MULTI – OBJECTIVE, INTEGRATED, REGIONAL ENERGY SYSTEM OPTIMISATION

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**Objective:** Development of an integrated optimisation method focusing on regional industrial waste heat valorisation and heating and cooling utility selection, aiming at minimising investment and operational costs as well as CO\textsubscript{2} emissions.

A. Development of generic models for heating and cooling demands of buildings and industrial processes (using regression analysis and data from literature reviews).

B. Geolocalisation and characterisation of heating and cooling demands of case-study (Luxembourg) based on Geographical Information System (GIS) databases.

C. Industrial excess heat potential characterisation. Calculation of rate of return on investment (RoRoI) for internal excess heat recovery. For RoRoI > 1 year: excess heat considered for regional valorisation.

D. Generation of regional composite curves. Use of multi-objective optimisation generating solutions with minimised total costs and CO\textsubscript{2} emissions, combined with Mixed Integer Linear Programming (MILP) for optimal process integration and energy conversion selection and sizing.

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