ENERGY & UTILITY SKILLS

Skills for a greener world

Estimates of UK employment in “green” jobs, occupations and firms

25th January 2024

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Estimates of UK employment in “green” jobs, occupations and firms

1 Executive summary

1.1 Measuring green employment

1.1.1 The Office for National Statistics (ONS) defines a green job as:

- Employment in an activity that contributes to protecting or restoring the environment, including those that mitigate or adapt to climate change[1]

1.1.2 They have developed three approaches to measuring green jobs:

- Industry-based approach
- Occupation-based approach
- Firm-based approach

1.1.3 It is important to note that these are experimental estimates of green jobs. Therefore, they are subject to revision as definitions, methods and data sources are reviewed.

1.2 Employment in green industries

1.2.1 In 2020, total employment across these green industries was estimated at 526,000 full time-equivalents (FTEs) in the UK. This was 4% higher than the 507,000 estimated in 2015 (the earliest estimates available) but was 3.5% lower than the peak in 2018 (545,000 FTE).

1.2.2 The fall in employment in green jobs between 2018 and 2020 was largely because of lower employment in the Energy efficient products and Waste industries.

1.2.3 Growth between 2015 and 2020 was seen across a number of activities, in particular:

- Renewable energy increased by around 10,000 FTEs
- Water quantity saw an increase of around 8,000 FTEs
- Environmental charities grew by around 6,000 FTEs
- Low emission vehicles saw employment increase by around 6,000 FTEs

[1] https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/developingestimatesofgreenjobsintheuk

1.2.4 Growth in employment associated with different renewable electricity technologies varies substantially:

- Offshore wind grew the most – by 290%, or an additional 8,700 FTEs
- Hydropower doubled its workforce from 600 to 1,200
- Other renewable sources remained stable at 300 FTEs
- Onshore wind saw its workforce shrink by 38%, or fewer 2,900 FTEs
- Solar saw the largest decline, with its workforce almost halving over the period – losing 44% of its workforce, or 4,400 fewer FTEs

1.3 Employment in green occupations

1.3.1 Around a quarter (27%) of working adults in Great Britain reported in May 2023 that they would describe any part of their job as a "green job", while around 1 in 20 (4%) reported that all or most of their job relates to "green" activities.

1.3.2 Working males (30%) appeared more likely than working females (24%) to describe any part of their job as green.

1.3.3 Working adults in Scotland (38%) and Wales (36%) appeared more likely to describe any part of their job as green than those in England (26%).

1.4 Employment in green firms

1.4.1 Nearly half (47%) of UK employees worked in one of ten industries that accounted for less than 1% of total UK greenhouse gas (GHG) emissions in 2021.

1.4.2 Just three industries – the electricity, gas, steam and air conditioning industry, manufacturing, and the transportation and storage industry – accounted for over 61% of total UK GHG emissions in 2021 but employed just 15% of UK employees.

2 Measuring “green” employment

2.1.1 The Office for National Statistics (ONS) defines a green job as:

- Employment in an activity that contributes to protecting or restoring the environment, including those that mitigate or adapt to climate change[2]

2.1.2 They have developed three approaches to measuring green jobs:

- Industry-based approach: including all jobs in a green industry, with industries classified according to the activities they carry out
- Occupation-based approach: including all jobs that are green regardless of the industry they are in, based on the activities carried out by workers
- Firm-based approach: including all jobs in a "green" firm, with such firms being classified based on, for example, their level of emissions

2.1.3 The employment estimates in this report are based on the number of full-time equivalents (FTEs) working in each of these three measurements. Under this approach, a person working full-time for one year would be counted as one FTE.

2.1.4 The data in this report are taken from Office for National Statistics (ONS), released 27 September 2023, ONS website, statistical bulletin, Experimental estimates of green jobs, UK: 2023

2.1.5 Finally, it is important to note that these are experimental estimates of green jobs. Therefore, they are subject to revision as definitions, methods and data sources are reviewed. ONS will continue to have discussions with stakeholders about the activities listed and will also be reviewing data sources to identify potential improvements to methods, or if alternative data sources are available.

2 https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/developingestimatesofgreenjobsintheuk

3 Employment in green industries

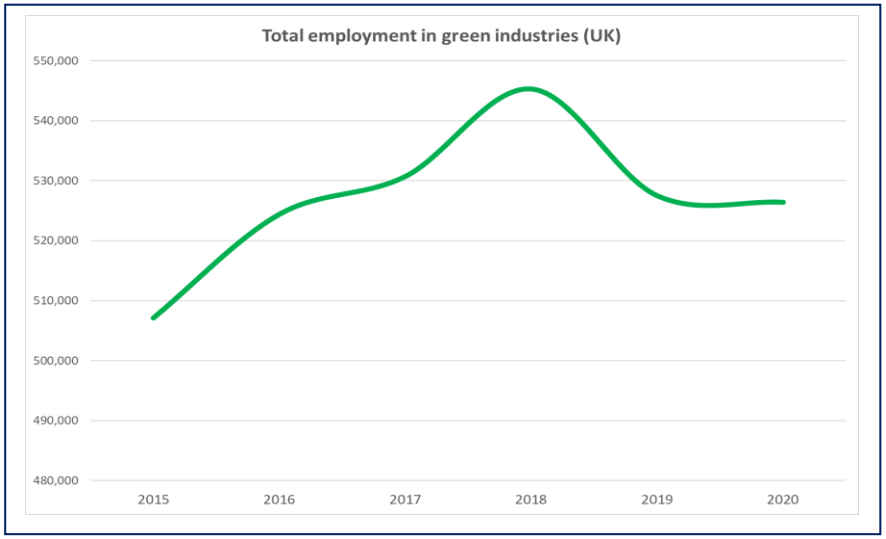
3.1.1 The industry-based approach includes all jobs in a green industry or sector and are the ONS' headline estimate of employment in green jobs.

3.1.2 These activities include research and development, design, production, installation, operation and maintenance, and specialised consultancy services. Full definitions of these activities can be found in Appendix 1.

3.1.3 In 2020, total employment across these green industries was estimated at 526,000 full time-equivalents (FTEs) in the UK. This was 4% higher than the 507,000 estimated in 2015 (the earliest estimates available). For context, employment across all sectors of the UK economy grew by 2.4% during the same period.

3.1.4 Since reaching its peak in 2018 at 545,000 FTEs, employment in green industries has fallen by 3.5%.

Figure 1: Total employment in green industries: 2015 to 2020 (UK)



Source: Opinions and Lifestyle Survey from the Office for National Statistics

3.1.5 The fall in employment in green jobs between 2018 and 2020 was largely because of lower employment in the Energy efficient products and Waste industries. These activities saw a decrease in employment of around 20,000 and 23,000 FTEs between 2018 and 2020, respectively.

3.1.6 Energy efficient products and waste were the two largest industries, with around 113,000 and 97,000 FTE employees in 2020, respectively. These two activities accounted for 40% of all employment in green jobs in 2020.

3.1.7 Growth between 2015 and 2020 was seen across a number of activities, in particular:

- Renewable energy increased by around 10,000 FTEs
- Water quantity saw an increase of around 8,000 FTEs
- Environmental charities grew by around 6,000 FTEs
- Low emission vehicles saw employment increase by around 6,000 FTEs

Figure 2: Experimental employment figures, top level framework, UK: 2015 - 2021

Industry	2015	2020	Change	
			Number	%
Alternative fuels, including hydrogen supply	3,900	600	-3,300	-85%
Bioenergy	7,200	7,500	300	4%
Carbon capture and storage	~	300	N/A	N/A
Energy efficient products	115,500	112,700	-2,800	-2%
Energy saving and monitoring	13,300	14,100	800	6%
Energy storage	1,000	2,100	1,100	110%
Environmental charities	27,600	33,700	6,100	22%
Environmental consultancy not elsewhere classified	8,900	5,700	-3,200	-36%
Environmental related education	2,200	2,500	300	14%
Grid infrastructure	*	*	N/A	N/A
In-house environmental activities	5,100	2,100	-3,000	-59%
Low carbon transport	13,700	19,300	5,600	41%
Management of forests	10,800	11,700	900	8%
Managerial activities of government bodies	13,800	11,400	-2,400	-17%
Nature protection and restoration (excluding forests)	21,800	23,400	1,600	7%
Nuclear power	12,100	15,400	3,300	27%
Recycling	27,600	29,600	2,000	7%
Renewable energy	24,700	34,900	10,200	41%
Repairs	49,000	45,900	-3,100	-6%
Waste	96,200	96,800	600	1%
Wastewater	23,000	19,300	-3,700	-16%
Water quantity	29,700	37,400	7,700	26%
Total	**507,100**	**526,400**	**19,300**	**4%**

Source: Experimental estimates of green jobs, UK: 2015 – 2020, ONS.

~ Indicates that data has been supressed.

* Indicates that no data is available at present.

3.1.8 These estimates include employment in nuclear power, which some may not classify as green. In 2020, employment in nuclear power was estimated to be around 15,000 FTEs.

3.1.9 In relation to Grid infrastructure, where ONS do not yet provide estimates of green jobs, the 2022 *Business Register and Employment Survey* estimates that 141,000 FTEs are employed in the transmission and distribution of electricity; the distribution of gas through mains; the collection, treatment and supply of water and sewerage. However, not all these workers will be directly employed in the decarbonisation of those networks.

3.1.10 The Renewable Energy industry grew by 10,200 (41%) between 2015 and 2020. In the table below we can see which technologies contributed most to that overall growth.

Figure 3: Experimental employment figures, Renewable Energy, UK: 2015 - 2021

Rank	2015	2020	Change	
			Number	%
Renewable electricity	**21,400**	**23,400**	**2,000**	**9%**
Hydropower	600	1,200	600	100%
Offshore wind	3,000	11,700	8,700	290%
Onshore wind	7,600	4,700	-2,900	-38%
Other renewable sources	300	300	0	0%
Solar	9,900	5,500	-4,400	-44%
Renewable heat	**2,500**	**8,700**	**6,200**	**248%**
Renewable combined heat and power	**800**	**2,800**	**2,000**	**250%**
Total	**24,700**	**34,900**	**10,200**	**41%**

Source: Experimental estimates of green jobs, UK: 2015 – 2020, ONS.

3.1.11 Renewable heat grew the most – increasing its FTEs by 248%, or additional 6,200 FTEs.

3.1.12 Renewable combined heat and power grew by 250% - an additional 2,000 FTEs.

3.1.13 Within Renewable electricity, there is a mixed picture depending on specific technology types:

- Offshore wind grew the most – by 290%, or an additional 8,700 FTEs
- Hydropower doubled its workforce from 600 to 1,200
- Other renewable sources remained stable at 300 FTEs
- Onshore wind saw its workforce shrink by 38%, or fewer 2,900 FTEs
- Solar saw the largest decline, with its workforce almost halving over the period – losing 44% of its workforce, or 4,400 fewer FTEs

3.1.14 It is worth noting the variation in employment estimates from different sources. While the ONS, in this data, estimate offshore wind employment to be 11,700 (which is similar to the estimate produced by the ONS' *Low Carbon and Renewable Energy Economy* 2021 survey), the Offshore Wind Industry Council in its *Offshore Wind Skills Intelligence Report 2023* report direct employment in offshore wind as 17,394 – almost 50% higher. The cause of such variation is likely definitional (i.e. scope of activities) and methodological (i.e. the data source – what and how it is collected).

4 Employment in green occupations

4.1.1 ONS' occupation-based approach measures all jobs that are "green", regardless of the industry they are in, based on the activities carried out by workers or the objectives of their work. It can be useful to understand the characteristics of who is working in green jobs, regardless of the sector they are in.

4.1.2 Respondents to the Opinions and Lifestyle Survey were asked a series of green jobs questions and relate to Great Britain only, as the survey does not cover Northern Ireland.

4.1.3 As responses are based on unedited people's opinions of their jobs, it is important to note that inconsistencies may be present in the data. For example, respondents who said they would describe any part of their job as green may then go on to report they spend no time on green activities, and vice-versa.

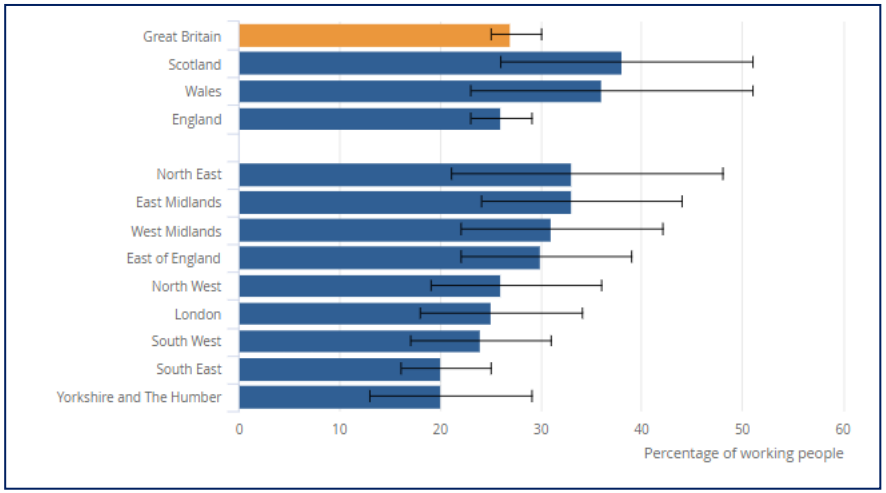
4.1.4 Around a quarter (27%) of working adults reported that they would describe any part of their job as a "green job".

4.1.5 Approximately 4% of respondents reported that all or most of their job related to green activities.

4.1.6 The majority of those who said that they would describe any part of their job as green were male (56%). Working males also appeared more likely than working females to describe any part of their job as green, at 30% compared with 24%.

4.1.7 Working adults in Scotland (38%) and Wales (36%) appeared more likely to describe any part of their job than those in England (26%). It is important to note that estimates for some of the regions are subject to higher levels of uncertainty because of sample sizes.

Figure 4: Percentage of working adults who described any part of their job as green, by region, Great Britain, 4 to 29 May 2023



Source: Opinions and Lifestyle Survey from the Office for National Statistics

5 Employment in green firms

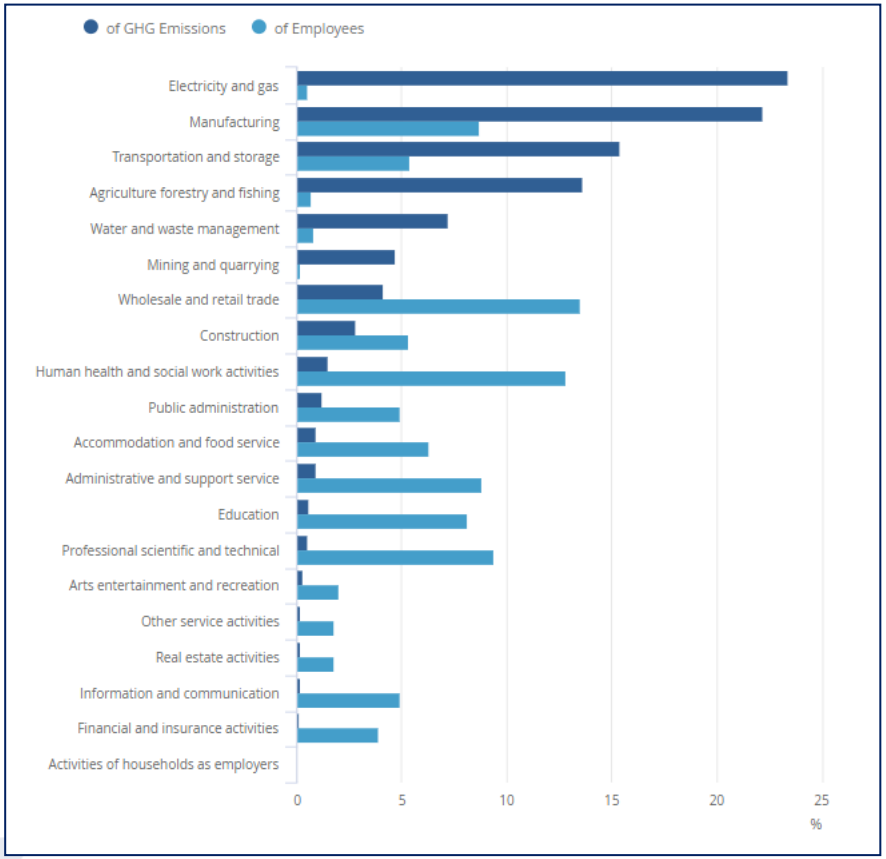
5.1.1 The firm-based approach to measuring green jobs measures all jobs in firms classified as "green". By looking at this, we can also identify firms which will need to transition towards green, and therefore the number and characteristics of employees within them.

5.1.2 As a proxy for green industries, ONS has considered the relative contribution of each industry to total GHG emissions.

5.1.3 In 2021, there were 10 industries whose emissions contributed less than 1% to total GHG emissions. These 10 industries collectively accounted for 4% of total GHG emissions and employed 47% (12.3 million) of total employees.

5.1.4 In contrast, just three industries – the electricity, gas, steam and air conditioning industry; manufacturing; and the transportation and storage industry – accounted for over 61% of total GHG emissions in 2021 and 15% (3.8 million) of total employees. These industries are likely to be most affected by the UK's transition to net zero, and already have the highest number of "green jobs", such as renewable energy.

Figure 5: Percentage of total greenhouse gas emissions (residence basis) and total employees by industry, UK, 2021



Source: Office for National Statistics, Ricardo Energy and Environment, Business Register and Employment Survey, Northern Ireland Statistics and Research Agency

Appendix 1 – Defining green industries

Listed below of the definitions of each of the green industries detailed in chapter 3:

- **Alternative fuels, including hydrogen**

  Research and development, design, construction, production, operation and maintenance, and specialised consultancy services relating to energy alternative fuels which are not classed as bioenergy. Includes hydrogen produced either by electrolysis or low carbon thermochemical processes, or both.

- **Bioenergy**

  Research and development, design, construction, production, operation and maintenance, and specialised consultancy services relating to energy from renewable biomass sources. Includes electricity, heat and combined heat and power.

- **Carbon capture and storage**

  Research and development, design, construction, and operation and maintenance of the infrastructure related to the capture of either waste CO2 or other greenhouse gases, or both, at point of emission or from the atmosphere more generally, and using it for additional economic activity and depositing it where it will not enter the atmosphere.

- **Energy-efficient products**

  Research and development, design, manufacture, specialised consultancy services and installation of energy-efficient products.

- **Energy saving and monitoring**

  Research and development, design, production, installation, operation and maintenance, and specialised consultancy services relating to systems that reduce energy consumption through effective heat or electricity management, including equipment and related systems for doing this.

- **Energy storage**

  Research and development, design, construction, operation and maintenance of the infrastructure for energy storage. This includes the storage of electricity, hydrogen, thermal energy, and other energy.

- **Environmental charities**

  This activity includes charities whose purpose is to protect and/or manage the environment and natural resources. Environmental charities include those providing environmental education and training, conservation and preservation of fauna and flora, and promotion of environmental issues (e.g. pollution abatement and control).

- **Environmental consultancy n.e.c.**

  Expert advice, training and education (academic and work-based) on protecting or restoring the environment that is not elsewhere categorised (n.e.c.).

- **Environmental-related education**

  This activity includes education aimed at environmental protection and management of natural resources. This activity includes tertiary education (non-university tertiary education and university tertiary education).

- **Grid infrastructure**

  Research and development, design, construction, operation and maintenance of the infrastructure related to the decarbonisation of grid networks. This would include the conversion of gas networks to be suitable for hydrogen, and the decarbonisation of the electricity grid.

- **In-house environmental activities**

  This includes activities that businesses carry out in-house to protect the environment against the damaging or depleting impact of the business's activity. It includes activities such as waste management and wastewater treatment on site.

- **Low carbon transport**

  The research and development, design, specialised consultancy services and manufacture of equipment related to transport designed to specifically reduce or remove emissions. Also includes the research and development, design, production and installation of infrastructure to support low and zero carbon transport, including electric vehicle (EV) charging infrastructure.

  Low carbon transport includes zero and low emission vehicles, low carbon water transport, low carbon road and public transport, low carbon air travel and other low carbon travel. We will continue to consult with users on the scope of these activities, for example, whether all rail would be included or only employment activity related to decarbonising rail.

  This category includes the manufacture of bicycles where it is for specific large-scale projects, such as city bikes. Leisure bikes are excluded.

- **Management of forests**

  This activity includes activities relating to forests available for wood supply (but not currently cultivated) and for forests not available for wood supply (such as, protected forests, nature reserves, national parks). Associated activities carried out for their maintenance and management (restoration activities and prevention and control of forest fires) are included. This includes restoration activities (reforestation and afforestation) as well as the prevention and control of forest fires.

  Activities and products concerning measurement, control, laboratories and so on are also included, as well as education, training and information, and general administration activities linked to the management of non-cultivated forest and forests not available for wood supply. This division does not include cultivated forests for wood supply or reforestation activities of cultivated forests.

- **Managerial activities of government bodies**

  This category includes public administration aimed at protecting the environment and management of natural resources. Activities such as the issuing of environmental permits and licenses, monitoring of air, land and water, protection of biodiversity and landscapes, and the development of environmental policies are included.

- **Nature protection and restoration (excluding forests)**

  Activities and measures aimed at the conservation, reintroduction or recovery of fauna and flora species, as well as the restoring, reshaping and rehabilitation of damaged habitats for the purpose of strengthening their natural functions.

  This includes activities that promote a return to original conditions of soil and wetlands (including peatlands), and economic activities that improve soil and wetland functions without necessarily promoting a return to pre-disturbance conditions.

- **Nuclear power**

  This includes research and development, design, construction, production, specialised consultancy services and installation of infrastructure for producing electricity from nuclear power, as well as the production of electricity from nuclear power, and the operation and maintenance of related infrastructure.

  This category excludes energy attained from nuclear decay, which is covered in our section on "renewable combined heat and power". It also excludes activities relating to decommissioning, nuclear medicine and military nuclear programmes.

- **Recycling**

  This activity includes the salvage of wrecks (automobiles, ships, computers, televisions and other equipment) and the processing of metal and non-metal waste and scrap and other articles into secondary raw materials. It also includes the separating and sorting of materials from waste streams and mixed recoverable materials into distinct categories. The production of energy from waste is excluded here and captured under "bioenergy".

- **Renewable energy**

  Research and development, design, construction, production, manufacture and installation of infrastructure, and specialised consultancy services for producing energy from offshore wind, onshore wind, solar, hydropower, and other renewable sources (such as tidal or wave power, or geothermal sources).

- **Repairs**

  These activities relate to the repair of personal and household goods, and computers. It excludes the repair and installation of machinery and equipment in the manufacturing sector.

- **Waste**

  These activities relate to the collection, treatment and disposal of various forms of waste, such as solid or non-solid industrial or household waste, as well as contaminated sites. The output of the waste can either be disposed of or become an input into other production processes.

- **Wastewater**

  These activities relate to the collection, treatment and disposal of wastewater, industrial or household, as well as contaminated sites. The output of the wastewater or sewage treatment process can either be disposed of or become an input into other production processes.

- **Water quantity**

  This category includes natural water, water treatment and supply services for domestic and industrial needs. Management of water includes activities aimed at minimising the intake of inland water through in-process modification as well as the reduction of water losses and leaks, and the installation and construction of facilities for water reuses and savings.

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