

## Efforts increase to improve sustainability

Big-name retrofit projects are helping to promote environmentally sound practices, says **Fiona Harvey**

Look up at the Empire State Building from the streets of Manhattan, and you probably will not realise there is a revolution going on inside. The towering building is receiving a radical “green makeover” that will cut its energy use and greenhouse gas emissions by nearly 40 per cent, and make it a pioneer in the use of new environmentally sound practices from cleaning to “green” pest control.

The Empire State is just one example – some of the world’s most historic buildings, including the UN headquarters and Balmoral Castle, the Scottish residence of the UK royal family, are being overhauled to reduce their environmental impact.

Many new additions such as New York’s Bank of America Tower and London’s Shard of Light project have been or will be built to demanding green standards. But for each of these high-profile projects, many thousands of buildings are still being erected or refurbished without modern energy efficient features.

Buildings – commercial, industrial and residential – account for about 40 per cent of the world’s greenhouse gas emissions. Heating and cooling are the most energy-intensive activities, followed by electricity use for lighting, appliances and other services. Moreover, the direct emissions from energy use in buildings are only one piece of the puzzle. A structure’s design can contribute to greenhouse gas production through trans-

portation, for example – a building’s location, and whether it is well-served by public transport, makes a big difference.

Good practice can substantially reduce greenhouse gas emissions by as much as 70 to 80 per cent, according to the World Business Council for Sustainable Development (WBCSD), which has conducted a new study of energy efficiency. Refurbishing buildings need not be disruptive: “The best time for companies to consider improving the environmental impact of their facilities is when they are already planning a major investment into building refurbishment or expansion,” says Davide Vassallo, a director at Arthur D Little, a management consultancy. “We estimate the cost of adding a sustainability element to a major capital investment at 5 to 20 per cent of the total cost.”

Wasting energy also wastes money. The retrofit of the Empire State Building will cost about \$20m, but its annual energy savings will be \$4.4m a year when it is complete. The payback for some of the most straightforward efficiency measures is immediate – adjusting the thermostat, turning off lights and computers when offices are empty. Other measures – insulation, new glazing, changing lighting systems, smart meters or better boilers – incur an upfront cost and take longer to make a net saving.

The first step for any business wanting to control its energy costs is to measure them, says Bill Sisson, director of sustainability at United Technologies and co-chair of the WBCSD project. “What you don’t measure, you can’t manage,” he says. By measuring energy use – usually a simple question of metering – managers can see where the bulk is going. Heating and cooling are likely to be priorities, yet companies waste millions every year in inefficient practices – for instance,

expending energy on cooling buildings they have already heated indirectly through electrical appliances or even the body heat of its occupants. Passive heating systems make use of these heat sources, such as by cooling computer server rooms with a flow of air that carries heat to cold rooms.

For regions where more heating is required, insulation and glazing may be the first focus. More efficient boilers also play an important part – modern combined heat-and-power (CHP) systems can generate electricity while recycling the resulting heat, and are growing more popular in industrial installations.

Before taking any action, however, companies must consider its effects and take care to do their refurbishing in the right order, warns Constant van Aerschot, director of sustainable construction at Lafarge, a French building materials company.

“Investing in a new boiler is no good if you have not looked first at insulation,” he says. Otherwise, the heat from the expensive kit will simply be wasted. Companies must also look to ventilation – without that, airtight buildings can fall prey to mould and other nasties.

The way buildings are used makes a huge difference to energy consumption too. Big food retailers, for example, pay millions to heat their acres of outlet space yet leave their refrigerators open so customers can dive in without having to open doors to get at cooled food. This is enormously wasteful, compared with the simple expedient of keeping frozen and chilled food in cabinets.

Why does energy efficiency occupy such a low priority for most companies? One answer is that energy is only a small part of their overheads. Mr van Aerschot says the energy bill makes

up less than 5 per cent of costs for an average office-based company. Moreover, energy costs are still falling in the recession, giving companies less of an incentive to save. Yet halving a bill from 5 per cent to 2.5 per cent of overheads is still an attractive prospect.

There is another reason why many companies ignore the energy efficiency of their buildings: they do not own them. The landlord-tenant relationship means the interests of each are often at odds over energy use. For instance, tenants may not have the right – or may be unwilling – to make improvements to the building as they will benefit only until the end of the contract. Landlords may not want to take on refurbishment work if the advantages in lower bills accrue to tenants.

Depending on the contract, the situation can be even worse: some leave landlords with an incentive to maximise the inefficiency of their buildings. This occurs when landlords pass on heating and electricity costs to tenants with a surcharge, usually a percentage of the bill.

These sometimes intractable problems have contributed to a widespread habit of ignoring energy efficiency – a habit that market forces alone are unlikely to break unless energy prices rise sharply for an extended period.

The WBCSD suggests a better answer is regulation. We have grown used to regulations governing the safety of buildings. Why should energy efficiency not be regulated too? In some regions, such as the European Union, this is already happening. In the US, the Obama administration has recently shown a desire to regulate carbon dioxide. The days when the Empire State Building stands out as much for its green credentials as its architecture may be numbered.