



Department for  
Business, Energy  
& Industrial Strategy

# Phase 3b Public Sector Decarbonisation Scheme Technical Annex: Public Sector Emissions by Sector

Deriving Sectoral Emissions using the  
Building Energy Efficiency Survey

August 2022



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# Introduction

This publication describes how BEIS has estimated the sectoral emission shares of the public sector and will be an input to the decision on where to set the Public Sector Decarbonisation Scheme Phase 3b sector soft caps. These figures utilise information gathered for the [Buildings Energy Efficiency Survey](#) (BEES) in 2015<sup>1</sup>. The BEES data has been converted, incorporating new information on the BEES building stock, as well as updated energy consumption data for England, Wales and the UK in 2015, into estimates of both energy use and Greenhouse Gas emissions for public sector buildings. This data is presented for England and Wales, and separately for England, disaggregated by BEES sub-sector.

## Method and results

### Energy use by building type, England and Wales

The [Buildings Energy Efficiency Survey](#) (BEES) compiled data on buildings energy use, disaggregated by electricity and non-electricity, for a sample of around 3,700 non-domestic buildings in 2015. From this, estimates for all non-domestic buildings in England and Wales are derived, using energy consumption data from the [Digest of UK Energy Statistics](#), combined with [sub-national energy consumption statistics](#) (and incorporating subsequent evidence updates on the BEES building stock). From this dataset, estimates of energy use in public sector buildings in England and Wales (based on a sub-sample of around 650 public sector buildings) in 2015 are drawn. This is detailed, by BEES sub-sector, in Table 1. To note, all tables split by BEES sub-sector exclude sub-sectors which have a sample of 0.

**Table 1: Estimated Energy use in public sector buildings by BEES sub-sector, 2015, England and Wales**

Sector group	BEES sub-sector	Electricity (GWh)	Non-electricity (GWh)
Health	Hospitals	3,720	9,610
Health	Health Centre	650	1,020
Education	State Primary school	1,180	4,970
Education	State Secondary school	1,690	3,880

<sup>1</sup> A new [non-domestic building survey](#) to update the BEES evidence is currently being undertaken for BEIS.

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Education	Uni Non-residential	1,870	3,310
Education	Uni Residential	310	1,300
Other public	Offices (public)	2,420	3,460
Other public	Clubs & community centres	50	100
Other public	Law court	100	200
Other public	Police station	640	2,000
Other public	Prison	420	1,410
Other public	Theatre	240	390
Other public	Fire and Ambulance station	230	730
Other public	Leisure Centres	690	5,330
Other public	Ministry of Defence (MoD) Accommodation	60	120
Other public	Ministry of Defence (MoD) offices	610	950
Other public	Ministry of Defence (MoD) storage	120	1,030
Other public	Museum	110	130
All public	Total	15,130	39,950

## Greenhouse Gas emissions by building type, England and Wales

Greenhouse Gas (GHG) emissions are calculated for public sector buildings based on the energy use figures presented in Table 1. For electricity, a single emissions factor is applied to the sub-sector electricity use data. However, non-electricity fuels have different GHG emissions factors, and the type of fuel used varies between buildings (within the sub-sectors presented). Therefore, non-electricity energy use is first converted to GHG emissions (carbon dioxide equivalent) at building level, before re-aggregating to sub-sector. Table 2 sets out the emissions factors used for this process (for 2015 where applicable), sourced from the [Treasury Green Book](#) supplementary appraisal guidance tables, and the [Simplified Building Energy Model](#) (SBEM) (for Biomass), while Table 3 sets out the resultant GHG emissions for each sub-sector. Where possible, emissions factors relating to the public/commercial sector are used.

**Table 2: GHG emissions factors for non-domestic buildings (kgCO<sub>2</sub>e/kWh)**

Fuel	Value	Source
Electricity	0.3605	Green book supplementary appraisal guidance, Table 1 (grid average, public/commercial, 2015)
Gas	0.1839	Green book supplementary appraisal guidance, Table 2a
Oil	0.2517	Green book supplementary appraisal guidance, Table 2a
Liquified Petroleum Gas (LPG)	0.2145	Green book supplementary appraisal guidance, Table 2a
Biomass	0.0450	SBEM 2016, Table 10

**Table 3: Estimated Greenhouse Gas emissions from public sector buildings, by BEES sub-sector, 2015, England and Wales**

Sector group	BEES sub-sector	GHG emissions, electricity (MtCo <sub>2</sub> e)	GHG emissions, non-electricity, (MtCo <sub>2</sub> e)
Health	Hospitals	1.34	1.77

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Health	Health Centre	0.24	0.19
Education	State Primary school	0.43	0.93
Education	State Secondary school	0.61	0.74
Education	Uni Non-residential	0.68	0.61
Education	Uni Residential	0.11	0.25
Other public	Offices (public)	0.87	0.48
Other public	Clubs & community centres	0.02	0.02
Other public	Law court	0.04	0.04
Other public	Police station	0.23	0.37
Other public	Prison	0.15	0.28
Other public	Theatre	0.09	0.07
Other public	Fire and Ambulance station	0.08	0.14
Other public	Leisure Centres	0.25	0.61
Other public	MoD Accommodation	0.02	0.02
Other public	MoD offices	0.22	0.18
Other public	MoD storage	0.04	0.19
Other public	Museum	0.04	0.02

All public	Total	5.45	6.90
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## Greenhouse Gas emissions by building type, England

Greenhouse Gas emissions figures can also be calculated separately for England (and by residual for Wales). In order to do this, energy use (for each fuel type) is first converted from England and Wales, to England, using scaling factors derived from the [sub-national energy consumption statistics](#), as set out in Table 4. Where available, Public Sector categories for each fuel are used; where not available, the Industrial, Commercial and Other category is used as a non-domestic category. These scaling factors are applied at individual building level before re-aggregating to sub-sectors.

**Table 4: Sub-national scaling factors**

Fuel	(A) England and Wales (GWh)	(B) England and Wales to UK scaling factor	(C) UK (GWh)	(D) UK to England scaling factor	(E) England (GWh)
Electricity	14,033	1.12	15,778	0.81	12,821
Gas	13,966	1.14	15,974	0.82	13,059
Oil	35	1.55	55	0.62	34
Coal	16	1.22	20	0.76	15
Biomass	1,583	1.32	2,087	0.65	1,355

Table 4 shows how figures for England and Wales have been scaled to England only. Starting at (A), energy consumption for England and Wales is multiplied by (B) to get UK energy use (C). This is then multiplied by (D) to get England only energy use (E). The scaling factors (B) and (D) are applied at individual building level, before re-aggregating to sub-sectors, in Table 5.



**Table 5: Estimated Greenhouse Gas emissions for public sector buildings, by BEES sub-sector, 2015, England**

Sector group	BEES Subsector	GHG emissions, electricity England, 2015 (MtCo2e)	GHG emissions, non-electricity use, England (MtCo2e)	GHG emissions, non-electricity (%)
Health	Hospitals	1.23	1.65	26%
Health	Health Centre	0.22	0.18	3%
Education	State Primary school	0.39	0.87	13%
Education	State Secondary school	0.56	0.70	11%
Education	Uni Non-residential	0.62	0.57	9%
Education	Uni Residential	0.10	0.23	4%
Other public	Offices (public)	0.80	0.45	7%
Other public	Clubs & community centres	0.02	0.02	0%
Other public	Law court	0.03	0.04	1%
Other public	Police station	0.21	0.35	5%
Other public	Prison	0.14	0.26	4%
Other public	Theatre	0.08	0.07	1%
Other public	Fire and Ambulance station	0.08	0.13	2%

Other public	Leisure Centres	0.23	0.56	9%
Other public	MoD Accommodation	0.02	0.02	0%
Other public	MoD offices	0.20	0.16	3%
Other public	MoD storage	0.04	0.18	3%
Other public	Museum	0.04	0.02	0%
All public	Total	4.98	6.44	100%

**Table 6: Estimated total non-electricity emissions share by sector group**

Sector group	Share of non-electricity emissions
Health	28%
Education	37%
Other public	35%

Table 6 represents BEIS's estimate of the non-electricity emission shares of the public sector by sector group. Subsectors are aggregated to the three sector groups using the unrounded figures for non-electricity emissions presented in Table 5. Rounding has only been applied at the final stage of calculation, to the nearest 1%. Emissions from electricity consumption have been excluded when calculating sector emission shares as they depend on the decarbonisation of the grid.

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