PROJECT FACTSHEET

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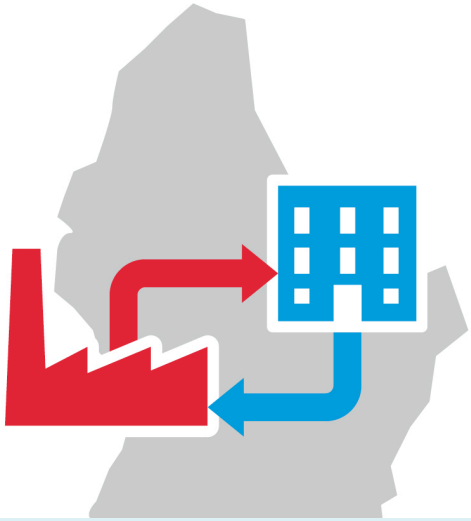
OptiHeat

Optimisation methodology minimising costs and environmental impacts by heat recovery and energy technology selection at regional and national scales.



Inspiration

In an effort to reduce greenhouse gas emissions and to improve resource use, the European Commission published a new directive on energy efficiency (2012/27/EU) in December 2012. Among other measures, it requires member states to conduct cost-benefit analyses of heating and cooling systems. These assessments should identify optimal solutions, in terms of technologies and management concepts, to efficiently cover heating and cooling demand while minimising resource use and cost.

Current optimisation methodologies for heat management rely on mathematical methods like Mixed Integer Linear and Non-Linear Programming (MILP, MINLP). So far, these optimisation methods all address specific and distinct aspects of heat management (e.g. heat recovery, network design, process demand, building and urban energy demand). An integrated approach combining these aspects has not yet been fully proposed. These methods have also been developed for single processes and urban or industrial sites, but not yet for large (regional and national) scale applications. The lack of a holistic multiple-scale approach to optimisation could lead to sub-optimal solutions and/or to insufficient consideration of constraints.

Innovation

The main objective of the OptiHeat PhD project is to develop an integrated optimisation method for heat management at large scale. It will combine several existing and specific optimisation methods covering energy production, storage, heat recovery, etc., while considering costs and the minimisation of CO2 emissions using a combination of MILP and MINLP approaches. The optimisation methodology will be applicable to small and large scales (processes, sites, regions and countries), some not yet fully addressed.

Impact

This project will lead to a flexible optimisation method that will have larger applicability than the current case-specific, stand-alone approaches. The outcomes of the thesis can be used to conduct cost-benefit analyses as required by the EU. The data generated for the case-study in the Grand-Duchy of Luxembourg will be useful for municipalities that need to address energy-related issues at local level (e.g. Pacte Climat).

The optimisation method will also provide the scientific background for the development of new energy-contracting services related to optimal heat management across regions and countries (e.g. using mobile heat transport systems).

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Partners

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