my SMART Life

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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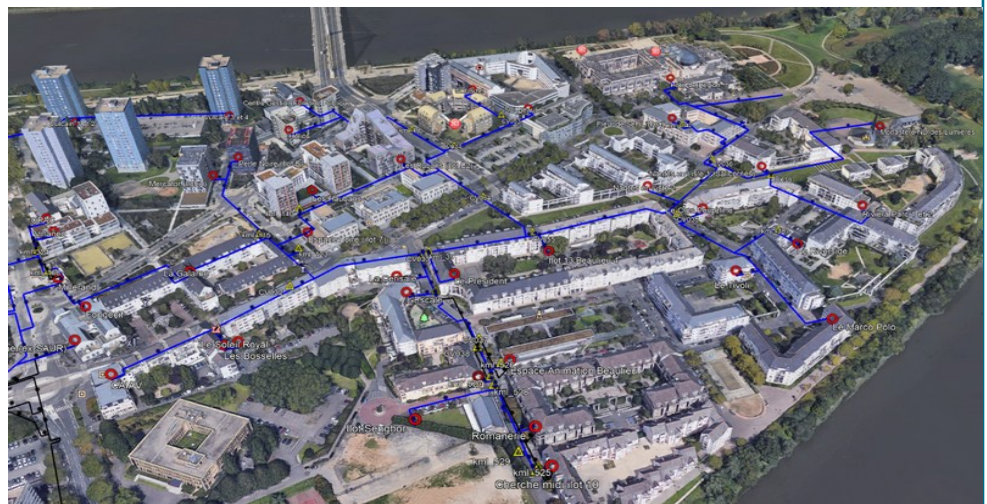

Nantes Métropole

Decision aiding and district heating optimisation

This action was implemented by IMT Atlantique, in collaboration with Nantes Metropole and Erena. Two reports present the achievements of this action (D2.9, D2.10): https://mysmartlife.eu/publications-media/public-deliverables/

► OBJECTIVES

› To model the heating network of Centre-Loire Île-de-Nantes to support a decision aiding tool.

› To facilitate the evaluation of scenarios for the evolution of the heating network, thanks to a multi-actor, multi-criteria analysis.

► IMPLEMENTATION

CHALLENGE / CONTEXT

District heating networks contribute to the reduction of CO_2 emissions, energy consumption and heating costs; it is a major sector for the energy transition. To develop these networks efficiently, however, many parameters come into play: the energy impact, the economic stakes, the technical constraints, the social aspects... Improving the network quickly becomes complex, deciding between the different evolution scenarios is difficult, and this action aims precisely at facilitating their apprehension.

SOLUTIONS

The work carried out is ultimately aimed at providing the various stakeholders in the heating network with a decision-making tool to facilitate the evaluation of the various scenarios for the evolution and optimisation of the heating network. In particular:

› connection of new buildings

› energy savings through optimal use of the heat available in the substation

› energy savings by sharing the effort between the two production plants.

For this project, the work of the research team focused on the "Nantes Centre Loire" heating network. With around 85 km of pipes and more than 380 substations, divided into 3 subnetworks, it is the largest of the three heating networks in Nantes Metropole. More than 16,000 homes and numerous public facilities are supplied with heat, mostly renewable (objective: 84%). Composed of 3 sub-networks: "Beaulieu", "Centre-Ville", and "Nord", it is on the "Beaulieu" sub-network, which serves most of the Île-de-Nantes area, that the study focused its attention. The solution was built as part of a double research action on:

› The modelling of the Centre-Loire heating network. This modelling made it possible to feed the optimisation and decision support algorithms.

› The development of an Human-Machine Interface, based on an existing decision-support framework (Diviz), to enable decision-makers to interact with the tool and evaluate scenarios for the evolution of the heating network in a more intuitive way.

Finally, the aim is to enable a multi-actor and multi-criteria evaluation of network evolution scenarios.

MONITORING

The key performance indicators (KPI) of this action concern:

› The quality of the heating network data: completeness, consistency, frequency, etc. When the data is not complete, recovery scenarios can be used to ensure minimal operation - based on typical days, for example.

› Network evolution scenarios: the potential energy impact, in particular, with regard to social acceptance, economic and financial aspects, etc. All this information is estimated on the basis of available data.

› Finally, the relevance and use of the tools developed will be evaluated.

These indicators will be aggregated with those of all the actions of the Nantes-based mySMARTLife demonstrator in order to give a consolidated result of the overall impact of the project.
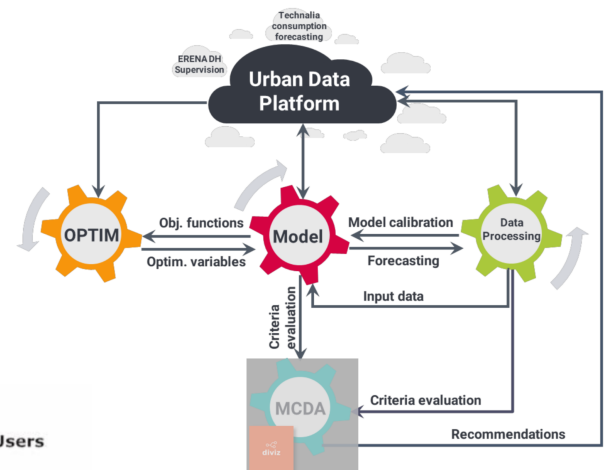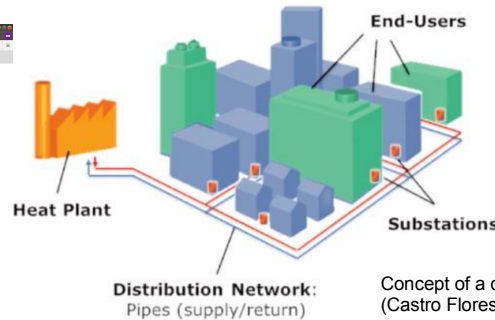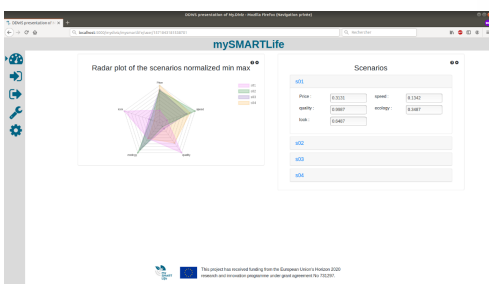
► BENEFITS

Environmental

› Potentially, a decrease in heat production.

Users and citizens

› Help for operators in evaluating different scenarios for the development and optimisation of the heating network.

› Potential reduction in heating costs through optimisation of the heating network.

Project developments are represented by the cogwheels, with the development of an additional interface backed by the MCDA wheel (diagram produced by IMT Atlantique, project deliverable D2.10)

Concept of a district heating network (Castro Flores, 2018)

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