

Renewable electricity in Scotland, Wales, Northern Ireland and the regions of England in 2019

Introduction

This article provides information and analysis on the amount of electricity from renewable sources, disaggregated below UK level. It includes information on capacity, generation and number of operational sites, as well as derived load factors, for the four UK countries, the nine English regions and, from 2014, UK Local Authorities^{1 2}. It updates the published figures in the September 2019 edition of *Energy Trends*.

These data are consistent with those published for the UK in Table 6.4 of the Digest of United Kingdom Energy Statistics 2020 (DUKES), and use similar categories³. The UK totals published here are consistent with the figures published in *Energy Trends*. However, there are small differences between the totals published for England, Northern Ireland, Scotland and Wales published here and those published in ET 6.1. Some sites cannot be allocated to local authorities where it would disclose the generation of individual schemes. There are also a number of installations that cannot be allocated to specific local authorities or regions in this article and the related tables, this is because their precise location is not known. In ET 6.1 the location of this sites and their generation is estimated so that all generation is recorded as either England, Northern Ireland, Scotland or Wales. It is planned that in next years release there will be a change of methodology so that the national totals are consistent.

These data cover all renewable electricity schemes, including those accredited under the Renewables Obligation (RO), Feed in Tariff (FiT) and Contracts for Differences support mechanisms. These data also include some schemes that are not eligible for support, such as pre-April 2002 large-scale hydro and non-CHP energy from waste schemes and those schemes that are registered with the MCS (Microgeneration Certification Scheme) but are not accredited to FiTs. However, small-scale schemes that are not supported by government subsidy schemes or have not registered with the MCS are not included in these figures. As a result, the solar PV capacity and generation figures are likely to be underestimated. We are looking at options for extending our data coverage.

Consistent time-series data for each year from 2003 for regional and Local Authority data from 2014, are available as Excel spreadsheets⁴. The spreadsheets include detailed data and additional charts for generation, capacity, number of sites, generation per GVA and load factors by country of the UK, region of England and by Local Authority.

Key points – 2019

Renewable generation in the UK grew by 9.5 per cent from 110 TWh in 2018 to 120.5 TWh in 2019. Within this:

- Generation in England was **up 7.8 per cent**
- Generation in Northern Ireland was **up 6.0 per cent**
- Generation in Scotland was **up 14.3 per cent**
- Generation in Wales was **up 9.4 per cent**

¹ Offshore wind is allocated to the region to which its output is connected. The exceptions are Robin Rigg, which comes ashore at Seaton, Cumbria but whose generation is associated with Scotland, and Burbo Bank, which comes ashore in Wales but whose generation is associated with the North West. Hornsea Project One, going live this year, lands in the East Midlands but grid connection is in Yorkshire and the Humber.

² Where disclosure of confidential generation data was likely at the site level the data have been removed, and added to the unallocated row at the bottom of the Local Authority listings.

³ On occasion, it has been necessary to combine some renewable sources into categories so that information about individual sites provided in confidence (rather than from publicly available sources) to Ricardo Energy & Environment and (BEIS) is not disclosed.

⁴ www.gov.uk/government/statistics/regional-renewable-statistics

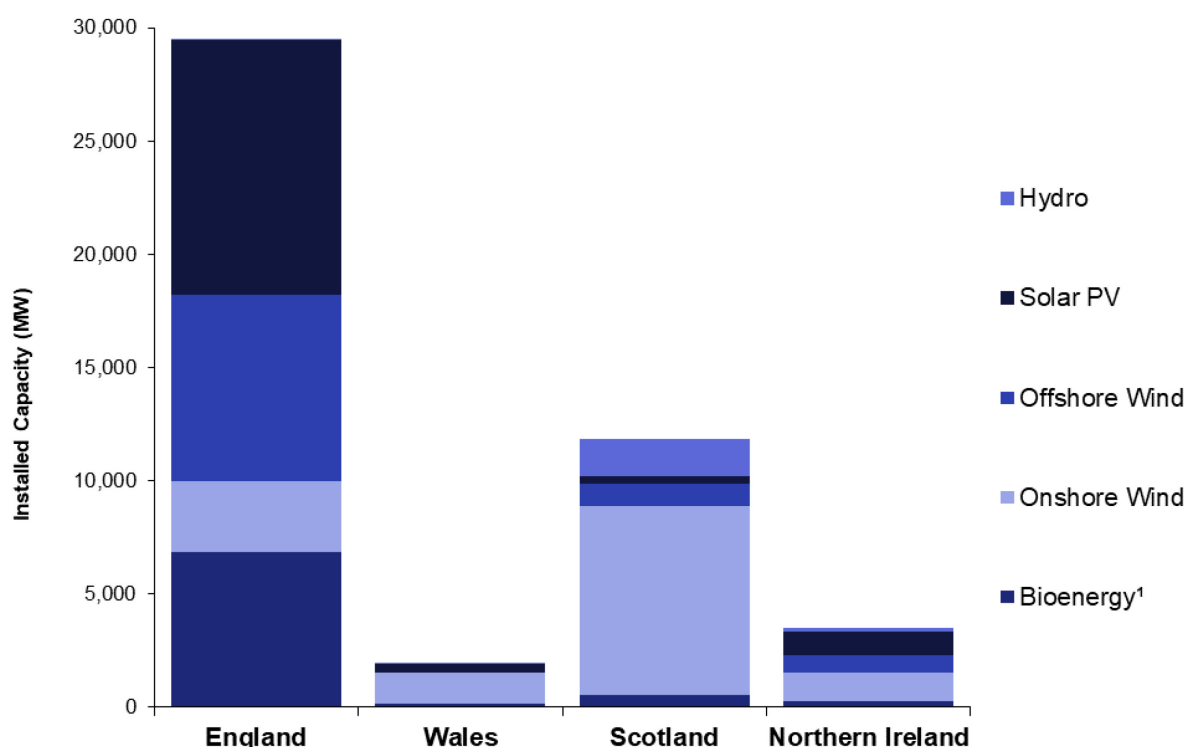
Generation in all countries was boosted by new capacity coming online. Overall capacity increased by 6.5 per cent from 44.3 GW at the end of 2018 to 47.2 GW at the end of 2019. Within this:

- Capacity in England was **up 6.1 per cent**
- Capacity in Northern Ireland was **up 2.5 per cent**
- Capacity in Scotland was **up 7.6 per cent**
- Capacity in Wales was **up 5 per cent**

Capacity

- England had the most renewable capacity and generation, about two and a half times that for Scotland. This is largely due to the fact that England has 89 per cent of the UK's bioenergy capacity (mostly from four biomass units at Drax and the Ferrybridge Multifuel Power Station in Yorkshire and the Humber), 84 per cent of the PV capacity and 34 per cent of the offshore wind capacity. Chart 1 shows a breakdown of capacity at the end of 2019 by technology and country.

Chart 1 – Renewable capacity at the end of 2019 by technology and country



¹ Bioenergy includes biomass, waste, anaerobic digestion, landfill gas and sewage gas

- The technology with the highest growth in capacity was **offshore wind** which grew by 21 per cent in the UK. The additional capacity was largely in Yorkshire & the Humber (69 per cent) where capacity more than tripled over the course of the year. This was driven by Hornsea Project One with the addition of 1,218 MW capacity. Scotland (20 per cent) then followed with a capacity increase of 315 MW from Beatrice Offshore windfarm.
- **Onshore wind** grew by 4.2 per cent in the UK – 73 per cent of the new capacity was in Scotland, 24 per cent in Wales, 2 per cent in Northern Ireland but just 1 per cent in England.
- **Solar PV** capacity grew by 2.1 per cent, with Yorkshire and Humber having the largest percentage increase at 8.0 per cent.
- **Biomass and waste** grew by 3.8 per cent overall. Within this, capacity grew by 2.5 per cent in England. The additional capacity was primarily in Yorkshire and Humber (44 per cent) including a further 76 MW at Ferrybridge Multifuel and 41 MW at Templeborough Biomass. Scotland grew by 13 per cent from Dunbar (37 MW) and Glasgow GGREC (15 MW).

Special feature – Sub-national renewable electricity

Table 1 shows the largest new schemes (including capacity increases) in 2019:

Table 1 - Largest new schemes

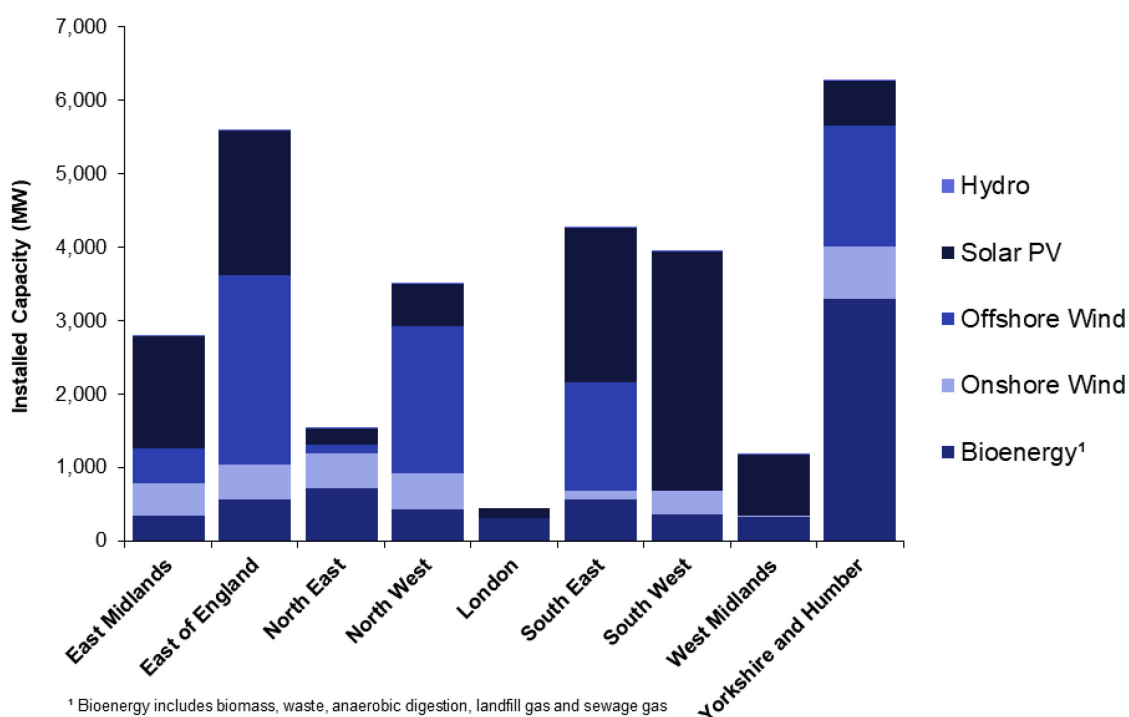
Onshore wind	Dorenell Wind Farm (capacity increase)	Scotland	177 MW
	Clocaenog Forest	Wales	96 MW
	Kype Muir Wind Farm	Scotland	88 MW
	Middle Muir Wind Farm	Scotland	51 MW
	Tom Nan Clach	Scotland	39 MW
	Mynydd y Gwair Wind Farm	Wales	33 MW
	Coire Na Cloiche	Scotland	30 MW
Offshore wind	Hornsea Project One - Heron & Njord	Yorkshire & H	1,218 MW
	Beatrice Offshore windfarm (capacity increase)	Scotland	315 MW
	East Anglia 1 (capacity increase)	East of England	179 MW
	Kincardine Offshore Windfarm	Scotland	49 MW
Solar PV	York Solar Farm	Yorkshire & H	35 MW
	Huntington Water Treatment Works	North West	7 MW
Biomass and waste	Ferrybridge Multifuel Power Station (additional capacity)	Yorkshire & H	76 MW
	Templeborough Biomass Power Plant (additional capacity)	Yorkshire & H	41 MW
	Dunbar	Scotland	37 MW
	Beddington	London	30 MW
	SIMEC Power 2 Limited	Wales	18 MW
	Full Circle Energy Park	N Ireland	15 MW
	Glasgow Renewable Energy and Recycling Centre	Scotland	15 MW
	Javelin Park EfW	South West	15 MW

The regions with the highest capacity in England (including PV) are:

- Yorkshire and the Humber – 6,269 GW (50 per cent from biomass and waste - mostly from Drax and Ferrybridge – and 37 per cent from wind – mostly from Hornsea Project One)
- East of England - 5,580 GW (55 per cent from wind and 35 per cent from PV)
- South East - 4,268 GW (50 per cent from PV and 37 per cent from Wind).

Capacity by English region is shown in Chart 2:

Chart 2 – Renewable capacity at the end of 2019 by English region and technology



Special feature – Sub-national renewable electricity

Table 2 summarises capacity growth, the key technologies in each region as well as the major sites:

Table 2: Regional capacity growth			
Region	Key Technology	Growth (MW)	Key Schemes
East Midlands	Biomass and Waste	1.8	Lincoln EFW (Survey revision), Technology reassignments
	Solar PV	5.4	Mainly medium and small-scale projects (FIT)
East of England	Solar PV	19.8	Poplars, Volmary Site, Tesco Extra Hazelmere, Mainly medium and small-scale projects (FIT)
	Offshore Wind	178.2	East Anglia 1
	Onshore Wind	5.5	Common Barn (Formerly Highfield Farm), FiT Revisions
North East	Solar PV	3.6	Mainly medium and small-scale projects (FIT),
North West	Solar PV	18.9	BAE Samlesbury Aerodrome, Pilkington, Clifton Marsh Wastewater Treatment Works 1, Clifton Marsh Wastewater Treatment Works 2, Huntington Water Treatment Works, Mainly medium and small-scale projects (FIT)
London	Biomass and Waste	29.9	Beddington
	Solar PV	3.7	Mainly medium and small-scale projects (FIT)
South East	Biomass and Waste	5.2	Milton Keynes Waste Recovery Park
	Solar PV	13.0	Kent Solar Farm, Mainly medium and small-scale projects (FIT)
	Onshore Wind	9.4	New Rides Farm (Clark Recovered)
South West	Biomass and Waste	20.2	Swindon Energy Ltd, Javelin Park EFW
	Solar PV	15.9	Five Mile Drive (Northwick Springhill Extension), Bridgwater, Mainly medium and small-scale projects (FIT)
West Midlands	Solar PV	-	4.5 Mainly medium and small-scale projects (FIT)
Yorkshire and Humber	Biomass and Waste	116.9	Templeborough Biomass Power Plant- Rotherham, Ferrybridge Multifuel 1 ('C') Power Station Plus 2
	Solar PV	45.3	Bransholme Solar (Carlam Hill Education), York Solar Farm, Mainly medium and small-scale projects (FIT)
	Offshore Wind	1,218.0	Hornsea Project One - Heron & Njord
	Onshore Wind	9.0	Withernwick Extension
Northern Ireland	AD	0.5	Bellshill AD (Farm AD), Duffless AD (Farm AD), Radox Biogen (Farm AD), Edenmore Farm (Farm AD), TADA (Farm AD), Carrick Road 200 AD (Farm AD), SDPowerLtd (Farm AD), Annaghroe Road AD (Farm AD), Backhill Road AD (Farm AD), Barnailt Road AD (Farm AD), Creagh Concrete (Farm AD), Derryhirk Road AD (Farm AD), Dowland Road AD (Farm AD), Drumslade Road AD (Farm AD), Dunnalong Road (2) AD (Farm AD), Greenogue Road AD (Farm AD), Just Farm Energy (Farm AD), Lough Road AD (Farm AD), McGrane Nurseries (Farm AD), Milltown Gravel AD (Farm AD)
	Biomass and Waste	25.0	Drumrusk, TGE Dual Fuel, Knockmore, Duncrue Incineration, Full Circle Energy Park
	Solar PV	11.7	Dunore PV Farm, Finvoy Solar Farm
	Onshore Wind	8.8	Mainly small-scale projects
Scotland	AD	1.0	Glasgow Renewable Energy and Recycling Centre (Waste AD), Hatton Farm AD/Grissan Carnside Limited (Farm AD), Portgordon Maltings/Grissan Portside Limited (Farm AD)
	Biomass and Waste	52.1	Glasgow Renewable Energy and Recycling Centre, Dunbar
	Solar PV	9.7	Mainly medium and small-scale projects (FIT)
	Wave and tidal	2.0	Magallanes (FoW - EMEC)
	Offshore Wind	357.6	Beatrice Offshore windfarm (additional capacity), Kincardine Offshore Windfarm
	Onshore Wind	417.0	Galawhistle, Dorenell Wind Farm (Previously Site A and B Scaut Hill), Middle Muir Wind Farm, Kype Muir Wind Farm, Tom Nan Clach, Achlachan, Coire Na Cloiche
Wales	Biomass and Waste	28.8	Biomass UK No 2 Ltd - Barry, SIMEC Power 2 Limited
	Solar PV	0.6	Llancayo Solar Farm, mainly medium and small-scale projects (FIT)
	Onshore Wind	139.5	Mynydd y Gwair Wind Farm, Clocaenog Forest, Bryn Blaen Wind Farm

Generation

- For similar reasons to capacity, generation from renewable sources in England was also more than two and a half times higher than Scotland, with the higher utilisation rates of bioenergy and wind offset by the lower rates of the more intermittent solar PV which account for 14 per cent of English renewable generation.

Number

- Excluding PV, England continues to have the largest number of renewable sites (5,775) following by Scotland, Northern Ireland and Wales; the position for the last two countries is reversed when PV is taken into consideration.
- Excluding PV, Regions with the highest number in England are the South West, East of England and Yorkshire and the Humber. When PV is taken into consideration, the South West still has the highest number of sites but is followed by the South East.

Capacity and Generation per GVA

- Economic activity in each country or region is measured in terms of Gross Value Added (GVA)⁵. Scotland continues to show both the largest capacity from renewables per £ of GVA followed by Wales, Yorkshire and the Humber and Northern Ireland.
- In terms of electricity generated, Scotland also shows the largest generation per £ of GVA, followed by Yorkshire and the Humber (due to Drax), Wales, North East and Northern Ireland.

Load Factors

Load factors are the ratio of how much electricity was generated as a proportion of the total generating capacity. UCLFs or “load factor on an unchanged configuration basis” describes the amount of electricity generated from schemes that have been operating throughout the whole of the calendar year with the same installed capacity configuration⁶.

The UCLFs and load factors on a standard basis can be found in the load factor time-series spreadsheets⁷. A summary by country is given in Table 3:

Table 3 - Load factors on an unchanged configuration basis by UK country and technology:

	Onshore Wind	Offshore Wind	Solar PV	Hydro	Biomass and Waste
England	26.4%	40.2%	11.3%	35.1%	65.8%
Northern Ireland	25.4%	n/a	9.3%	37.6%	66.0%
Scotland	26.1%	37.9%	10.1%	36.8%	75.4%
Wales	27.6%	35.0%	10.9%	23.5%	71.7%
UK average	26.2%	39.6%	11.2%	35.5%	66.3%

- Wales now has the highest **onshore wind** load factor (27.6 per cent) followed by England (26.4 per cent), Scotland (26.1 per cent) and Northern Ireland (25.4 per cent). This implies that there have been some outages and curtailments for some large Scottish wind farms.
- England, however, has the highest load factor for **offshore wind**.

⁵ GVA is Gross Value Added as published as Total GVA in Regional Gross Value Added (Income Approach), December 2015 at: www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/regionaleconomicactivitybygrossdomesticproductuk/1998to2018
www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry

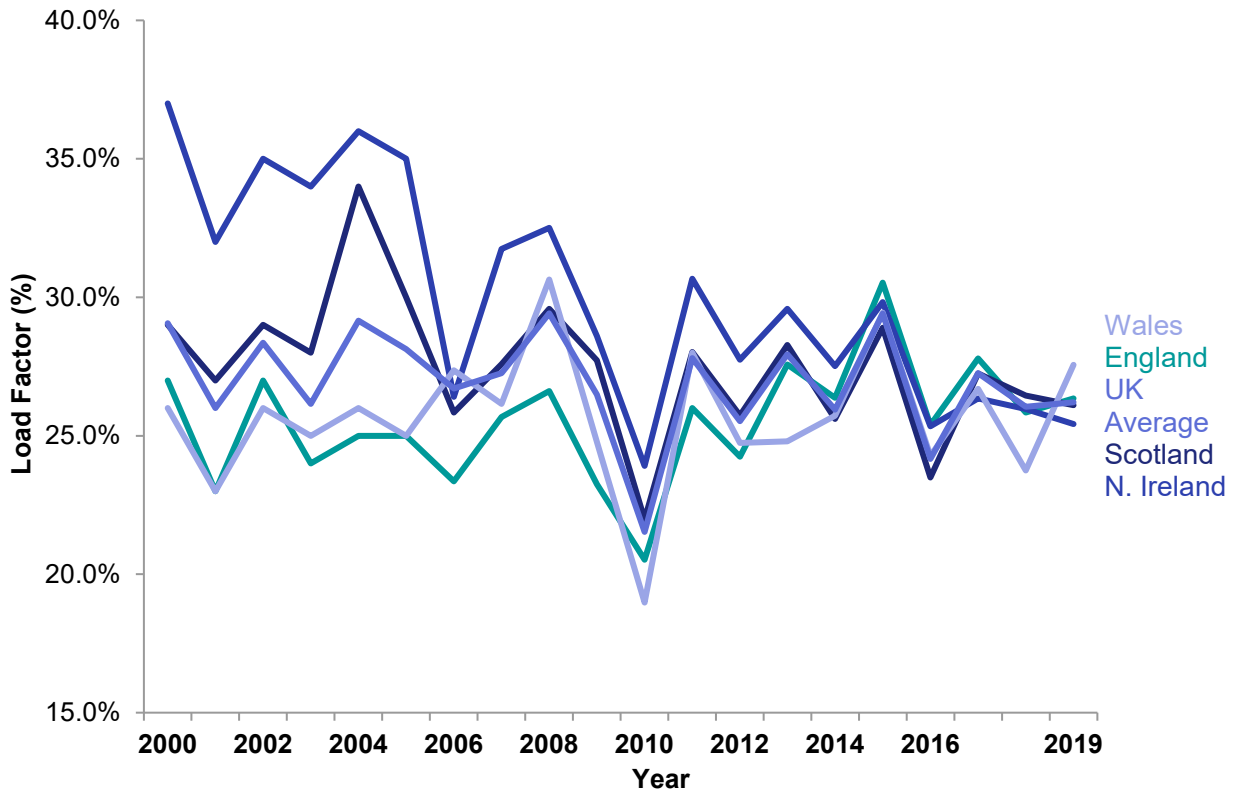
⁶ The formula for calculating this is:

$$\frac{\text{Electricity generated during the year (MWh)}}{\text{Installed capacity of schemes operating throughout the year with an unchanged capacity configuration (MW) x hours in year}}$$

⁷ Available at: www.gov.uk/government/collections/renewables-statistics These data are only reported where the region contains three or more operational schemes.

- England also has the highest average load factor for **solar PV**, followed by Wales, Scotland and Northern Ireland which is in keeping with the relative solar irradiance in these countries.
- Load factors for other technologies and additional graphs are included in the related spreadsheets.

Chart 3 – Onshore wind UC LFs since 2000 by UK country

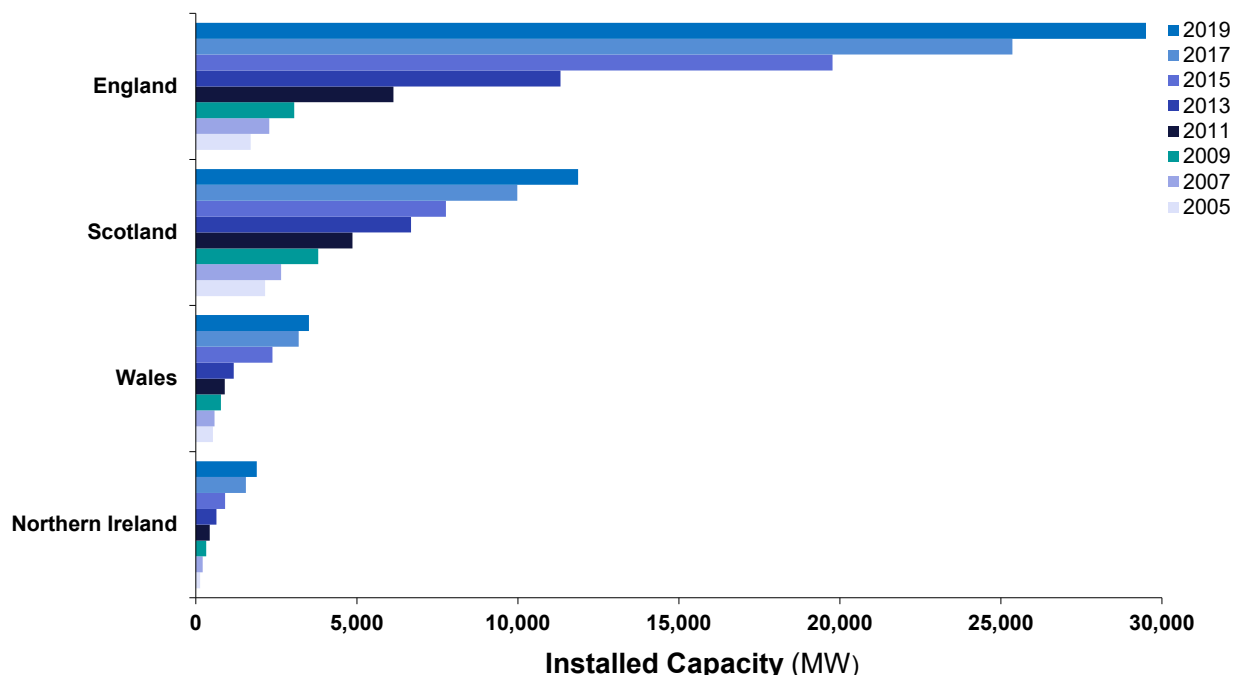


Time series

- Capacity and generation have grown at different rates in different regions for each technology, which is partly dependent on the available resource and the support mechanism. In the case of the installed capacity for solar PV, following a period of rapid growth encouraged by the RO and FiT schemes, the initial fast rate of growth has slowed down, which is also reflected in the corresponding generation figures; this is probably due to a combination of effects including closure of the RO, a reduction in FiT financial support mechanisms and the rapid exploitation of prime development sites.
- In the case of landfill gas, the rate of exploitation of prime sites reached saturation several years ago but interestingly there is no similar plateauing of generation data which instead decreases with time. This is because biogas production rates reduce with time as the biodegradable resource gets exploited.

Chart 4 shows how capacity has grown over time in each country:

Chart 4 – Total renewable capacity by country 2005 – 2019



Local authority analysis

- Tables 4 to 6 rank the top five Local Authorities (LAs), per: number of installations, installed capacity, and generation for key technologies; these are also shown graphically in the Excel spreadsheets. The Local Authority data used for this analysis has recently undergone some further data cleansing and revisions by Ofgem; as a result, there will be some minor differences when compared with the data published from the Annual Survey in DUKES.
- Since last year, several local authority boundaries have been amalgamated with others and now come under a new name⁸; in once instance there was just a name change. These have been amended in the time-series spreadsheets from 2016 onwards but the order listings remain unchanged so that time-series comparisons can still be made with pre-2016 datasets. Those LAs now amalgamated with others now have no data. A footnote has been included that explains this.
- **Number of sites:** Cornwall remains the top ranked (18,546), reflecting the large number of solar PV schemes installed in the South West. For other technologies, the top ranking LAs for number of installations for onshore wind, hydro, landfill gas, anaerobic digestion and plant biomass are the Orkney Islands, Highland, Thurrock, Shropshire and Mendip respectively.
- **Capacity:** Selby is the top ranked, primarily from Plant Biomass (Drax Dedicated Biomass), followed closely by Highland, primarily from wind and hydro.
- **Generation:** Selby is top ranked, primarily from Plant Biomass: For other technologies, the top ranking LAs are onshore wind (Highland), PV (Cornwall), hydro (Highland), landfill gas (Thurrock), anaerobic digestion (Shropshire) and plant biomass (Selby).
- Wiltshire and Cornwall continue to have large numbers of PV sites with correspondingly high capacity and generation which represents the installation of large solar farms. Interestingly, Sunderland and County Durham between them have an unusually large number of PV sites, especially for a region with low solar irradiance. However, they have much lower capacities

⁸ “Bournemouth”, “Christchurch” and “Poole” are now “Bournemouth, Christchurch and Poole”; “East Dorset”, “North Dorset”, “Purbeck”, “West Dorset”, “Weymouth and Portland” are now “Dorset”; “Forest Heath” and “St Edmundsbury” are now “West Suffolk”; “Suffolk Coastal” and “Waveney” are now “East Suffolk”; “Taunton Deane” and “West Somerset” are now “Somerset West and Taunton”. “Shepway” is now called “Folkestone and Hythe”.

Special feature – Sub-national renewable electricity

and generation. This large number of small schemes represents the uptake of domestic installations.

- Highland's overall capacity and generation is driven by the construction of large-scale wind farms. Whilst the Orkneys has the highest number of wind sites, some 3 times that of the Highland's, it has a much smaller capacity and generation, most likely because these are mainly small projects meeting local needs.
- Shropshire continues to show the highest number of AD facilities as well as capacity and generation, this reflects the availability of AD feedstock due to the high level of livestock farming in this District.

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Table 4: Local Authority: Number of sites generating electricity from renewable sources, 2019 ¹												Number	
Onshore Wind	Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total ²		
Orkney Islands	788	Cornwall	18,076	Highland	299	Thurrock	9	Shropshire	36	Mendip	30	Cornwall	18,546
Aberdeenshire	577	Wiltshire	9,609	Argyll & Bute	121	Doncaster	8	Strabane	21	Dumfries & Galloway	18	Wiltshire	9,639
Cornwall	436	Peterborough	9,190	Gwynedd	119	North Lanarkshire	8	Herefordshire County of	20	Herefordshire County of	16	Peterborough	9,198
Dumfries & Galloway	298	Sunderland	8,876	Perth & Kinross	89	Warrington	8	Dumfries & Galloway	14	East Riding of Yorkshire	10	Sunderland	8,887
Highland	267	County Durham	8,707	Dumfries & Galloway	85	Wiltshire	8	Dorset	13	Powys	10	County Durham	8,828
										Shropshire	10		
UK Total	9,887		990,966		1,535		456		658		435		1,004,272

Table 5: Local Authority: Installed capacity of sites generating electricity from renewable sources, 2019 ¹												MW	
Onshore Wind	Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total ²		
Highland	1,825	Wiltshire	595	Highland	805	Thurrock	40	Shropshire	20	Selby	2,663	Selby	2,720
South Lanarkshire	1,195	Cornwall	591	Argyll & Bute	296	Central Bedfordshire	33	East Cambridgeshire	18	Northumberland	448	Highland	2,692
Dumfries & Galloway	679	Dorset	278	Perth & Kinross	278	Warrington	32	Redcar and Cleveland	10	Fife	77	North East Lincolnshire	1,497
South Ayrshire	653	South Cambridgeshire	271	Dumfries & Galloway	151	North Lanarkshire	26	East Riding of Yorkshire	10	Slough	63	Lancaster	1,381
Scottish Borders	641	Shropshire	215	Stirling	86	Aylesbury Vale	21	Herefordshire County of	9	Sheffield	62	South Lanarkshire	1,251
UK Total	14,125		13,345		1,874		1,055		530		4,543		47,163

Table 6: Local Authority: Generation of electricity from renewable sources, 2019 ¹												GWh	
Onshore Wind	Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total ²		
Highland	4,138	Cornwall	580	Highland	3,114	Thurrock	116	Shropshire	111	Selby	8,996	Selby	9,093
South Lanarkshire	2,681	Wiltshire	575	Perth & Kinross	828	Central Bedfordshire	114	East Cambridgeshire	88	Fife	396	Highland	7,470
Dumfries & Galloway	1,624	Dorset	284	Argyll & Bute	587	Havering	111	Strabane	57	Allerdale	361	Lancaster	3,737
Scottish Borders	1,451	South Cambridgeshire	274	Dumfries & Galloway	418	Warrington	108	Redcar and Cleveland	56	Breckland	338	East Suffolk	3,357
Moray	1,370	Shropshire	193	Stirling	320	Aylesbury Vale	105	East Riding of Yorkshire	52	Sheffield	326	Dumfries & Galloway	2,912
UK Total	32,187		13,067		5,933		3,624		2,896		25,273		120,675

1 Top five ranked Local Authorities (LAs). Where more than five schemes are listed, this indicates that more than one LA has the same ranking.

2 Totals include offshore wind sites allocated to nearest Local Authority.

Revisions

Historic revisions this year were only carried out to the 2016, 2017 and 2018 datasets which has resulted in changes to both capacity and generation for all but two regions. These are due to several reasons that include the reassignment of unknown FiT data from the Other category, capacity revisions to be consistent with MPP, ROCs and the MSIW Survey returns, the identification of some duplicates, closures and additional schemes and finally, the reallocation of some technologies from Biomass to AD. These revisions are summarised in Table 7:

Year	2016		2017		2018	
	MW	GWh	MW	GWh	MW	GWh
England						
East Midlands	-1	-11	0	-7	2	-6
East of England	0	0	0	0	0	0
North East	0	0	0	0	1	1
North West	2	2	3	4	9	7
London	1	1	1	1	3	2
South East	2	3	1	1	10	5
South West	-10	-7	-9	-6	-7	-4
West Midlands	-3	2	-11	-4	-8	-4
Yorkshire and the Humber	0	0	0	0	0	0
Northern Ireland	3	14	7	33	8	4
Scotland	-2	-22	4	-15	8	-13
Wales	1	5	1	6	2	8

Further information

For further details on the sub-national renewable analysis in this article please contact:

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www.gov.uk/government/statistics/regional-renewable-statistics