Building EQ
intelligize your energy management

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About Building EQ

BuildingEQ is a project in the Intelligent Energy Europe Programme of the European Commission. BuildingEQ aims at strengthening the implementation of the EPBD (Energy Performance of Buildings Directive) by linking the certification process with commissioning and optimisation of building performance. Within the scope of the project, methodologies and tools are to be developed that can be used for ongoing commissioning and optimisation of non-residential buildings using gathered data from the certification process according to the EPBD.
The emphasis will be on feasibility and cost-effectiveness of energy reduction measures with regard to building practice. Main target groups are the industry for Facility and Energy Management, real estate owners, energy agencies and energy consultants.

The consortium at a project meeting in Stuttgart

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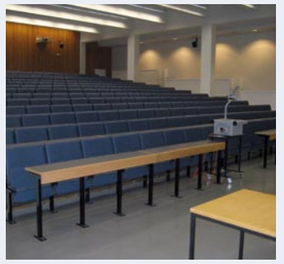
| MULTI PURPOSE BUILDING STUTTGART | DISTRICT HOSPITAL HAGENOW | MINISTRY DÜSSELDORF | KREUZGEBÄUDE ESSEN | STATE TREASURY HELSINKI | HUT ENGINEERING DEPARTMENT ESPOO | AURORA 2 JOENSUU | SENATE HEADQUARTERS HELSINKI | INFORMATIC SYSTEMS MILAN | LECTURE HALLS MILAN ELECTRONICS DEPARTMENT MILAN | DUKA HOUSE GOTHENBURG | NORDSTADEN GOTHENBURG

DEMONSTRATION BUILDING: HUT ENGINEERING DEPARTMENT, ESPOO (FIN)



Energy saving potentials of 20 – 30 % found

The implemented BuildingEQ data gathering and analysis identified potential energy savings mainly by adjusting air handling units running on schedules according to the need. By comparing measured consumption to the simulated targets, energy saving potentials of 30 % for heating and 20 % for electricity was estimated.

Overview

Kind of data acquisition	Building automation system
Yearly energy cost	59,000 Euro
Cost for installation of data acquisition for minimal data set	5,000 Euro = 8 % of yearly energy cost
Estimated possible savings	14,000 Euro/year = 24 % of yearly energy cost
Simple pay back (of data acquisition only)	0.4 years
Possible cost for engineering if 3 years of simple payback were acceptable	37,000 Euro

Building characteristics

OWNER: Senate Properties, a government owned enterprise under the Finnish Ministry of Finance
YEAR OF ERECTION: 1966 (renovated 2005)
NET FLOOR AREA: 8,600 m²
UTILIZATION: The building is used for educational purposes There are offices for researchers and auditoriums, seminar rooms, classrooms and a canteen in the building
CONSUMPTION OF ELECTRICITY: 735,000 kWh/a, 85 kWh/(m²·a)
CONSUMPTION OF HEATING: 870,000 kWh/a, 101 kWh/(m²·a)
BUILDING ENVELOPE: Window strips in a red brick facade and supporting frame made of concrete
BUILDING SERVICES:
- District heating
- Six air handling units with heat recovery, heating and cooling, mechanical ventilation
- Domestic hot water by district heating

Results of the Building EQ project

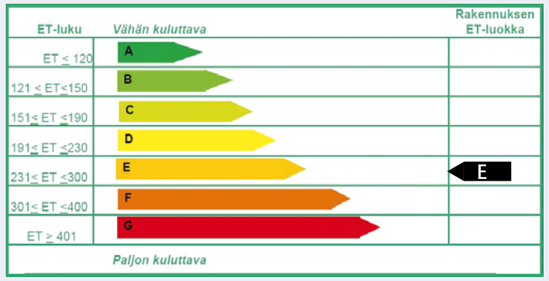
- Energy saving potential in the operation of buildings 5 - 30 %
- Realisiation of these potentials with low or no investment costs
- BuildingEQ methods and tools allow quick and cost efficient detection of these potentials
- Ongoing performance evaluation is prerequisite for energy efficient operation
- Consortium suggests amendment of EPBD with mandatory performance monitoring

www.BuildingEQ.eu

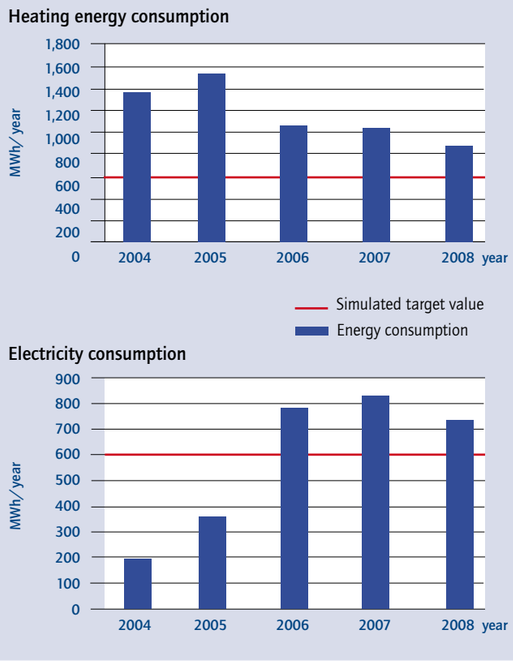
Supported by European Commission
Intelligent Energy Europe

Result of certificate

As of 2009 in Finland, energy performance certificates for existing buildings are required. The certification of non-residential buildings in the building stock is carried out using the actual energy consumption (operational rating OR) as a basis. As well as the heating energy, the electricity consumption and the cooling energy are considered. The user-dependent electricity consumption for electrical devices like PC's, refrigerators, etc. is not included. The gross floor area is used as reference value.
The energy efficiency is divided into 7 classes from A (highest efficiency) to G (lowest efficiency). The boundary values defining the classes are set depending on the building use. This distribution is based on statistical values of the energy consumption of existing buildings in Finland.
The energy performance rating for the building is class E and it was defined based on measured energy consumption during year 2008.



A target consumption was simulated for the building by using spatial 3D model of the building and hourly dynamic simulation. The picture of the 5 last years measured electricity and heating energy consumption show how the renovation changed the consumption level of the building: heating energy decreased and electricity consumption increased. During 2007, some adjustments to AHU running hours and temperature setpoints were done, which resulted in a decrease of energy consumption from 12 to 19 %. Compared to the target, energy saving potentials can still be estimated 30 % for heating and 20 % for electricity.



Overview saving potentials

DESCRIPTION OF SAVINGS	INFLUENCE
HEATING	
Heating for air handling unit (AHU) 309 (kitchen etc.) has been on during summer	Reduced heating consumption
Check the setpoint for inlet temperature for heating circuit of ventilation	Reduced heating consumption
VENTILATION	
Reduce running hours of AHU303 from 24/7 during summer	Reduced electricity consumption
Reduce running hours of AHU301, 302 and 304 from office hours to meet the need during summer	Reduced electricity consumption
Check the need to run AHU309 for kitchen also during weekends	Reduced heating and electricity consumption
Check the need to run AHU305 for auditorium during weekends on summer	Reduced electricity consumption

Analysis of Measured data

The analysis indicates that most of the air handling units (AHU) are running according to the same schedule through the whole year, although there is limited functions during summer holiday (university building, no lectures). These typical patterns can be well seen in graph I (1).

The carpet plot below shows that the AHU of the north-west zone is even running both in the night as well as on weekends during summer time (see graph IV (2)).