Working towards an environmentally sustainable and equitable future?
New evidence on green jobs

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This Data Insight explores employment in green jobs in England and Wales. The article considers who is working in a green occupation and calculates if there is a pay benefit for doing so. It presents findings by linking O*NET (Occupational Information Network) data on green jobs[1] to de-identified data from the Annual Survey of Hours and Earnings (ASHE) linked to the 2011 Census – England and Wales dataset[2,3].

Summary

Given the urgency of the transition to net-zero, there is a need for a robust evidence base to support green policy interventions. Intelligence in relation to green jobs, however, is partial and fragmented, driven in part by the lack of an international consensus on definition and its effect on data collection. This paper contributes new evidence to explore green employment in England and Wales by linking O*NET data to de-identified data from the newly linked ASHE- 2011 Census dataset[4].

This evidence indicates that male, white, full time, and individuals working for small and medium sized enterprises or foreign owned companies are more likely to work in green occupations. There is also a substantial pay premium[5] for those that do, which reduces the overall gender and ethnic pay gap. However, gender and ethnic pay gaps persist within green occupations. The results suggest that, to have a fair and just transition, interventions may be required to address the dual inequality of opportunity and pay in green occupations, before they become embedded.

Background

The climate crisis and environmental emergency is potentially the greatest challenge faced by the global community. International governments have set ambitious plans to transform to a net zero economy, with the UK targeting 2050.

Green jobs are at the core of this transition and have an important role in delivering environmental management strategies that promote sustainable economic development. This evolution provides an opportunity to address embedded labour market inequalities to support a fair and just transition.

To do so, government and businesses need to develop policies and strategies based on a robust and reliable evidence base, which at present is lacking. Green jobs have the potential to serve as a catalyst for social equity, but little is known about how the transition is impacting different groups.

What we did

We linked O*NET data to ASHE- 2011 Census dataset. This enabled us to identify green jobs by occupation. We mapped United States O*NET data on US green tasks and occupations to that on UK occupations using the "LMI for All" crosswalk[6], a tool developed in the UK to facilitate the comparison of labour market information (LMI) across different occupational classifications.

The mapping allowed us to identify jobs which were either directly or indirectly green. Jobs which were directly green were new jobs or jobs that required enhanced skills. Jobs that were indirectly green jobs were jobs that were impacted due to the greening of the economy.

Throughout the analysis, we focused on those working in green jobs and drew comparisons with those working in other occupations. We considered various labour market outcomes, including share of employment and hourly pay, while exploring the effects across different gender and ethnic groups.

We analysed both single year data (cross-sectional) and data from multiple years (panel-data). We used the latest year's data for the single year (2018), while using the full dataset (2011-2018) in a panel analysis framework to account for time varying factors. Our full sample for the single year included approximately 175,000 employees, while the sample totalled approximately 1.4 million across all years.

We used regression models to estimate the likelihood of working in green occupations (direct and indirect) and the pay-premium for working in a green occupation. We compared:

- the effect of gender and ethnicity on likelihood of being in a green job

- raw pay gap: the difference between average pay for green and non-non green jobs

- adjusted pay gap: the difference between average pay for green and non-non green jobs, while controlling for all other observable characteristics.

- gender and ethnic pay gap for those working just in green occupations.

Through the inclusion of interaction terms (e.g. being female and looking after dependent children) this allowed us to uncover nuanced characteristics that are driving some of the gender inequality in pay.

What we found

Individuals are more likely to work in green occupations if they are white and male

Figure 1 uses the binary measure of green jobs and reveals that 32% of occupations were classed as being green in 2018. Albeit when the (preferred) continuous measure is used, approximately 16% of all occupations are green.

Figure 1: Share of green employment by gender and ethnicity (2018)

Source: Authors calculations based on O*NET and Office for National Statistics (ONS)

The raw figures reveal that men filled more than two thirds of all green jobs. This compares to just over a half of all employment. Green occupations accounted for one in three occupations for white workers, whereas this dropped to less than one in four for Black and Black British workers. Since employment rates for this group are below that for white counterparts – 69% compared to 77% – this green occupation employment disadvantage is compounded.

Table 1, which uses regression analysis, revealed that females are less likely to be employed in green occupations (Column 1). The results suggest that a considerable part of this may be related to childcare responsibilities (Column 2) which appears to be a significant barrier to employment in green jobs for women.

Table 1: Characteristics of workers in green occupations (2018)

	(1) Green Occupation	(2) Green Occupation & Female interaction
Female	-0.275***	0.002

Female interaction
    & pre-school child
    & primary school child
    & senior school child
		-0.068*
		-0.086**
		-0.090***

Additional controls	Y	Y

* p<0.10 ** p<0.05 *** p<0.01

Source: Authors calculations based on O*NET and ONS (ASHE Linked to Census 2011)

Table 2 shows that Asian and Black minority ethic groups are less likely to be employed in a green occupation, particularly in directly green occupations (Columns 1 and 2) – i.e. those which require new skills or those which are newly created.

Table 2: Characteristics of workers in direct and indirect green occupations (2018)

	(1)	(2)	(3)
	Direct		Indirect
	Green Enhanced Skills	Green New and Emerging	Green in Demand
Ethnicity (ref. white)			
Asian/Asian British	-0.112***	-0.090**	0.016
Black/Black British	-0.133***	-0.116***	0.059
Additional controls	Y	Y	Y

* $p<0.10$ ** $p<0.05$ *** $p<0.01$
Source: Authors calculations based on O*NET and ONS (ASHE Linked to Census 2011)

There is a pay premium for working in a green job, which reduces the gender pay gap overall

The existence of a pay premium for working in a green occupation is shown in Table 3 which reports the median wage of those working in green occupations in 2018. To benefit from larger sample sizes we use ASHE data only to reveal that in 2018 those working in a green occupation earned £14.00 per hour, compared to just £11.14 for those working in all other occupations. The average hourly wage for both men and women in green jobs exceeds average wage for total employment (£12.04).

Table 3: Hourly average earnings by gender (2018, median pay)

	Occupations		
	Green	Other	Total
Male	£14.38	£12.33	£13.39
Female	£13.06	£10.53	£10.99
Total	£14.00	£11.14	£12.04

Source: Authors calculations based on O*NET and ONS

In our regression analysis we used a variety of models to estimate the pay premium. After taking account of a variety of factors, in our preferred model (which benefits from the full power of the 2011-2018 dataset), we estimate there is a pay premium of around 4% for working in a green occupation.

When looking at just those that work in green jobs, there is still evidence that gender and ethnic pay gaps persist

The results of the regression analysis reveal that the same pay inequalities (gender and ethnicity) that are present in the wider labour market are still present when looking solely at green occupational employment. For example, Table 1 (Column 1) shows that females, Asian/Asian British and Black/Black British workers in green occupations earn over 10% less than their male and white counterparts.

Table 1: Hourly average earnings by gender (2018, median pay)

	(1) Green Jobs - Pay	(2) Green Jobs - Pay (Interactions)
Female	-0.148***	-0.329
Ethnicity (ref. white)		
Asian/Asian British	-0.152***	-0.159***
Black/Black British	-0.177***	-0.211***
Female interactions:		
& Married		-0.052**
& Dependent - senior school child		-0.043**
Enterprise size (ref 250+)		
& 0-9		-0.209**
& 10-49		0.078*
& Manufacturing		-0.129**
& Finance/Law		-0.089*
Additional controls	Y	Y

* $p<0.10$ ** $p<0.05$ *** $p<0.01$
Source: Authors calculations based on O*NET and ONS (ASHE Linked to Census 2011)

In Column 2 we include some interaction terms in order to better understand what is driving the female pay gap. The results suggest that domestic responsibilities seem to have a negative effect on female pay in green occupations (i.e. female and married; female and dependent child), while there are also increased disadvantages for females working for small companies (0-9) and in specific sectors (manufacturing and finance/law).
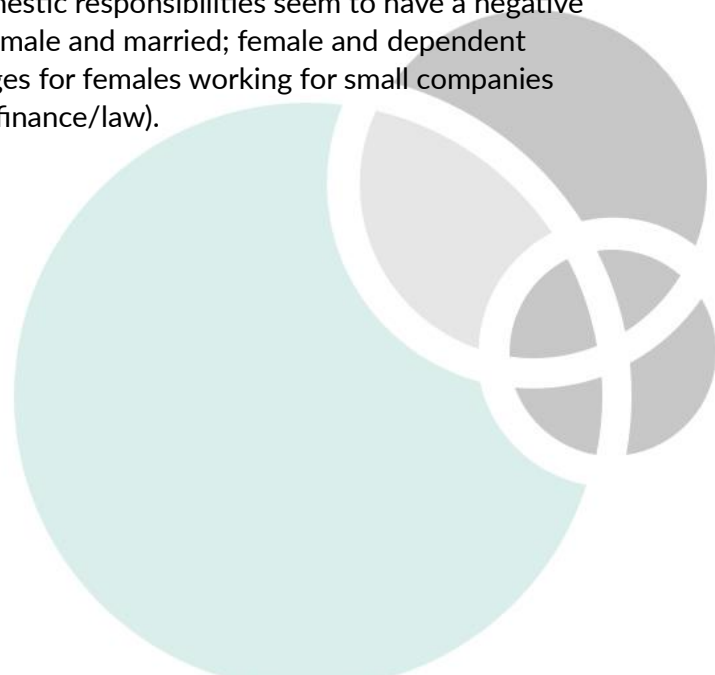
Why it matters

The identification of a pay premium in green occupations suggests that these jobs are not only vital for environmental sustainability, but are also becoming economically sustainable and desirable. This can help shift public perception of green jobs from being "alternative" or "niche" roles to mainstream career paths that offer competitive or even superior compensation. For policymakers, this finding can justify more robust support and investment in the green economy, leveraging economic incentives to meet environmental goals. Moreover, for businesses, it emphasises the importance of aligning business practices with sustainability goals to attract talent and capital in an increasingly eco-conscious market environment.

The greening of the economy offers the potential for a more inclusive and just transition. That said, policymakers should note the dual inequality that green occupational employment appears to engender. Not only are female and ethnic groups underrepresented in green employment, but when they are employed in green jobs, they are paid less than their counterparts. Further research is needed to explore the mechanisms through which this occurs, and policies put into place to mitigate this.

What next?

As there is no agreed definition of green jobs, this project intends to test the robustness of the findings reported here by taking both 'top-down[7]' and alternative 'bottom-up[8]' approaches. For example, top-down estimates can be generated by linking data on emissions at the sector, industry or company level, while bottom-up approaches can be supported through links to additional datasets (e.g. Low Carbon and Renewable Energy Economy Survey).

In ongoing analysis, we intend to explore the influence of other factors on the gender and ethnic pay gap reported in green jobs. For example, we intend to use the employee-employer link of the ASHE-Census 2011 dataset to explore the role that employers play in shaping labour market differences in green jobs. By analysing the observed gaps, we can estimate the precise role that employers play in driving the pay gap, and the gap which remains unexplained (e.g. discrimination).

Finally, given the geographic identifiers in the dataset (local authority), given that some green sectors may be concentrated in areas, it would also be useful to further explore spatial issues and their influence on inequality.
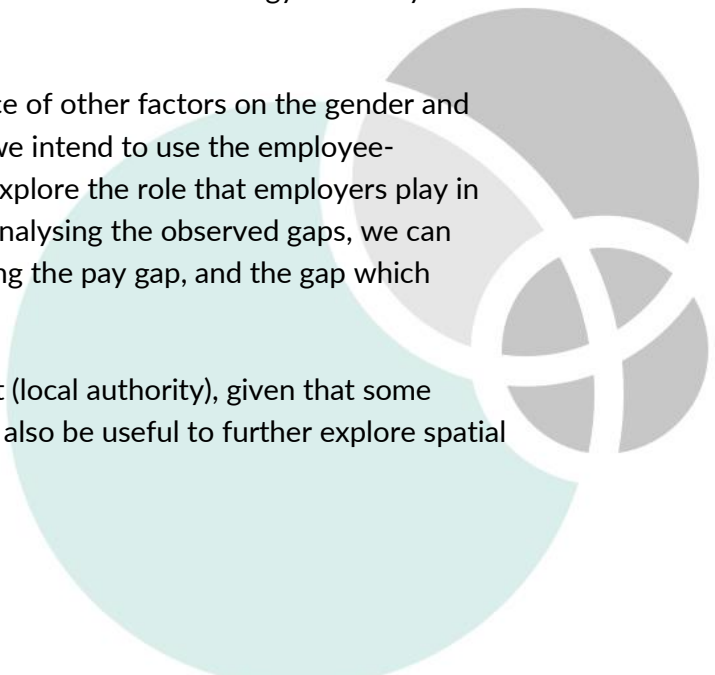
References

1. Information on the O*NET (2010) *O*NET Green Task Development Project* is available at www.onetcenter.org/reports/GreenTask.html

2. Data source: Office for National Statistics. (2023). Released 03 July 2023, ONS SRS Metadata Catalogue, dataset, Annual Survey of Hours and Earnings linked to 2011 Census – England and Wales, https://doi.org/10.57906/80f7-te97.

3. For an overview of the research project see https://www.adruk.org/our-work/browse-all-projects/research-fellows-using-adr-england-flagship-datasets-829/

4. For a more detailed analysis, see Whittard, D., Bradley, P., Phan, V. and Ritchie, F., (2025) Working Towards an Environmentally Sustainable and Equitable Future? New Evidence on Green Jobs from Linked Administrative Data in the UK. *Journal of Cleaner Production*.

5. In this study, a pay premium means that on average wages are higher than the national average.

6. The LMI for All crosswalk is available at the UK's Department for Education's online portal – available at www.lmiforall.org.uk

7. Top-down approaches categorise all occupations within specific sectors or activities related to the zero-carbon transition as 'green'.

8. Bottom-up approaches identify specific activities within firms or occupations that qualify as green.
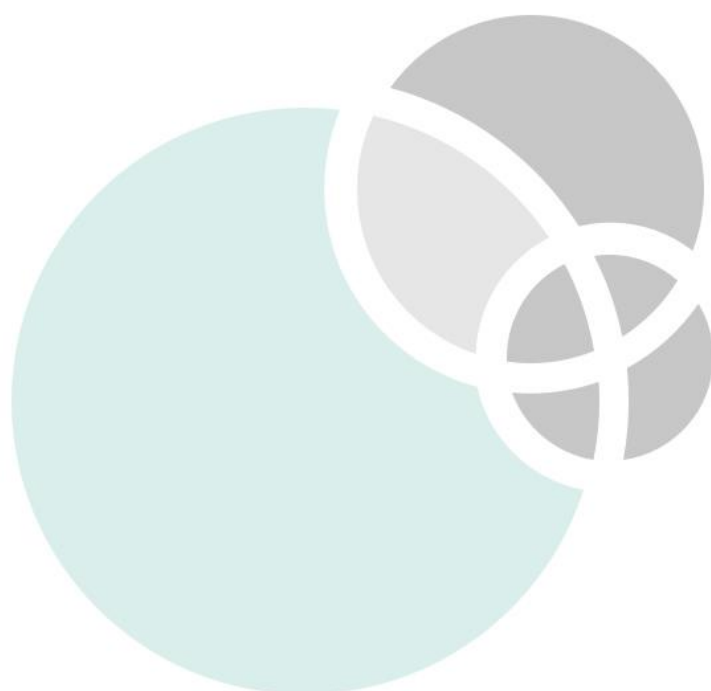
Acknowledgements

About ADR UK

ADR UK (Administrative Data Research UK) is a partnership transforming the way researchers access the UK's wealth of public sector data, to enable better informed policy decisions that improve people's lives. By linking together data held by different parts of government and facilitating safe and secure access for accredited researchers to these newly joined-up and de-identified data sets, ADR UK is creating a sustainable body of knowledge about how our society and economy function – tailored to give decision makers the answers they need to solve important policy questions. ADR UK is funded by the Economic and Social Research Council (ESRC), part of UK Research and Innovation.

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