

Main findings of the DECC Study on Energy Use by Air-Conditioning: *New insights into air conditioning in the UK*

This study is aimed at providing a better understanding of UK electricity consumption by air conditioning in non-domestic buildings. Some of the main findings are summarised below:

Cooling in air conditioning systems may account for around a tenth of total UK electricity consumption (29TWh in 2010) which is higher than previously reported¹. However, considerably uncertainty remains around this figure.

Air conditioning system systems are becoming more prevalent in UK buildings and in 2012 approximately 65% of UK office space and 30% of UK retail space has air-conditioning.

Heat-waves are becoming more frequent across the UK and in the South-East of England, the number of heat-wave days per year increased from 5 in 1961 to 17 in 2003.

Cooling in offices typically uses around 40 kWh/m² per year.

- The monitored data showed a median electrical consumption for cooling in offices of 44 kWh/m² per year.
- In the EPC sample the average (calculated) value for electricity energy use in offices was slightly lower at 37 kWh/m² per year.
- These values are similar to existing (typical) benchmarks of 31 and 41 kWh/m² per year for standard and prestige offices, respectively.

In some offices, air-conditioning systems were in use when buildings were unoccupied; ie out of hours and at weekends.

Total electricity use for cooling in the retail sector is comparable with that in offices, but measured electricity consumption data is less readily available

The EPC analysis indicated that:

- Over half of air conditioning systems in the UK are split systems with a seasonal energy efficiency ratio of around 3.4.
- Around 70% of offices and 50% of retail premises have multiple system types installed within the same building
- For building types with air conditioning 70% of the floor area is cooled.
- Only 10% make recommendations relating to air conditioning and these mostly relate to more efficient equipment, including variable speed drives, and reducing air leakage from ductwork

The analysis of Air Conditioning Inspection Reports revealed that:

- Most inspections appear to be technically competent, but the recommendations are often generic, which limits their usefulness.
- The most common recommendations in the Reports relate to improving controls (27%) and maintenance (16%).
- F-gas leakage check certificate were confirmed for only 19% of the systems inspected, despite leakage checks being mandatory. However, as the Reports analysed were all completed prior to Defra introducing new regulations in 2015 and the Environment Agency upgrading its compliance team this finding may not reflect current practice.

Whilst current Regulations on product efficiency, and limits on whole-building energy use have the potential to achieve significant energy savings there still remains a large untapped potential in the difficult area of management and user behaviour.

¹ 20TWh Energy Consumption in the UK

The views expressed in this report are those of the authors - Alan Abela, Lorna Hamilton, Roger Hitchin, Andy Lewry and Christine Pout, and not necessarily those of the Department of Energy and Climate Change (nor do they reflect Government policy).

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