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Introduction: The PAC report notes that across the UK, one in five, or 21 per cent, of all jobs will be affected in the transition to net zero and move to more circular business models (Robins, et al. 2019). This will impact all sectors of the economy with energy, construction and manufacturing seeing the largest changes, presenting an immense challenge for the UK skills system. The Green Jobs Taskforce and now the Green Jobs Delivery Group and insertion of net zero as key criteria with the Local Skills Improvement Plans are all welcome developments. We add to this, evidence on the following key aspects of the supply of skills for net zero:

- *Are workers ready for the green transition and what are the barriers and motivators to participation in further education and skills training for net zero?*
- *What opportunities are there to engage people in areas with lower levels of education and skills attainment in training programmes? Lessons from the Foundation Industries¹*
- *Employer engagement in the skills system*

Summary Findings: Workers are very concerned about climate change and are willing to accept the need for upskilling, job change or even relocate as the economy transitions. The green economy is an attractive proposition and viewed positively because it is meaningful work. However, many are concerned that their current skills-sets are not relevant for the green economy. Workers in lower skilled occupations and more disadvantaged areas are more likely fear losing their jobs in the green transition, say they will need to learn new skills but are considerably less likely to have the chance to update them. This creates a degree of inertia around skills training for net zero which is not evenly distributed across the labour market. Many workers are not consulted, engaged, or trained by their employer around net zero. There is a lack of engagement at business level that inhibits engagement in dialogues over climate challenges and the skills needed for the green transition. Net zero targets require energy intensive or so-called foundational industry (FI) sectors to decarbonise rapidly, achieving this is compounded by specific employment and skills challenges. Many of the current well-paid, good-quality jobs that are under threat and also those that will be created in the FI sector transition are located in areas of the UK with low levels of educational attainment and participation in skills programmes. Important net zero infrastructure projects in these regions may be delayed due to insufficiently skilled labour available to carry out key tasks.

Recommendations:

1. Focused action is needed so that people in communities where net zero infrastructures in being developed are aware of the good green jobs that are emerging and have access to the skills training and underpinning education needed to access them to help ensure key net zero infrastructure projects are not stalled.
2. A better understanding is required of how workers view the green transition and how this shapes their work and training decisions. This intelligence is needed to help inform workplace, national and regional skills planning for net zero.
3. Skills policy needs to support labour market stakeholders (employers, workers, training providers) and those involved in supporting business transitions to net zero to jointly articulate how new technologies, new business models and skills solutions map together

(preferably at the local, regional, sectoral, national levels) to ensure the rapid scaling up of provision needed to address the climate challenge and build a strong economy.

4. Strategic leadership development is needed on the inter-relation between environmental issues, decarbonisation pathways and the workforce requirements needed to help design frameworks that are fit-for purpose and build effective engagement in the employer-led skills system.

Questions for Government Departments: This in turn leads to the following questions for Departments:

1. What focused action is underway so that people in communities where net zero infrastructures in being developed are aware of the good green job opportunities and understand the skills needed to access them and the provision available to help them achieve this?
2. What plans are there to improve understanding of how workers view the green transition and the effect this has on their training decisions?
3. What additional steps need to be taken to support labour market stakeholders and those involved in supporting business transitions to net zero to jointly articulate how new technologies, new business models and skills solutions map?
4. What provision is available to help improve strategic leadership on the inter-relation between environmental issues, decarbonisation pathways and the workforce requirements?

Evidence for this contribution is drawn from a [programme of research](#) into employment and skill needs for the transition to a net zero and more circular economy. Specifically, we draw upon a survey of 2,000 UK workers¹ on their readiness for the green transition and in-depth case-based research across energy intensive or Foundation Industries² (FI) on the skills needed for decarbonisation and challenges in delivering them. The evidence presented draws on this empirical data and our analysis of supporting literature.

Expert credentials: The authors are part of a multi-disciplinary group of 40+ academics at the [Centre for Employment Relations Innovation and Change](#) at the University of Leeds specialising in the changing nature of work and employment and the implications for skills and training. [Prof. Vera Trappmann](#) is professor of comparative employment relations and [leads a programme of work](#) on the green transition, climate change and the worker voice. She is an expert in industrial restructuring and training leading on projects for the European Commission, the European Trade Union Institute, the German Research Foundation, IG Metall, and most recently for Hans Böckler Foundation [on Just Transition in 12 countries](#). She is a Board member of the [Priestley International Centre on Climate](#). [Dr. Ursula Balderson](#) is a Post-Doctoral Research Fellow on the future-of-work and job quality in the context of climate change and the transition into a greener economy. Before recently joining Leeds, she worked at the University of Cambridge researching working conditions and jobs quality. [Dr. Jo Cutter](#) is a Lecturer in Work and Employment Relations and expert in the employment relations of skills and training and comparative employment and training systems. She is specialised in post-16 skills and workforce development policy and currently sits on the Yorkshire and Humber Climate Commission's Future Economy Panel.

¹ [Cutter et al 2001 Worker perceptions of climate change and the green transition](#)

² [Balderson et al 2022 Decarbonising the foundation industries and the implications for workers and skills in the UK](#)

Inquiry contribution

- *How ready are workers for the green transition and what are the key barriers and motivators to participation in further education and skills training for net zero?*

Our survey of 2,000 found that workers are very concerned about climate change and thus willing to accept the need for upskilling, job change or even relocate to find work as the economy transitions. The vast majority are willing to develop new skills (81 percent) and feel confident about doing so (75 percent), emphasising the opportunity for participation to support the green skills transition. Yet, workers in lower-skilled occupations are more likely to feel that they will need to change jobs: 21 percent for those in process and elementary positions versus 14 percent for managers and professionals. They are also less likely to say that they have skills relevant for the green transition, 33 percent believe they will need to learn new skills (Cutter et al. 2021, p8, 19, 23).

Many people (65 percent) see intrinsic value in work in the green economy. Workers are attracted to jobs that produce a tangible sense of social value: a distinct but often invisible component of job quality (Cutter et al. 2021, p19). Over half of those expressing interest in switching to these green sectors state that they would need to develop relevant skills and experience, this proportion rises to over 80 per cent for those interested to work in electrical engineering, environmental conservation and environmental assessment auditing. Yet, the survey findings illustrate that workers are rarely consulted around their views on climate change and what the transition to net zero will mean in terms of jobs and skills. There is a fundamental lack of engagement at community and business level that inhibits worker engagement in dialogues over climate challenges and the skills needed for the green transition.

This accords with other research which finds that workers have limited knowledge of potential jobs in the green economy and face barriers in the skills and training pathways needed to access them; this is especially the case for those working lower skilled roles (Public First, 2021). Oil and gas sector workers are attracted to jobs with seemingly transversal skills, such as offshore wind, rig decommissioning and related renewable energy sector jobs and over 80 per cent would consider working in a different industry. Although many have a highly transferable skillsets, accreditation systems may not allow these to be easily recognised in new settings (Jeliazkov, Morrison, & Evans, 2020).

Our report on the survey of 2,000 UK workers presented analysis, comparing responses from workers in Yorkshire and the Humber (Y&H) with the rest of the UK to consider the issues in an industrial region with high levels of carbon emissions and with lower-than-average levels of education and training, yet considerable opportunities in the transition to net zero. Workers in Y&H are more likely to think that the 'greening' of jobs will require them to learn new skills feel yet less equipped to deal with the green transition than in other parts of the UK. They are less likely to have regularly updated knowledge and skills, less likely to think their knowledge and skills are relevant for the green economy or be engaged in dialogue at work about the changes and skills needed to support net zero targets (Cutter et al., 2021, p 22, 23). This highlights that the specific challenges of meeting at zero targets are compounded by additional challenges to developing a skilled workforce in disadvantaged areas; but this also indicates the opportunities that net zero might bring.

- *Opportunities to engage people in areas with lower levels of education and skills attainment – lessons from the foundation industries (FIs)*

The FIs are economically and strategically important to the UK (Griffin, Hammond, & McKenna, 2021) and employ around 250,000 people (ERC, 2021). Employment is fluctuating in some sub-sectors but is forecast to decrease in others such as chemicals (Balderson, et al., 2022, p24) all are seeking to decarbonise their processes and supply chains. Decarbonising FIs will have effects on employment and jobs which are not yet well understood. The regional concentration of FI employment (with the exception of cement which tends to be quite dispersed) in geographic areas where good quality well paid jobs are hard to come by, means that job losses and growth have the potential to further exacerbate/address regional inequalities (SQW, 2021). The UK is addressing FI decarbonisation through a series of industrial cluster decarbonisation projects where largescale hydrogen and Carbon Capture and Storage (CCS) projects will be rolled out. The first three are Teesside, the Humber and the Northwest.

FI businesses are struggling to attract talent, 40% of FI businesses report that staff recruitment and skills needs are a major obstacle to business success (ERC, 2021). This is in part due to the perception of these industries and nationwide technical and STEM skills shortages. The FI sector also has an aging and un-diverse workforce (a quarter of report that more than half their employees are over 50 years old) and a tendency for subcontracting limits investment in workforce training and apprenticeships, leading to skills shortages that in turn can increase the cost of securing appropriately skilled workers (Balderson et al., 2022, p25).

The Foundational Industries Challenge programme that sits within the wider Industrial Strategy, managed by UKRI, has initiated research into the innovation readiness and related employment and skills requirements of the FI sector. Broadly speaking, FIs have not yet defined their innovation roadmaps for decarbonisation and related skills requirements which will get them there (ERC, 2001, Hopley, et al., 2021). Early findings stress the need for engineers who are flexible across disciplines and be able to apply general engineering skills with a sustainability focus. There are also digital and data analysis skills gaps (Balderson et al., 2022, p26).

The industrial decarbonisation cluster projects are located in areas where education and skills participation levels are low (Balderson et al., 2022). Simultaneously there are already many job vacancies similar to those that will be created during both the construction and operational phases of the clusters such as Skilled Metal, Electrical and Electronic Trades, Skilled Construction and Building Trades, science, Research, Engineering and Technology Professionals, and Process, Plant and Machine Operatives (Vivid Economics, 2020). Skills mismatches are already causing problems for employers. This means that although jobs will be created, there is no guarantee that these positions will be easily filled.

- *Employer engagement in the skills system*

The approach to the skills strategy is that it is employer driven, yet complexities of delivering net zero and unknown technological pathways pose a challenge for articulating the skills and training needs in both established and emergent sectors: there are currently very few employers operating in the hydrogen and CCS economies, but they will be central to industrial decarbonisation. If responsibility for articulating future skills needs and initiating training lies with employers that do not yet exist, it seems that industry may struggle to find appropriately skilled workers to fill the jobs, potentially slowing down their expansion and the green transition overall (Balderson et al. 2022). There is a strong argument here for future skills pathways to be developed in collaboration with government, providers, employers and workers to help ensure businesses have the skills needed for net zero.

The current emphasis on new entrants and apprenticeships, while recognised important, this is not sufficient given that 80% of the current FI workforce will still be active in 2030, (Alvis et al., 2015) and emphasis is needed on the training and development of the existing sector workers. Given that transformative decisions are made at higher levels within organisations, often where there is more apprehension to adopt and implement change, it is suggested that further advocacy and leadership development needs to target strategic decision-makers. This highlights the need for leadership development on the inter-relation between environmental issues, decarbonisation pathways and the workforce requirements needed to achieve them and the design of frameworks that are fit-for purpose (Balderson et al., 2022).

- *Solutions emerging to meeting the skills challenge in the FIs*

Within the FIs, attempts to address employment and skills needs are currently being supported by the FI Challenge programme, the FI industries are starting to recognise commonalities and the need to work together more closely to protect the jobs and businesses that remain. This is likely to involve the development of FI-wide courses (in place of those targeted more specifically at glass, cement, steel etc) where there is considerable overlap in terms of the knowledge and skills required by workers in these industries. Creating pathways from local educational establishments and supporting workers to transition into jobs and build relevant skills is crucial to ensure UK FI viability. Rapid action on these elements needs to be particularly focused on the regions where FI businesses are concentrated (e.g. Stoke for Ceramics, and the M62 corridor for Glass). Unless significant investments are made in the local education and skills systems where large decarbonisation projects are being rolled out, these well paid high skilled jobs may remain out of reach for those in local communities (Local Government Association, 2021). If the economic and employment benefits of these projects are to be fully realised by local communities, then strong locally targeted education and training support will be needed to address the skills gap of local workers (Vivid Economics, 2020).

Conclusions and Recommendations

Many workers are ready and willing, in principle, to work in the green economy, but they need to be more effectively engaged in dialogue about the prospects for change at work, their skills and training needs and opportunities to up-/re-skill. There are specific challenges of building workforce skills around net zero given the regional issues of education levels and skills participation in areas where net zero jobs are likely both emerge and be in transition. Specific and focused attention needs to be paid in these areas to building worker and employer engagement around these green jobs and skills. We are only beginning to understand how workers view the green transition and how this shapes their work and training decisions. A better understanding of this is needed to inform both national and regional skills planning for net zero.

The focus on local planning for skills to include net zero considerations via the Local Skills Investment Plan process is welcome, but the workforce challenges faced by key sectors that need to rapidly decarbonise such the FI sectors highlight the need for a stronger articulation between local sectoral and national level challenges. For the FI sector, the TFI programme is a good start in this regard, but there is more to do to build clearer linkages to wider stakeholders across the systems of innovation and skills formation. The TFI programme is a good example of work to build mechanisms that promote the dialogue needed between different stakeholders. But gaps remains in articulating how technology readiness and skills solutions map across levels (local, regional, sectoral, national) to ensure the rapid scaling up of provision needed to address the climate challenge and build a strong economy.

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