

## SUMMARY

### **Examination of a gym HVAC system to optimize energy consumption**

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The aim of this thesis is to investigate the energy modernization possibilities of a gym in the centre of Budapest from the building services engineering point of view. In addition to reducing energy consumption, the operator of the facility has expressed a number of requirements for the system to be implemented. The main energy saving options that can be implemented considering the existing system of the facility will be listed in the literature review. The principle of operation and the main characteristics of these possible solutions are also presented.

In this thesis, the heating-cooling and ventilation system of the facility is redesigned drawing from a number of sources in the literature to select the correct design parameters. The sizing is followed by the design of the building services systems, a description of the operation of the proposed system, and finally an estimate of the energy consumption of the new system, so that the energy saved compared to the old system can be calculated.

After understanding the client's needs and usage patterns, a re-dimensioning of the heating/cooling and comfort ventilation system became necessary, as there are many discrepancies between the originally designed system and the current usage, and the existing system is oversized. Several short-term solutions and a long-term solution is proposed to meet all needs in the form of a three-pipe VRF system, for which I have estimated the expected energy savings. In order to explore further energy saving potential, I propose carrying out the following studies:

Following a comprehensive literature review, it is recommended to examine if implementing a waste water heat recovery solution is both feasible and economically justified.

To address the demand of the pool and jacuzzi systems, the integration of additional DHW generating units is recommended.

Finally, there is possible energy saving potential in optimizing the pool area ventilation system.