



An European urban transition project towards more sustainable cities through innovative solutions, in the fields of mobility, energy and digital.

Smart City

Global project

Coordination: Cartif
European grant: 18 M€
30 partners, 6 countries
 Period: Dec.2016 - Nov.2021
 Demonstrators: Nantes, Hamburg, Helsinki

@mysmartlife_EU
<https://mysmartlife.eu/>

Nantes demonstrator site

Coordination: Nantes Métropole
European grant: 4,5 M€
10 partners

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Digital



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ACTION OVERVIEW



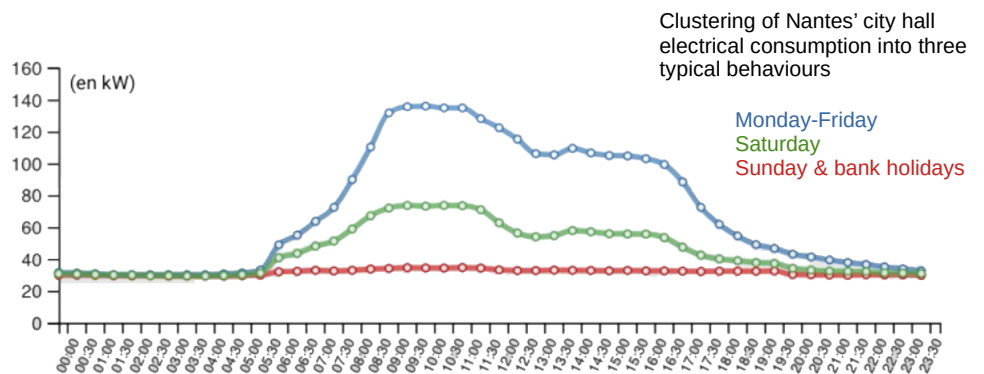
Public buildings' electrical behaviour clustering

This experiment was conducted with Edgemind, and accompanied and experimented by Nantes Métropole. This partnership implementation was carried out as part of the Energy Datalab, and of the use case research for Nantes Métropole's Urban Data Platform. More information can be found in D2.11 and D2.8: <https://mysmartlife.eu/publications-media/public-deliverables/>

► OBJECTIVES

- › To experiment a new usage based on the electrical load curves
- › To prototype an interactive web application for visualising the energy behaviour of public buildings, classified by standard consumption days.
- › In the long term, test the use of machine learning to predict the consumption of a building over a day.

► IMPLEMENTATION



CHALLENGE / CONTEXT

Nantes Métropole has several hundred public buildings, which it manages on a daily basis. With the deployment of smart electricity meters throughout France, Nantes Métropole can access the electrical load curves of its public buildings. This fine information makes it possible to carry out more accurate monitoring, but this is not so easy given the number of buildings. This data can be analysed by algorithms, such as the classification and then machine learning algorithms used here, in order to reduce the daily behaviour of each building to a few typical days on an annual basis.

SOLUTIONS

The Energy Datalab (see the corresponding action overview) is the platform developed by Enedis, which collects, and makes available to Nantes Métropole, the electrical load curves of its 100 most consuming public buildings.

This data is also integrated into Nantes Metropole's Urban Data Platform (see action overview). For this experimentation, Nantes Metropole has opened an API access to Edgemind to provide them the load curves.

The work is based on clustering algorithms, to highlight the typologies of consumption days for a given building. "Typical days" then emerge, and representative load curves of these days allow a visual understanding of the typical behaviour of a building, all year round. This also makes it possible to quickly visualise singularities (for instance, a "Wednesday" type day identified on a Saturday). An interactive web interface has also been developed to visualise and manipulate the results. The use of machine learning algorithms has been explored in greater depth.

MONITORING

This experimentation was the subject of a restitution and evaluation of the hypotheses:

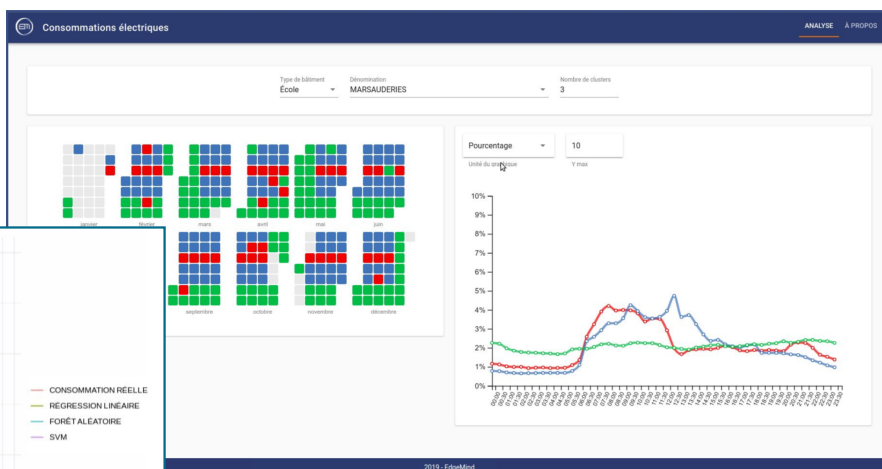
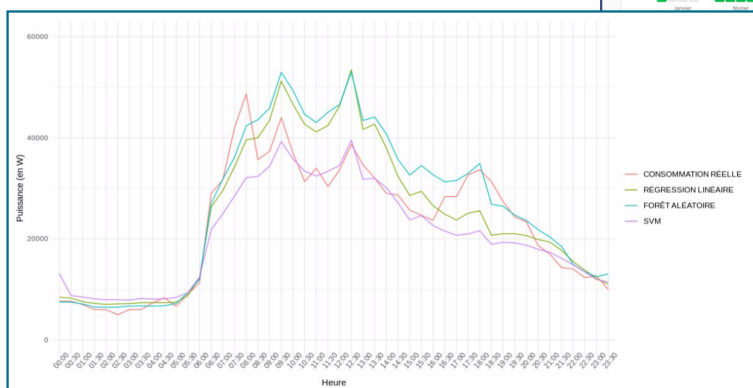
- › The relevance of the prototyped service: although Nantes Metropole does not plan to equip itself with tools of this type for the moment, this experience has highlighted an interesting use of the data.
- › The predictive capacities of Edgemind's machine learning algorithms: as can be seen in the illustration below, various algorithms are fairly close, overall, to the consumption of a day for a building; however, no algorithm is able to reproduce all the day's behaviours in detail.
- › Finally, this is part of a more global approach to experimenting with new services based on the data available in the Urban Data Platform which, in connection with the previous points, must be evaluated.

► BENEFITS

This experimentation

- › facilitates the monitoring of energy consumption in public buildings, and identification of potential sources of energy optimisation
- › the 'consumption gap' function allows the rapid isolation of the consumption differences between a building and its theoretical consumption thanks to a visual interface.
- › provides an initial feedback on the capabilities of innovative methods of data exploitation.

Precision of prediction algorithms



Interactive interface to play with the results



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