Demand Side Management A model driven approach to promote energy self-consumption
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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%.

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