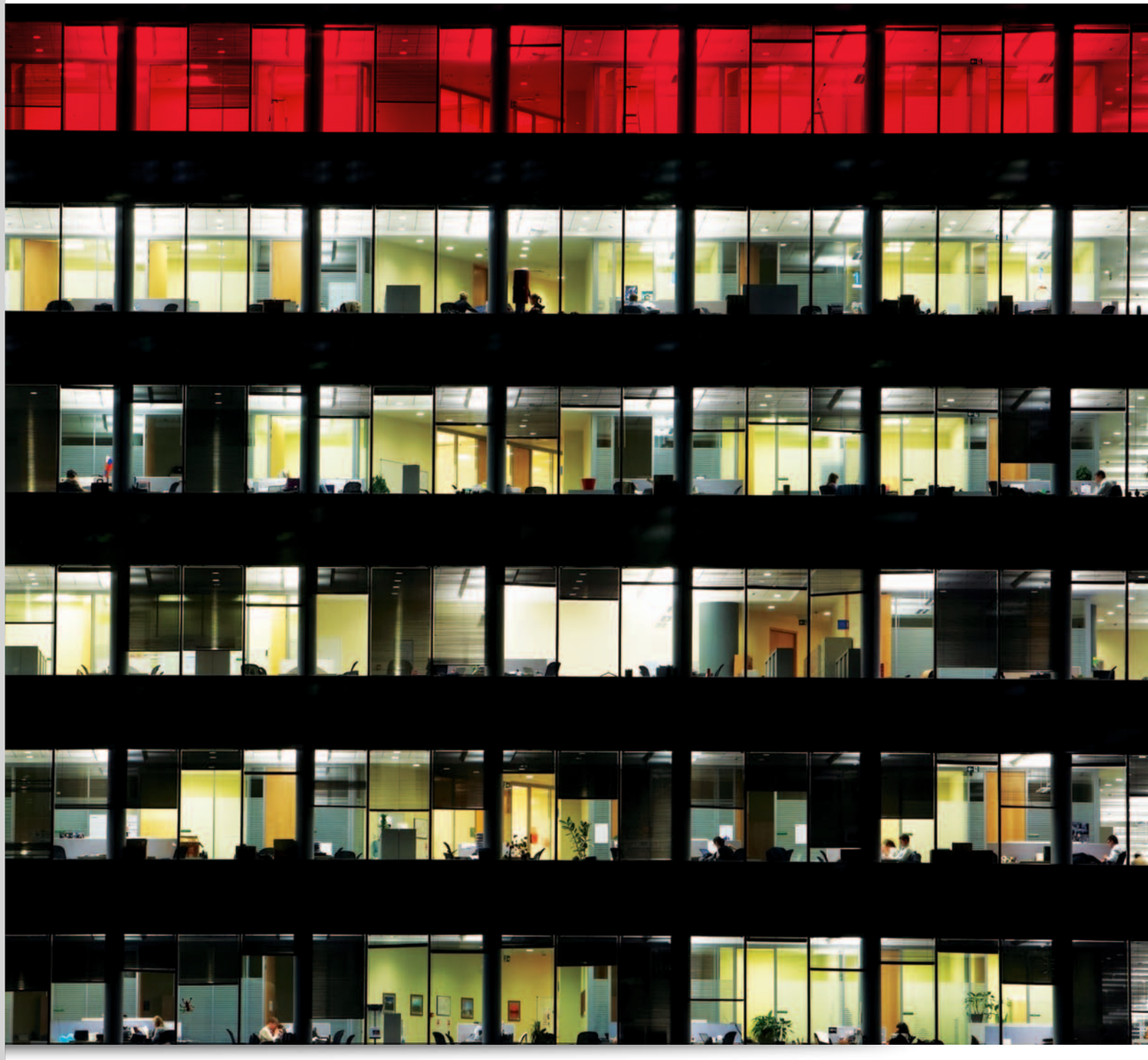
Information Guide

Long Term Efficiency

ISSUE 42



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Guide to long term efficiency

This is an independent guide produced by Mitsubishi Electric to enhance the knowledge of its customers and provide a view of the key issues facing our industry today. The guide accompanies a series of seminars, all of which are CPD accredited.

The Government is aiming for an 80% reduction in UK carbon emissions by 2050, but 60% of the commercial floor space that will exist in 2050 has already been built. This makes the long term energy performance of existing buildings one of today's major challenges.

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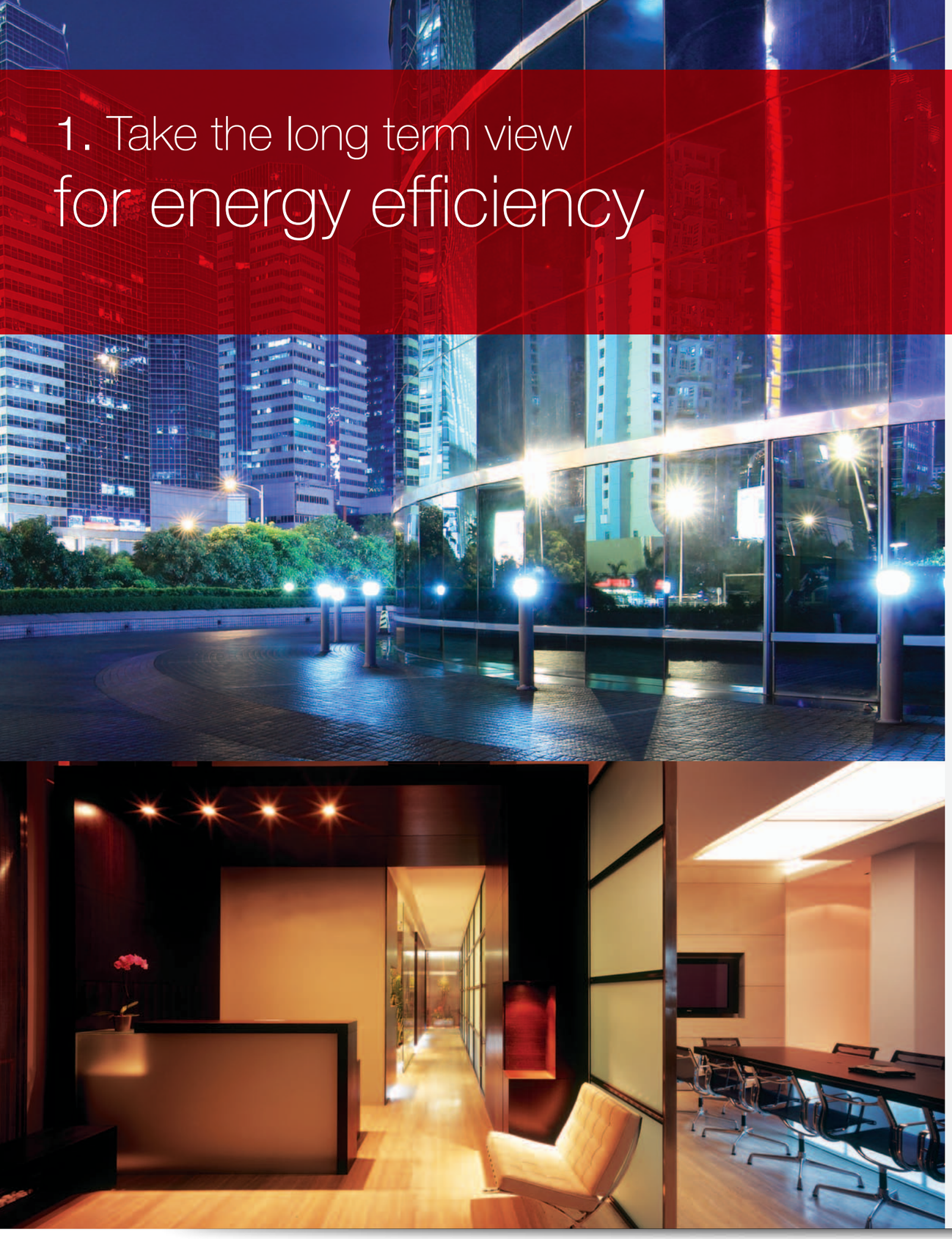


1. Take the long term view for energy efficiency

It is fair to say that a lot of attention is being paid to the energy efficient design of today's commercial and public sector non-domestic buildings. The influence of Part L 2010 is being felt and there is a strong drive to ensure that predicted energy performance reaches ever-tighter targets. Part L will be updated again in 2013 and in another three years after that.

However, Part L deals mainly with new-build projects. One area which is still proving challenging is the long term energy performance of buildings. And this is a problem that is growing in its significance. Government aims to reduce UK carbon emissions by 80% against 1990 levels by 2050, with the built environment playing an important part in reaching this target. This will be impossible to achieve with new-build alone. According to figures from CIBSE (the Chartered Institution of Building Services Engineers), 60% of the commercial floor space that will exist in 2050 was already built in 2010.

The need to refurbish and to operate buildings as energy efficiently as possible is therefore becoming more urgent. This means that building owners and operators need to pay close attention to how their buildings function over the long term.

The advantages are not only environmental. By reducing the energy requirements of a building over the long term, building operators can not only reduce their carbon emissions, but also lower their energy costs. Around 80% of the costs of a building are accounted for during its operation – of which up to 50% are energy-related[1]. The good news for office building managers is that energy is one of the most controllable overhead costs their business faces so taking action can have a positive impact directly on the bottom line.

When examining operational energy use in a typical office building, for example, we can highlight several important areas of usage:

- **Heating**
- **Hot water production**
- **Lighting**
- **Cooling and ventilation**
- **Auxiliary energy** (e.g. for PCs and other office equipment)

Achieving long term energy efficiency in a commercial building means considering all these areas of energy use, and examining carefully how they can be optimised to ensure occupant comfort without using more energy than required. One of the most important first steps to take is to find out where energy is being used. Metering and sub-metering are vital tools in the fight against energy waste. Unless you know where energy is being used, you won't be able to monitor and manage it.

There are some 'quick wins' that can be gained, and which can show savings on energy costs within a matter of months. But in order to build on these sort of savings, building owners and managers have to think about the whole lifetime of their building including maintenance programmes, replacement of inefficient equipment where necessary and continuous energy monitoring.

According to the Carbon Trust[2], there are three main opportunities to save energy in the average office building: switching off, maintenance, and refurbishment or replacement. Our next features will look at these options.

1. DENA (Deutsche Energie-Agentur; German Energy Agency) Conference 2008
2. Carbon Trust publications: Office-based Companies – maximising energy savings in an office environment (CTV 007)

2. Simple steps to improve efficiency: low-cost with fast payback

Although long term energy efficiency requires a strategic approach, there is no reason why a business should not look for some 'quick wins' on the path to greater energy efficiency. Not only can this show some encouraging savings very quickly, it is also useful for winning staff buy-in for more strategic measures.

1. Meter and measure

It is important to know what your current energy use is, and to be able to identify where the energy is being used. Metering and sub-metering are central to this process, and information from your meters should be treated as business critical. This will help to form a before-and-after picture of any energy saving measures, and also keep your energy efficiency on-track in the long term.

2. Get control of your controls

Building management systems often control up to 80% of the energy using equipment in a building.

However, without regular checks even automated systems can drift away from the optimum. This energy drift can see efficiency drop by up to 5% a year if left unchecked.

- Check on sensors: are they working correctly? Has any office equipment been moved near a sensor? For example, a photocopier under a temperature sensor can result in unnecessary use of cooling.
- Office moves can mean that sensors are no longer monitoring the area of a building they are supposed to. Have dividing walls been placed in front of a sensor?
- Ensure that manual overrides have not been left on. Occupants may turn lights on and forget to turn them off; or cooling may be running in a meeting room even though it's unoccupied.
- Check timers to see that they are in-line with your building's hours of use. Are boilers running at weekends? Is your lighting on when it's not required?

Once the basic checks are done, you can take a more in-depth look at the capability of your building controls. Manufacturers are supplying their equipment with more intelligent controls built-in, allowing for more subtle control strategies even in buildings that do not have complex building management systems. For example, some specialist air conditioning controls can now also control third party lighting controls, and have built-in seven day time clocks. Ensure that your facilities management team know what can be achieved with the equipment, and that it is being used to minimise energy waste.

3. Maintenance is key

According to the Carbon Trust, energy consumption of ventilation and air conditioning systems can increase by up to 60% if regular maintenance is not undertaken.

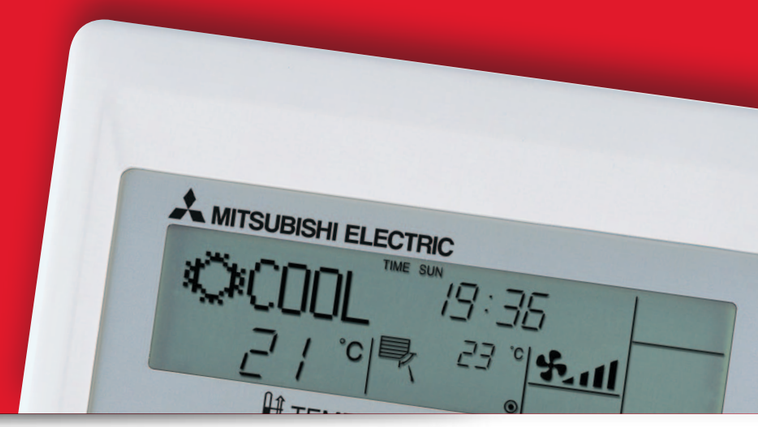
- Check your maintenance schedule and service contract. It is a false economy to cut regular maintenance on air conditioning systems because it not only causes higher energy consumption, but can also lead to breakdowns and faults.
- Simple checks on outdoor units can ensure that they are not blocked with debris, causing poor performance and energy waste.
- Ensure that you are complying with the legal requirement for annual checks on your air conditioning system. The aim of these checks is to reduce leaks, but can also be done alongside regular maintenance.
- Talk to occupants about their heating and cooling needs. Reducing heating temperatures by just 1ºC can cut fuel consumption in a typical office by 8%[1]. Gaining staff buy-in is very helpful, and encouraging them to dress appropriately for the outdoor conditions can enable the building manager to reduce the indoor temperature by a few degrees without causing discomfort to occupants.

One of the most important things to bear in mind about these quick wins, is that they should be part of an ongoing energy monitoring process in the building. Checks on timers, overrides, outdoor units and maintenance schedules should be part of the overall energy saving strategy.

1. Carbon Trust Energy Saving Fact Sheet: Office

Low and no-cost tips for reducing energy used by your air conditioning system

- Set the time-clocks on your air conditioning system to ensure that the system only runs when the building is occupied. Some new air conditioning systems offer in-built time clocks as standard.
- Limit the set-points on your air conditioning. For example, set the air conditioning to operate between 21ºC and 23ºC only. This creates a comfortable environment but restricts over-running of the cooling or heating
- Lock controllers on your air conditioning so that functions cannot be altered. This will prevent set points being altered and heating/cooling modes being changed.
- Ensure that lights are switched off at night. Some air conditioning systems include controllers that can communicate with lighting systems as well, so that lights can be controlled with the same time-clock as air conditioning.
- Get staff buy-in for energy saving measures and encourage them to ensure that PCs, monitors and other office equipment is off at the end of each working day.



3. Applying new technologies for energy efficiency: refurbishment and replacement

Once lower cost options for reducing energy requirements and cutting energy waste have been explored, it is useful to examine the benefits of new technologies, and of replacing older equipment that is using more energy than necessary.

There are a number of technologies that can be applied to existing buildings that can have a significant effect on both carbon emissions and energy use. For example, the use of heat recovery systems can create substantial savings on the initial capital costs of heating and cooling plant.

Heat recovery is a technology that recovers the heating (or cooling) energy from air that is being extracted from the building and applies this energy to incoming air. In this way, the temperature of air in winter, for example, that comes into the building can be pre-warmed by outgoing air. This reduces the requirement for heating, saving both energy and carbon. The same can be done in reverse to lower the temperature of incoming air during summer months.

Preventing heating or cooling energy loss is an important step in reducing wasted energy. For example, savings can also be made by ensuring that windows are not opened when heating or cooling systems are operating. Controls can now be fitted that ensure the cooling or heating turns off if an occupant opens a window. This has proved particularly useful technology in the hotel sector.

However, it may be that the air conditioning system in a building is simply too old to offer any real improvements in energy efficiency. There may therefore be a good argument for replacing the system with more modern and efficient technology. Developments in air conditioning systems over the past decade have seen substantial improvements to their energy efficiency.

For example, a Mitsubishi Electric City Multi 8hp YHM-A system which operates on R410A refrigerant uses 45% less energy than its PUHY-200YMF equivalent purchased ten years ago. A high COP model purchased today uses 50% less energy than its ten-year-old equivalent. Furthermore, modern fitting systems mean that it could be possible to use existing pipework and even wiring with the replacement equipment, saving on costs and business disruption.

Another good reason for considering complete replacement of older air conditioning systems is that the regulations on Ozone Depleting Substances are already in force. This means that any air conditioning system using HCFC refrigerants such as R22 can no longer use virgin refrigerants – they must now operate on recycled or reclaimed HCFC refrigerant. Furthermore, there will be a complete ban on all HCFC refrigerant use from 1st January 2015.

Users of refrigerants such as R22 will already be experiencing price rises for replacement. According to specialist gas suppliers BOC, only a small percentage of R22 is being returned to suppliers for recycling creating a shortage and increased prices in the market.

Although replacement of an air conditioning system carries a higher capital cost than simply improving the performance of an existing one, the payback can be substantial. HSBC bank invested £16 million to replace air conditioning equipment at almost 800 branches around the UK. By adding technologies such as heat recovery and better controls, the bank almost halved its branches' energy bills, reduced carbon emissions and saw savings on operational costs of over £2 million per year. With rising energy prices, payback periods are becoming shorter and savings more substantial.

It may also be appropriate to consider renewable energy options for a building. Heating accounts for over half the energy used in commercial buildings, according to the Carbon Trust. Heat pumps offer a low-carbon approach to heating that can also often reduce running costs.

The key advantage of heat pumps is that at point of use, for every 1kW of electrical energy input into a heat pump, 3.2kW of heat is produced. There are a number of options available, and they are becoming increasingly popular in the commercial buildings sector.

Reducing energy use in commercial buildings is a challenge for building owners, operators and occupants. By taking a long term approach, these stakeholders can achieve lower energy costs, reduced carbon emissions and a comfortable working environment.

Further information

If you missed the CPD seminar on **Long Term Efficiency** you can call your Mitsubishi Electric Regional sales office to arrange an in-house presentation of this information.

If you would like to receive invitations to future CPD events, please email **lesmarcomms@meuk.mee.com**

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