

Article

Research into “green jobs”: time spent doing green tasks, UK: 1997 to 2019

This article provides new experimental estimates of the time spent doing green tasks, over time, by UK country and by industry. It uses a new method, based on task-level data from the O*NET database in the US.

Contact:
Josh Martin and Ellys Monahan
environment.accounts@ons.gov.
uk
+44 1633 455783

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1 . Main points

- Around 7 to 8% of hours worked in the UK are estimated to have been spent on green tasks in 2019; this is up from around 5 to 6% between 1997 and 2007.
- The proportion of workers spending any time doing green tasks is estimated to have increased from around a quarter between 1997 and 2005, to more than a third between 2012 and 2019.
- All countries of the UK follow a similar trend in the proportion of workers and hours worked doing green tasks; England tends to have slightly higher levels of time spent on green tasks.
- The proportion of time spent on green tasks varies widely across industries, with production industries tending to have higher proportions.

There are many ways to define a “green job”, and no internationally agreed approach. These estimates use a new experimental methodology, based on task-level information from the US. These estimates should be treated with caution.

2 . Definitions used in this research

The final report of the Government's [Green Jobs Taskforce](#) highlights the importance of employment in the UK's transition to [net zero territorial greenhouse gas emissions by 2050](#) and for meeting other environmental goals, such as protecting and restoring nature. It said: "Every job has the potential to become "green" as the world moves to combat climate change".

Defining, quantifying and monitoring "green jobs" is therefore crucial. The Office for National Statistics (ONS) already produces widely-used estimates of jobs in the low carbon and renewable energy economy and the environmental goods and services sector. We have also explored [the challenges of defining a green job](#), and are developing our related work further. A novel approach, taken in this article, is to look at green tasks. Jobs that have a certain proportion of time spent on green tasks could be considered green jobs. We have identified the proportion of time spent on green tasks (as defined by the [O*NET Green Task Development Project](#)) for each occupation, using a range of data and modelling techniques.

The definition of a green task in this context includes a variety of activities related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy.

This article contributes to research on defining and measuring green jobs, as set out in the [green jobs workplan](#). It does not, at this stage, provide an overall total green jobs estimate on a task basis.

3 . Distribution of time spent doing green tasks

Around 7 to 8% of hours worked by people in employment in the UK are estimated to have been spent on green tasks in 2019. This is up from around 5 to 6% between 1997 and 2007, and from around 6 to 7% between 2011 and 2015.

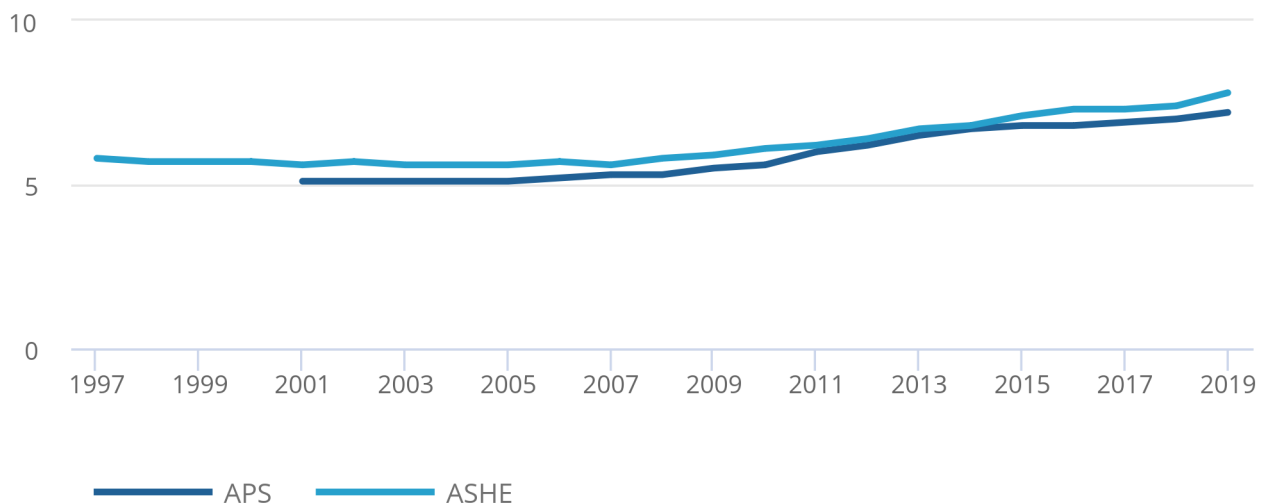
We have used two different labour market data sources to produce these estimates, which produce similar results. The Annual Population Survey (APS) covers employees and the self-employed and is our preferred source for most breakdowns in this article. The Annual Survey of Hours and Earnings (ASHE) covers employees only, but has a better industry allocation than the APS, so is used for the industry breakdowns in section 5.

Figure 1: Around 7 to 8% of hours worked were spent on green tasks in 2019, increasing by around 2 percentage points since 1997

Proportion of hours worked spent on green tasks, whole economy, UK, 1997 to 2019

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Proportion of hours worked spent on green tasks, whole economy, UK, 1997 to 2019



Source: Office for National Statistics – APS, ASHE and O*NET

Notes:

1. APS is a household survey which covers employees and self-employed. ASHE is a business survey which covers just employees. APS estimates are extended for periods before 2004 using LFS-based estimates.
2. Both sources make an adjustment for changes in the occupation classification in 2011.

We also considered the proportion of workers who spend any time doing green tasks, from a small fraction of their time to the majority of their time.

Figure 2 shows that the proportion of workers spending any time doing green tasks is estimated to have increased from around a quarter between 1997 and 2005 to more than a third between 2012 and 2019.

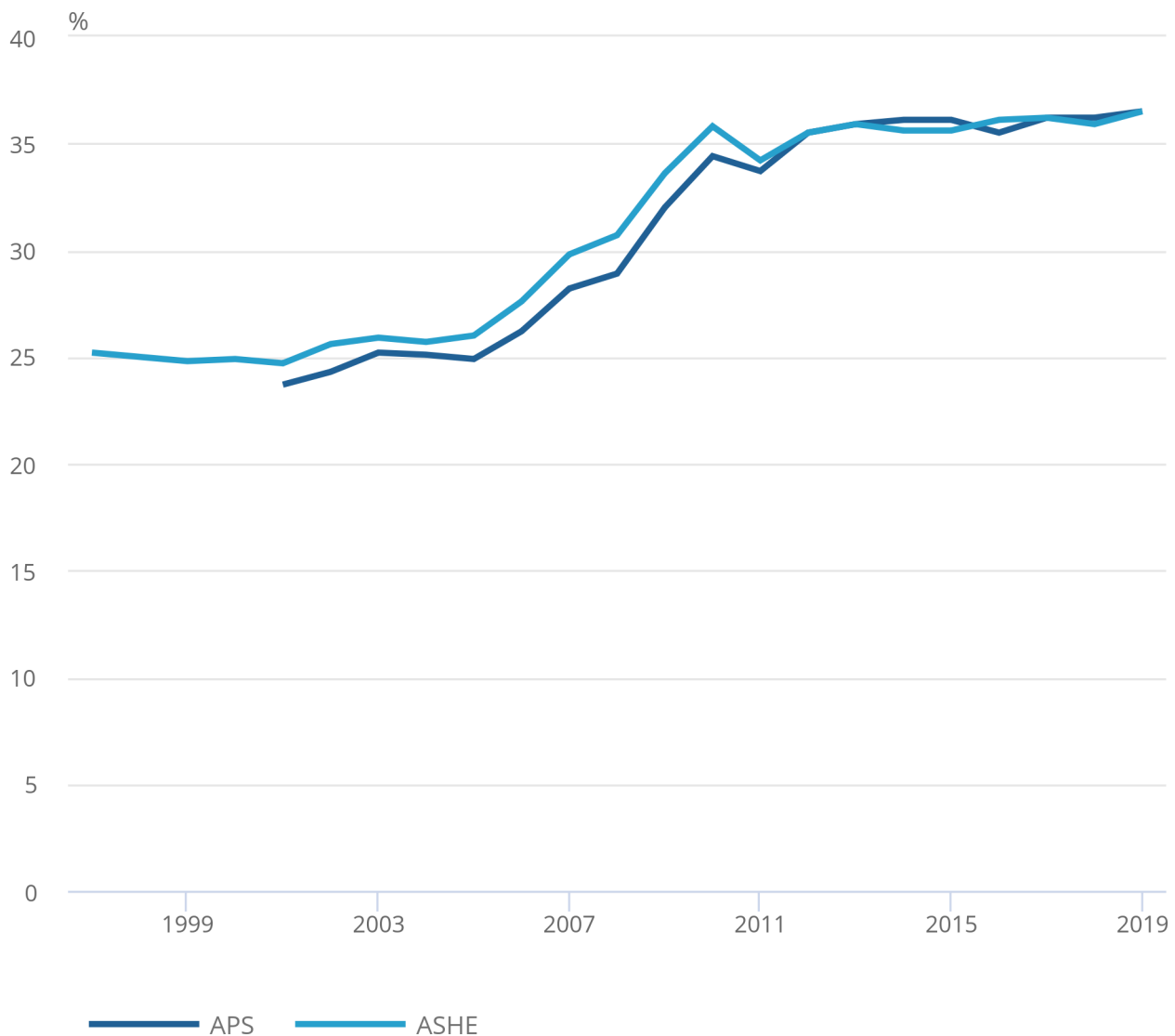
Most of this increase came between 2005 and 2010. There have been regular international discussions on climate change issues over the last two decades, some of which have had results in international climate change agreements. For instance, the [Kyoto Protocol](#), an international climate change agreement, which was adopted by the UN in 1997, came into force in early 2005.

Figure 2: The proportion of workers spending any time on green tasks in 2019 was around 10 percentage points higher than in 1997

Proportion of workers who spent time on green tasks, whole economy, UK, 1997 to 2019

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Proportion of workers who spent time on green tasks, whole economy, UK, 1997 to 2019



Source: Office for National Statistics – APS, ASHE and O*NET

Notes:

1. Both sources make an adjustment for changes in the occupation classification in 2011.

Figure 1 and Figure 2 show increases at slightly different times. The share of hours worked doing green tasks increases modestly between 2005 and 2010, then increases more rapidly from 2011 onwards. The share of workers doing any green tasks increases mostly between 2005 and 2010, and modestly little thereafter. This can also be seen in Figure 3, which shows the changing distribution of time spent on green tasks.

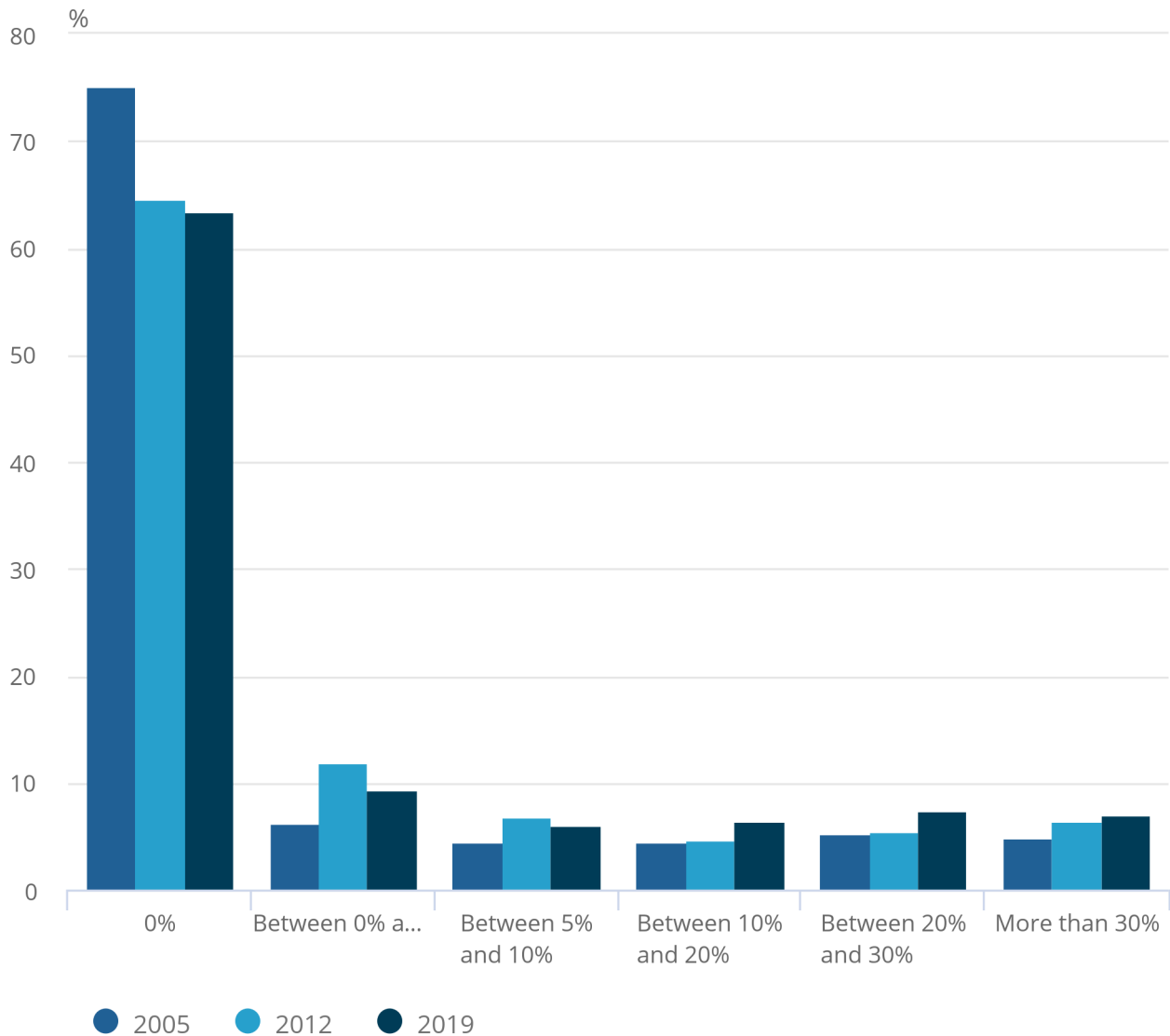
Changes between 2005 and 2012 are characterised by a sharp fall in the proportion of workers not spending any time on green tasks and increases in the proportion of workers spending small proportions of their time on green tasks (notably 1 to 5% of their time). By contrast, there was an increasing share of workers spending more than 10% of their time on green tasks. This could be a result of new green tasks or of making existing tasks greener.

Figure 3: The proportion of workers spending more time on green tasks has increased between 2005 and 2019

Distribution of the proportion of time spent on green tasks, whole economy, UK, 2005, 2012 and 2019

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Distribution of the proportion of time spent on green tasks, whole economy, UK, 2005, 2012 and 2019



Source: Office for National Statistics – APS and O*NET

Workers spending large proportions of their time on green tasks contribute almost half of the total number of hours on green tasks. Of the total 73.5 million hours a week estimated to have been spent on green tasks in 2019, around 35.4 million were done by the 7% of workers who spent 30% or more of their time doing green tasks. The other 93% of workers spending less than 30% or none of their time on green tasks contributed about 38.1 million hours on green tasks.

4 . Time spent doing green tasks by country

All four countries of the UK follow a similar trend in the proportion of workers and hours worked doing green tasks.

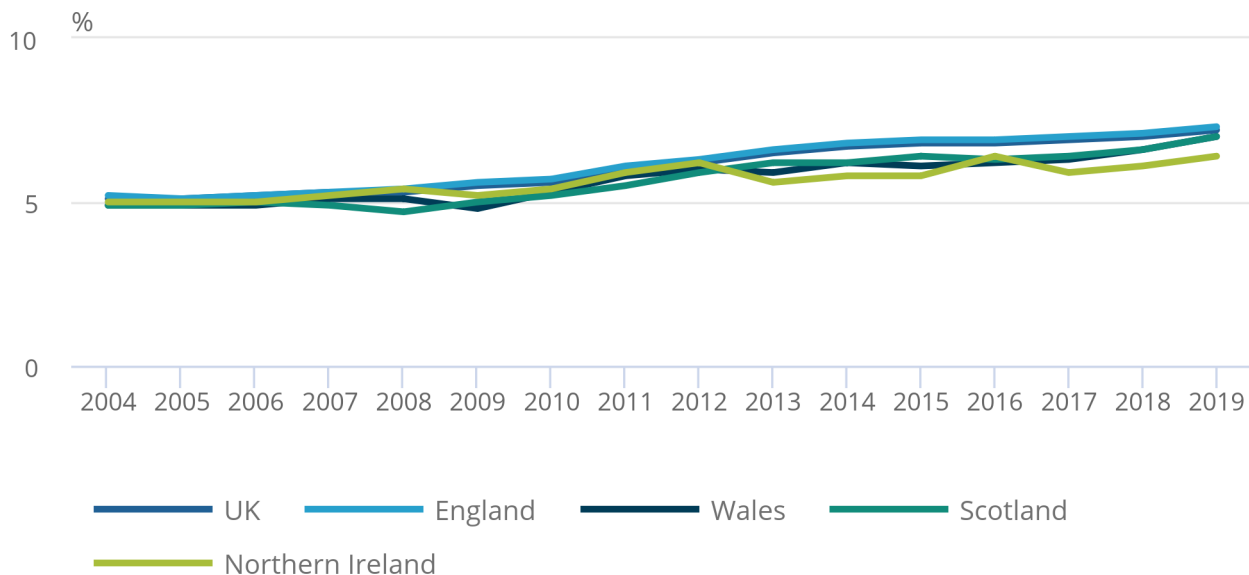
Figure 4 shows that England is estimated to have the greatest share of hours worked on green tasks (at 7.2%), slightly above the UK average. While estimates for Scotland, Wales and Northern Ireland are a little lower at around 7% in Scotland and Wales, and 6.4% in Northern Ireland. They are also more volatile because of smaller survey sample sizes.

Figure 4: All countries of the UK have seen a similar trend in the proportion of hours worked spent doing green tasks over time

Proportion of hours worked spent on green tasks, whole economy by country of the UK, 2019

Figure 4: All countries of the UK have seen a similar trend in the proportion of hours worked spent doing green tasks over time

Proportion of hours worked spent on green tasks, whole economy by country of the UK, 2019



Source: Office for National Statistics – APS and O*NET

Notes:

1. Variations by country will only reflect differences in occupational mix, and not differences in the proportion of time spent on green tasks by occupation across countries.
2. There is an adjustment for changes in the occupation classification in 2011.

The differences between countries are slightly larger at the upper end of the distribution.

Figure 5 shows that the proportion of workers spending at least 20% of their time on green tasks was highest in England every year between 2004 and 2019, reaching a peak of nearly 15% in 2019.

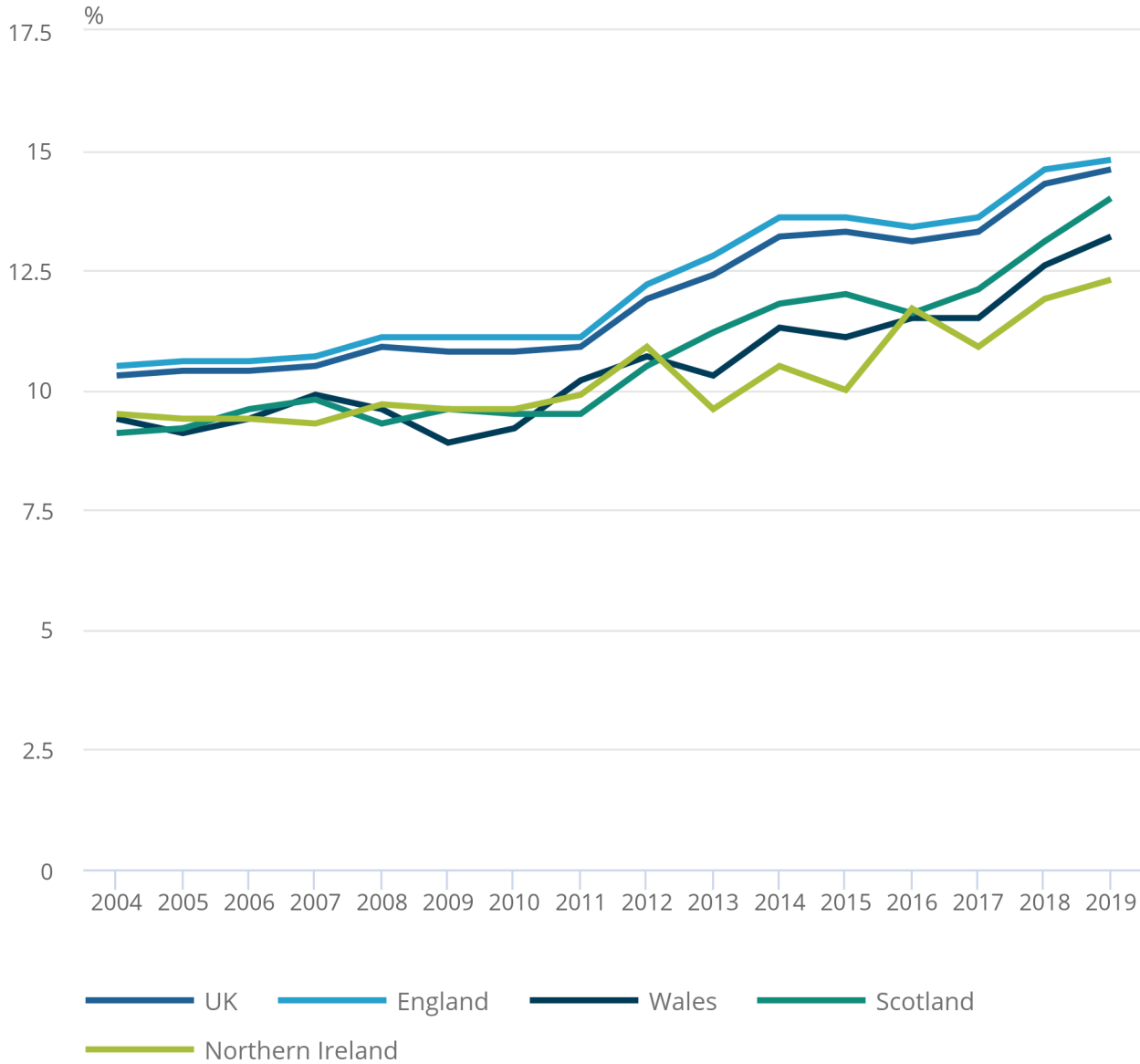
Wales, Scotland and Northern Ireland again follow similar trends, but have lower proportions of workers spending at least 20% of their time on green tasks. Scotland has seen the largest increase among the four countries in this period in recent years on this measure, from 11.6% in 2016 to 14.0% in 2019.

Figure 5: England has the highest proportion of workers spending at least 20% of their time doing green tasks

Proportion of hours worked spent on green tasks, whole economy by country, UK, 2019

Figure 5: England has the highest proportion of workers spending at least 20% of their time doing green tasks

Proportion of hours worked spent on green tasks, whole economy by country, UK, 2019



Source: Office for National Statistics – APS and O*NET

Notes:

1. There is an adjustment for changes in the occupation classification in 2011.

5 . Time spent doing green tasks by industry

There is great variability in the proportion of time spent on green tasks across industries.

We use the Annual Survey of Hours and Earnings (ASHE), a business survey which has a better allocation of workers to industries, for industry breakdowns. As ASHE only covers employees, estimates for industries with large numbers of self-employed workers (such as construction and agriculture) should be interpreted with caution.

Figure 6 shows that production industries including mining, utilities and manufacturing had the highest estimated proportion of hours spent on green tasks in 2019. The share was above 12% for each of these industries, compared with below 8% for all industries in the UK as a whole.

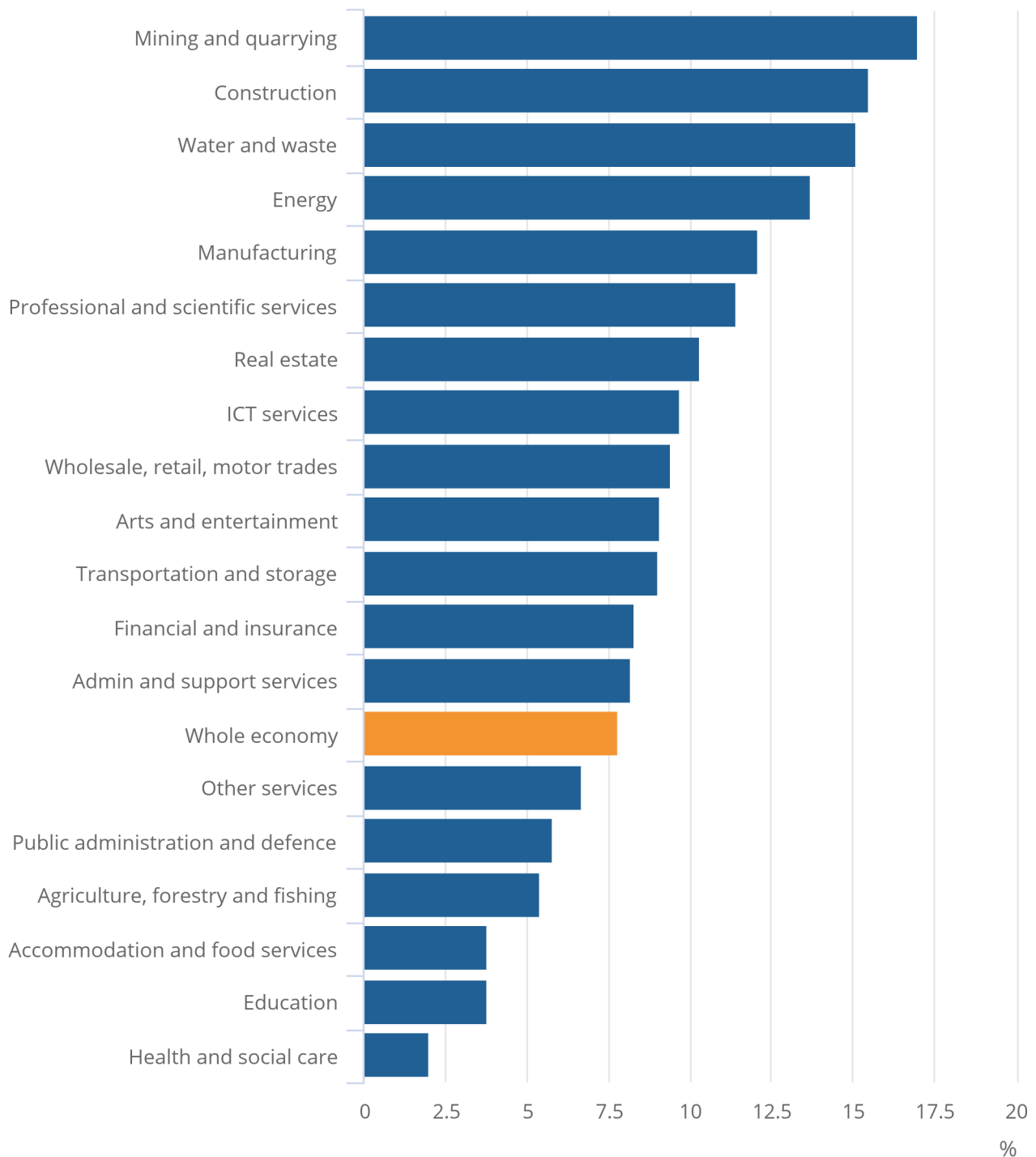
Services industries had lower shares, especially the health and social care, education, and accommodation and food services industries.

Figure 6: Production industries had higher proportions of hours worked on green tasks in 2019

Proportion of hours worked spent on green tasks, by industry, UK, 2019

Figure 6: Production industries had higher proportions of hours worked on green tasks in 2019

Proportion of hours worked spent on green tasks, by industry, UK, 2019



The mining industry has the highest proportion of hours worked on green tasks. Figure 7 shows how over 85% of workers in the mining industry spend some time doing green tasks. However, a relatively smaller proportion spend at least 20% of their time doing green tasks. This suggests that the mining industry has a large number of workers with relatively small shares of their time spent on green tasks, potentially related to regular but low-intensity green activities.

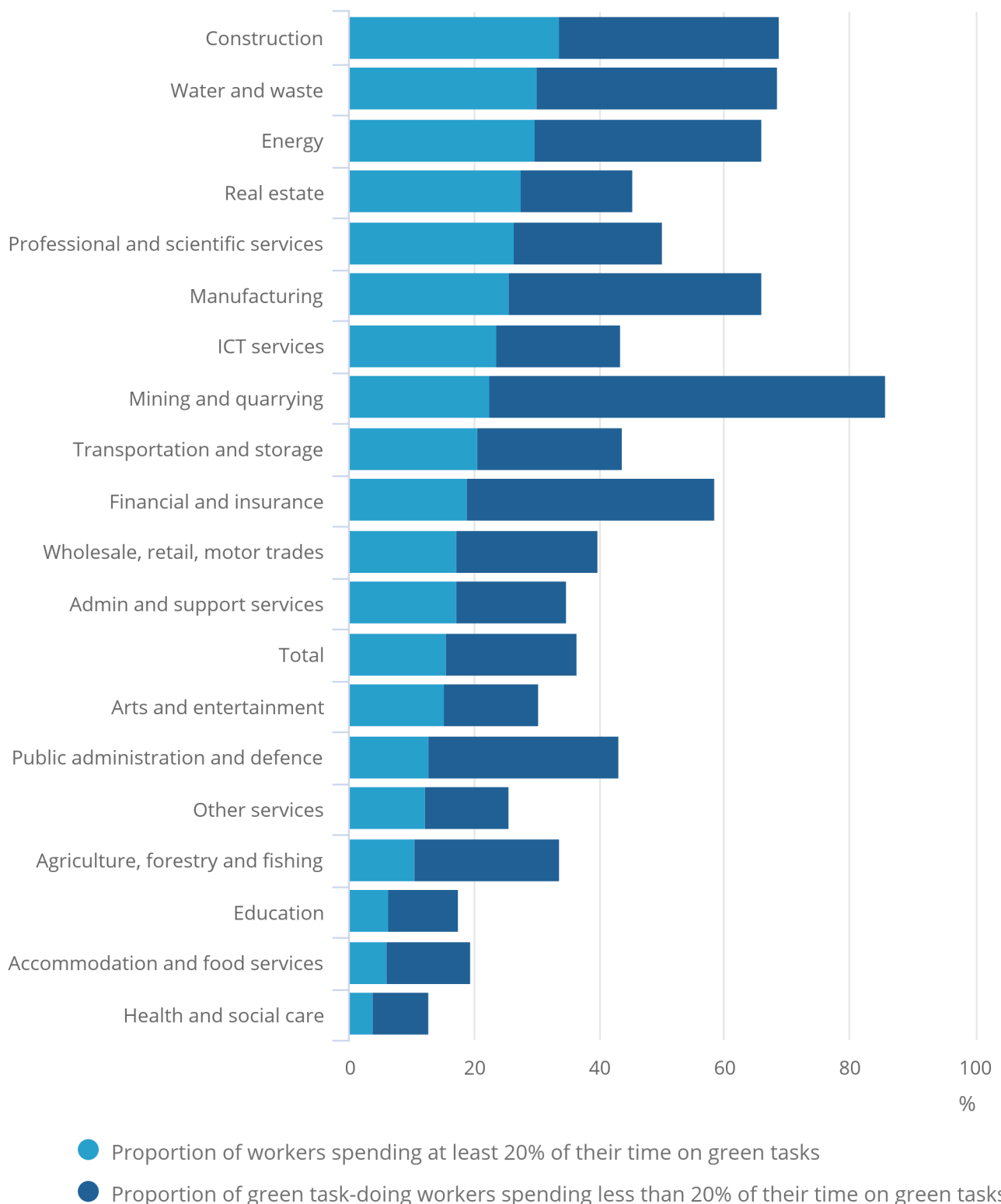
By contrast, the utilities and energy industries have relatively high shares of workers spending at least 20% of their time doing green tasks. This may suggest that green tasks tend to be larger elements of many jobs in these industries.

Figure 7: Energy and utilities industries had higher proportions of workers spending more than 20% of their time on green tasks

Proportion of green task-doing workers, spending more than and less than 20% of their time on green tasks, by industry, UK, 2019

Figure 7: Energy and utilities industries had higher proportions of workers spending more than 20% of their time on green tasks

Proportion of green task-doing workers, spending more than and less than 20% of their time on green tasks, by industry, UK, 2019



Notes:

1. Proportion of green task-doing workers spending less than 20% of their time on green tasks is calculated as the proportion of workers doing green tasks, minus the proportion of workers spending at least 20% of their time on green tasks.

6 . The Office for National Statistics’ (ONS) research into “green jobs”

As highlighted in the [“green jobs” workplan](#), the task by occupation-based approach taken here provides additional insight into green jobs. We plan to look further into the task by occupation-based analysis, into the demographics and characteristics of those undertaking green jobs. We are also committed to exploring alternative approaches to the measurement of green jobs as outlined in the workplan.

7 . Data for time spent doing green tasks

[Time spent on green tasks](#)

Dataset | Released 7 March 2022

Experimental estimates of the time spent doing green tasks, over time, by UK country and by industry. The estimates use a new method based on task-level data from the O*NET database in the US.

8 . Glossary

O*NET

A US labour market database containing detailed information on tasks for a detailed list of occupations.

Green tasks

A work task, as identified in the O*NET database, that is "green". The definition of green in this context includes a variety of activities related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy.

"Green jobs"

"Green jobs" are not defined in this work. There is currently no agreed definition, but this analysis relates to workers who spend some fraction of their time doing green tasks.

9 . Measuring the data

Methodology

More details about the methodology are given in an accompanying methodology article.

Time spent on green tasks is estimated using task-level data available in the US O*NET database. No equivalent database exists for the UK.

[O*NET](#) has, for each of almost 1000 detailed occupations, a list of around 20 occupation-specific tasks. For each task, data on the frequency of the task, the importance and relevance of the task, and other data, is collected from workers doing that occupation or occupational experts. These data are updated periodically for each occupation.

We use the information on the relevance and frequency of each task, combined with a marker for which tasks are green to estimate the fraction of time spent on green tasks. These are identified in the O*NET database between 2011 and 2019 based on a 2011 study. We add these markers to earlier and later releases of the O*NET database using automated and manual processes.

To fill in the gaps between data collections, we use linear interpolation and extrapolation to create estimates of the time spent on green tasks by occupation between 1997 and 2021. We then convert this from O*NET occupation codes to the [UK Standard Occupation Classification \(UK SOC\)](#), via the US Standard Occupation Classification (US SOC), and the [International Standard Classification of Occupations \(ISCO\)](#). Given the majority of matches are not one-to-one, we take the arithmetic average (mean) of converted green time shares by UK SOC code.

We then apply these green task time shares to UK labour market data.

UK labour market data sources

We use two UK labour market sources in this analysis: the Annual Population Survey (APS) and the Annual Survey of Hours and Earnings (ASHE).

The APS is the UK's largest continuous household survey. It is not a standalone survey but uses data combined from wave 1 and wave 5 (the first and last wave) of the main [Labour Force Survey](#) (LFS), plus a boost from the Local Level Labour Force Survey for England, Wales and Scotland. Industries and occupations are coded by interviewers based on information given by respondents. It covers employees and the self-employed, but the quality of the industry allocation is generally considered to be less reliable than business surveys. As such, we use APS data for our UK and country breakdowns, but not our industry breakdowns. See the [APS QMI](#) for more details.

ASHE is based on a 1% sample of employee jobs taken from HM Revenue and Customs (HMRC) Pay As You Earn (PAYE) records. Information on earnings and hours is obtained from employers and treated confidentially. Occupations are coded by the Office for National Statistics (ONS) based on written responses from businesses. Industries are allocated based on information held on the Inter-Departmental Business Register (IDBR). ASHE covers employees only. See the [ASHE QMI](#) for more details.

Current measures of "green jobs" published by the ONS

The Environmental Goods and Services Sector (EGSS) estimates are published according to the [United Nations System of Environmental Economic Accounting](#) definition, which includes "areas of the economy engaged in producing goods and services for environmental protection purposes, as well as those engaged in conserving and maintaining natural resources." These cover a range of activities from the production of renewable energy to Government environmental management activity to organic agriculture.

The [Low Carbon and Renewable Energy Economy \(LCREE\) survey](#) collects information, including employment, from businesses conducting low carbon and renewable energy activities. The survey focuses on sectors with economic activities "that deliver goods and services that are likely to help the UK generate lower emissions of greenhouse gases, predominantly carbon dioxide". The scope of LCREE is narrower than the EGSS definition; some activities that might be considered "green", such as recycling and the protection of biodiversity, are not among the sectors included. However, LCREE potentially captures more activity as it samples businesses across the economy, no matter their primary purpose, finding many businesses have some activity but are not solely active in LCREE sectors.

10 . Strengths and limitations

Strengths

The task and occupation-based approach to measuring "green jobs" explored in this research captures those in occupations not classified within green industries and sectors. This avoids assumptions on whether an industry or sector is green, broadening the definition and capturing those occupations where time is spent on green tasks.

A task and occupation-based approach also reflects "greening" within occupations since the approach can reflect changes in the times of activity each occupation does over time.

Limitations

The method uses the [US O*NET database](#) and applies task statements within occupations to the UK. This makes a key assumption that the tasks undertaken within occupations are the same within the US and UK, and that those considered green in the US are also considered green within the UK.

These data must be mapped from US occupation codes to UK occupation codes using an international occupation classification. This presents several opportunities for mismatch between codes, which could lead to under- or over-estimates of the fraction time spent on green time in certain UK occupation codes.

The task and occupation-based approach neglects differences within occupations, where the firm, industry or job role may impact on time spent on green tasks. Occupations can cover a diversity of roles, but the method uses a single average green time share for each occupation. It also does not capture time spent on non-green tasks in firms that might be considered to be focussed on green activities.

For each occupation, the estimated proportion of time spent on green tasks varies across all industries and countries. As such, variations found in this research by country and industry in the proportion of total hours worked on green tasks will only reflect differences in the occupational mix, and not variations in the proportion of time spent on green tasks within occupations.

The [O*NET green tasks development project](#) began in 2010, with green task markers included in the O*NET data from 2011 to 2019. Before 2011 and after 2019 we have added green task markers using automated and manual processes, which may make the estimates in earlier and later years less reliable.

ASHE does not cover the self-employed nor does it cover employees not paid during the reference period who could be unemployed, switched to self-employment, exited the labour market or their employer may not have responded to the survey. See the [ASHE QMI](#) for more details.

The APS collects self-reported data from respondents. Although data validation and imputation are used, collected responses may not be fully accurate, may be missing information and may not fully match responses given by businesses. See the [APS QMI](#) for more details.

11 . Related links

[The challenges of defining a "green job"](#)

Article | Released 7 April 2021

Reviews the options available to define "green jobs" and explores the challenges in doing so. The ONS contributions to defining and measuring "green jobs" are explained, together with alternatives from the relevant literature.

[Low carbon and renewable energy economy, UK: 2020](#)

Bulletin | Released 17 February 2022

Estimates of the size of the UK's green economy from the Low Carbon and Renewable Energy Economy Survey, including turnover and employment.

[Environmental goods and services sector \(EGSS\) estimates](#)

Dataset | Released 3 June 2021

Estimates of the UK's environmental goods and services sector: output, gross value added, employment and exports, 2010 to 2017 and (provisional) 2018.

["Green jobs", current and upcoming work: March 2022](#)

Article | Released 7 March 2022

How the ONS has contributed to understanding "green jobs" through regular estimates and research articles, and what our future work on "green jobs" will include.