

# ■ aM&T — taking control of energy use

**With growing demands on organisations to manage and reduce their energy consumption, monitoring and targeting (M&T) is becoming increasingly important in both the public and private sectors. Paul Martin explains how, by using M&T, energy consumption can be effectively managed.**

There are basic M&T principles that can be applied within any organisation and can lead to cost savings and reductions in carbon emissions. However, the most beneficial form of M&T is automatic monitoring and targeting (aM&T) which, despite allowing considerable energy savings, does not have to be costly or complicated to implement.

M&T refers to the collection, interpretation and reporting of information on energy use. Its role is to measure and improve energy performance and identify opportunities for reducing energy consumption and, therefore, cost. Indeed, between 5–20% energy savings can be achieved with little or no capital outlay through M&T techniques.

aM&T is used when dealing with high amounts of data and is so-called because the data collection is automated. There are three parts to aM&T, as follows.

1. Automatic Meter Reading (AMR).
2. M&T software.
3. Implementation of analysis techniques.

## AMR

AMR (automated meter reading) is achieved using advanced meters, defined by The Carbon Trust as, “any form of metering system which provides a greater degree of energy consumption data beyond that used for basic billing”. In general, AMR refers to the automatic collection of data from meters, which is transferred to a central database for billing and/or analysis.

The main advantage of installing advanced meters is that they provide accurate and regular consumption

data every half hour. This ensures that a building’s energy consumption is very closely monitored, allowing an energy manager to collect detailed information about a building’s energy consumption. This is useful not only to determine times when energy is wasted, but can also help predict energy use and ensure that energy bills are correct.

Utility billing has been shown to contain an unacceptably high number of errors; a survey carried out by TEAM (Energy Auditing Agency Ltd) in 2006 showed 3% of bills to be incorrect. This did not include the number of estimated bills, with approximately 70% of estimated bills relating to gas. Such paucity of information does not allow energy managers to effectively get on with the job of saving energy. By the use of AMR, however, this problem can be drastically reduced.

## M&T software and analysis techniques

Once AMR and M&T systems are in place, it becomes easier to actively manage energy consumption and improve energy efficiency. However, despite its benefits, there is sometimes too much information retrieved from AMR for a meaningful analysis of energy, making it difficult for an energy manager to analyse data and find discrepancies. The use of data analysis and exception reporting tools is therefore required.

Data analysis tools often take the form of dedicated aM&T software, which can automatically identify typical faults and produce useful and reliable exception reports. In addition, some experience is needed, either from a consultant or experienced energy manager, to interpret results and implement the necessary energy saving measures.

Implementing an aM&T system will ease the pressure of energy managers having to manipulate half-hourly information. Another benefit is that the system can be automatically set to trigger alarms

and exceptions when a site's consumption exceeds a certain limit.

After looking at the half-hourly data, it is possible to target energy saving measures towards particular areas of a site. Specific problem areas can also be identified, which can include energy intensive equipment and the times of use. It is then possible to make key recommendations, including quick win solutions, for energy saving and carbon reduction.

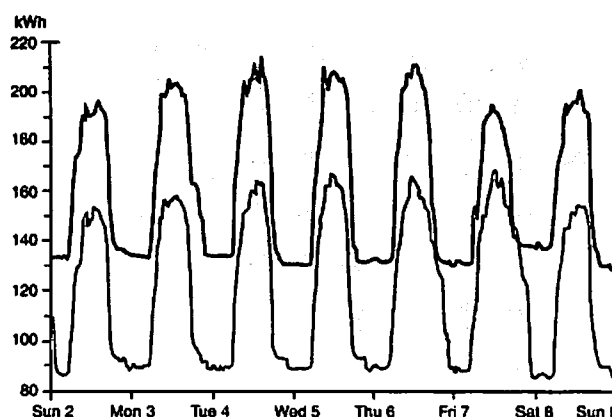
The case study below explains how half-hourly data was used to make significant energy and cost savings.

## Compliance with legislation

Using aM&T will assist organisations to comply with forthcoming legislation and meet Government requirements. It is becoming more and more essential for organisations to manage their energy as efficiently as possible.

There is increasing pressure on companies to reduce their energy consumption and the past few years have seen growing media coverage on this topic. Most companies have a corporate social responsibility to reduce their carbon emissions, particularly their "carbon footprint". The UK's commitment under the Kyoto Protocol requires

## Site performance — before and after relaxing the control regime



organisations to help meet the goal of reducing carbon emissions by 5.2% below 1990 levels between 2008 and 2012.

The EU Energy Performance of Buildings Directive requires public sector organisations to produce Display Energy Certificates (DECs) by April 2008. Public sector organisations with buildings exceeding 1000m<sup>2</sup> are required to comply with this legislation. If an eligible public sector building fails to display a valid DEC by this date, the organisation will be charged £500. In addition, there is a £1000 charge for not including a valid advisory report of recommended energy saving measures. □

### Case study

The Merseyside Maritime Museum is a useful case study illustrating the installation of AMR and the energy and cost savings that can be achieved as a result. The work carried out by the consultant focuses on high levels of overnight electricity and gas consumption being detected at the museum. The installation of the AMR system, along with all recommended energy saving measures, paid for itself in less than eight months.

A reporting system was set up through a software package that automatically "dialed up" the meter, so that the Energy Manager at the museum and the consultant could view the result. The analysis of the half-hourly information gathered was essential to reducing electricity and gas consumption. Below is a summary of the steps taken.

The consultant's first challenge was to identify where savings could be made. Through analysing half-hourly data using the software, it was found that there was a typical electricity demand of 400kW during the day and a high level of 280kW at night-time. This identified that the chillers, air handling units (AHUs) and heating systems were in operation 24 hours a day, seven days a week, in order to maintain a desired temperature level of 24°C and a relative humidity of 50% for preserving the museum's artefacts. The consultant advised on how the museum should operate the three AHUs serving the theatre, entrance foyer and shop. These AHUs were operating continuously but it was recommended for controls to be installed, resulting in an automatic switch-off whenever the building was unoccupied.

Additional sub-metering was installed on all three chiller units to investigate how the chiller should operate. It was then recommended that savings could be made by changing the control regime, including relaxing the chiller controls and their set points, while still keeping the building conditions within the Department of Culture, Media and Sport guidelines for the museum's artefacts. The consultant recommended relaxing the humidity settings to a band of 40–60% instead of 50% (where appropriate). The next step was to install external temperature and humidity sensors to enable analysis of the savings achieved.

As a result of the AMR project, gas consumption was reduced by 25% in seven months and electricity consumption by 7% in seven months. Consequently, the system paid for itself in eight months, equating to a saving of £22,633 in seven months.

The diagram "Site performance before and after relaxing the control regime" provides an illustration of this. This has resulted in substantial electricity, gas and water savings for National Museums Liverpool.