A Just Transition? Green jobs, good jobs and labour market inclusivity in Scotland

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Abstract

Responding to the climate emergency, governments have pledged to deliver a net zero future. Delivery requires more green jobs and a just transition of good jobs and labour market inclusivity. The problem is that there is no agreed methodology for classifying green jobs. The paper reports the findings from analysis of Scotland, applying the GreenSOC – an adaptation of the green occupation's classification of the US Bureau of Labor Statistics and O*NET. The analysis uses the UK Labour Force Survey and web-scraped job vacancy data to assess the extent and demand for green jobs as well as the pay and gender composition of these jobs. The findings are mixed. First, there are few new green jobs but a strong greening of existing jobs. Second, while green jobs offer higher wages, they tend to be dominated by male workers. These findings suggest that the employment benefits of the transition to net zero are less inclusive than anticipated and that policy and practice need to adjust. Offering recommendations, the paper provides improved definitional and empirical understanding of green jobs as well as offering insights into how green jobs might be made more inclusive.

Keywords
gender, good jobs, green jobs, green occupations, GreenSOC, just transition, labour market inclusion, net zero, pay, Scotland

Introduction

Responding to the climate emergency, there is an international policy consensus on the need to deliver a net zero economy. This economy requires more green jobs and, additionally, a 'just transition' of good jobs and labour market inclusivity (EU 2023; HM Government 2021; ILO 2023; OECD 2021; UN 2021). Focusing on Scotland, this paper empirically assesses the delivery of these policy aspirations. The Scottish Government has an ambitious target of net zero carbon emissions by 2045 and a 75% reduction by 2030. Its just transition agenda, and ongoing commitment to improving job quality through what it terms 'Fair Work' (Scottish Government 2021a), aims to help deliver 'a fairer, greener future for all' (Scottish Government 2021b). The research was commissioned by Skills Development Scotland (SDS),[i] an agency of the Scottish Government in the context of the Scottish Government (2021b) recognising that a just transition will involve an adaptation of workers skills and working practices and need to meet employer demand, while contributing to tackling inequality in Scotland.

The starting position for the paper is recognition that there is no internationally agreed methodology for classifying green jobs, which makes it difficult to assess if either a net zero economy or just transition is being delivered (Abrahamsson et al. 2023; OECD 2023; ONS 2021). However, there is an emerging consensus on the utility of measurement work undertaken through the US Bureau of Labor Statistics and O*NET (Dierdorff et al. 2009; see also Sofroniou and Anderson 2021). Drawing on but adapting this work, our analysis uses a newly developed classification of green jobs that we call the 'GreenSOC'.

Whilst policy parlance refers to 'green jobs' – see, for example, the UK's Green Jobs Task Force (2021) and the EU's Green Deal (EC 2019) – analytically, a job is an occupation within an industry. As a consequence, we examine these green jobs through occupational and industry classifications. Our subsequent classification of green occupations allows the capture of new green jobs and the impact of the net zero transition on other existing jobs. As such it aligns with the ILO's (2023) point that change has to occur across all jobs and sectors if a net zero economy is to be achieved and sustained.

The paper is structured as follows. The next section discusses the policy push for a net zero economy and, with it, a just transition. The outline covers international policy positions as well as those within Scotland. It also highlights the definitional debates about measuring green jobs. The following section outlines the GreenSOC methodology as well as the data sources for the analysis. The next section presents the findings, first on the extent of green jobs and then demand for them. It then focuses on the just transition and good jobs and the inclusiveness of these jobs. The conclusion summarises the findings, reflects on progress to achieving a net zero economy with a just transition and makes recommendations for further policy development. The paper provides improved methodological and empirical understanding of green jobs as well as offering insights into how green jobs might be turned to be more inclusive.

Background

There is an international policy consensus that a transition to a net zero economy is needed to help tackle climate change (EC 2019; ILO 2023; OECD 2023; Renner et al. 2008;). This transition will create more new green jobs as well as impact existing jobs (Consoli et al. 2016; Gagliardi et al. 2016; IRENA 2016; Knudsen et al. 2023; Poschen and Renner 2015). Climate change policy, however, offers more than green jobs growth. What makes the transition to net zero distinct from other economic transitions is that it is not market driven but policy driven, intended to deliver a 'just transition'. Two policy aspirations are salient within this just transition. First that 'no-one is left behind' in the transition to a net zero economy, which means being 'inclusive' in two ways: supporting workers de-jobbed by the phasing out of fossil fuels and providing better labour market inclusion for marginalised workers, particularly female workers (ILO 2023; also OECD 2023; UN 2021). Second, the new green jobs will be 'decent jobs' or 'good jobs', at least as indicated by pay (Renner et al. 2008).

Within the UK, these policy aspirations are reflected in Scotland. Scotland has a government-sponsored Climate Emergency Action Plan (CESAP) also centred on creating more green jobs (Skills Development Scotland 2020). As part of its national strategy for delivering economic prosperity, the Scottish Government (2022) identifies five policy programmes, one of which is intended to 'generat[e] new, well-paid jobs from a just transition to net zero'. Paralleling these policy aspirations is another to improve job quality through the encouragement of 'fair work' in Scotland which includes pay (Scottish Government 2021a). Echoing the ILO, for the Scottish Government the just transition is thus one that is 'fair and leaves no one behind' (Scottish Government 2021b: 5).

A key challenge in measuring progress to a net zero economy is that there is no internationally agreed definition of a green job (ONS 2021). Indeed, even within the EU, different agencies of the European Commission interpret green jobs differently (Urban et al. 2023). The absence of a commonly accepted definition leads to widely varying green job estimates (OECD 2012).

Definitional approaches generally fall into one of two main camps (Sofroniou and Anderson 2021). The first is a 'purist' approach, with green jobs narrowly defined in terms of their 'green credentials' (Dierdorff et al. 2009) – that is, jobs in sectors that 'contribute substantially to preserving or restoring environmental quality' (Renner et al. 2008: 39) and are typically located in the energy/renewables industries (Sofroniou and Anderson 2021). The second is an 'inclusive' approach that envelopes the wider impact of the greening on jobs and includes but extends beyond sectors directly focused on environmental preservation and restoration (Dierdorff et al. 2009; OECD 2012).

It is recognised that a consistent approach to defining green jobs is needed (Cedefop and OECD 2015). Most policy emphasis and, as a consequence, measurement, has focused on jobs based on the purist approach, for example the EU's Environmental Goods and Services Sector classification (Eurostat 2016; see also Renner et al. 2008; Hogarth 2012). At the same time, there is recognition within policy that the whole of the economy and so all jobs in all sectors need to change if net zero is to be achieved and sustained (ILO 2023; Green Jobs Task Force 2021). These two positions suggest what needs to be included in the development of a consistent approach to measuring green jobs.

Reflecting this recognition, the classification of green occupations of the US Department of Labor's O*NET (Occupational Information Network)ii (Dierdorff et al. 2009) is gaining traction amongst researchers and policymakers internationally, including within Europe (e.g. Consoli et al. 2019; Green Jobs Taskforce 2021; Valero et al. 2021; Cedefop 2023). This green occupational taxonomy, using the US O*NET-SOC 2006, distinguishes three types of green jobs: first, New & Emerging Occupations, sometimes called 'pure' green jobs, which are completely novel or emerging in the transition to a green economy; second, Enhanced Skills Occupations which capture changing skills requirements in some existing jobs; and, third, Increased Demand Occupations resulting from green economic activities increasing employment demand for some existing jobs. Including net zero transition unaffected non-green, what are sometimes called 'brown' jobs, there is then four job types. We use this occupational classification as the starting point for measuring the extent and demand for green jobs and assessing if these jobs are delivering a just transition in Scotland.

Research design

In drawing on the O*NET approach to classify green occupations (Dierdorff et al. 2009), there are challenges applying it to Scotland and anywhere else outwith the US (Sofroniou and Anderson 2021). First, O*NET is focused on occupations based in the US (Christoph et al. 2020) but tasks can vary for the same occupation in different countries due to differing regulatory regimes and training and education systems (Richard et al. 2012). Second, there is a need to adapt the O*NET classification to the UK Standard Occupational (SOC), which covers Scotland. The SOC is updated every ten years. There is a crosswalk between the O*NET and SOC 2010 (the old version of the SOC) but no crosswalk from O*NET to SOC 2020 at the time of the study. To address these challenges, we used the crosswalk between the US O*NET-SOC and the UK SOC2010[iii] and then the crosswalk between the SOC2020 and the SOC2010 to identify the green occupations at the four-digit level of SOC2020. The researchers then manually examined the occupational list. A further examination was conducted by Skills Development Scotland and business stakeholders in order to finalise the list of green occupations at 4-digit level of SOC. The final list of green occupations was discussed and agreed with the SDS and the researchers. The use of external practitioner input plus data triangulation amongst the researchers is used in other attempts to create new occupational classifications, for example the UK's graduate occupational classification (GradSOC) (Elias and Purcell 2013).

In addition to this adaption to the UK/Scottish labour market, two other adaptations are needed. First more explicit inclusion needs to be made of knowledge within occupations. The current O*NET categorisation of green occupations rightly makes explicit reference to the skills of those occupations. However, all occupations comprise tasks underpinned by skills and knowledge and both O*NET and SOC outline these skills and knowledge. The knowledge component needs to be made explicit in order not to underplay changes occurring to some jobs as a result of the transition to net zero – that is, the greening of the skills and knowledge within existing jobs. Second, whilst data gathering for O*NET in the US is well-resourced compared to similar classification systems in the UK and elsewhere, its classification update can still be limited. Every year, some but not all occupations are reviewed (Handel 2017). Dierdorff's mapping was conducted in 2009. Given the intensified policy

push to address climate change since the 2015 Paris Agreement[iv] and its encouragement of new green jobs, there is a danger that the classification might be outdated. There is a need therefore for the classification to be supported by more timeous data collection (Christoph et al. 2020). Capturing 'real time' change would be helpful and web-scraped job vacancy data offers this opportunity (Cardenas Rubio and Warhurst 2022).

This triple adaption provides a new 'GreenSOC' that is more inclusive, more responsive and more sensitive to non-US, in this case Scottish, labour markets. It also means that the analysis can extend beyond the jobs in industries that directly contribute to net zero to other industries and jobs that indirectly support this aim.

Beyond the general adaptions, to distinguish 'pure green' New & Emerging Occupations in Scotland, we drew on the Scottish Climate Emergency Skills Action Plan 2020-2025 (CESAP) (SDS 2020). Using a sector-based approach, CESAP highlights the areas of economic activity deemed to be key to meeting net zero carbon emissions targets in Scotland. These areas involve energy production, waste and resource efficiency etc. However, the CESAP does not map these activities areas onto a standard industrial classification such as the Standard Industrial Classification (SIC) 2007 used in most of the official labour markets statistics in the UK. The lack of mapping makes it difficult to estimate the share of people working in companies that are key to delivering the net-zero target in Scotland. With additional input from SDS, we therefore mapped the CESAP sectors to SIC codes. We also ran a text mining exercise using the SIC2007 descriptors to identify green sectors that may not have been identified previously, for example we identified some SIC codes related to transport and waste treatment.

To assess if green jobs are good jobs, the UK now has a standard measure of job quality. However, data to support the measures is still being developed (see ONS 2022). In the interim, and included in the standard measure of job quality, we use pay as an indicator of job quality, with higher wages often used as an indicator of good jobs (see, for example, Goos and Manning 2007). As a measure of a just transition that is socially inclusive, we use gender, doing so for two reasons. First, because the fossil fuel oil and gas industries generally and within Scotland are overwhelming dominated by male workers (IRENA 2019). The shift away from these industries to a net zero economy ought therefore to be accompanied by a gender shift in employment (Cohn and Duncanson 2023; ILO 2015). Second, as part of the UN's Sustainable Development Goals 5, closing the gender gap in employment is deemed to be important (Azcona et al. 2023).

The analysis uses UK Labour Force Survey (LFS) data and web-scraped job vacancy data to assess the extent and demand respectively for green jobs in the Scottish labour market as well as the pay of these jobs and the gender of workers employed in them. The LFS is conducted quarterly by the UK's Office for National Statistics with our analysis covering the period 2014 to 2021. UK focused web-scraped job vacancy data has been collected by the Warwick Institute for Employment Research since 2019 and covers the period from then to 2022. It helps address the time-lag limitations of O*NET.

Findings

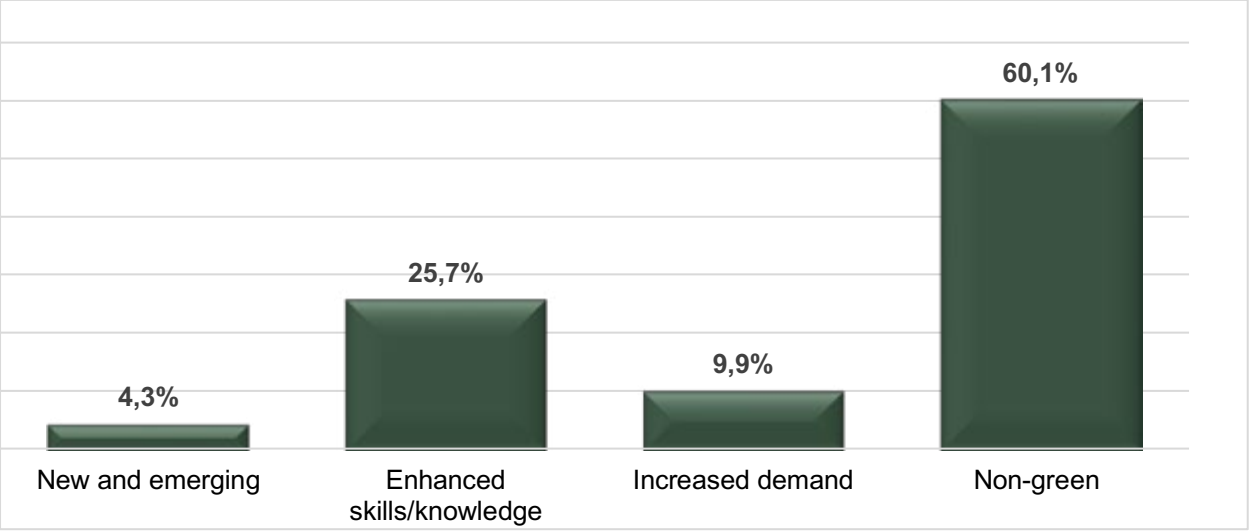
The findings first focus on the extent of and then demand for green jobs in Scotland. Findings related to the just transition are then presented, focusing first on whether green jobs are good jobs as indicated by pay and then these jobs' inclusiveness proxied by female employment.

The extent of green jobs

Using LFS data this section examines the extent of green jobs in Scotland. In 2021 there were 2.5m jobs in Scotland. The full range of green job types – and non-green or brown jobs – as a percentage of total employment in Scotland are shown below in Figure 1. New & Emerging green jobs account for just 4.3% of all jobs in Scotland. This figure is low. However, the findings suggest a strong greening of existing jobs: just over a quarter of jobs (25.7%) are Enhanced Skills & Knowledge jobs. Almost one-tenth (9.9%) are Increased Demand jobs. Most jobs in Scotland (60.1%) remain unaffected 'brown jobs', not falling into any of the three green job categories.

Some caution needs to be exercised with the figure for New & Emerging green jobs. Using the SOC2020 4-digit level, current LFS data does not provide sufficient detail of the specific economic activity of many of these jobs. For example, Mechanical Engineers are classified as a New & Emerging green job as they work on both new products and processes focused on renewable energy or energy efficiency. Including all Mechanical Engineers in this category is possibly an overestimate as not all Mechanical Engineers will focus on these products and processes; some remain focused on non-green products and processes. As a consequence, the 109,645 (or 4.3% of total employment) New & Emerging green jobs, and indeed all green job figures presented here, should be regarded as the maximum of the estimate driven by current data limitations.

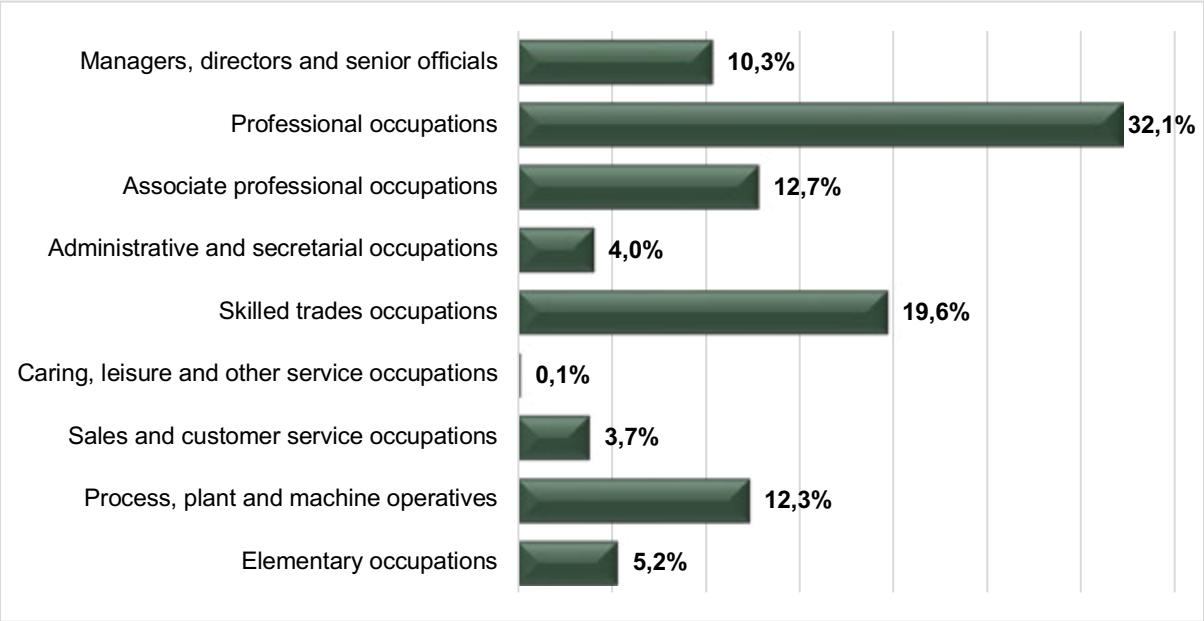
Figure 1: All green occupational categories plus non-green occupations in Scotland



It is useful to disaggregate the percentage share of green jobs in Scotland by Major Occupational Group (UK SOC2020), see Figure 2 below. Professional occupations have the highest proportion of

green jobs by occupational group (32.1%), followed by Skilled trades occupations (19.6%). Caring, leisure and other service occupations have the lowest proportion of green jobs (0.1%).

Figure 2: Green jobs in Scotland by SOC2020 Major Occupational Group



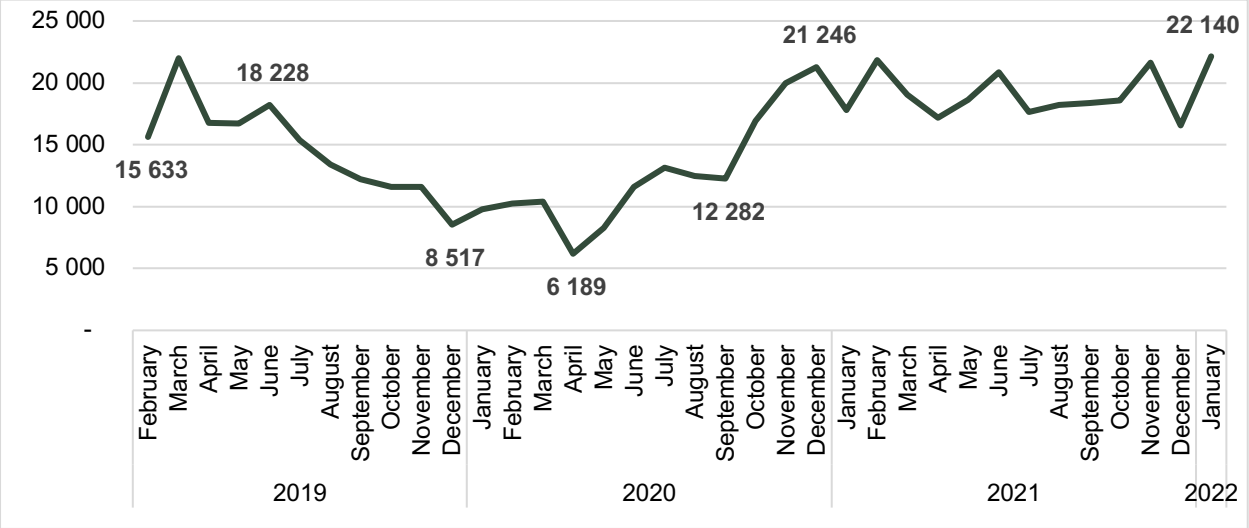
Moreover, there are clear differences in each green job category. Professional occupations have the highest proportion (43.2%) of New & Emerging green jobs and Associate professional occupations have the second highest (20.4%). Moreover, New & Emerging green jobs are concentrated exclusively in five of the nine UK Major Occupational Groups: Professional occupations; Associate professional occupations; Administrative and secretarial occupations; Skilled trades occupations; and Process, plant and machine operatives. Similarly, Professional occupations have the highest proportion of Enhanced Skills & Knowledge jobs (42.7%) and Skilled trades occupations have the second highest proportion (19.2%). Most Enhanced Skills & Knowledge green jobs (97.1%) are located in four Major Occupational Groups: Professional occupations; Managers, directors and senior officials' occupations; Skilled trades occupation; and Associate professional occupations. By contrast, over half of Increased Demand green jobs comprise Process, plant and machine operatives (29.3%) and Skilled trades occupations (27.1%). Professional occupations are notably absent in the Increased Demand category.

Demand for green jobs

Given that green jobs are a relatively new development within the labour market, analysis of web-scraped job vacancy data offers insights into 'real time' change. In particular, it helps identify any changing employer demand for green jobs covering the three categories.

Job vacancy data over 2019 to 2022 signals a post-Covid labour market recovery in Scotland. Figure 3 below highlights the low of 6189 vacancies in April 2020 as the pandemic took hold to the recovery of 22,140 job vacancies in January 2022.

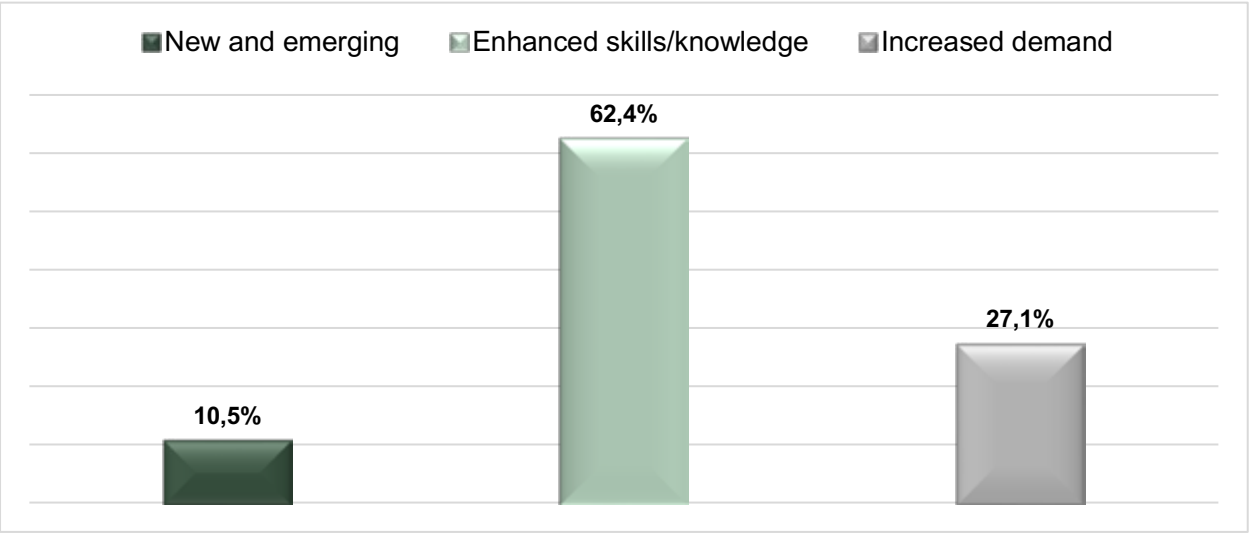
Figure 3: Job vacancy numbers in Scotland, February 2019 to January 2022



Analysis of job vacancy data reveals that green job vacancies as a proportion of all job vacancies in Scotland is consistent with LFS data on green jobs as a proportion of total employment. Just 39.9% of all job vacancies are green jobs across the three categories. Vacancy data also uncovered new job titles that do not even feature in the recently completed SOC2020, such as a 'net zero engineer'.

Vacancy data also mirrors LFS data in terms of variation in the relative proportion of jobs by green job category, see Figure 4 below. However, there are some differences: there is a slight decrease in the proportion of Enhanced Skills & Knowledge jobs and a slight increase in the proportion of Increased Demand jobs.

Figure 4: Proportion of green job vacancies in Scotland by category, February 2019 to January



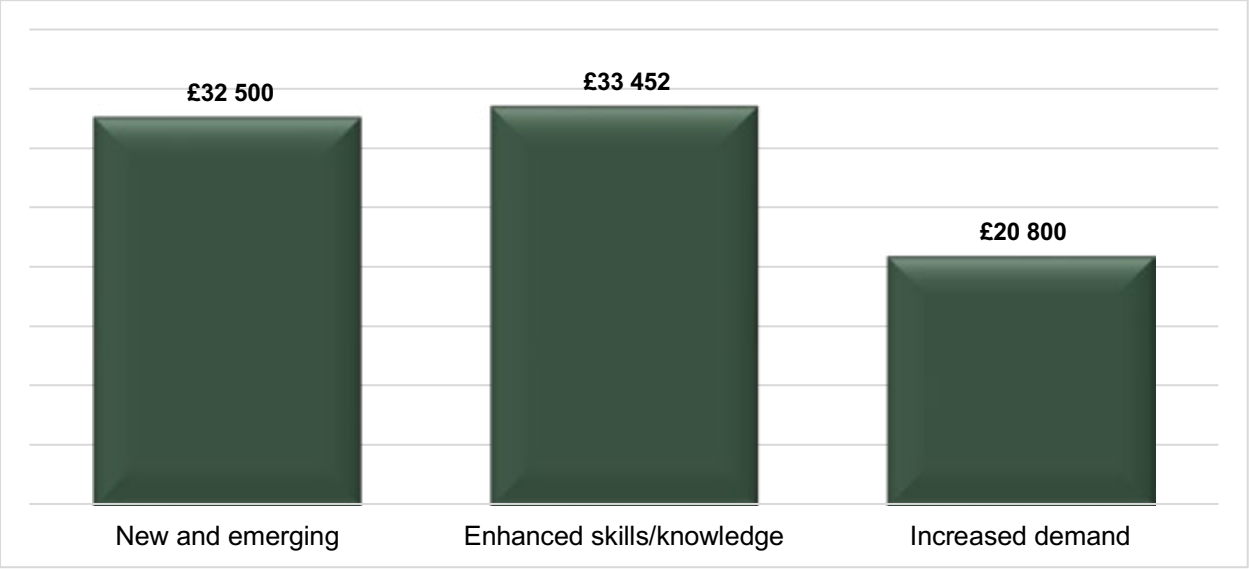
2022

It is important to note that the overall number of job vacancies increased over the period (see Figure 3 above). Thus, in terms of actual job vacancy numbers, there was an increase in all three green job categories. By Major Occupational Group, Professional occupations account for most of the New & Emerging job vacancies (47.1%). Professional occupations account for over half (55.7%) of all Enhanced Skills & Knowledge job vacancies. Elementary occupations have the highest proportion of Increased Demand job vacancies (41.8%), followed by Sales and customer service occupations (23.2%).

The quality of green jobs

In this section we use pay as the main proxy for job quality to assess whether green jobs are good or not compared to non-green jobs. We recognise that advertised pay rates might differ from actual pay received but that it is difficult to control for the possible variance. The vacancy data reveals that median advertised wages are higher in green jobs than in non-green jobs in Scotland (£29,673 vs £23,837). Within the three green jobs categories, median wages are highest, but only slightly higher, in Enhanced Skills & Knowledge jobs and lowest in Increased Demand jobs, see Figure 5 below.

Figure 5: Green job vacancies in Scotland by category and median wages



Moreover, wage trends over the period 2019 to 2022 point to contrasting pay trajectories for New & Emerging jobs and Enhanced Skills & Knowledge jobs (an upwards trend) versus Increased Demand jobs and non-green jobs (a downwards trend).

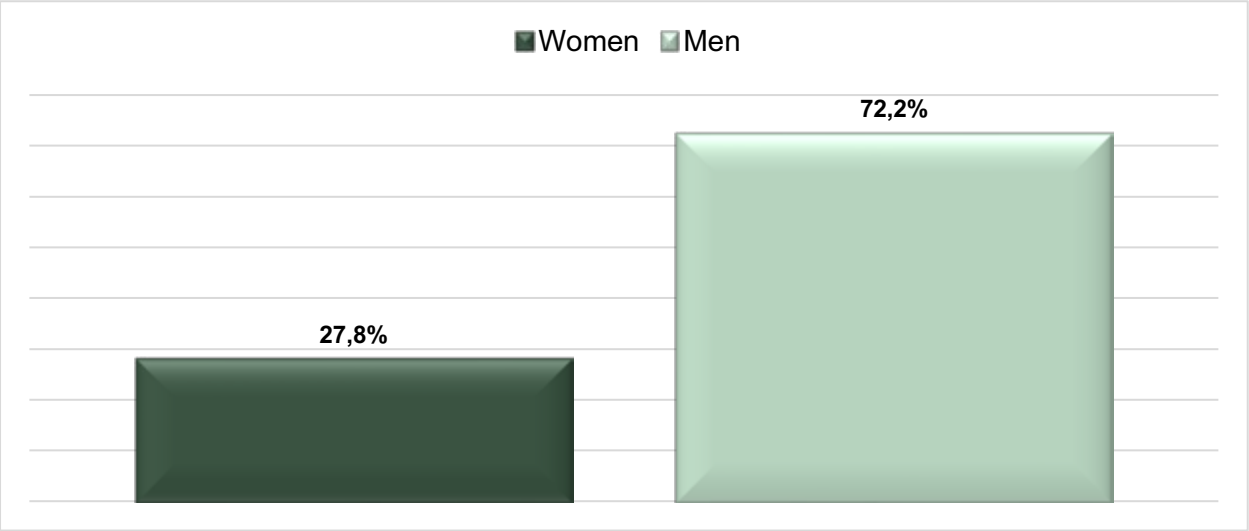
These findings reflect the types of occupations that are most prevalent in each of the three green jobs categories and the typical skills that characterise these occupations. Within the SOC there is a hierarchy of occupational types called 'groups', and occupational groups higher up the hierarchy are associated with higher skills, as proxied by qualifications, and so higher pay typically.[v] The findings on pay reflect this hierarchy, with a prevalence of Professional occupations and Associate professional occupations in New & Emerging green jobs, and a prevalence of Professional

occupations and Skilled trades occupations in Enhanced Skills & Knowledge jobs – see Figure 1 above. By contrast there are no Professional occasions in the Increased demand jobs, which have instead a prevalence for Skilled trades occupations but even more Process, plant and machine operatives.

Gender and green jobs

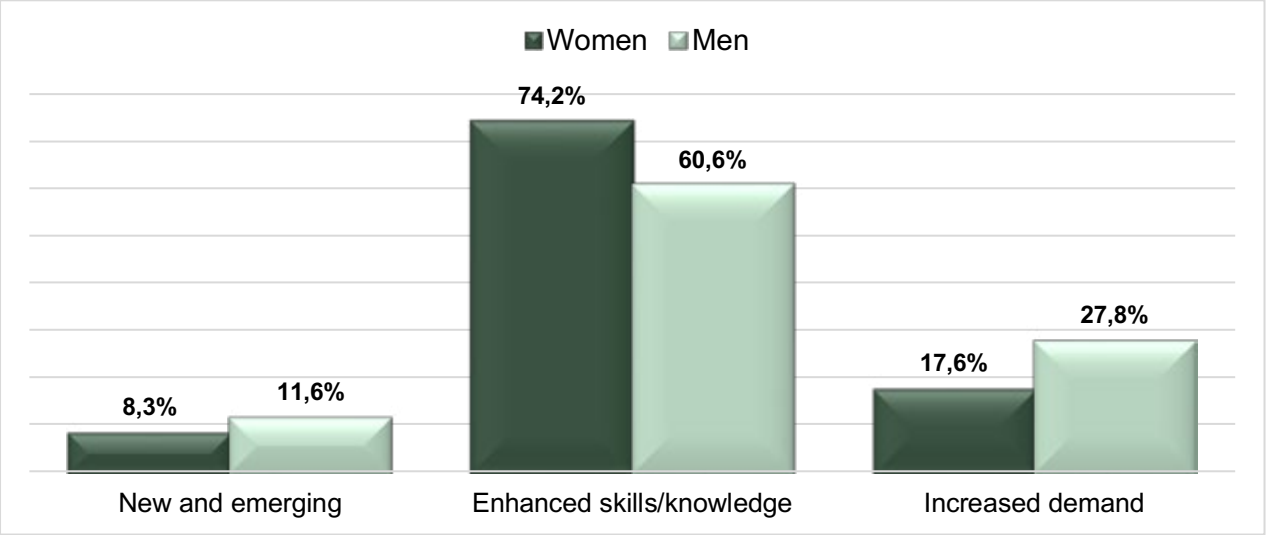
Delivering a just transition to net zero requires a clear focus on issues of inclusiveness, particularly in terms of gender. In this respect women are markedly under-represented in the three categories of green jobs in Scotland, see Figure 6 below. Green jobs disproportionately involve men (i.e. 27.8% women vs 72.2% men).

Figure 6: Green jobs by gender in Scotland



Although there are clearly far fewer women than men working in green jobs, it is useful to look at differences in the relative distribution of women and men by green job category (see Figure 7 below).

Figure 7: Relative distribution of women and men in Scotland by green job category



Of women working in green jobs, around three quarters are in Enhanced Skills & Knowledge jobs (74.2% vs 60.6% men). It is interesting that it is in New & Emerging jobs that the relative concentration of women and men has the narrowest gender gap (8.3% women vs 11.6% men) despite the fact that engineering occupations tend to dominate this green jobs category. Thus, while these jobs tend to be good jobs as measured by pay, they also tend to be exclusory in terms of who is currently accessing them.

Discussion and Conclusion

One of the key challenges in pursuing a net zero economy with a just transition has been the lack of consensus about what constitutes a green job. Without knowing what a green job is, it is difficult to measure progress in creating those jobs, their quality and who works in them. As such, it is important to develop and use a consistent approach to defining green jobs (Cedefop and OECD 2015). To address this unmet need we developed a new GreenSOC adapted from work by the US Bureau of Labor Statistics and O*NET (Dierdorff et al. (2009) that is gaining international acceptance. Our adaptations enable this work to be applicable beyond the US. This GreenSOC has three categories of occupations which capture, firstly, new, pure green jobs, secondly, existing jobs that are greening and, thirdly, existing jobs more in demand because of the transition to new zero. We used this GreenSOC to analyse green jobs in Scotland but suggest that it and its methodology be given serious consideration for wider adoption.

Framed by the GreenSOC, we then used data from the UK LFS plus our own web-scraped Scottish job vacancy data to analyse green jobs in Scotland. Despite the policy imperatives internationally and a climate emergency plan in Scotland, our findings reveal that most jobs in Scotland remain non-green or brown jobs, neither contributing directly or indirectly to nor affected by the net zero transition. As for the extent of and demand for green jobs specifically in Scotland, the empirical findings are mixed. On the one hand, there are few new 'pure' green jobs currently. On the other hand, there is clear evidence of a strong greening of existing jobs. Demand for green jobs is rising slightly, though again mainly for greening jobs. These findings show that a greening of jobs is occurring in Scotland through qualitative changes to existing jobs driven by green activities and technologies. Whether the new job titles revealed in the vacancy data merely reflect the greening of job labels (greenwashing) or signal more substantive changes to the content of jobs is not sufficiently clear, but this development further shows that it is possible for non-green jobs to change. As such, change is clearly happening that supports a greening of jobs across the economy, though not the change anticipated in current policy, with its emphasis on pure green jobs (e.g. Renner et al. 2008). In terms of a just transition and the quality of green jobs in Scotland, the data shows that green jobs generally offer higher wages than non-green jobs because green jobs are higher skilled professional, associate professional and skilled trades occupations. Moreover, the green jobs pay premium seems to be widening. However, in terms of inclusiveness, women are markedly under-represented in green jobs in Scotland, with green jobs employing mainly male workers. Overall, these findings

suggest that the transition to 'pure' green jobs is still limited and that while good jobs exist, the employment benefits of the transition to net zero are, so far, less inclusive than anticipated and that policy and practice need to adjust. Moreover, these findings for Scotland as a whole in terms of the proportion of green jobs and their pay and gender composition are replicated at regional level within both Scotland England – see for example Cardenas Rubio et al. (2023) and Dickinson et al. (2022) respectively.

At present, government policy internationally assumes that there will be a rise in green jobs and that these jobs will be good and inclusive, part of a just transient to a net zero future (EU 2023; HM Government 2021; ILO 2023; OECD 2021; UN 2021). These assumptions need to be tempered. Our findings for Scotland and other parts of the UK suggest that the extent and demand for pure green jobs is limited so far and that while those jobs that do exist offer higher pay, which as a marker of job quality suggests that they are good jobs, these jobs are exclusive in the sense that they tend to employ male workers. To help realise a net zero economy, stimulating employer demand for 'pure' New & Emerging green jobs will be needed. There are a number of ways in which this demand stimulation might occur: through, for example, green investment, state/regional-level regulation and incentive schemes (Cedefop 2012; Rodrik 2014) and firm-level 'eco-innovation' (Gagliardi et al. 2016). Developing an ecosystem approach to workforce development and planning that specifies the key actors and their roles, responsibilities, resources and relationships would be helpful, if a complex (Warhurst and Findlay, 2012; Anderson, 2010). Supporting the greening of existing jobs might be less challenging. Given that it is incremental changes to these jobs' skills and knowledge, one way of encouraging this greening will be through training that delivers upskilling and reskilling using micro-credentials (see Karanovic et al. 2022) rather than create new degrees or apprenticeships. Whilst it requires modification rather than reconfiguration of skills systems, past evidence suggests that this provision runs the danger of 'capture' by education and training providers unless embedded within well-functioning ecosystems (Buchanan et al. 2017). There are already initiatives to provide of such micro-credentials, for example by Una Europa. This alliance of 11 European universities offers a Micro-credential in Sustainability that is intended to be a supplement to a degree.[vi]

If a just transition for all is to be delivered, the current empirical shortfall in inclusiveness needs to be recognised and prioritised in policy (see also ILO 2023). Widening participation needs to be built into ecosystem planning (Knudsen et al. 2023), with our findings showing that there is a particular need for 'gender-transformative' planning (Kwauk and Casey 2022; see also ILO 2019; Sofroniou and Anderson 2021). In both cases – stimulating new green jobs and supporting the greening of existing jobs – there will be a need to ensure that female workers, as well as other marginalised groups, are able to benefit equitably from the transition to a net zero economy. Doing so will require inclusive training, upskilling and reskilling programmes (Kuersteiner and Ordal 2023; ILO 2019; SDS 2020). This mainstreaming of gender is evident already in Spain where, in 2020, a Just Transition Strategy was adopted that aims to ensure policies to promote green jobs enable women to take advantage of the opportunities provided by the transition (ILO 2022).

That green jobs seem to be better quality jobs is a welcome finding and concurs with the findings of other research (Consoli et al. 2016). What is needed now is monitoring and the public reporting by

the European Commission and national governments of the quality of green jobs. This task is currently hampered by the lack of an internationally agreed measure of job quality and so what might constitute a good job. In our analysis we used pay but there are other dimensions of job quality that feature in research and policy internationally (Warhurst et al. 2022), including in Scotland (Scottish Government 2021a). What is needed is an international standard measure of job quality against which green jobs can be assessed. A standard measure has been developed and adopted for the UK (see ONS, 2022) and is championed for the European Union by IndustriAll (2024). These measures have seven dimensions: pay and benefits; terms of employment; nature of work; social support; worker voice and representation; work-life balance; health, safety and psychosocial wellbeing. In addition, if the inclusiveness of the net zero transition is to be evaluated and similarly reported, there is a need to develop a set of performance metrics for an inclusive labour market. These metrics ought to include the female employment gap as well as similar gaps for other marginalised groups previously highlighted by the European Commission for example as in need of support: older and younger, migrant and low-skilled workers (EC 2010). These metrics should also be able to capture transitions of workers from employment in sunset fossil fuel dependent sectors to the sunrise sectors related to the environment sector/s as well as capture the rate of greening in existing occupations. Taken together, these metrics might form what might be called a Climate Change Labour Market Index.

The implementation of these suggestions would be more effective if part of a new integrated policy development. Policy silos are rarely effective. Climate change policy needs to envelop not only economic policy but incorporate education and training, employment and social policies. Only with these policies' integration will green jobs help deliver a just transition that addresses climate change. While we have provided improved definitional and empirical understanding of green jobs in Scotland, the Scottish findings offer not just empirical insights in the extent, demand and quality of green jobs and who works in them, they also offer theoretical insights into how a just transition might be achieved through green jobs.

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Endnotes

[i] For the report, see Cárdenas-Rubio et al. (2022).
[ii] For information on O*NET, see: https://www.onetonline.org/
[iii] Available in https://api.lmiforall.org.uk
[iv] United Nations: Paris Agreement, adopted in Paris on 12 December 2015, Registration No. 54113
[v] For information on the UK SOC, see:
https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc
[vi] See: https://www.una-europa.eu/study/microcredential-sustainability

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