INTEGRATED ENERGY PLANNING ASSISTANCE FOR MAJOR CONSUMERS
Application : HUG – CLUSE-ROSERAIE HOSPITAL DISTRICT

Context and Motivations

Given the present context of energy transition, the so called « Major consumers» are subject to new legal prescriptions enacted by the State authorities in the purpose of targetting the federal vision known as the «2000 Watt society». The objective of the project is to help match the Hospital Property Master plan with the energy strategy, in the aim of developing and optimizing long-term synergies between exploitation constraints and opportunities (hospital-scaled and district-scaled energy projects)

Current energy status

Energy flow inventory

The energy flow indexation is the the starting point of energy sink identification and integration potential assessment. It is based on data monitoring, short-term measurements and SIA standards (*values). Missing values are extrapolated from models developed on the base of internal documentation and references (**values)

Building heating model

The parameters are identified by fitting the model with the recorded consumption data (square residual minimisation). Such model allows an adaptive characterization of the needs:
- The envelop heat transfer coefficient (U) can be improved by refurbishment actions
- The hygienic standards related to the type of activity of the premises imposes the minimum fresh air flow requirements. It is adaptable to various architectural configuration

Development perspectives

2015 hospital configuration

2030-2050 hospital configuration

Multi-period and multi-objective optimization

The property Master Plan and the various energy supply projects (GeniLac, Géothermie 2020, etc.) allow the implementation of actions to be optimized over the next 34 years (4 periods):
- Building refurbishment
- Heat recovery system installation
- Renewable utilities integration

The solutions are little diversified due to redundancy constraints (backup in case of failure) and as the temperature levels of the heat pumps are optimized to compete with gas utilities.

Improvement potential (best scenario)

The implementation of heat recovery systems on ventilation and condensation heat (refrigeration Unit) allows to save 17% of the primary energy consumption

Refurbishment of the north zone’s buildings in 2030 helps to save 9% of the primary energy while increasing the annual total cost by 3%

The increase in renewable energy share is mainly related to the implementation of lake water supply in 2022, for heat pumping and direct-cooling purposes (GeniLac project)

The utility sizing is based on extreme and degraded operating conditions (additional months: 14 to 16)

Integrative composite curves for period 2030-2050

During summer-time, no fossil heat source is required except for sterilization needs (it should be treated independantly to reduce exergy losses). Lake water is suitable for comfort direct cooling.

During winter-time, lake water is the only source allowing heat pumping. Multiple stage heat pumps are to be considered.

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