

## Aggregated energy balances showing proportion of renewables in supply and demand

### Introduction

In 2016, the Economics and Social Affairs Department of the United Nations published its International Recommendations for Energy Statistics (IRES)<sup>1</sup>. The report recommended countries should include an "of which renewables" column to their energy balances, both absolute values and percentages.

Adding this breakdown provides a fuller picture of renewable energy in the UK. Although DUKES chapter 6 reports progress against the Renewable Energy Directive (RED), it is based on final consumption and is calculated using a methodology specific to the directive<sup>2</sup>. BEIS has considered that publishing this information will provide users with additional insights into renewable energy trends in the UK.

### Summary table

The summary table for 2017 (Table 1 below) uses a simplified version of the annual energy balance and shows the renewables components for supply, demand, transformation, and final consumption.

**Table 1: 2017 Energy balance, showing proportion of renewables (ktoe)<sup>3</sup>**

	Hard Coals	Man. Solid Fuels	Crude Oil & NGL	Petroleum Products	Natural Gas	Bioenergy & Waste	Primary Electricity	Electricity	Heat Sold	TOTAL	of which share of renewables	
<b>SUPPLY</b>												
Indigenous production	1,934	0	50,944	0	40,019	12,924	20,924	0	0	126,745	17,340	13.7%
Imports	5,807	712	58,480	36,722	45,132	3,475	0	1,562	0	151,891	3,728	2.5%
Exports	-369	-14	-42,040	-25,374	-10,802	-431	0	-293	0	-79,323	-525	0.7%
Marine bunkers	0	0	0	-2,596	0	0	0	0	0	-2,596	0	0%
Stock change	2,098	-2	361	-113	1,028	0	0	0	0	3,373	0	0%
<b>Primary supply</b>	<b>9,470</b>	<b>696</b>	<b>67,746</b>	<b>8,639</b>	<b>75,377</b>	<b>15,969</b>	<b>20,924</b>	<b>1,269</b>	<b>0</b>	<b>200,090</b>	<b>20,543</b>	<b>10.3%</b>
Statistical difference	-65	1	-66	-10	337	0	0	-35	0	163		
<b>Primary demand</b>	<b>9,535</b>	<b>694</b>	<b>67,811</b>	<b>8,649</b>	<b>75,040</b>	<b>15,969</b>	<b>20,924</b>	<b>1,304</b>	<b>0</b>	<b>199,927</b>	<b>20,548</b>	<b>10.3%</b>
Transfers	0	10	-2,476	2,483	224	-237	-5,801	5,801	0	4		
<b>TRANSFORMATION</b>	<b>-8,134</b>	<b>379</b>	<b>-65,335</b>	<b>64,539</b>	<b>-27,182</b>	<b>-9,587</b>	<b>-15,124</b>	<b>23,071</b>	<b>1,592</b>	<b>-35,779</b>	<b>-4,929</b>	<b>-</b>
Electricity generation	-5,559	-518	0	-533	-24,594	-9,387	-15,124	23,071	0	-32,645	-4,847	-
Heat generation	-4	-1	0	-52	-2,587	-200	0	0	1,592	-1,252	-81	-
Petroleum refineries	0	0	-65,795	65,691	0	0	0	0	0	-104	0	-
Coke manufacture	-1,435	1,351	0	0	0	0	0	0	0	-84	0	-
Blast furnaces	-989	-596	0	0	0	0	0	0	0	-1,585	0	-
Patent fuel manufacture	-146	143	0	-66	0	0	0	0	0	-69	0	-
Other	0	0	460	-501	0	0	0	0	0	-40	0	-
Energy industry use	0	458	0	4,315	4,903	0	0	2,041	322	12,040	672	-
Losses	0	109	0	0	580	0	0	2,283	0	2,972	712	-
<b>FINAL CONSUMPTION</b>	<b>1,401</b>	<b>516</b>	<b>0</b>	<b>71,356</b>	<b>42,599</b>	<b>6,145</b>	<b>0</b>	<b>25,851</b>	<b>1,270</b>	<b>149,139</b>	<b>14,236</b>	<b>9.5%</b>
Industries	972	296	0	4,308	8,677	1,162	0	7,964	692	24,071	3,620	15.0%
Transport	11	0	0	55,051	0	997	0	411	0	56,470	1,125	2.0%
Domestic	392	172	0	2,472	25,540	2,216	0	9,062	260	40,116	5,124	12.8%
Other Final Users	27	0	0	2,034	7,955	1,770	0	8,413	318	20,518	4,367	21.3%
Non energy use	0	48	0	7,490	426	0	0	0	0	7,964	0	0.0%

The spreadsheet, available at;

[www.gov.uk/government/collections/renewables-statistics#energy-trends:-articles](http://www.gov.uk/government/collections/renewables-statistics#energy-trends:-articles)

also shows this on a year-by-year basis from 2000, alongside a time-series without the individual fuels, as shown in Table 2.

<sup>1</sup> [https://unstats.un.org/unsd/energy/ires/IRES\\_edited2.pdf](https://unstats.un.org/unsd/energy/ires/IRES_edited2.pdf)

<sup>2</sup> The key differences are that the RED basis uses net calorific values and a normalisation process to smooth out the effects of extreme weather years for hydro and wind generation.

<sup>3</sup> Note that for a number of rows, the tables do not show the proportion of biofuels. For transformation for instance, the total in the energy balance is the net loss of the transformation process. A renewable component of this can be calculated but it is in itself fairly meaningless.

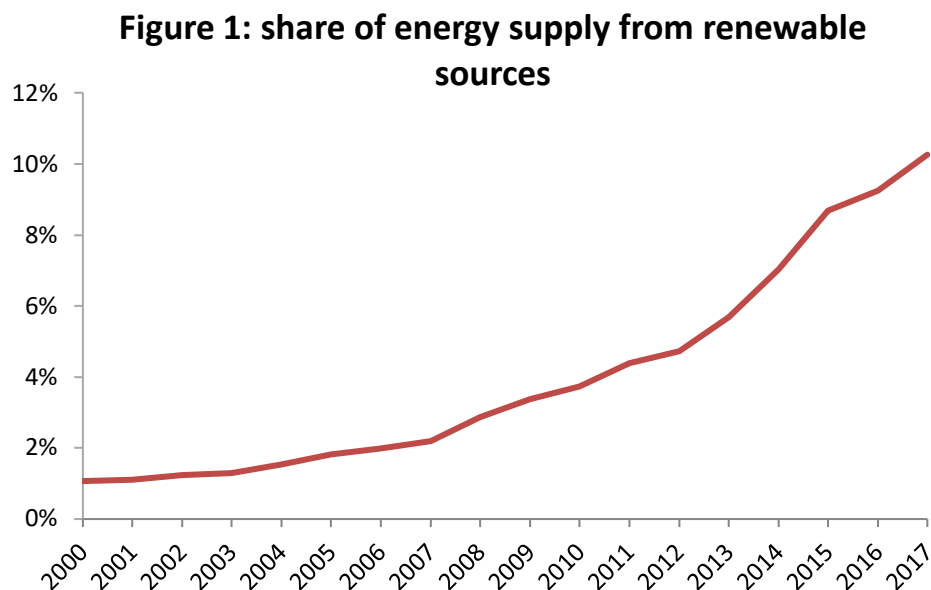
**Table 2: Energy balance 2015 to 2017, showing proportion of renewables (ktoe)**

	2015			2016			2017		
	TOTAL (ktoe)	of which renewables (ktoe)	share of renewables (%)	TOTAL (ktoe)	of which renewables (ktoe)	share of renewables (%)	TOTAL (ktoe)	of which renewables (ktoe)	share of renewables (%)
<b>SUPPLY</b>									
Indigenous production	124,481	14,158	11.4%	126,256	15,087	11.9%	126,745	17,340	13.7%
Imports	155,319	4,010	2.6%	150,077	4,021	2.7%	151,891	3,728	2.5%
Exports	-76,650	-407	0.5%	-75,774	-391	0.5%	-79,323	-525	0.7%
Marine bunkers	-2,684	0	0.0%	-2,840	0	0.0%	-2,596	0	0.0%
Stock change	3,911	0	0.0%	4,837	0	0.0%	3,373	0	0.0%
<b>Primary supply</b>	<b>204,378</b>	<b>17,760</b>	<b>8.7%</b>	<b>202,557</b>	<b>18,717</b>	<b>9.2%</b>	<b>200,090</b>	<b>20,543</b>	<b>10.3%</b>
Statistical difference	0			-127			163		
<b>Primary demand</b>	<b>204,378</b>	<b>17,746</b>	<b>8.7%</b>	<b>202,684</b>	<b>18,711</b>	<b>9.2%</b>	<b>199,927</b>	<b>20,548</b>	<b>10.3%</b>
Transfers	32			-14			4		
<b>TRANSFORMATION</b>	<b>-41,425</b>	<b>-4,589</b>	<b>-</b>	<b>-37,423</b>	<b>-4,653</b>	<b>-</b>	<b>-35,779</b>	<b>-4,929</b>	<b>-</b>
Electricity generation	-37,535	-4,513	-	-34,219	-4,577	-	-32,645	-4,847	-
Heat generation	-1,197	-75	-	-1,218	-76	-	-1,252	-81	-
Petroleum refineries	-152	0	-	-103	0	-	-104	0	-
Coke manufacture	-152	0	-	-81	0	-	-84	0	-
Blast furnaces	-2,277	0	-	-1,692	0	-	-1,585	0	-
Patent fuel manufacture	-68	0	-	-64	0	-	-69	0	-
Other	-44	0	-	-46	0	-	-40	0	-
Energy industry use	12,477	575	-	12,058	569	-	12,040	672	-
Losses	3,291	600	-	2,954	595	-	2,972	712	-
<b>FINAL CONSUMPTION</b>	<b>147,217</b>	<b>11,982</b>	<b>8.1%</b>	<b>150,235</b>	<b>12,895</b>	<b>8.6%</b>	<b>149,139</b>	<b>14,236</b>	<b>9.5%</b>
Industries	24,063	2,893	12.0%	23,700	3,158	13.3%	24,071	3,620	15.0%
Transport	55,013	1,097	2.0%	55,994	1,116	2.0%	56,470	1,125	2.0%
Domestic	40,297	4,484	11.1%	41,661	4,737	11.4%	40,116	5,124	12.8%
Other Final Users	19,987	3,508	17.6%	20,819	3,884	18.7%	20,518	4,367	21.3%
Non energy use	7,858			8,061			7,964		

## Trends

- Over time, the proportion of renewables in energy supply has been steadily increasing over the years, rising from 1.1 per cent in 2000 to 10.3 per cent in 2017

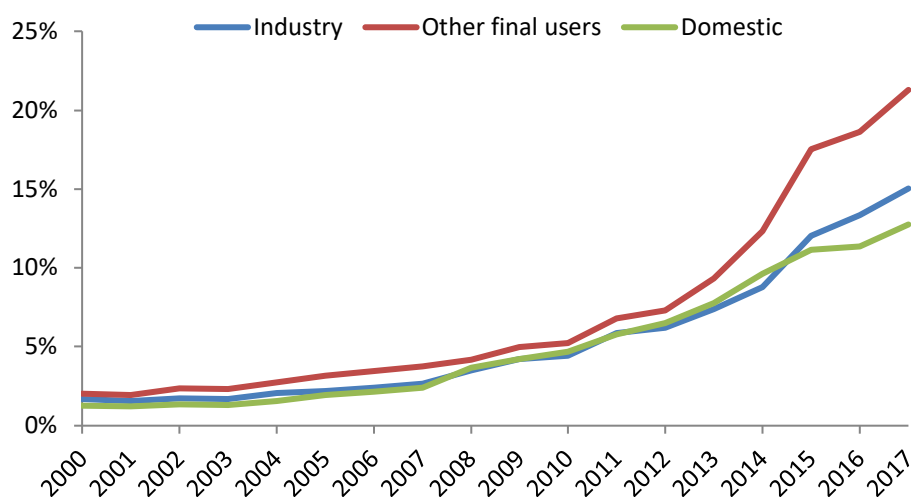
Figure 1: share of energy supply from renewable sources



- This is in line with the 10.2 per cent progress against the RED as reported in DUKES 2018. As the two measures are calculated on a different basis, they do not match exactly.
- For demand, the proportion met through renewables depends on the fuel mix supplied into the sector. The greater the demand met through electricity, in general the greater the proportion of renewables given the relatively high level of renewables within the electricity generation mix.

- Accordingly, the proportion of demand met from renewables varies from a low of 2 per cent (for transport, mainly from biofuels) to a high of 21 per cent for ‘other final users’, which is largely the service and commercial sectors that consume relatively large quantities of electricity.
- Figure 2 shows a comparison of the final energy consuming sectors (excluding transport) and the changing renewable component since 2000.

**Figure 2: Final consuming sectors;  
proportion of renewables**



Over the last three years, the proportion of renewables in the industrial sector has surpassed the domestic sector reaching 15 per cent in 2017. This trend has been driven by a sharp decrease in industry use of fossil fuels and a corresponding increase in the use of renewables. Table 3 shows how each individual fuel type has impacted the change between the two years. The proportion of renewables in the “other final user” category remains the highest at 21 per cent.

**Table 3: Fossil fuel consumption in the industrial sector by fuel;**

	ktoe		Change (ktoe)		Change (%)
	2015	2016	2017	2015-2017	2015-2017
Hard Coals	1,380	1,107	972	-409	-30%
Man. Solid Fuels	510	314	296	-214	-42%
Petroleum Products	4,212	4,288	4,308	97	2%
Natural Gas	8,418	8,405	8,677	259	3%
Renewables	2,893	3,158	3,620	727	25%

### Development of the statistics

As this is only the second time BEIS has published this particular breakdown, comments from users are welcome to contribute to the ongoing improvement and usefulness of the statistics.

For further information, please contact:

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## Methodological Annex

The following calculations were used to derive the renewable components:

**Bioenergy and waste:** For bio-energy, the non-biodegradable part of waste which is included in the balances is excluded.

**Renewable electricity imports:** The renewable mix for those countries exporting electricity to the UK grid (France, Ireland, and The Netherlands) was calculated for each year using data from the International Energy Agency (IEA).

**Renewable electricity exports:** BEIS assumed that electricity exported from the UK contained renewables in proportion to the overall supply.

**Biogas:** The ratio of biogas injected into the gas grid to natural gas, is used to calculate the renewable component.

### Worked example – domestic renewables consumption

Table A.1 illustrates the calculation of the renewables components with reference to domestic consumption in 2017.

Table A.1. worked example (ktoe)

Fuel Source	Fossil	Renewable	Total
Coal	392	0	392
Manufactured Fuel	172	0	172
Petroleum	2,472	0	2,472
Natural Gas	25,459	81	25,540
Bioenergy	0	2,207	2,207
Electricity	6,242	2,820	9,062
Heat	244	17	260
<b>Total</b>	<b>34,981</b>	<b>4,125</b>	<b>40,106</b>
Proportion, of which renewables			<b>12.8%</b>

### Notes for renewable data

Natural gas: BEIS estimate that 237 ktoe of biomethane was injected into the gas grid. If this biogas was consumed equally by all gas consumers, then 81 ktoe were consumed by the domestic sector.

Bioenergy: Sum of domestic consumption of wood, solar thermal and heat pumps.

Electricity: BEIS estimate 31.1 per cent of electricity supply was produced from renewables.

Heat: BEIS estimate that 6.5 per cent of heat sold was generated from renewables.