M4SE@Home
Math for Smart Energy at Home

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In this talk, we present one of the Math-Enterprise interaction success stories at Cemosis called *Math for Smart Energy project at Home* (M4SE@Home) [1] in collaboration with J.B. Caillau at Université Bourgogne Franche-Comté at that time, now at Université Côte dAzur. Cemosis is a research platform of the Université de Strasbourg at the interface of mathematics, other disciplines, enterprises, and society. Cemosis is a node of the french MSO network [2]. A Master internship and a Ph.D. student were involved in this project and coached by two Professors.

With the multiplications of photovoltaic panels and the possibility to use household electricity production at home in Germany, new problems emerged. Massive energy rejection causes disturbances in the electrical network. Energy distributors now impose regulations on household energy profiles in the form of an energy roadmap (E-roadmap) prescription at critical hours subject to various constraints such as the amount of energy that could be rejected in the electric network. The E-roadmap is built using various sources of information such as the weather forecast or the energy stock exchange, and feeds an Energy Management Gateway (EMG) controlling the energy storage and usage of the batteries. From the household perspective, the objective is to optimize the production efficiency by minimizing energy wastes and possibly maximizing profits during the E-roadmap free schedule.

In this talk, we present the modeling of the system including the regulatory aspects as well as the design of the algorithm behind the EMG. We discuss a few scenarios based on synthetic E-roadmaps.

References

[1] Math for Smart Energy project (M4SE)
http://www.cemosis.fr/projects/hager

[2] Modelization, Simulation, Optimization Network (MSO)
http://www.agence-maths-entreprises.fr/a/?q=fr/reseau-mso

[3] Modelization, Simulation, Optimization Network (MSO)
http://www.agence-maths-entreprises.fr