



*Intelligent  
Metering*

training handbook

Creating a sustainable building  
- School Edition

## The Intelligent Metering Project

The building sector is responsible for a significant proportion of energy consumption in the European Union, accounting for around 40 % of total consumption. Any action to accelerate increased energy savings in this sector is therefore of strategic importance with respect to European energy-related policies. The project aims to demonstrate and promote the extensive take-up of intelligent metering across Europe. By changing building occupant behaviour, energy use can be rationalised. Intelligent metering analyses half-hourly monitored data to identify activities to change the behaviour of building owners and tenants resulting in energy and water savings. Work to date, carried out in Leicester, has demonstrated savings of up to 30% with little or no investment.

Intelligent metering represents a unique opportunity to create a truly 'sustainable' project in schools. Its main focus is energy and water, however research shows that setting these aims into a wider context will provide a more powerful and effective learning experience. The Learning for Sustainability Pathways development framework produced by the WWF has been chosen as a basis for the training package. It has a 'whole school participatory approach' and its cyclical process enables the school community to learn from experiences through thorough planning implementation, reflection and then by taking action. Schools will be at very different starting points and the very open ended nature of the training accommodates this.

In addition, the pack contains a wide range of other support material including good housekeeping information to enable schools to save energy and water with little or no expenditure. Together with the posters and stickers in the 'Training Action Plan' section, this will enable all schools in the project to quickly make full use of the Intelligent Metering Data.

As the intention is to involve the whole school community the materials are wide-ranging. The project remit is to change behaviour, and the training can be used with motivational reward schemes for all the building users, for example the 'Investors in People award', and the 'Eco school' scheme.

We also want to give our schools the tools to be visionary about future possibilities. Some case studies are included, detailing examples of best practice such as teaching and learning programmes, and projects implementing energy efficiency measures in school buildings.

Finally, our schools need to live and exist in a climate of often quite fast moving and turbulent change. Sustainable Development projects can fit very easily into the new Ofsted arrangements and into other initiatives such as 'Every child Matters'.

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## INTELLIGENT METERING TRAINERS PACK- SCHOOL BUILDINGS

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European Commission Energy Intelligent Europe programme  
'Energy Savings from Intelligent Metering and Behavioural Change'  
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The partners in the project are as follows:

- County of South Jutland (Denmark),
- Energieagentur Waldviertel (Austria),
- ENERGIE 2000 e.V.(Germany),
- Esbensen (Denmark)
- IT Power Ltd (UK),
- Leicester City Council (UK),
- Sonnenplatz Großschönau GmbH (Austria).

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# 1 Introduction

## 1.1 Environmental Background

Municipal interest in energy efficiency has traditionally been concentrated on reducing fuel costs. More recently, there has been recognition that using energy can have an impact on environmental pollution. With international commitments to reduce carbon dioxide emissions, local government is now playing its part to reduce energy consumption, so reducing the impact of both local and global pollution. Global pollution is the threat of climate change due to increased concentrations of carbon dioxide in the earth's atmosphere. In particular the additional carbon dioxide produced through human activity. The vast majority of this is due to the burning of fossil fuels. Thus, any reduction in energy use reduces the use of fossil fuels, which in turn reduces the emissions of carbon dioxide. It is carbon dioxide emissions that have been the subject of international commitments, including the United Nations conference on environment and development in Rio de Janeiro in 1992, where the Framework Convention on Climate Change was published.

Further commitments have been made since 1992 with a view to reduce the global emissions of carbon dioxide. The European Union has agreed to specific targets, as have member states of the Union. Industry thus has a role to play in helping both government and the European Union reduce the emissions of carbon dioxide by improving energy efficiency.

However, it is local pollution that has the most immediate impact on the general public. The use of energy produces oxides of nitrogen ( $\text{NO}_x$ ) and oxides of sulphur ( $\text{SO}_x$ ), which result in acid rain and poor air quality. This acid rain not only attacks buildings by dissolving sand stone but also attacks forests and other plant life. The impact upon local air quality is more noticeable in the warmer, summer months, when low-level ozone reacts with sunlight to create photochemical smog. This particularly affects people with breathing difficulties and is becoming an increasing concern for European Union Member States. Whilst the major energy source for this comes from the use of oil, petrol and diesel fuel, improving the energy efficiency of municipal buildings can reduce the emissions of pollutants, which can therefore reduce the impact on local air quality.

## 1.2 Local Agenda 21

At the United Nations Earth Summit in Rio de Janeiro in 1992, international commitments were made to help promote environmental sustainability. One of these initiatives was Agenda 21. Within Agenda 21 is a series of targets that need to be successfully met in order to reduce human impact on the environment. Agenda 21 attempts to involve all sections of the community (not just the major industry or government). It expects all local and regional authorities to draw up local Agenda 21 initiatives, which involve all sections of the community to identify ways of reducing their environmental impact. The process is attempting to involve everyone and to promote sustainable development as improvements to quality of life rather than using

threats of additional environmental legislation. Intelligent metering is an initiative that fulfils these requirements.

The building sector is responsible for a significant proportion of energy consumption in the European Union, accounting for around 40 % of total consumption. Any action to accelerate increased energy savings in this sector is therefore of strategic importance with respect to European energy-related policies. The European Commission supported Intelligent Metering project aims to demonstrate and promote the extensive take-up of intelligent metering across Europe. To maximise the energy savings available from the implementation of efficient technologies and products there needs to be an accompanying change to responsible energy behaviour by building users. By changing building occupant behaviour energy use can be rationalised. Intelligent metering analyses half hourly monitored data to identify activities to change the behaviour of building owners and tenants resulting in energy and water savings. Work to date carried out in Leicester has demonstrated savings of up to 30% with little or no investment.

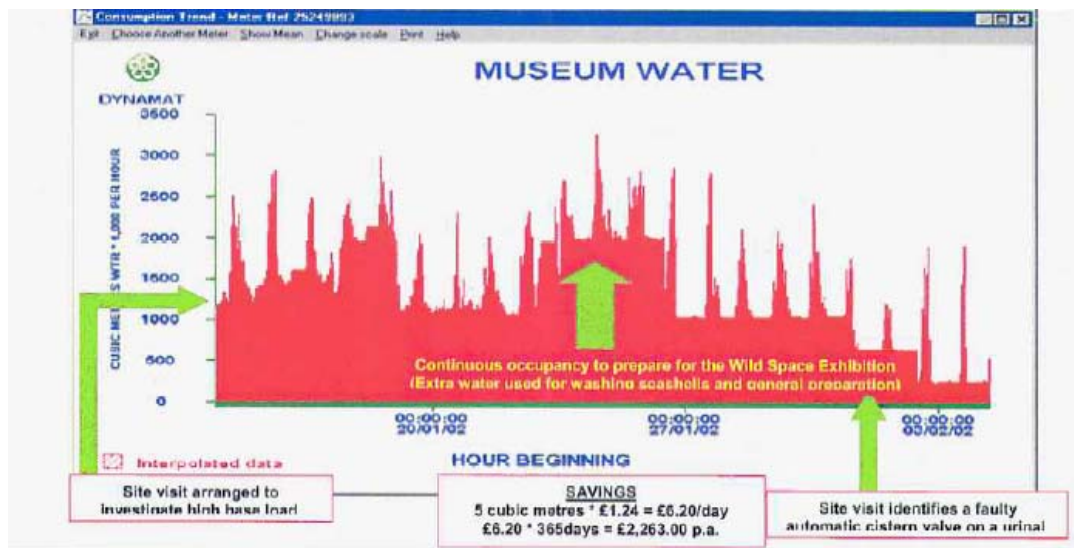
### ***1.3 The European Commission supported Intelligent Metering project***

The European Commission, through its Intelligent Energy Europe programme, is providing support for the project 'Energy Savings from Intelligent Metering and Behavioural Change' (Contract ref. EIE/04/107/SO7.38635, Intelligent Metering), involving partners in Austria, Denmark, Germany and the United Kingdom. The project runs from January 2005 to December 2006.

The project aims to demonstrate and promote the savings available from the use of intelligent metering and training occupants in public buildings and to show that these savings can be achieved at little, or no, additional cost.

The overall objective of the project is to maximise the energy savings available across Europe through the use of intelligent metering and behavioural changes of building occupants. Energy and water use in local authority buildings including offices, schools, sports/leisure facilities and community centres is being monitored. This data is being processed to identify actions and associated savings. Training is then being provided to the building users.

Leicester City Council's energy monitoring systems have been based around billing data provided by the utilities. However this type of system can only detect an increase in consumption 2 or 3 months after it occurs. Also, the deregulation of the energy markets has made it more difficult to obtain accurate, reliable energy data and manual reading of meters presents a practical problem. Therefore the Energy Management Section investigated intelligent metering systems that could capture real time data.



### The System used in Leicester

The Data Bird System uses low power radio to automatically transmit meter readings to a central receiver/data logger, thus avoiding the need for conventional hard wiring. The meter reading data is then automatically downloaded to a PC to the Energy Efficiency Centre, where it is analysed. When unusual consumption is identified feedback is provided to the building users.

The automatic meter reading package (DYNAMAT) provides the following:

Automatic data collection and validation

- Highlights immediate problems
- Indicates faults rather than excessive consumption

Meter reading profiling and analysis

- This shows day peaks and night / weekend lows
- It reveals leaks / wastage

Automatic reading of meters and data analysis

- Monitoring against historical targets or theoretical guidelines. Consumption related to weather, occupancy, production or a signature of past consumption profiles

Reporting

- This is regular and on an exception basis
- Trends that fall out of tolerance are immediately flagged up

Easy import and export of data

- Data and reports can be saved in other formats enabling information to be sent electronically

Finance module allows production of bills

- Enables Leicester City Council to recharge tenants for their individual usage

## **1.4 Purpose of the training package**

This training package has been developed as part of the 'Training Building Occupants' work package. The objective of this Work Package is:

- To train building occupants in how to save energy and water through behavioural change and to relate to the data being provided to support behavioural change.

Training will be provided to the building occupants on changing their usage patterns in order to save energy and water. Other work has identified a number of ways in which buildings can make savings. These results have helped in developing training material. Training sessions will be carried out within each building so the occupants can be introduced to the intelligent metering systems and see the results coming from these in real time.

The training will be adapted for different building users in different types of building. For example, in offices training will be provided for managers (including building and energy managers) using small group discussion and one to one interviews, while for the majority of the office workers larger group presentations/training sessions will be used. In schools, the training will be directed in different forms at the management and teachers, and at the pupils e.g. using special educational materials.

The data already collected as part of the project will be used to estimate potential savings from the occupants carrying out the actions recommended by the training. This will be used to demonstrate to them the importance of their actions.

In addition to training sessions, this work package includes the development of posters to be displayed around the buildings, reminding the occupants of the training they have received and important actions they can implement. The key posters will include the "Display" poster being piloted under the DG Environment Display project (<http://www.display-campaign.org/>), which highlights the energy performance of the building and is being utilised to facilitate the introduction of Buildings Directive. This will complement this project and highlights how key actions can be taken forward in harmony and the need for the project in each country to be aware of synergies and benefits of work being carried out by the Commission services.