iSERVcmb Best Practice

Electricity savings of 6% per year through improving the HVAC control, use of natural cold sinks and reduction of head loads

Building number 15

Vienna – AT

Introduction

This report summarizes the results of Owner's participation to the iSERVcmb project with regard to its cooling system energy consumption. The report refers to the period from 2012 to 2014.

iSERV Achievements

Energy Savings
Electricity: 1.8 kWh/m²

6%
Total building electrical consumption reduction since participation

Cost Savings
Electricity: 0.4 €/m²

Emissions Reductions
Electricity: 0.8 $kgCO_2/m^2$

Investment to achieve savings
0.1 €/m²

	Key Figures
Location	Vienna, Austria
Sector	Office
Construction Date	2004
Project Size	33.091 m²
EPC	N/A
Sub-metering Level	Partly metered
Data Frequency	15'
Data Collection Protocol	Meters and sensors attached to BMS
Data Sending Protocol	Manually extract & send data to an address
Nature of savings achieved	Improved HVAC Control Use of natural cold sinks Reduction of head loads
No. HVAC Systems	11
HVAC Components	☐ Heat Generators ☒ Cold Generators ☐ All-in-One Systems ☐ Heat Pumps ☐ Air Handling Units ☐ Humidifiers ☐ Dehumidifiers ☐ Pumps ☐ Storage Systems ☐ Terminal Units ☐ Heat Recovery ☐ Heat Rejection

"By participating in the iSERVcmb project we could show once again our commitment to conscious use of energy. The already existing data for operations management have generated a double benefit and showed us where we have potential for optimization. I am pleased that such projects are encouraged at EU level and give us the opportunity to compare us with similar establishments. With the acquired knowledge we can continue to provide our employees also in the future a comfortable indoor climate."

Owner of the building number 15

Building Profile

The analyzed building was built in 2004 and has a conditioned net area of around 33,000 m². In the basement, there are various service providers (bank, café, fitness center), in the upper floors various premises. The cooling is provided by two central chillers and a reversible heat pump. The heat dissipation in the individual rooms is accomplished by means of cooling blankets, fan coils and ventilation systems. Over the investigation period, the electrical energy consumption for cooling was around 30 kWh/m²a (outside climate-adjusted). Compared with buildings of the same need, the electrical energy consumption for cooling ranges is in the lower third.

Building Management System installed

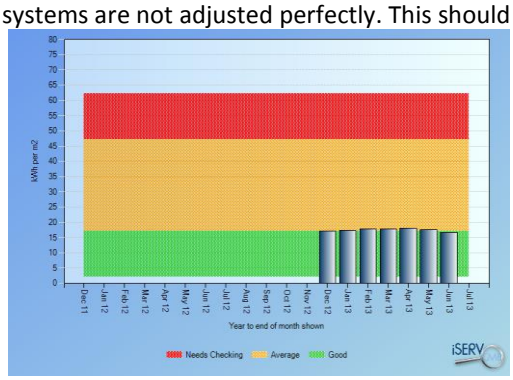
The building has a central management system by which the machines for room conditioning are monitored and controlled. The relevant data for the project has been read out from this management system (measurement interval: 15 minutes). The operation time is Monday till Friday between 06:00 and 20:00.

Energetic analysis and optimization potential

The evaluation of the measurement data through the HERO database led to the following findings: the building is supplied with coldness all-the-year. The months with the highest consumption are June, July and August. The average effort in the investigated period amounts to 115 kW_{el} (installed net output: 643 kW_{el}). On individual weekdays the power peaks reach up to 13,439 kW_{el}. The average part-load efficiency of the refrigeration plants is 18% in the period considered. The weekly load profile of the refrigeration plant shows that Monday till Friday are the most energy-intensive days in the week. In 75% of all cases the value deviates from the mean value by up to 11%. Relating to the daily load profile, the maximum is between 07:00 and 17:00. However, up to 50% less energy is needed for the cooling between 18:00 and 02:00.

To reduce the energy consumption, the following measures are imaginable:

- Improving the HVAC control: As shown in the following graph, the specific electrical energy consumption of the system is a little bit too high, in comparison with other buildings. Maybe the set points of the control systems are not adjusted perfectly. This should be checked in a first step.



- Use of natural cold sinks: To reduce the energy consumption, the natural cold in the night should be used through opening windows. It is a very simple and effective measure.
- Reduction of head loads: The last step would be to identify the head loads. That means, that it would be necessary to go throuh the house and identify the most relevant “heat generators”, evaluate them and find measures to reduce them (for example: optimize the effect of the shading elements)

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