Demand Side Management A model driven approach to promote energy self-consumption
Alexandre Rio, Yoann Maurel, Olivier Barais, Yoran Bugni

To cite this version:
Alexandre Rio, Yoann Maurel, Olivier Barais, Yoran Bugni. Demand Side Management A model driven approach to promote energy self-consumption. Colloque de l’institut Mines Télécom, Jun 2018, Rennes, France. hal-02317918

HAL Id: hal-02317918
https://hal.archives-ouvertes.fr/hal-02317918
Submitted on 16 Oct 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Case study: Industrial site self-consumption

- Self-consumption of renewable energies is defined as electricity that is produced from renewable energy sources.
- The autonomy of sites with micro-generation capabilities is greatly increased by self-consumption of locally produced energy.
- One of the keys is thus to align production and consumption either by planning processes differently or by relying on storage capabilities.

Help for “What-if”/“what-for” questions:
- How to size local renewable energy production units or storage to meet a site’s energy consumption.
- Which region would be the most interesting for the expansion of a business?
- What organization of activities enables the best autonomy and self-consumption?

Proposal: Simulator and Domain Language

- Model Driven Engineering (MDE) approach to address variability.
- Energy Management System (EMS) in simulation or using real sensors.
- Domain Specific Language (DSL) to represent an industrial site.
  - Production, consumption, storage.
  - Activities and constrains modeling.
- Description files are used by a simulator.
- Simulator can be extended by experts, through plugins, to model complex devices behavior.

Experiences

Evaluation: Activity shift recommendations

- Simulator can use third-party prediction to estimate future events: solar production, device usage.
- Recommend actions based on context: battery state, user activity to optimize autonomy and self-consumption.
- Take into account process constrains and flexibility and battery cycle usage.
- Improve autonomy from 30% to 50% or 70%.