



Energy:



The emission data for offices is mostly based on a survey of large companies in the UK. It distinguishes 4 types of offices with different space and electricity needs.

Energy consumption is very similar in industrialized countries offices¹. We base our calculations on UK values² as there is most precise data available and used country specific electricity emission factors to extrapolate office emissions for other regions. There is some data from the US and Japan indicating that office energy use is very similar all over the industrialized world. We assume that western standard offices in developing countries have similar energy requirements and calculated the emissions accordingly. We used DEFRA (2009) values for Africa, Latin America, Middle East. As DEFRA (2009) doesn't provide a value for the Asian average electricity emission factor, we used the average of China, India and Indonesia and separated it from the value for South Korea and Japan as there are large differences in CO₂ intensity. Energy use in the UK offices is typically split into 80% electricity and 20% gas². We have used this assumption for all regions. We did not include any considerations regarding weather conditions or insulation standards for the moment but are hoping to get better data. If your offices in developing countries are on significant lower standards you would need to assess their energy needs individually, as there are no benchmarks available.

Air conditioning / cooling contributes a large share to office electricity use. We based our calculations on Goodall² and Hitchin³. As the data in Goodall stems from a variety of offices throughout the UK, we had to estimate that their samples application of air condition is in line with the average for the country, i.e. covering roughly 20% of the floor area.³

Table 10: Average emissions from office operations per employee in tCO₂e per employee per year

| Type of Office | Air Conditioning | EU | Australia | Africa | Latin America | Middle East | China, India, Indonesia | Japan & South Korea |
|-------------------------|------------------|------|-----------|--------|---------------|-------------|-------------------------|---------------------|
| Pure Office | With AC | 2.32 | 4.99 | 3.91 | 1.58 | 4.26 | 5.13 | 2.64 |
| | Without AC | 1.62 | 3.27 | 2.61 | 1.15 | 2.82 | 3.36 | 1.81 |
| Office and some Retail | With AC | 2.81 | 5.98 | 4.7 | 1.92 | 5.11 | 6.15 | 3.18 |
| | Without AC | 2.1 | 4.27 | 3.39 | 1.49 | 3.67 | 4.38 | 2.35 |
| Mostly Retail | With AC | 4.56 | 9.58 | 7.56 | 3.15 | 8.21 | 9.85 | 5.15 |
| | Without AC | 3.85 | 7.87 | 6.25 | 2.72 | 6.77 | 8.08 | 4.32 |
| Media and Entertainment | With AC | 4.74 | 9.97 | 7.86 | 3.28 | 8.54 | 10.24 | 5.36 |
| | Without AC | 4.04 | 8.25 | 6.55 | 2.85 | 7.1 | 8.48 | 4.53 |

For the direct input of energy use, we used the standard values from DEFRA (2009). The calculation of electricity emissions is based on the EU average electricity mix.

¹ e.g. US Government, "Commercial Buildings energy consumption survey, consumption and expenditure, table C3A in the US and "Estimation of life cycle energy consumption and CO₂ emission of office buildings in Japan", Michiya Suzuki & Tatsuo Oka, 1998² "Carbon emissions and the service sector", Christian Goodall, 2007, available at <http://www.lowcarbonlife.net>

³ "Local Cooling: Global Warming? UK Carbon Emissions from Air-Conditioning in the Next Two Decades" ,E R Hitchin, C Eng BSc MCIBSEMI GasE and C H Pout, BSc D Phil Building Research Establishment, Watford , UK, available at <http://www.cibse.org>