Internship: Game theory for optimal flexible asset management in the context of the French electricity market

Context and work environment

The internship is proposed by the numeric platform of Paris-Saclay, which is integrated within the R&D line "Power" of TotalEnergies OneTech. Its main objective is to boost the strategy of decarbonization of assets undertaken by TotalEnergies (TTE).

The intern will be based in our Saclay building, and work within the Scientific Computing team, in particular the optimization project, that focuses on research and development of optimization algorithms for internal use cases.

Objectives of the internship

In France, RTE -Réseau de Transport d'Electricité- is the transmission system operator (TSO) that maintains balance between supply and demand and ensures grid stability. For these purposes, numerous methodologies are used, from direct operational interventions on the grid to third-party-based interventions through the newly-democratized electricity market. Among the latter category, notable examples are the NEBEF mechanism (Notification d'Echanges de Blocs d'Effacement), balancing market and ancillary services market. This new framework opens the door to the participation of new actors, like TTE, looking to expand their activities into this growing flexibility market.

The main objective of this internship is to develop a proof of concept of how a game-theory-based tool can aid in simulating market interactions between asset owners and the TSO, and help these actors make optimal decisions in the flexibility market.

The student will start by building a simple toy model in a single-leader-multiple-follower framework and focusing on one of the mechanisms of the flexibility market. If the student makes enough progress, the model can then be complexified.

Required skills

Master 2 or 3rd year of engineering school in a relevant field.

Demonstrated knowledge: optimization and control theory, operations research, scientific programming, good writing and presentation skills.

Expected proficiency in: Python, Github, LaTeX, Microsoft Office.

Languages: full professional proficiency in English, French (optional).

Supervision

Dr. Nouha Dkhili, TotalEnergies R&D/optimization

To apply, please send your CV to the email address below with the mention [Application].

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