Spotlight on...
carbon reduction

CONSIDERATE CONSTRUCTORS SCHEME

Case Study: BAM
Effective Onsite Energy Management

BAM's ambition is to have a net positive impact on the environment. An important part of achieving this involves managing their energy use. They believe that effective energy management is the best way to save money and should be planned as early as possible.

They have developed an extensive energy management procedure which covers a wide range of aspects of the construction process. Implementing it has helped BAM to effectively reduce emissions across its site activities.

THE PROCEDURE

Energy Management

The procedure states that sites should:

- **Appoint an individual with responsibility for site energy management.**
- **Ensure remote/intelligent metering is installed to the main energy supplies (including both electricity and natural gas where used). Bigger sites should be sub-metered to identify where energy is being used.**
- **Regularly analyse energy use via monthly reports and the online energy monitoring system to identify potential savings.**
- **At tender stage contact Central Energy Management at BAM Plant, and during mobilisation, produce a power plan to ensure all aspects of energy efficiency are incorporated into the project. This involves identifying how much, and when, energy will be required for accommodation, plant and equipment.**
- **This will enable a timely grid connection, minimise costs of connection (through correct sizing of the supply), secure optimum rates from the supplier (you can give them a more accurate load profile) and identify opportunities for savings (e.g. choosing more efficient plant and equipment). It is also important to identify winter and summer periods within the programme as this will affect energy consumption (e.g. wet trades during winter are likely to result in additional energy and cost for heating/drying).**
- **Review plant procedure for temporary builders' supplies.**
- **Consult clients at tender stage as to existing plans for grid connection. Request an indicative quote from the local District Network Operator (DNO) for new supplies as this may highlight any problems early on and help secure connection on time.**

ACCOMMODATION

The procedure states that sites should:

- **Use energy efficient site accommodation with high levels of insulation and appropriate controls for lighting, heating and cooling.**
- **Fit dehumidifiers to drying rooms.**
- **Request an EPC for accommodation units from the supplier and opt for higher rated cabins (i.e. A – C rated).**
- **Fit timers to heater circuits in cabins and set them to come on during work hours only.**
- **Fit thermostats to offices or heaters.**
- **Turn thermostats down by 1ºC to save up to 10% on heating bills.**
- **Use photocells to turn lights off when daylight is sufficient.**
- **Consider alternative heating sources, such as air source heat pumps and gas driven heating.**
- **Promote best practices to subcontractors if they are providing their own accommodation.**
- **Use high efficiency LED or fluorescent lighting.**

TEMPORARY ELECTRICS

The procedure states that:

- **Sub distribution panels supplying the main construction area are to be timed to enable the lighting and transformers to be controlled locally. Non-timed output(s) will also be available for safety lighting etc.**
- **Accommodation should be supplied by timed MDA panel(s) to allow for the total electrical isolation of non-essential cabins during 'non-working hours' while maintaining an electrical supply to critical units e.g. those that house IT servers or refrigeration.**
- **Charging points for large battery powered equipment (e.g. MEWP's and Pop up's) should be controlled by time clock to enable the charging period to be controlled**
- **Use of efficient accommodation will minimise cabling requirements and reduce costs.**

It also asks:

- **Has a site electricity supply been organised by the client? Can an early connection design be organised to speed up the connection process?**

PLANT AND EQUIPMENT

The procedure states that sites should:

- **Request details of plant efficiency from suppliers (e.g. BAM Plant) to enable selection of the most efficient option available.**
- **Consider energy efficient alternatives to standard equipment by asking the hirer what's available.**
- **Ensure that the plant selected for a task is appropriate in terms of its capacity. Avoid over and under capacity, this applies to all plant. Attention to plant capacity is needed for generators, excavators, telehandlers, pumps and cranes.**
- **Use inverter driven 'soft start' cranes and hoists which reduce maximum demand.**
- **Ensure plant is well maintained and efficient.**
- **Switch off plant when not in use, do not leave engines running.**
- **Plan effectively to avoid double handling of materials (during levelling, excavation etc.) in order to minimise fuel consumption.**
- **Use electrically powered compressors rather than diesel.**
- **Promote best practices to subcontractors and ensure they are reducing fuel use.**

HEATING

The procedure states that sites should:

- **SConsider the programme and avoid wet trades (e.g. vinyl adhesive, screed) in winter, as these often need heating for drying.**
- **Select alternative activities/materials that avoid or reduce the need for drying.**
- **Only operate heaters when they will be effective (heating makes little sense in open plan buildings that are not yet enclosed, or where doors stay open all day).**
- **Where feasible, adjust the programme to reduce the need to dry as fast as possible.**
- **Where feasible, make use of lower level (wattage) heating such as radiators, to avoid use of high energy using electric heating (e.g. 13kW fan heaters).**

LIGHTING

The procedure states that sites should:

- **Use LED lighting rather than tungsten filament.**
- **Use Passive Infrared (PIR) Detectors for night security.**
- **Ensure timers are fitted to turn off all non-emergency site lighting at night.**
- **Avoid unnecessarily high lighting levels throughout the site.**
- **Ensure emergency lights and back-up power are on separate circuits from other lighting.**
- **Have separate circuits for different lighting zones.**
- **Install timer switches on appropriate circuits to avoid unnecessary lighting out of hours.**
- **Install photocells on appropriate circuits to avoid unnecessary external lighting during the day.**
- **If room and walking route layouts make it practicable, install power sockets outside side rooms/apartments, and require subcontractors working in individual rooms to bring their own task lighting which they connect to our system.**
- **Ensure the task lighting brought by subcontractors avoids the use of tungsten bulbs.**
- **Ensure responsibility is assigned to individual(s) to optimize the use of manual switches and timer switches (as daylight hours change) to avoid unnecessary consumption.**

ENERGY INSPECTIONS

The procedure states that an energy inspection is to be undertaken at least once per project. The timing of the inspection will vary depending on the nature of the project. However, to achieve savings it is important the inspection is carried out as early as practical. The energy inspection may include recommendations to install control equipment.

Additional inspections should be considered if a site setup changes significantly, for example more cabins brought to a site, or change from diesel generators to a grid supply. Monthly energy reports can also act as a guide. A project with out-of-hours consumption of more than 50% may require investigation.

GENERATORS

The procedure states that sites should:

- **Ensure generators are specified to optimum efficiency loadings (75%).**
- **Consider multiple generators of different sizes to cope with varying loads (e.g. a day and a night generator).**

- **If cranes are generator-dependent (sometimes happens when grid supply is secured but of insufficient capacity to operate cranes at peak load), ensure generators are appropriately sized, to increase average operating efficiency whilst meeting peak load.**
- **Consider options for alternative fuels, such as gas generators or biodiesel generators.**
- **Consider use of uninterruptable power supply for out-of-hours power for essential items only (servers, security, lighting etc.)**

THE PROCEDURE IN PRACTICE

During their Aintree Hospital project, BAM were able to effectively manage their energy use through using their procedure.

Following the energy management section, Automatic Meter Reading (AMR) meters were installed on site. These sent data to a digital energy monitoring system which produced monthly reports on the site's energy use. The reports helped the team identify that out-of-hours energy use was above expected, with 52% of energy being used during these periods.

In order to troubleshoot the issue, a number of timers were added to heaters and zip boilers. Further data showed that these were able to reduce out-of-hours consumption to 50% but not completely solve the problem. A main part of the issue was that the timers were being altered without permission. To resolve this, the team decided to have a last man out switch installed to turn off all non-essential electrics. The benefits of this were almost immediate. Energy consumption dropped by 48% (or 16,689kWh) over the following six months compared to the previous six, which is equivalent in consumption to approximately four average UK households.

The AMR meters enabled the team to trial different energy-saving measures and easily assess their effectiveness through data analysis. The procedure eventually resulted in significant cost reduction. Whilst the total cost of the switch was approximately £1,900; the potential savings due to reduced energy consumption was approximately £4,000 a year.

Through using their procedure, BAM were able to effectively deal with their onsite energy issues, which provided them with both economic and environmental advantages.