

Electricity generation and supply figures for Scotland, Wales, Northern Ireland and England, 2008 to 2011

Introduction

This article shows how generation and consumption of electricity varies across the four countries of the United Kingdom. It updates and extends that published in December 2011. The UK figures shown in the tables in this article are taken from the Digest of United Kingdom Energy Statistics (DUKES) 2012, Chapters 5 and 6 and so the definitions used are identical to those in the Digest. Tables 1 and 2 are shown in “landscape” format at the end of the main text and cover the last four years.

Generation and trade

Table 1 shows generation and supply of electricity in each of the UK countries. Because the mix of generating plant is not the same in each country, the overall percentage for each fuel type in individual years will change according to the fuels and stations that are available and the most advantageous to use.

Between 2010 and 2011, England's share of total generation remained at 76.5 per cent. Increases in coal, nuclear and renewables generation was offset by a decrease in gas generation. Scotland's share, meanwhile, increased from 13.1 per cent to 13.9 per cent, due to increases in nuclear, hydro and wind generation, outweighing a decrease in coal generation. For Wales, there was a decrease in the share from 8.4 per cent to 7.4 per cent, mainly due to a decline in gas generation. Northern Ireland's share of generation rose from 2.0 per cent to 2.2 per cent, mainly due to increased gas generation. On average, over the last four years, 75.9 per cent of UK electricity generation has taken place in England, 13.4 per cent in Scotland, 8.6 per cent in Wales and 2.2 per cent in Northern Ireland.

Both Scotland and Wales are net exporters of electricity, with England importing electricity from both countries and from continental Europe (via the France and Netherlands interconnectors). Northern Ireland trades electricity with the Republic of Ireland to which it is a net exporter. It also imports electricity from Scotland via the Moyle interconnector - these imports were greater than exports to the Irish Republic in each of the last four years. In 2010, Scotland exported 20.6 per cent of the electricity generated there to consumers elsewhere in the UK and this rose to 26.1 per cent in 2011. Transfers from Scotland to England rose by 45 per cent between 2010 and 2011, to a new record high, as Scottish generation increased and consumption fell. Wales exported the equivalent of 24.5 per cent of its generation to consumers in England in 2010, falling to a record low of 13.4 per cent in 2011.

Generation by fuel

For each of the four UK countries, Table A1 shows the shares of the generation of electricity by the fuel categories used in Table 5.6 of the Digest of UK Energy Statistics 2012, for 2010 and 2011. The position in 2011 is shown in Chart 1, in terms of GWh. After unplanned and planned outages to nuclear stations had reduced nuclear's share of generation in England in 2008, nuclear's share increased again in 2009 as these stations returned. The share of nuclear in generation in England fell again in 2010 due to maintenance outages at several stations including Sizewell B, which was offline for six months, before increasing once more in 2011 as these stations came back on line. In Scotland, after an increase in the share of nuclear in 2009, it fell back in 2010 due to maintenance outages. Nuclear's share in Scotland rose again in 2011 to one third of all generation due to increased availability. In Wales, nuclear generation fell in 2010 before rising again in 2011.

Due to high gas prices, in England, gas's share of generation fell by six percentage points, between 2010 and 2011, while coal's share rose by three percentage points. This pattern, of an increase in coal's share at the expense of gas, between 2010 and 2011, was repeated in Wales. Gas's share also declined in Scotland, but coal's share declined further, by eight percentage points. In 2011, gas's share of generation in each of England, Scotland and Wales was at a record low for the 2003 to 2011 period covered. In Northern Ireland (where electricity is traded within the

Irish all-island market, as opposed to the Great Britain market), however, gas's share of generation increased, at the expense of coal.

Table A1: Shares of each country's generation, by fuel type, 2010 and 2011

	Scotland	Wales	Northern Ireland	England
2010				
Coal	29.4%	18.4%	24.4%	29.2%
Gas	16.8%	49.8%	64.0%	50.1%
Nuclear	30.6%	17.2%	-	14.1%
Renewables	19.2%	5.0%	10.2%	4.7%
Oil and Other	4.0%	9.5%	1.4%	1.8%
2011				
Coal	21.0%	22.6%	18.4%	32.0%
Gas	15.7%	39.1%	68.0%	43.6%
Nuclear	33.0%	19.7%	-	16.6%
Renewables	26.8%	7.9%	12.6%	6.2%
Oil and Other	3.5%	10.7%	1.1%	1.5%

Combined heat and power (CHP) forms the bulk of "Other generators" generation, although some major power producers (MPPs) also operate generating plant that is partially CHP. CHP statistics for 2011 on a sub-national and regional basis were published in the September 2012 issue of Energy Trends (see references at the end of the article). The share of generation accounted for by generators other than major power producers varies across the UK. In Scotland, in 2011, other generators had a 12 per cent share, while in England the share was 9 per cent, in Wales 8 per cent and in Northern Ireland 8 per cent.

Chart 1: Generation by country and fuel type in 2011 (all generating companies)

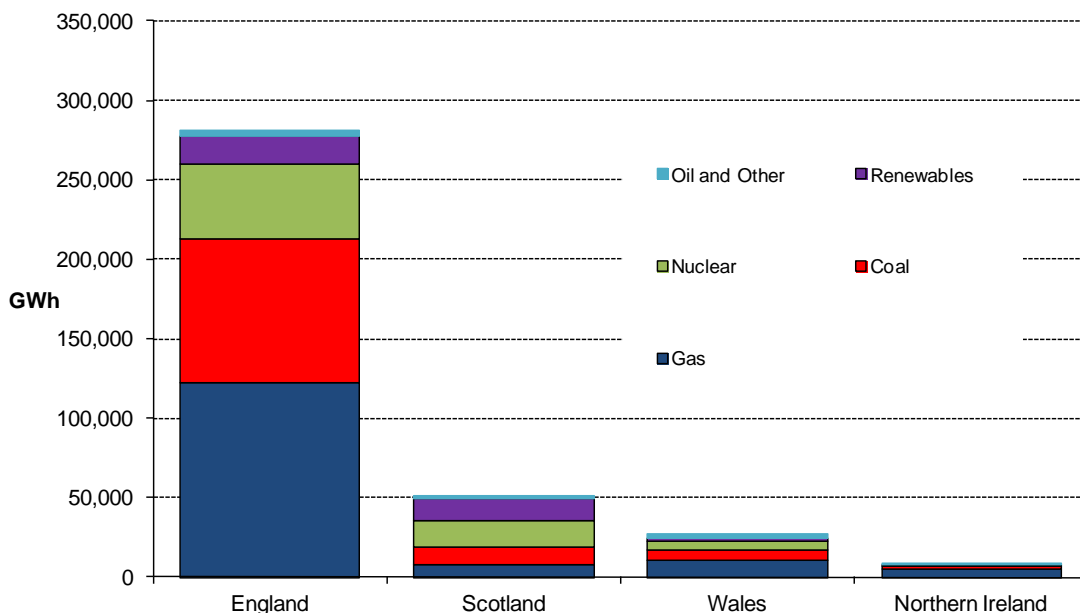
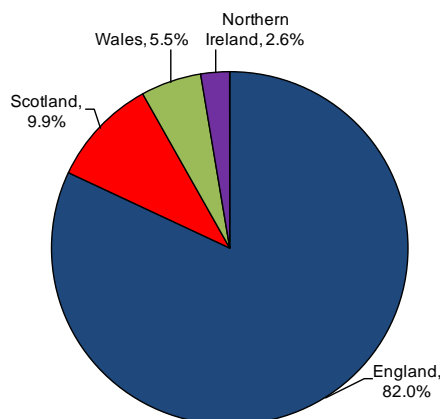


Chart 2: Electricity consumption in 2011



Consumption and sales

Transmission and distribution losses are not separately available for Scotland, Wales, Northern Ireland and England so estimates have been made using the UK proportions. Consumption figures have then been calculated by deducting net transfers and losses figures from the electricity supplied figures shown in Table 1. These show (Chart 2) that in 2011, 9.9 per cent of electricity consumption in the UK was in Scotland, 5.5 per cent in Wales, 2.6 per cent in Northern Ireland and 82.0 per cent in England. These shares were all little changed from the average percentage shares for each country for the period 2008 to 2010, namely 82.0 per cent for England, 10.0 per cent for Scotland, 5.4 per cent for Wales and 2.6 per cent for Northern Ireland.

Separate data are collected for sales of electricity from the public supply system in Scotland, England and Wales, and Northern Ireland and published in monthly table ET 5.5 on DECC’s Energy Statistics website (see references at the end of the article), but for this article the breakdown between England and Wales has been estimated. Because of definitional and other differences set out in the technical notes to Chapter 5 of DUKES 2012, there is a statistical difference between the calculated consumption and the sales data in Table 1. The overall statistical difference for the UK equals that shown in Table 5.3 of DUKES for the UK as a whole for the public distribution system.

As part of its commitment to improving the quality of its statistics, DECC continues to examine this statistical difference and look further at the component series to see where the differences might be arising and thus where improvements to the data might be made.

Chart 3 shows the relationship between generation and consumption of electricity in each of the countries by means of a flow diagram.

Renewables

The share of renewables in electricity generation or sales is measured in two different ways in the UK¹. First, there is the “headline” overall measure that shows the percentage of electricity generation accounted for by all renewables. Secondly, there is the measure that is based on the Renewables Obligation (RO) (and the analogous Renewables Obligation (Scotland) - ROS) which shows the percentage of electricity sales accounted for by renewables eligible under these obligations. The main differences are the exclusion from the RO of large-scale hydro and non-biodegradable wastes². Table A2 shows the overall measure for 2008, 2009, 2010 and 2011.

Table A2: Renewables percentages

		UK	Scotland	Wales	Northern Ireland	England
Overall renewables percentage	2008	5.6	18.2	4.3	6.3	3.6
	2009	6.7	21.0	5.0	10.4	4.2
	2010	6.8	19.2	5.0	10.2	4.7
	2011	9.4	26.8	7.9	12.6	6.2

¹ There is also a third method used by the EU – a Renewables Directive basis – see Chapter 6 of the Digest of UK Energy Statistics 2012, table 6.7 and paragraph 6.38.

² Specific exclusions from eligibility for the RO are existing hydro plant over 20 MW; all plant using renewable sources built before 1990 (unless re-furbished); and energy from mixed waste combustion unless the waste is first converted to fuel using advanced conversion technology.

High rainfall in the winters of 2008 and 2009 saw a large increase in hydro generation in Scotland. With its high proportion of natural flow hydro, as well as wind generation increasing by over a third due to increased capacity, renewables' share in Scotland under the headline measure increased by almost three percentage points to stand at 21.0 per cent in 2009. Scotland's renewables' share fell in 2010 mainly due to a fall in hydro generation as a result of much lower rainfall. With much higher rainfall, higher wind speeds and increased wind capacity, Scotland's renewables' share rose to 26.8 per cent in 2011. This share is very much higher than other parts of the UK. In 2011, all four countries had a record high percentage of electricity generated by renewables. On a RO basis, the percentage measure for the UK (5.4 per cent in 2008, 6.7 per cent in 2009, 7.0 per cent in 2010 and 9.7 per cent in 2011) is not meaningful at sub-national level because electricity generated in one part of the UK can be sold in a different part of the UK.

In Scotland, the renewables target (which was to reach 31 per cent by 2011 and 100 per cent by 2020) is expressed as generation as a proportion of gross electricity consumption (defined as generation plus transfers into Scotland less transfers out of Scotland). In 2008, this percentage was 22.2 per cent, rising to 27.6 per cent in 2009, falling to 24.2 per cent in 2010. In 2011, this rose to 36.3 per cent, thus exceeding the target ³.

The amount of electricity from renewable sources transferred from Scotland or Wales to England, or from Scotland to Northern Ireland, is not known. What is known from Table 2 is that the amount of ROS eligible electricity generated in Scotland in 2011 was 38 per cent more than in 2010, while the amount of RO eligible electricity generated in Wales in 2011 was 34 per cent more than in 2010. In England, the increase was 29 per cent. In Northern Ireland RO eligible electricity generated was 27 per cent more. In the UK as a whole, RO eligible electricity production increased by 33 per cent. Over the four years shown in Table 2, the increases in RO eligible electricity production have been substantial across all countries, namely 63 per cent for Northern Ireland, 66 per cent for Scotland, 40 per cent for Wales and 69 per cent for England.

Renewables statistics for 2011 on a sub-national and regional basis were published in the September 2012 issue of Energy Trends (see references at the end of the article).

James Hemingway

Electricity Statistics

Tel: 0300 068 5042

E-mail: James.Hemingway@decc.gsi.gov.uk

Chris Michaels

Electricity Statistics

Tel: 0300 068 5050

E-mail: Chris.Michaels@decc.gsi.gov.uk

References:

Digest of UK Energy Statistics 2012 (DUKES); published for DECC by The Stationery Office.

£62.00, but also available on DECC's energy statistics website at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx.

Energy Trends monthly table 5.5:

www.decc.gov.uk/en/content/cms/statistics/source/electricity/electricity.aspx

"Combined Heat and Power in Scotland, Wales, Northern Ireland and the regions of England in 2011" – Energy Trends September 2012, page 60:

www.decc.gov.uk/en/content/cms/statistics/publications/trends/articles_issue/articles_issue.aspx

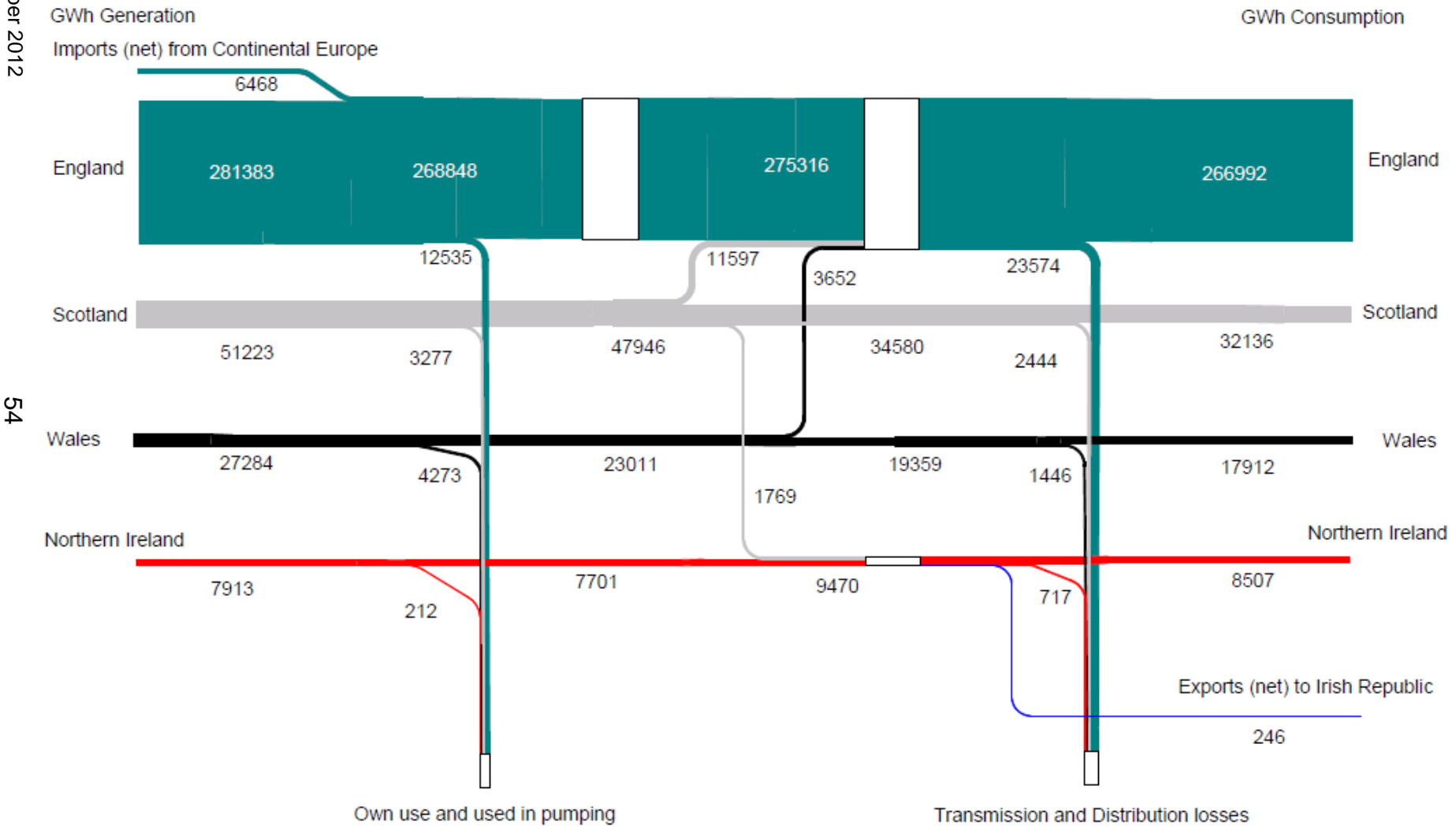
"Renewable energy in Scotland, Wales, Northern Ireland and the regions of England in 2010" – Energy Trends September 2012, page 49:

www.decc.gov.uk/en/content/cms/statistics/publications/trends/articles_issue/articles_issue.aspx

³ The corresponding percentages for the UK as a whole are 5.5 in 2008, 6.7 in 2009, 6.7 in 2010 and 9.2 in 2011, which are similar to the overall renewables percentages in Table 2.

December 2012

Chart 3: Electricity generation and consumption flow chart, 2011



54

Table 1: Generation and supply of electricity in Scotland, Wales, Northern Ireland and England, 2008 to 2011

		2008					2009					<i>GWh</i>
		UK total	Scotland	Wales	Northern Ireland	England	UK total	Scotland	Wales	Northern Ireland	England	
Generated by	Major power producers	355,209	45,147	36,560	9,234	264,268	342,374	45,284	30,370	7,628	259,092	
	Other generators	33,781	4,973	1,646	390	26,771	34,400	5,886	1,618	392	26,504	
Total generated		388,989	50,121	38,205	9,624	291,039	376,774	51,170	31,988	8,020	285,596	
Own use by Other generators		1,684	248	82	19	1,334	1,822	312	86	21	1,404	
Electricity supplied (net) by Other generators		32,097	4,725	1,564	371	25,437	32,578	5,574	1,532	371	25,100	
Used in pumping at pumped storage and other own use by MPPs		20,033	2,682	5,806	288	11,258	19,593	3,649	4,732	184	11,029	
Electricity supplied (net) by MPPs		335,175	42,466	30,754	8,946	253,010	322,781	41,635	25,638	7,444	248,063	
Electricity transferred to England (net of receipts)		-	8,444	12,168	-	-20,612	-	10,209	8,140	-	-18,349	
Electricity transferred to Northern Ireland (net of receipts)		-	545	-	-545	-	-	1,937	-	-1,937	-	
Electricity transferred to Europe (net of receipts)		-11,022	-	-	222	-11,244	-2,861	-	-	367	-3,228	
Transfers from other generators to public supply		13,545	1,597	542	286	11,121	16,265	2,419	578	295	12,973	
Transmission losses		6,547	661	349	167	5,370	6,853	671	364	180	5,638	
Distribution losses		21,310	1,925	1,068	533	17,784	21,192	1,796	1,065	548	17,782	
Consumption from public supply [A]		331,900	32,469	17,711	8,856	272,863	313,883	29,452	16,649	8,581	259,201	
Consumption by autogenerators		18,538	3,147	1,021	84	14,285	16,292	3,151	953	76	12,111	
Total Electricity consumption		350,437	35,616	18,733	8,941	287,148	330,175	32,597	17,602	8,658	271,319	
Electricity sales (public supply) [B]		331,870	30,941	18,586	8,093	274,250	313,784	29,955	17,498	8,265	258,065	
Statistical difference between calculated consumption [A] and sales [B]		+29	+1,528	-875	+763	-1,386	+98	-510	-850	+316	+1,142	

Figures in this table do not sum exactly to the UK totals shown because of rounding

		Table 1 continued: Generation and supply of electricity in Scotland, Wales, Northern Ireland and England, 2008 to 2011									
		2010					2011				
		UK total	Scotland	Wales	Northern Ireland	England	UK total	Scotland	Wales	Northern Ireland	England
Generated by	Major power producers	347,649	44,238	30,018	7,128	266,265	332,312	44,880	25,043	7,319	255,070
	Other generators	34,123	5,755	2,153	502	25,714	35,490	6,343	2,241	594	26,313
Total generated		381,772	49,992	32,170	7,630	291,979	367,802	51,223	27,284	7,913	281,383
Own use by	Other generators	1,703	287	107	25	1,283	1,973	353	124	33	1,464
Electricity supplied (net) by	Other generators	32,420	5,468	2,045	477	24,431	33,517	5,990	2,116	561	24,850
Used in pumping at pumped storage and other own use by MPPs		18,615	3,264	4,383	199	10,769	18,323	2,924	4,149	179	11,072
Electricity supplied (net) by MPPs		329,034	40,973	25,634	6,929	255,497	313,988	41,956	20,893	7,140	243,998
Electricity transferred to England (net of receipts)		-	7,998	7,897	-	-15,896	-	11,597	3,652	-	-15,250
Electricity transferred to Northern Ireland (net of receipts)		-	2,297	-	-2,297	-	-	1,769	-	-1,769	-
Electricity transferred to Europe (net of receipts)		-2,663	-	-	232	-2,895	-6,222	-	-	246	-6,468
Transfers from other generators to public supply		15,292	2,595	680	383	11,635	16,394	3,016	818	441	12,119
Transmission losses		5,975	593	325	155	4,902	6,476	633	354	169	5,320
Distribution losses		21,062	1,816	1,049	532	17,665	21,705	1,811	1,091	548	18,254
Consumption from public supply [A]		319,967	30,863	17,044	8,690	263,370	308,444	29,165	16,615	8,388	254,276
Consumption by autogenerators		17,113	2,874	1,364	94	12,781	17,103	2,970	1,297	120	12,716
Total Electricity consumption		337,080	33,736	18,408	8,784	276,151	325,546	32,136	17,912	8,507	266,992
Electricity sales (public supply) [B]		319,919	31,143	17,737	8,316	262,724	308,033	28,072	17,241	7,476	255,244
Statistical difference between calculated consumption [A] and sales [B]		+47	-280	-693	+375	+646	+410	+1,093	-626	+912	-968

Figures in this table do not sum exactly to the UK totals shown because of rounding

Table 2: Generation of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2008 to 2011 GWh

		2008					2009				
		UK total	Scotland	Northern			UK total	Scotland	Northern		
				Wales	Ireland	England			Wales	Ireland	England
Major power producers:	Coal	120,305	11,591	9,364	2,040	97,310	99,287	11,896	6,547	1,371	79,473
	Oil	4,558	431	-	334	3,793	3,839	278	-	78	3,484
	Gas	161,583	9,822	16,059	6,537	129,165	152,598	7,430	14,111	5,642	125,415
	Nuclear	52,486	15,079	7,080	-	30,327	69,098	16,681	6,122	-	46,295
	Thermal renewables	2,607	231	60	-	2,315	2,670	242	91	-	2,337
	Hydro natural flow	4,224	3,923	278	-	23	4,294	4,056	216	-	22
	Hydro pumped storage	4,089	1,091	2,998	-	-	3,685	1,087	2,598	-	-
	Non thermal renewables	5,357	2,978	722	323	1,335	6,904	3,615	685	538	2,066
	Total		355,209	45,147	36,560	9,234	264,268	342,374	45,284	30,370	7,628
Other Generators:	Coal	4,077	71	-	37	3,968	3,751	69	-	31	3,651
	Oil	2,152	1,087	62	35	967	2,155	1,017	64	34	1,041
	Gas	14,636	1,786	487	31	12,332	13,901	1,940	470	32	11,459
	Thermal renewables	7,040	870	243	15	5,912	8,025	1,091	347	43	6,543
	Other thermal	2,444	-	529	-	1,915	2,327	-	468	-	1,860
	Hydro natural flow	931	786	56	26	63	947	808	50	31	58
	Non thermal renewables	1,757	352	267	245	892	2,420	943	220	221	1,036
	Wastes	744	21	-	-	723	873	18	-	-	855
	Total		33,781	4,973	1,646	390	26,771	34,400	5,886	1,618	392
Total generation by fuel		388,989	50,121	38,205	9,624	291,039	376,774	51,170	31,988	8,020	285,596
<i>within which:</i>	Renewables Hydro	5,155	4,709	334	26	85	5,241	4,864	266	31	80
	Wind, wave, solar	7,114	3,330	989	568	2,227	9,324	4,558	905	759	3,102
	Other	9,647	1,102	303	15	8,227	10,694	1,333	438	43	8,881
	Total	21,916	9,141	1,627	609	10,539	25,259	10,755	1,609	832	12,063
Renewables eligible under the renewables obligation		18,005	6,592	1,467	609	9,337	21,102	8,196	1,489	832	10,585
Percentage shares of generation:	Coal	32.0%	23.3%	24.5%	21.6%	34.8%	27.3%	23.4%	20.5%	17.5%	29.1%
	Oil	1.7%	3.0%	0.2%	3.8%	1.6%	1.6%	2.5%	0.2%	1.4%	1.6%
	Gas	45.3%	23.2%	43.3%	68.2%	48.6%	44.2%	18.3%	45.6%	70.7%	47.9%
	Nuclear	13.5%	30.1%	18.5%	-	10.4%	18.3%	32.6%	19.1%	-	16.2%
	Hydro natural flow	1.3%	9.4%	0.9%	0.3%	-	1.4%	9.5%	0.8%	0.4%	-
	Other renewables	4.3%	8.8%	3.4%	6.1%	3.6%	5.3%	11.5%	4.2%	10.0%	4.2%
	Other	1.9%	2.2%	9.2%	-	0.9%	1.8%	2.2%	9.6%	-	1.0%
	Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figures in this table do not sum exactly to the UK totals shown because of rounding

Table 2 continued: Generation of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2008 to 2011 GWh

		2010					2011				
		UK total	Scotland	Wales	Northern Ireland	England	UK total	Scotland	Wales	Northern Ireland	England
Major power producers:	Coal	103,941	14,653	5,929	1,817	81,542	104,797	10,728	6,170	1,414	86,485
	Oil	2,272	206	-	73	1,993	1,075	160	-	52	863
	Gas	161,747	6,618	15,227	4,840	135,062	132,753	6,227	9,880	5,301	111,346
	Nuclear	62,140	15,293	5,532	-	41,315	68,980	16,892	5,364	-	46,725
	Thermal renewables	3,690	299	72	-	3,320	4,531	274	76	-	4,181
	Hydro natural flow	2,758	2,579	164	0	14	4,594	4,362	210	0	21
	Hydro pumped storage	3,150	779	2,372	-	-	2,906	604	2,301	-	-
	Non thermal renewables	7,950	3,811	722	398	3,020	12,675	5,632	1,041	553	5,450
	Total	347,649	44,238	30,018	7,128	266,265	332,312	44,880	25,043	7,319	255,070
Other Generators:	Coal	3,753	62	-	41	3,650	3,786	51	-	41	3,694
	Oil	2,532	1,007	173	34	1,318	2,589	996	215	34	1,345
	Gas	13,908	1,770	806	44	11,288	14,062	1,825	790	77	11,369
	Thermal renewables	8,296	1,117	336	86	6,757	8,442	1,130	367	82	6,862
	Other thermal	1,559	-	511	-	1,048	1,439	-	405	-	1,034
	Hydro natural flow	885	734	49	53	50	1,093	970	58	19	46
	Non thermal renewables	2,266	1,051	278	244	693	3,075	1,360	406	340	969
	Wastes	924	14	-	-	910	1,005	12	-	-	993
	Total	34,123	5,755	2,153	502	25,714	35,490	6,343	2,241	594	26,313
Total generation by fuel		381,772	49,992	32,170	7,630	291,979	367,802	51,223	27,284	7,913	281,383
<i>within</i>											
<i>which:</i> Renewables Hydro		3,644	3,313	213	53	65	5,686	5,332	268	19	68
Wind, wave, solar		10,216	4,862	1,000	642	3,712	15,750	6,992	1,447	893	6,418
Other		11,986	1,416	407	86	10,076	12,973	1,404	443	82	11,043
Total		25,845	9,591	1,620	780	13,853	34,410	13,728	2,159	994	17,529
Renewables eligible under the renewables obligation		22,465	7,931	1,530	780	12,224	29,804	10,951	2,049	994	15,811
Percentage shares of generation:	Coal	28.2%	29.4%	18.4%	24.4%	29.2%	29.5%	21.0%	22.6%	18.4%	32.0%
	Oil	1.3%	2.4%	0.5%	1.4%	1.1%	1.0%	2.3%	0.8%	1.1%	0.8%
	Gas	46.0%	16.8%	49.8%	64.0%	50.1%	39.9%	15.7%	39.1%	68.0%	43.6%
	Nuclear	16.3%	30.6%	17.2%	-	14.1%	18.8%	33.0%	19.7%	-	16.6%
	Hydro natural flow	1.0%	6.6%	0.7%	0.7%	-	1.5%	10.4%	1.0%	0.2%	-
	Other renewables	5.8%	12.6%	4.4%	9.5%	4.7%	7.8%	16.4%	6.9%	12.3%	6.2%
	Other	1.5%	1.6%	9.0%	-	0.7%	1.5%	1.2%	9.9%	-	0.7%
	Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figures in this table do not sum exactly to the UK totals shown because of rounding