# Case Study Elbetalschule Naumburg

## General introduction

72 buildings from all over Europe get metered in this project, 20 of them are located in Germany and attended by ENERGIE 2000 e.V., the energy agency in the district of Kassel. In Naumburg the Elbetalschule and a gymnasium are part of the project, 18 further are located in different other cities in the district of Kassel. The owners of the buildings are different, schools belong to the district as same as mostly the gymnasiums. Other buildings like kindergarten or public buildings belong to the communities or i.e. sports-clubs. Aim of the project is to save energy and running costs through behavioural change without large investment costs (i.e. trainings of the building operators). The identification of links between use of the buildings and their energy consumption is the main focus and innovation of the Intelligent Metering system.

Naumburg is a small town having 6049 inhabitants in the town and 4 smaller villages.

## Primary school

General description

The school was built in 1965, as a primary school. It was in the typical construction design of that time with no energy saving components. It originally had an electric heating system which was replaced be a warm- water heating system in 2002. The heating system is owned and managed by the Planungs- und Betriebs- GmbH (PBG), a district owned company.

Data

| | |
|---|---|
| Construction year: | 1965 |
| Size: | 6614 m² |
| Energy supply: | oil based district heating with wood pellet base load boiler since 2002 |
| Building type: | brick-construction |

Usage

It is used as a school for pupils from class 1 to 6. At present about 309 pupils are using the school educated by about 16 teachers

## *needed assessment*

### *1. Monitoring objectives*

*Basically Intelligent Metering will show that energy savings can be reached with small or no additional investment costs in public buildings. The saving potentials can be identified and tapped with the help of practical action guides. Those measures are available for buildings as well as for new or rebuilt buildings. Behavioural change will help to save public costs and reduce environmental pollution.*

***2. parameters to monitor***

*Electricity, water and heat should be metered in the project together with the outside temperature.*

***3. needs for implementation***

*For the implementation of IM you need meters with data transmission system, data cables and usable communication systems. The installation of intelligent metering has to be planned early when works at heating systems and their control equipment are foreseen. It is cost- saving to combine the IM with a control operation system*

***4. Lessons learnt***

*We have seen that it is difficult to implement Intelligent Metering in different buildings of different owners, because the necessary number of key persons who have to be informed and convinced is a great one. When an opinion leader has been identified who accelerates the implementation of the project with his own conviction, the introduction of Intelligent Metering will have chances to be successful. To save cost and minimise technical problems you should have an expert for these systems available for the whole project.*

## *system for data collection*

***1. Hardware***

*In Germany meters from different companies are in use. Water is not yet metered in the project, electricity is metered with impulse meters or like in this case some data come directly from the utility company. Heat is metered by heat-meters with impulses or data exit. The impulses or data were read by a data logger so called sm@rtBOX, system Senger & Partner (S&P) every 15 minutes. In this system not only the meter- readings were collected, but also data like system- temperatures, pressures, failures etc. The data were usually send once a day via telephone- line to a central server located in Braunschweig at S&P. Here the data will be transmitted and for the project and send to the common Intelligent Metering database at Esbensen in Denmark for generating Graphs and display them on www.intelmeter.com. The heat meters and the data transmission system is owned by PBG who allowed to use the system. The data of the main electricity counter came from the utility company eon, who send them daily to the server of ENERGIE 2000 e.V. From here they were send to S&P for conversion and transmission to Esbensen.*

***2. Communication (Data Transmission Protocols)***

*The communication is by wire between meters and data logger and via telephone line to the server. It causes a usable telephone equipment in the building with an unrestricted connection available.*

***3. Data management (Data storage)***

*The software of S&P archives the data automatically within their database. To make it accessible for the Intelligent Metering project, the saved data is exported daily in a standardized csv-file and sent to Denmark.*

***4. Costs***

*As a combined system for meter readings and control operations is used, the costs can't exactly stated. For electricity meters, wires and installation about 800 € were paid. The other costs were paid by the PBG, the owner of the heating plant.*

***5. Lessons learnt***

*In the district of Kassel there was no strategy for the implementation of the Intelligent Metering, because the project started very shortly. So there was no money in the budgets for the hardware, and ENERGIE 2000 e.V. as the only project partner has no own expert for metering techniques and data systems. Due to different building owners and a lot of involved companies and institutions a lot of coordination work was necessary. This causes a delay in installing meters and finally in the whole project. An other lesson learnt was to check the equipment needed exactly. So some installed heat- meters were not fitted with an connection to the power supply but with batteries. These meters had a software to solve the batteries which stopped data transmission to sm@rtBOX after a few hours every day. Those equipment is not usable, the meters had to be changed.*

## *Monitoring Management*

***1. Procedures***

*The data is counted by the meters continuously. Every 15 minutes the actual amount is read out by the meter. This is done by the server automatically and the data were stored daily in the S&P- database together with the data from eon. The values for every 30 minutes are exported and daily send to the partner Esbensen in Denmark. The software Dynamat processes the data and publishes the graphs on the website. The collected data is available for all building users and specific behavioural patterns can be identified and checked on their energy efficiency.*

***2. Responsibilities***

*The responsibility for the system is at PBG and ENERGIE 2000 e.V., but the caretaker of the school is checking the meters periodically.*

***3. Lessons learnt***

*It is necessary to define the data format. This is an international project, so it causes to convert data. Although the csv.- format is used it has to be converted. This is i.e. because a "**,**" means a "**.**" in some countries. The data from the utility company send as MSCONS have also to be processed before further usage.*

## *Data Analysis*

*Through Intelligent Metering the effective consumption of energy is surveyed. It points out actions which are energy intensive. The users of the buildings recognise, where energy cuttings can be done without any restrictions. With the help of training sessions barriers can be identified which provide energy efficiency and the people get motivated to remove those barriers and use the upcoming potentials. Immediately with the installation of the system the caretakers can see if the heating system or ventilation systems have false settings, which is normally unobservable.*

*Generally can be stated, that the basic load can be reduced easier, because cost transparency can be communicated i.e. for running monitors, copiers or other office equipment.*

***Examples for energy savings in the Elbetalschule:***
*Switching off of modems, computers, monitors, printers and other equipment after the school hours, resetting of temperatures and times of the heating system are examples of what could be done easily.*

## *Training package*

*The caretakers of district owned buildings were trained periodically in energy savings. At the last session in spring 2006 they were specially trained for Intelligent Metering. The next training session was specially for an interested group of the buildings users including the caretakers, some teachers and pupils taking part at a special environmental working group.*

***Training Timetable***

| date | participants | kind of training |
|---|---|---|
| 2006-03-14 | caretakers | general training |
| 2006-11-08 | caretakers, teachers | training using graphs |

## *Conclusions*

*Basically Intelligent Metering shows, that cuttings in the field of energy in public buildings can be reached with marginal additional costs. With practical tips for the building occupants and the communication of the necessary knowledge about energy and energy efficiency the users are motivated to realise the actions discussed in the training sessions. Such actions are mostly connected with marginal costs and amortise after a short time. At this time (Dec. 2006) we can`t number the savings exactly because we have not yet enough data for final evaluation. But what we can say is that we may have the following estimated savings: 4 % heating, 6 % electricity and 2 % water.*