

Is air conditioning a waste of energy?

Revision of the Building Regulations has thrown the spotlight on the benefits of air conditioning. Andrew Jackson, secretary of the Air Conditioning Industry Board, argues for a better understanding of the facts surrounding the debate

Only in recent years has air conditioning become newsworthy. In many new buildings it was simply there; a great benefit for the occupants but not something to get too excited about. Then along came the proposal to revise Part L of the Building Regulations so as to prevent the installation of air conditioning except in a handful of new buildings. Suddenly the whole equation changes and the subject is suddenly big news.

This added interest in air conditioning is to be welcomed but there is considerable confusion surrounding many aspects of the current air conditioning debate.

The current discussion largely rests on the misconception that air conditioning is wasteful because it consumes a great deal of energy in operation and is, in many cases, quite unnecessary.

However, there are many buildings, especially in on inner-city or urban sites surrounded by the noise and pollution caused by heavy traffic, which would be virtually uninhabitable without some form of air conditioning. The newly fashionable concept of 'passive ventilation' which largely untested on any meaningful scale, would not be appropriate for this type of building. Many critics are often using figures from the mid-seventies. The situation today is radically different not only because the design of air conditioning systems has improved but also because the buildings are now designed with energy conservation in mind. The combined effect can be startling, as the Beta section of the electricity industry's Business energy Awards demonstrates year after year.

No less than seven of the 1992 Beta finalists were air conditioned office buildings with a level of energy consumption below the 223kWh/m² pa specified by the Good Practice guidelines of the Energy Efficiency Office (Energy Consumption Guide 19). Indeed, one of these buildings achieved an energy consumption of 121 kWh/m² pa, a figure which compares very favourably with the EEO's Good Practice guidelines for heated-only buildings (131-156 kWh/m² pa).

Another typical false assumption is the existence of some casual link between air conditioning and Sick Building Syndrome (SBS). In fact, the link between SBS and air conditioning has never been proven and the latest research carried out at the Building Research Establishment indicates that ineffective office cleaning is to blame for SBS rather than air conditioning. Other research has shown that far from a cause of SBS, air conditioning may well be a cure. In a paper presented at the BRE in June, Thermal Comfort: Past, Present and Future, Dr Jouni J K Jaakola of the Department of Public Health, University of Helsinki, demonstrat-

ed a definite correlation between physical air parameters (internal temperature, relative humidity and air flow) and instances of SBS.

Dr Jaakola concluded that the best defence against SBS could be a combination of an internal temperature of around 20°C, a relative humidity exceeding 20 per cent and a minimum fresh air flow of 10 litres per person. The most effective, indeed possibly the only way of achieving these conditions would be by employing some form of air conditioning.

Other environmental arguments - such as those surrounding the nature of the refrigerants in an electric system - have largely been overtaken by recent advances. Refrigerants with a zero ozone depletion potential are already on the market and their range will be dramatically extended over the next few years as replacements for HCFCs become commercially available. With current research aimed very much at the concept of developing 'retrofitable' replacement refrigerants, conversion of existing CFC and HCFC installations to ozone-benign alternatives should become both simple and inexpensive.

Air conditioning does have a quantifiable advantage. Recent studies at the National Swedish Institute of Building Research have shown that controlling the internal environment is not simply important in terms of staff comfort, it can be of measurable value in improving employee performance. In particular, Dr David Wyon of the NSIBR has demonstrated that an internal working temperature of 27°C (by no means uncommon in a non-air conditioned building) produces decreased concentration and a drop in overall performance of up to 30 per cent compared to levels of output achieved at an optimum working temperature of 20°C.

Finally, restricting the use of 'comfort' air conditioning would scarcely make any impact to the Government's commitments to reduce the UK's CO₂ emissions. Air conditioning accounts for one per cent of the UK's total volume of CO₂ production. Moreover, this one per cent covers all applications of air conditioning in buildings, including essential uses including operating theatres, computer clean rooms etc, which, in any case, be exempted.

Carbon dioxide emissions due to comfort air conditioning are therefore less than one per cent. Limiting the use of air conditioning in new and refurbished buildings will have a negligible effect on overall emissions and will play no meaningful part in meeting the Government's objective.

'Limiting air conditioning in buildings will have little effect on emissions'