2027.
- **Contact:** Dr Rémy RIGO-MARIANI, CNRS Research Scientist, remy.rigo-mariani@grenoble-inp.fr
- **Application Materials:** Candidates should submit a CV, academic transcripts, a motivation letter.