

# Information paper – 10

## Area and age of UK office stock

Prepared by:  
David Clark

A paper referenced in the book:

### WHAT COLOUR is YOUR BUILDING?

David H. Clark



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Issue 1.0: 29 July 2013

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# Area and age of UK office stock

This information paper provides an overview of the area and age of the UK office stock.

## 1. TOTAL AREA OF OFFICE BUILDINGS

Building stock data in the UK is imperfect. The government’s regular collection and publication of commercial and industrial floorspace statistics ceased in 1985. The information in this section was supplied to the author by Bill Bordass of the Usable Building Trust, with much of it based on the work of the late Harry Bruhn on the Carbon Reduction in Buildings (CaRB) project.

An approximate breakdown of area by all building types in the UK is shown on Figure 1.

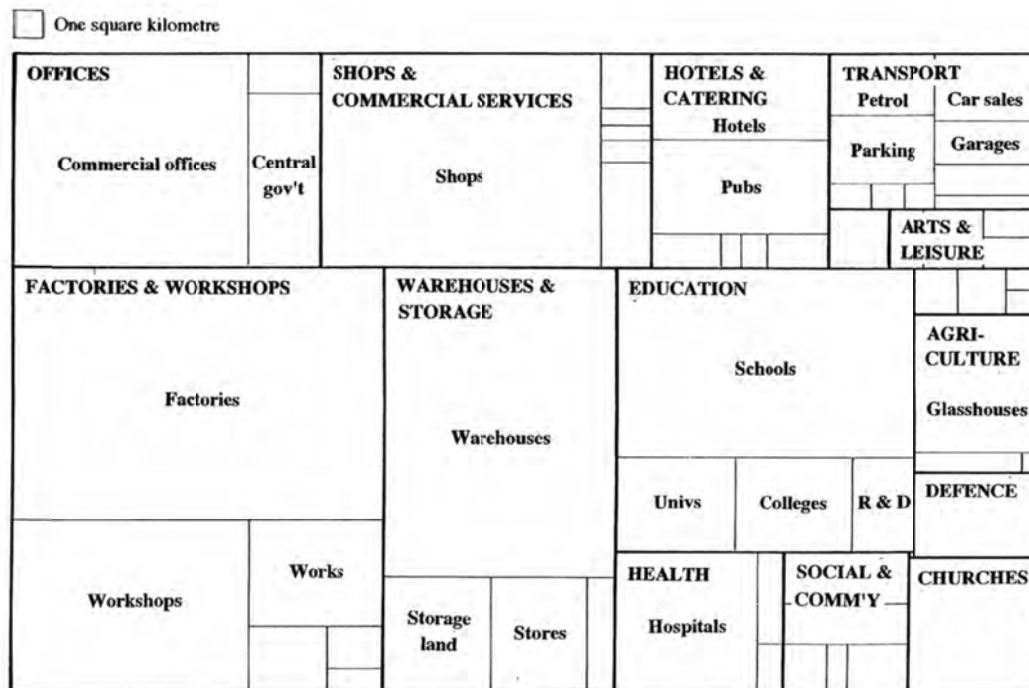


Fig 1 Estimate of floor area in UK by building type (Bruhns, 2005)

Figure 2 shows an estimate of annual energy consumption by building type and end use (heating, cooling, light, computers, DHW, catering and other) taken from the Bruhns 2005 paper *Identifying Determinants of Energy Use in the UK nondomestic Stock*. These were calculated by applying average energy indices (kWh/m<sup>2</sup>) to the floor areas for each building type. Manufacturing dominates due to the large area of floor space requiring heating. Offices represent the next highest sector with retail a close third.

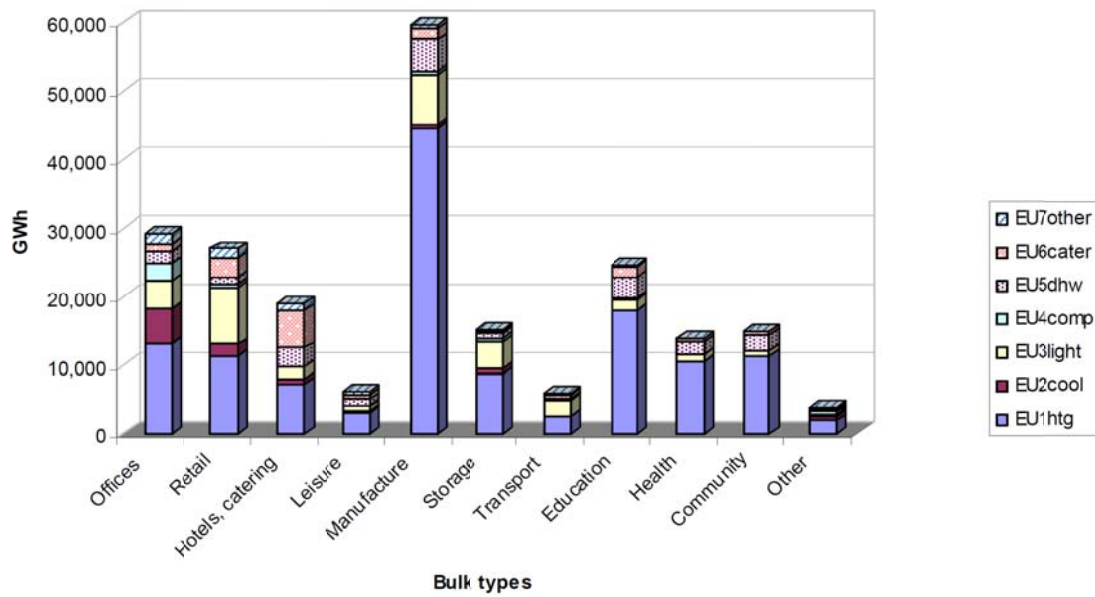


Fig 2 CaRB model of energy consumption by building type (Bruhn, 2005)

The estimates were then compared with the 2004 Digest of UK Energy Statistics (DUKES) data - refer to Figure 3. The Public and Commerce categories are 15% lower than the DUKES data, which is close to the difference expected because the CaRB model was confined to England and Wales (Scotland and Northern Ireland were excluded due to a lack of floorspace data). The large difference in the manufacturing data is because the CaRB model excluded process loads, which DUKES includes.

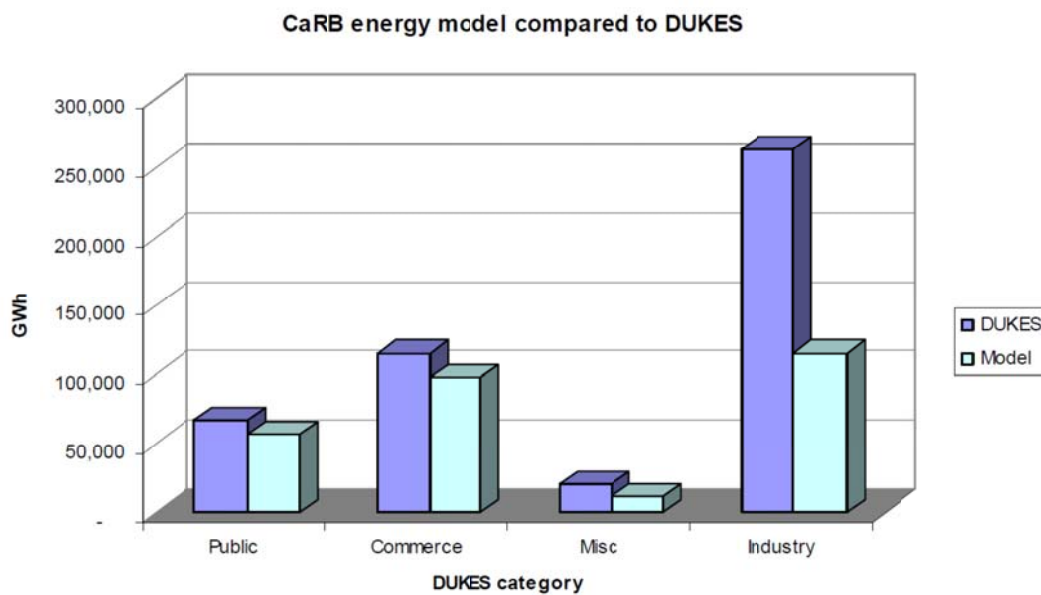
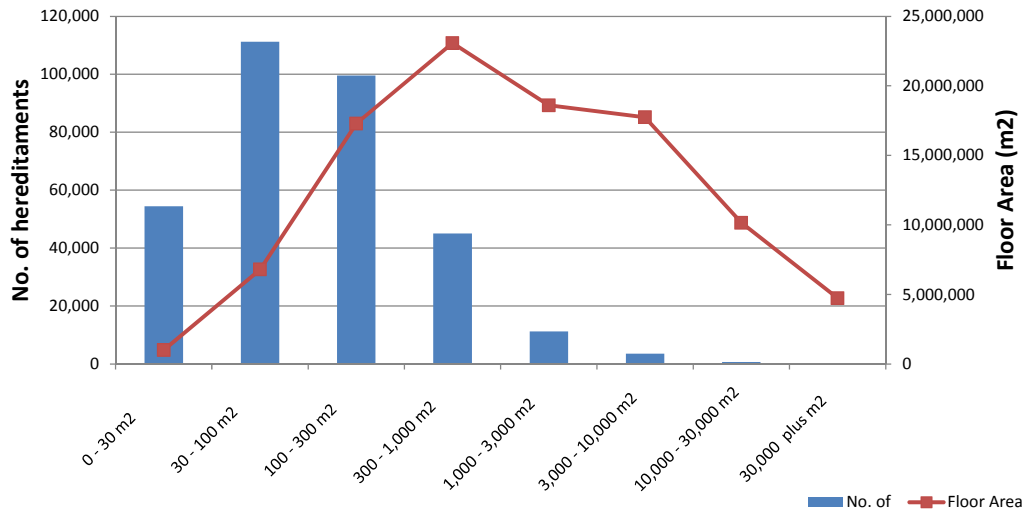


Fig 3 Comparison of CaRB energy model and DUKES 2004 data (Bruhn, 2005)

The total number and area of office space in the UK is uncertain. An estimate taken from analysis by Bruhn in 2005, and used in his presentation *Development of non-domestic stock modelling* in July 2005, is shown in Figure 4.



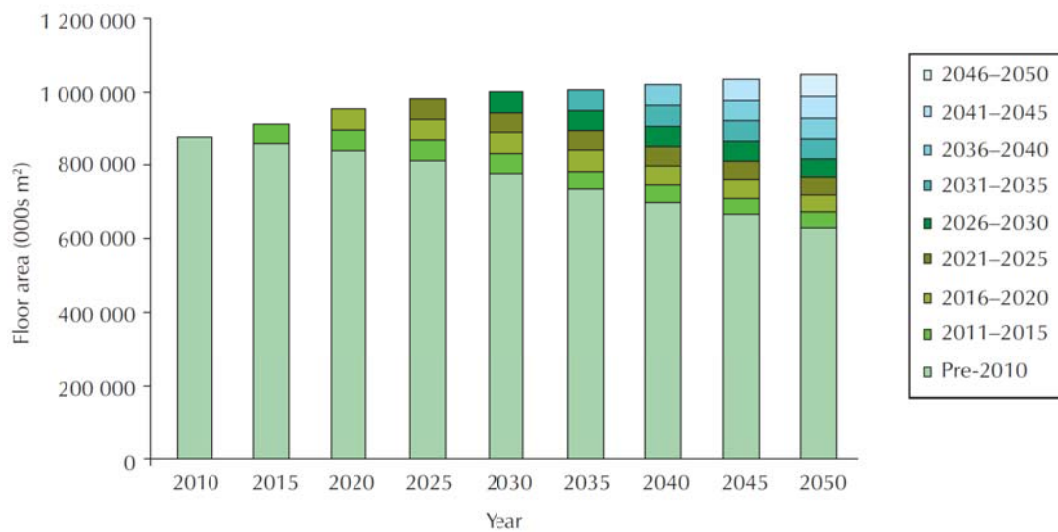
**Fig 4** Number and area of office spaces in the UK by Bruhn (2005)

There are over 325,000 office hereditaments (spaces) with a total floor area of 99.4 million m<sup>2</sup>. If the average CO<sub>2</sub> emissions in offices are assumed to be around 100 kgCO<sub>2</sub>/m<sup>2</sup> then this equates to 10 million tCO<sub>2</sub>, around 2% of the UK’s total greenhouse gas emissions in 2011.<sup>1</sup>

The area of office over 1,000m<sup>2</sup> accounts for under 5% of the total number of office spaces, but just over half of the total floor area, and consequently carbon emissions. Reducing energy consumption in the 15,000+ offices greater than 1,000m<sup>2</sup> should therefore be the first priority as this will have the biggest impact.

## 2. AGE OF UK OFFICE STOCK

The Building Research Establishment developed an energy use model to estimate national CO<sub>2</sub> emissions in the UK non-domestic building stock for DEFRA. The model included an estimate of the floor area in 2010 with projections to 2050 based on past new-build rates and an assumed demolition rate. The projected non-domestic building stock age profile is shown in Figure 5, with all buildings in 2010 assumed to be existing buildings.<sup>2</sup> About three quarters of the buildings standing in 2010 will still be standing in 2050 and these will account for 60% of the building stock in 2050.



**Fig 5 The projected age of non-domestic building stock in the UK 2010 to 2050**  
 (reproduced by permission from 'Energy efficiency in new and existing buildings: comparative costs and CO<sub>2</sub> savings' MacKenzie et al, BRE Trust, 2010, Copyright HIS)

Notes

- The UK's total emissions in 2011 were 552 GtCO<sub>2</sub>e. Statistical release: 2012 UK greenhouse gas emissions, provisional figures and 2011 UK greenhouse gas emissions, final figures by Fuel type and end-user, DECC, 28th March 2013. [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/193414/280313\\_ghg\\_national\\_statistics\\_release\\_2012\\_provisional.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/193414/280313_ghg_national_statistics_release_2012_provisional.pdf).

In 2003 BRE estimated that offices accounted for 9% of emissions due to commercial and public buildings, which accounted for 18% of total UK emissions. Applying the same percentages to the 552 GtCO<sub>2</sub>e total gives office buildings at 9 GtCO<sub>2</sub>. This is in the same ball park as the crude estimate of 10 GtCO<sub>2</sub> based on the CaRB floor area of 99.4 million m<sup>2</sup> and a benchmark of 100 kgCO<sub>2</sub>e/m<sup>2</sup>.

The BRE data is from Low Carbon Refurbishment of Buildings: a guide to achieving carbon savings from refurbishment of non-domestic buildings, CTV038, Carbon Trust, 2008. [www.carbontrust.com/media/81389/ctv038-low-carbon-refurbishment-of-buildings-management-guide.pdf](http://www.carbontrust.com/media/81389/ctv038-low-carbon-refurbishment-of-buildings-management-guide.pdf)
- Taken from *Energy efficiency in new and existing buildings: comparative costs and CO<sub>2</sub> savings*, MacKenzie et al, BRE Trust, 2010

**The inevitable legal bit**

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