



Understanding the impact of the transition to net zero on low paid jobs

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Fraser of Allander Institute in collaboration with the Hunter Centre for Entrepreneurship and Work, Employment and Organisation (WEO). Funded by the Joseph Rowntree Foundation.



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Foreword by the Joseph Rowntree Foundation

All too often when big change happens in society, those with the least suffer the most.

Inequalities of income, wealth, power and opportunity operate to expose those on low incomes to the worst impacts of economic, social and political shocks and transitions and we don't need to look far back to see this in practice and we can see this in both immediate shocks and in longer term transitions.

In terms of immediate shocks, after Russia's invasion of Ukraine – energy prices sky-rocketed and oil and gas companies have posted the largest profits in their histories. Yet households have faced their highest bills in recent history with over half of households not heating their home as much as needed over winter, while 15% had also skipped or cut down the size of meals.

And looking further back should ring alarm bells. In the 1970s de-industrialisation was already underway but government decision makers chose to ignore the potential impact on communities and recklessly accelerated it. But like the carbon dioxide that those industries proliferated, the scars on our people and their communities are longer term and still playing out today. It is no coincidence that the coal fields of Scotland, the valleys of Wales and the empty shipyards of the North East of England attract some of the highest levels of poverty in the UK.

In more recent times, following the great financial crash of 2008 the UK's response was to impose austerity on public services, particularly support for those with the least, and to casualise work. Not only fermenting low pay but also making work insecure, building a UK business model that managed supply and demand at the expense of workers rather than investment in productivity.

A transition that is necessary, pressing and manageable

“To be absolutely clear, we are not arguing that there is any choice in meeting our net zero obligations. The outcomes caused by a rapidly heating climate and the environmental, social and economic catastrophes that that would cause do not bear thinking about never mind comparing with some of the challenges of a net zero transition.”

The transition to a net zero economy is another such transition but, unlike immediate shocks like Russian aggression and Covid-19, one that we have an opportunity to manage to the benefit of both our climate and people.

But we do need to be mindful of the fact that this transition necessitates a number of choices. Just as these transitions and shocks of the past did. From the perspective of those experiencing in-work poverty, or at significant risk of it, we need to be conscious of the real conditions that exist now and likely will in the future.

We are under no illusion that there's a single solution or shortcut to this dilemma. Transitioning Scotland's economy to net-zero surfaces some of the most important labour market and political questions of our time. But there is a risk at the moment that we are asking the wrong questions and, as a result, risk perpetuating the mistakes of the past and putting the burden of the transition on the backs of those with the least resources to carry it.

Undoubtedly the net zero transition will provide economic opportunities particularly for a country with the depth of skills, academic knowledge, natural resources, business base and experience that

we have in Scotland. The challenges faced in the winding down of the North Sea basin and the decommissioning work it demands are huge but the skills and decades of expertise that have been gathered in operating one of the most technologically challenging oil and gas basins in the World leave our engineers, welders, divers etc well placed to move into renewable energy or other technologies. That's not to say that Government(s) can't assist in that transition and help to secure work in those emerging industries but the skills, relative wealth and innovative capacity of our current business base and workforce is such that the transition is more likely to be smooth.

There is also quite a lot of analysis of how moving from so called "Brown" jobs to "Green" jobs can be achieved. Technologies like hydrogen fuels, district heating, heat pumps, renewable generation etc are ripe for investment and acceleration and should, if managed well, provide opportunities for workers to gather new skills and secure good incomes and rewarding work. But in a world of far lower carbon emissions than we have today not everyone will work in one of these industries, just as not everyone works in energy production, heating buildings and mineral extraction today.

Most of the economy, and most low paid workers, are in other sectors. Hospitality, retail, health and social care dominate our low-paid workforce and while they may have received a weekly round of applause during the pandemic, levels of in-work poverty within those sectors are persistent, significant and in many cases growing.

The corrosive trend that sees people working and still not having enough to have a decent standard of living will not be reversed simply by the creation of new green jobs that support the decarbonisation of the economy. For those not directly employed in green industries, a more fundamental shift in the labour market will not happen without a plan for sectors where low-pay is concentrated. This report shows that there is no plan for this and that no attempt is being made to address in-work poverty with this tactic. It is a glaring missed opportunity.

While this is clearly in conflict with persistent political rhetoric of connecting "green jobs" with economic prosperity, there is a basic logic to it i.e., the demand for solutions to in-work poverty are far greater than the size of the sectors associated with low carbon economy. In fact, there is a genuine risk that if the transition is not managed with the interests of low paid workers in mind that it will threaten people's already fragile economic security.

The stakes of all of this have been raised by the cost of living crisis and the resulting erosion of people's financial resilience. Choosing not to see the drive to net-zero and need to address deep inequalities within the labour market as related issues is a missed opportunity to lift people out of poverty.

This is why we commissioned the University of Strathclyde's Fraser of Allander Institute, with contributions from their colleagues in the Hunter Centre for Entrepreneurship and the Department of Work, Employment and Organisation, to focus on the net zero transition and low paid work. Their analysis is just the first step in trying to understand how the transition might impact on those sectors where most people currently on low pay work. It seeks to understand if and how possible changes in the economy will impact on these sectors and workers.

This approach will require a whole system view of economic security as outlined in recent JRF work but this is beyond the scope of this report. Examples of this are state protections for the individual against external shocks, reduced labour market exclusion, guaranteed paid care leave, tenant rights and much more. Here it requires the Scottish Government to have a coherent and confident plan for low paid work generally and but also how it interacts with net-zero.

This plan must be ambitious enough to aim for a settlement that means being in low paid work does not have to define workers' wellbeing or consign them to being in poverty. It must accept that the harm that worklessness causes is not incomparable to that of being in persistent low-quality, low-paid work. And also that good work does exist and there are examples of it across comparatively low paid industries.

Every available resource should be made to seek these examples and enhance job quality which would give workers the opportunity to progress and ultimately make work a positive element of people's life. Legislation that is outwith the competencies of SG is clearly needed to raise the floor of working standards. Sick pay, parental leave, maternity/paternity pay, minimum wage rates and many other policies must be geared towards enhancing workers security and protecting them from poverty.

Of course, this is not the sole responsibility of the UK or Scottish Government. Business can and must be an equal partner in change and responsibility. Employers can and should go beyond the minimum. JRF are committed to working with key industries to get this message across and to work with them to develop a shared understanding of what must change.

It is also unclear as to how possible it is to meet the challenges of decarbonising the economy and reducing poverty without a more productive relationship between the Scottish and UK Government. Recent examples of political clashes over DRS, oil & gas licences and the two-child limit are indicative of a failure to treat the biggest challenges as a collective endeavour.

However, it is the Scottish Government who set the net-zero targets, the child poverty targets and the ambition for Scotland to be a Fair Work nation. They have done so without a plan for low paid jobs.

The transition to net-zero is the opportunity to set out this plan and put it into action across the country.

This transition is not some amorphous problem on paper, it is well underway. Albeit to varying degrees across sectors and locations. It is also unclear how and when the potential benefits of decarbonising the economy meet the risks. For example, will there be a gap in economic activity in specific areas of Scotland between the phasing from one energy source to another? What would that mean for that local economy? This sequencing must be considered and planned for, not left to chance.

This report shows that those in low paid jobs and at risk of in-work poverty have been excluded in considerations of justice outside their position as consumers. We have found that any argument to the contrary is rhetoric. Furthermore, the labour market outcomes of the transition already point to the entrenchment of some of the key drivers of inequality, namely the gendered nature of green jobs significantly favouring men.

This transition must happen for all of our benefit, we must not miss the opportunity for it also to transition us to an economy where we can all live a good standard of life with meaningful security for our families and loved ones.

Jack Evans, Joseph Rowntree Foundation



Executive Summary

The transition to Scotland becoming a net zero economy by 2045 will lead to a transformation of many parts of Scotland's economy. Ensuring that the upheaval does not cause significant harm to the workers affected is an ongoing concern of the Scottish Government, and a 'Just Transition' approach has been developed to mitigate negative impacts and to ensure emerging opportunities are shared widely.

Many elements of the transition to net zero are yet to be confirmed. According to the Committee on Climate Change, the Scottish Government has still to clarify how it will meet an expected shortfall in carbon removals between now and the target dates set out in legislation. Clarifying what these actions will be is the first required step in understanding what the impact on employment across the economy will be.

This report finds that the analysis accompanying the net zero plans under the Just Transition badge fall short of being able to assess the impact across the whole economy. Directly impacted jobs in industries with a high carbon footprint, and their immediate supply chain, are present in the literature and government policy analysis. However, the types of policies that are in scope for the net zero transition will have an impact well beyond these carbon heavy industries into less obvious sectors, such as retail and hospitality.

For example, energy efficiency and heating system requirements in commercial buildings will increase (at least in the short term) the cost base for firms who own and occupy buildings where changes are required. Regulations governing waste processing will have knock on effects for firms that dispose of items, such as packaging and food waste. The reducing size of carbon intensive industries will lead to a shift in spending patterns as employees seek employment elsewhere and changing consumer preferences towards low emission goods and services could impact heavily on demand in some sectors.

The specific remit of this work is to look at where these wider impacts intersect with low paid jobs. For a government also wedded to poverty reduction, ensuring that low paid workers are within the sights of the Just Transition strategy is of clear strategic importance. Unfortunately, we have found little evidence that this is the case.

Methods to ensure that low paid workers are able to be captured in analysis of the transition to net zero need to be developed. This paper provides an overview of two experimental approaches that could be further developed to provide this insight. These approaches show that there is potential for disruption to low paid workers from the net zero transition. Further refinement is required in order to arrive at a fuller understanding of the net effect and the timing of this potential disruption. Beyond this, policy makers need to better grasp the challenge of how to ensure the net zero transition can benefit low paid workers through opportunities in emerging, higher paid sectors.

We hope this analysis is helpful in informing the discussion going forward around how to support low paid workers through the net zero transition. There is no doubt that significant action to reduce emissions is required, and that without this transformation the risk to low paid workers, and wider society, from climate breakdown will dwarf any of the figures contained in this report. The main conclusion from our analysis is simply that the government need to go further in their assessment of what is required for a Just Transition. Although further development and consensus over the best way to capture this is required, this is achievable and will ensure government policies around climate change mitigation and poverty reduction are aligned and self-sustaining

1 Introduction

In recent years, the Scottish Government has continued to place great emphasis on two major policy issues, reducing climate emissions and reducing poverty. Scotland is in a unique position in the UK with statutory targets in relation to climate emissions and child poverty. These dual priorities featured heavily in the new First Minister’s first major policy statement in April 2023ⁱ. Indeed, the Scottish Government sees these twin goals as intertwined with meeting the net zero targets providing opportunities for improving living standards and reducing poverty.

The Climate Change (Emissions Reduction) (Scotland) Act 2019 was passed unanimously by all parties in the Scottish Parliament with the exception of the Green Party who abstained on the basis that it did not go far enoughⁱⁱ. The analysis and comment in this paper assume that the transition to net zero will happen. The reason for writing this paper is not to critique the merits of the net zero ambition, but to understand the issues that need to be reconciled to ensure poverty reduction ambitions can also be realised.

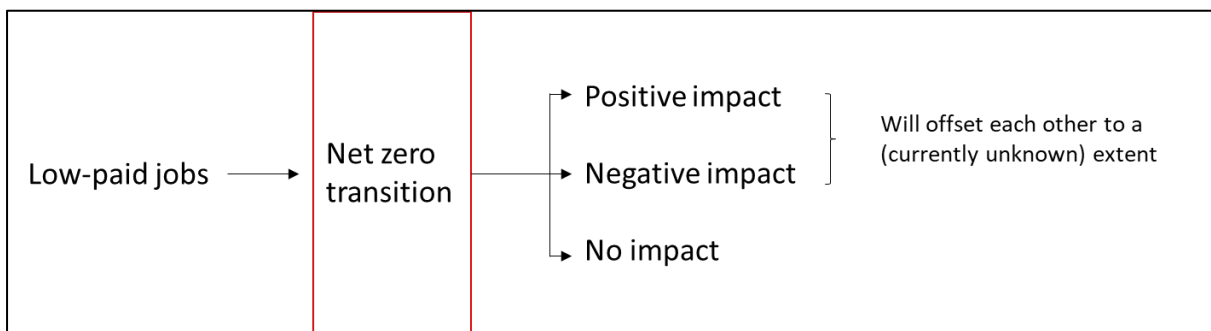
Initiatives such as the Just Transition Commission have been set up in order to consider how the requisite upheaval can maximise opportunities and avoid harm for affected groups of workers and communities. To date, the main focus of the Just Transition strategy has been on the carbon-intensive industries such as the energy sector as these are industries that will need to see the most significant changes if targets are to be met. There is an understandable focus on ensuring workers directly affected by the transition are able to transfer their skills into other, low-carbon, industries.

However, given the scale of the net zero challenge, there will be effects felt beyond those directly employed in carbon-intensive industries. It is important to understand where the net zero transition will lead to changes in demand and/or pressure on costs in other parts of the economy. For a government also focused on poverty reduction, understanding how this affects low paid jobs in particular is crucial. To date, we have seen little analysis which looks at the potential impact on low paid sectors such as retail and hospitality. This paper looks at analytical approaches that can potentially bridge this gap.

We use a bottom up approach that looks at low paid workers in the Scottish economy, and analyses the extent to which they could be affected by the net zero transition.

Figure 1 shows the three potential outcomes for low paid workers. They could be positively impacted, negatively impacted or not impacted at all.

Figure 1 – potential impacts on low paid jobs due to the net zero transition



This report focuses on the potential for negative impacts. This is a deliberate focus. We recognise that there may also be opportunities for low paid workers, particularly over the medium to long term as new industries emerge, although other conditions would need to be in place to maximise those opportunities (e.g. retraining). Nevertheless, the risk of disruption to low paid jobs has the potential to be significant given the financial precariousness of many who rely on low-paid work.

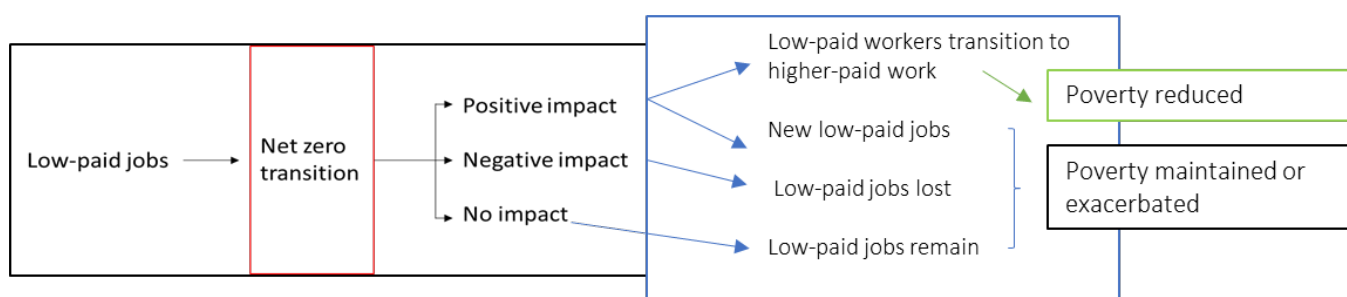
Disruption could involve temporary or permanent drop-offs in demand for labour, relocation of physical premises or a move to online services, or restructuring to accommodate cost rises elsewhere in the business. Awareness of the scope and scale of this disruption is the first necessary step in building an effective policy response.

As we have undertaken this work, a tension has emerged when trying to determine the best-case policy response that meets net zero and poverty reduction priorities. The loss of low paid jobs without replacement would, holding all else constant, lead to higher levels of poverty. However, the continued existence of low paid jobs in their current scale and form is unlikely to be consistent with meeting poverty reduction targets. Therefore, a policy response that only protects low paid jobs would not be effective at meeting the government’s stated priorities.

Whilst it is important that the disruption due to the transition to net zero does not lead to new, or exacerbate existing poverty there also needs to be consideration of the opportunities available for those whose low paid job remains unchanged over the period of the net transition. New low paid job opportunities that may emerge during the net zero transition are similarly sub-optimal.

Figure 1a provides an extension to the impact on jobs to consider the subsequent potential impact on poverty. As well as looking at the impact on jobs, effective strategies also need consider how to maximise the poverty reducing potential of net zero policies.

Figure 1a – extending the analysis on jobs to impacts on poverty



The report is structured as follows:

Section 2 provides an overview of the net zero transition

Section 3 provides an explanation of how we have defined low paid jobs in this report (further detail in Appendix A)

Section 4 summarises existing analyses of the impact of the net zero transition on jobs

Section 5 analyses low paid jobs that are not identified by existing analyses and assess alternative approaches to assess impact

Section 6 identifies evidence and policy gaps and further questions that result from this analysis

Section 7 concludes

This analysis is an initial step in trying to bring together analysis of net zero and low pay. Much of the analysis in section 5 is experimental in nature, and will benefit from further refinement. The purpose of the report is to provide JRF as the commissioner of this analysis, and the wider interested stakeholder community, an overview some of the key issues that could inform further analysis.

2 The net zero transition; sectoral transformations

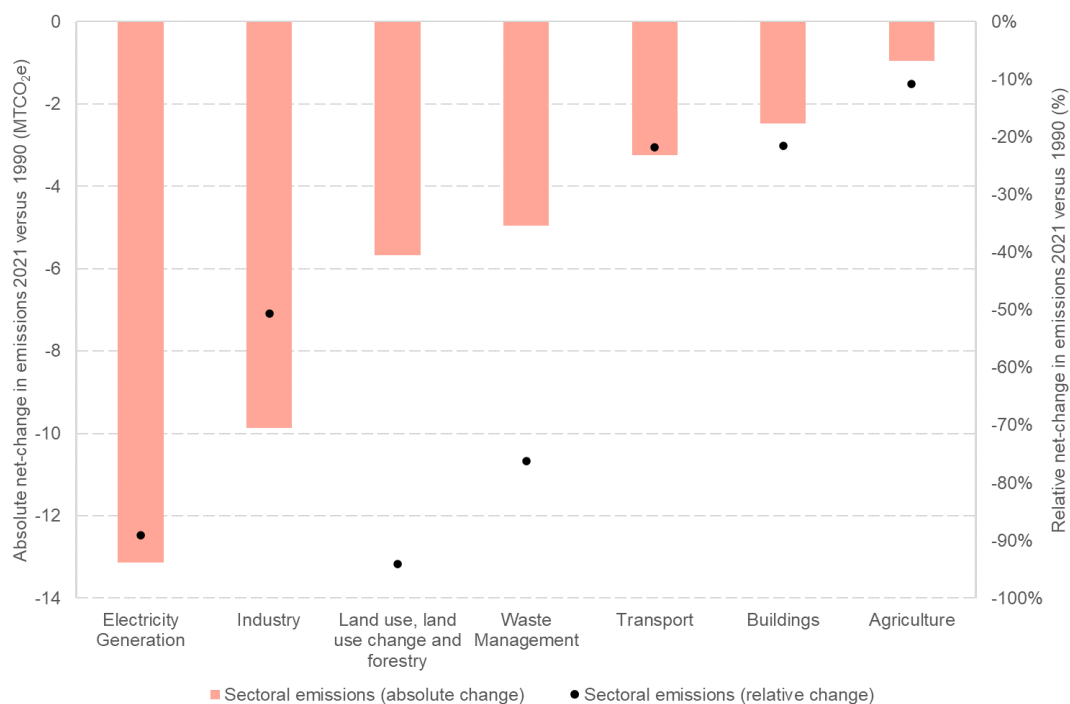
The Climate Change (Emissions Reduction) (Scotland) Act 2019ⁱⁱⁱ sets out Scotland's ambition of becoming a net zero emitter of Greenhouse Gases (GHGs) by 2045. This part of the paper sets out the current progress in towards decarbonisation, and the changes still required.

Past decarbonisation

Scotland has already made important progress towards achieving its aim of delivering net zero emissions by 2045, having cuts these by 51% in 2020 versus 1990^{iv}.

In relative terms, these cuts have been deepest in Land Use, Land-Use Change and Forestry (LULUCF) (-94%) electricity supply (-88%), waste management (-76%) and industry (51%) (Figure 2). Much less progress has been achieved in decarbonising Scotland's surface transport (-22%), buildings (-21%) and agriculture (-11%).

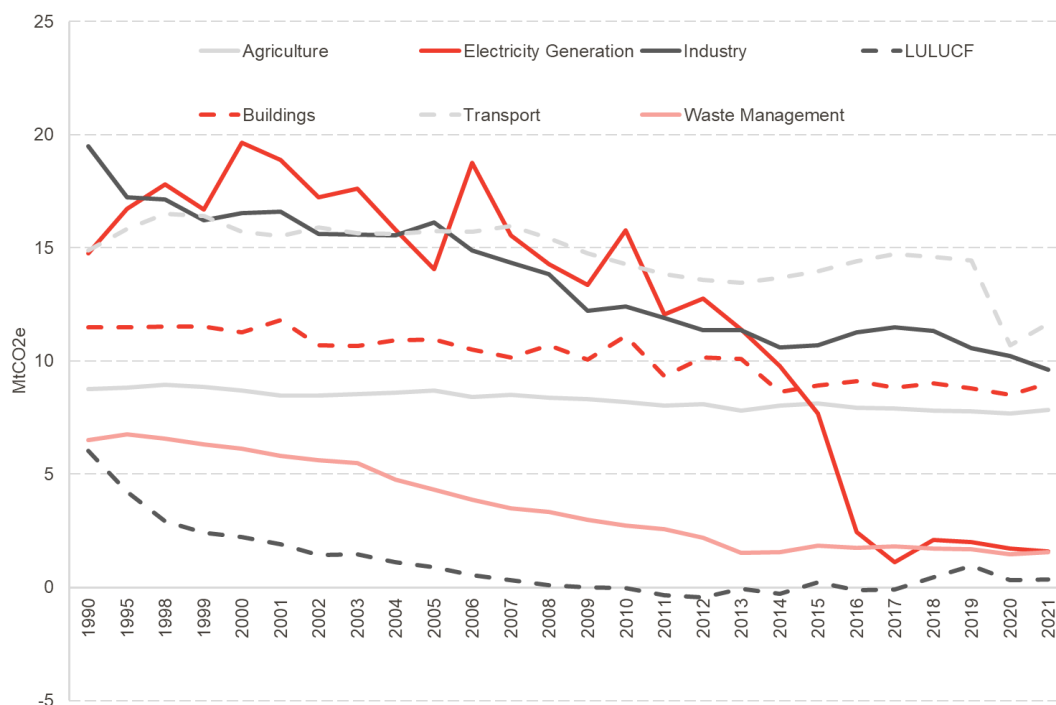
Figure 2: Absolute and relative change in Scotland's sectoral carbon emissions between 1990 and 2021



(Source: [ScotGov](#))

Importantly, we have also seen reductions flatline or even rise in some sectors in recent years, most notably surface transport and buildings (Figure 3). What can be gleaned from this analysis is that some sectors - like transport, buildings and agriculture - have still got to undergo a significant transformation if Scotland is to achieve net-zero.

Figure 3: Historical change in Scotland’s sectoral carbon emissions between 1990 and 2021



(Source: [ScotGov](https://www.scot.nhs.uk/scotgov))

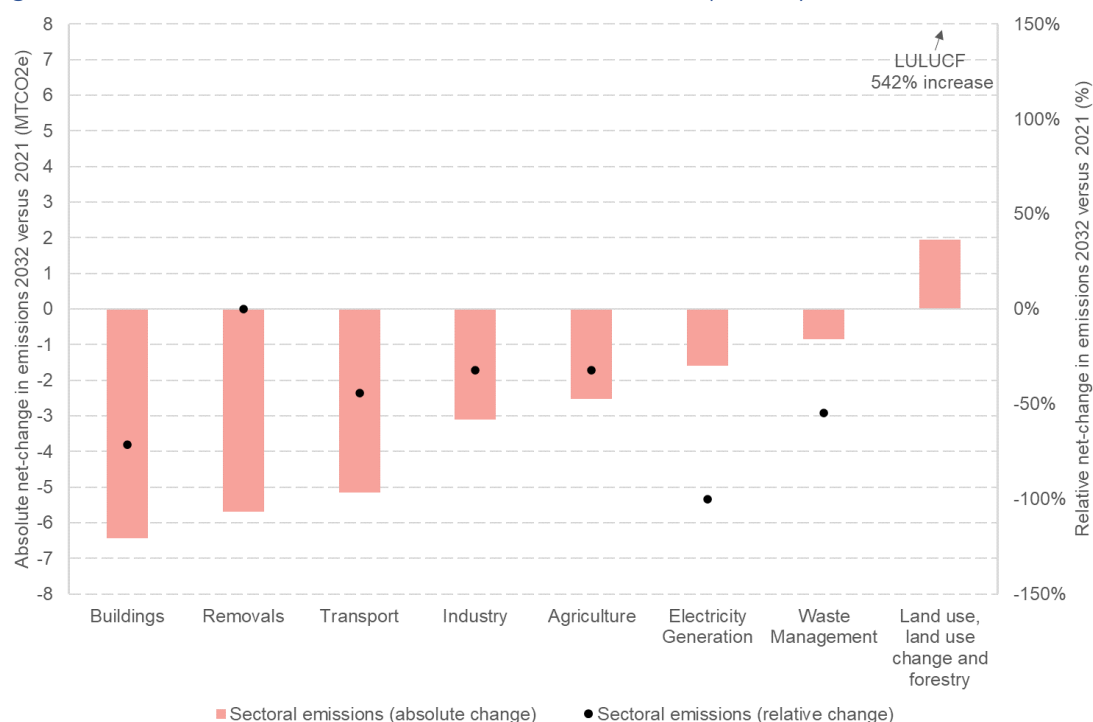
Future decarbonisation

Looking forward, how much will Scotland’s sectors need to decarbonise and change going forward? A net zero transition will demand a seismic transformation of most aspects of Scotland’s economy and society, however some sectors will undergo more radical change versus others.

The Committee on Climate Change (CCC) indicates that in terms of relative cuts to emissions, Scotland will see the deepest cuts coming from electricity generation, where all remaining emissions will be removed. Following this, it will be buildings (-71%), waste management (-55%), transport (-44%), industry (-32%) and finally agriculture (-32%) (Figure 4).

Notably, these sectoral cuts mostly fall far short of the 75% overall emissions reduction versus 1990 targeted in Scotland by 2030 and this shortfall in carbon removals will account for the removal of 5.7 MtCO₂ from the system. We also find that the CCC expect emissions from Land Use, Land-Use Change and Forestry (LULUCF) to increase by 542% in 2032 versus 1990. This is largely due to the fact that “around 80% of Scotland’s peatlands are degraded and contribute significantly to land use emissions” and historically Scotland has not met its own peatland restoration targets^v.

Figure 4: Sectoral emission cuts from Scottish Government’s pathway to 2032



(Source: [ScotGov](#) and [CCC](#))

Guiding these absolute and relative cuts to sectoral emissions are a host of sectoral targets and policies that are designed to deliver on these (Figure 5), which offer some insight into the types of changes Scotland is expected to make to its core economic sectors – and wider society – if it is to meet its own emission targets.

It is important to note that whilst the CCC has welcomed the level of ambition presented in Figure 5 “a clear delivery plan on how [key milestones] will be achieved is still missing”^{vi}. In short, with some notable exceptions – aviation and peatland restoration - the necessary ambition is largely in place but it is unclear how this will be realised, culminating in “a significant risk of Scotland failing to meet its annual targets in the 2020s and the interim 2030 target”^{vii}. Scotland was considered to be ‘significantly off-track’ in delivering on its policy ambition for all sectors apart from afforestation and phasing out fossil-fuel cars, which were considered to be ‘slightly off-track’, whilst low-carbon heat was too early to say.

Without a detailed delivery plan that outlines the nature and timing of specific changes to Scotland’s sector, it is not clear how these sectors will be impacted and when. By extension, the implications of Scotland’s net zero transition on Scottish low paid jobs will be difficult to quantify.

It is also clear that some sectors are failing to deliver on current policy ambition or fall short of the policy ambition required and that further policy change may be necessary. This presents further questions over the potential positive and/or negative impact on jobs.

In a bid to address any shortfall in ambition, as well as to help ensure delivery on suitable high-levels of policy ambition, the CCC has made a number of policy recommendations. If adopted by Scottish, and potentially UK government if responsibility is shared, then these could have a substantive impact

on the direction of sectoral change and associated impacts on low paid jobs. These are also outlined in Figure 5.

Figure 5 Progress against Scotland’s milestones (Source: [CCC](#))

Sector	Significant devolved powers?	Targets	Flagship policies and objectives	Selected CCC policy recommendations
Buildings	Yes	-70% by 2030 versus 2020	<p>Aiming for at least 124,000 homes to receive low-carbon heating systems by 2026, and 1.2 million homes and 50,000 non-domestic buildings by 2030. It is aiming to achieve installation rates of over 200,000 per year in the late 2020s.</p> <p>Practically all existing homes to reach the equivalent of an EPC C rating by 2033, an increase of around 1.4 million homes, or 55% of the existing stock.</p> <p>Consulting on prohibiting the use of direct emissions heating systems in new buildings warranted from April 2024^{viii}.</p> <p>Local authorities required to produce heat and energy efficiency strategies and delivery plans by the end of 2023 has been put in place.</p>	<p>Publish a monitoring and evaluation framework to track deployment of energy efficiency measures, heat pumps, and low-carbon district heating.</p> <p>Clear target dates for meeting new energy efficiency standards for non-commercial buildings.</p>
Transport	Yes	-53% by 2030 versus 2019	<p>Road transport and active travel Scotland plans to transition to 100% battery electric vehicle car and van sales by 2030.</p> <p>Reduce car-kilometres by 20% compared to 2019 levels by 2030.</p>	<p>Investment in more sustainable modes of travel and measures to reduce the attractiveness of driving.</p> <p>6,000 charge points by 2026 and approximately 24,000 charge points by 2030.</p>

			<p>National Planning Framework embeds the concept of the 20-minute neighbourhood.</p> <p>Introduction of Low Emissions Zones in city centres, which exclude the most polluting and carbon intensive vehicles.</p>	<p>More affordable and better connected inter-modal public transport.</p> <p>Embed the 20% car demand-reduction target within wider policy (e.g. planning, transport investment).</p>
			<p>Rail</p> <p>Remove diesel from all passenger services by 2035.</p>	
			<p>Shipping</p> <p>30% of Scottish Government-owned ferries to be low-emission by 2032.</p>	<p>Develop a plan for deploying shore power and electric recharging infrastructure at all of Scotland's major ports.</p>
			<p>Aviation</p> <p>No commitment on reducing aviation demand.</p>	<p>Implement the Air Departure Tax (ADT) as soon as possible.</p> <p>Publish a detailed strategy for decarbonising aviation in Scotland, including how decarbonisation of scheduled flights within Scotland will be achieved by 2040 and a strategy to limit airport expansion.</p> <p>Encourage the use of public transport for travel to and from Scottish airports.</p>
Waste	Yes	-53% by 2032 versus 2019 levels ^{ix}	<p>Scotland has committed to end the landfilling of biodegradable municipal waste from 2025.</p> <p>Reduction in food waste – 33% by 2025, includes commercial.</p> <p>Banning single use plastic. Moratorium for incineration and energy from waste facilities.</p>	<p>Reduce food waste by 50% by 2030.</p> <p>Retrofit existing Energy from Waste plants with CCS from the mid-2020s, and ensure any new Energy from Waste plants are all built CCS-ready.</p> <p>Set targets to reduce waste and improve recycling rates beyond 2025, ensuring these are</p>

			Deposit Return Scheme (but this has been delayed to 2025 at least).	more ambitious than existing targets and segregated by waste stream.
LULUCF	Yes		<p>Peatland restoration Scottish Government target of 20,000 hectares per annum, more than double the current rate of 8,000 hectares.</p> <p>Afforestation Scottish Government target of 18,000 hectares per year by 2024/25, almost double the current rate of 10,000 ha pa.</p>	<p>Raise the current target for peatland restoration of 20,000 hectares per year to 45,000 hectares per year. All upland peat should be under restoration management by 2045.</p> <p>Plant trees on 2% of farmland by 2025 while maintaining its primary use, rising to 5% by 2035, and extend hedgerows by 20% by 2035 and better manage existing hedgerows.</p>
Agriculture	Yes	-28% by 2030 versus 2020	<p>Ambition to reduce 2013 food waste levels by one third by 2025.</p> <p>Proposed introduction of conditional payments to farmers, crofters and land managers would be dependent on achievement of targeted outcomes for low-carbon farming approaches, biodiversity gain and wider environmental outcomes.</p>	Commit to a 20% shift away from all meat by 2030, rising to 35% by 2050, and a 20% shift from dairy products by 2030.
Electricity	No	-100% by 2032	Offshore wind deployment of 8-11 GW by 2030.	
Engineering carbon removals and CCS	No	Deployment of around 3.8 MtCO ₂ per annum of removals by 2030	CCUS cluster in Scotland could facilitate engineered removals deployment in the early 2030s.	Identify potential sites for new build and retrofit engineered carbon removals projects and takes into account proximity to biomass stocks, access to future CCS networks and impacts on energy systems.
Industry	No	-38% by 2030, versus 2020	Funding for innovative design and demonstration of innovation in hydrogen	New ambitious targets to improve industrial resource efficiency,

			and low-carbon products or processes.	<p>recycling and waste prevention for 2030.</p> <p>Dates beyond which new bioenergy facilities should be built with CCS, and dates for when CCS will need to be retrofitted to biofuel facilities already in operation.</p> <p>Resource-efficient construction and use of existing low-carbon materials through mandatory whole-life reporting followed by minimum whole-life standards for all buildings, roads and infrastructure by 2025.</p>
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Climate justice and a just transition

Any transformative change from the status quo – such as a net zero transition – has the potential to adversely impact some sections of society, whilst benefitting others. In short, there may be ‘winners’ and ‘losers’, depending on the type and speed of decarbonisation we witness. To alleviate these concerns around how fair or just this transition is, we have witnessed a growing emphasis on delivering ‘a just transition’ to net-zero. Box 1 offers an overview of where this term has emerged from and how it has been used in Scotland to date.

Box 1: What is meant by a ‘just transition’?

The Scottish Government is adamant that their 2045 vision for Scotland is one that “...will have a flourishing, climate friendly energy system that delivers affordable, resilient and clean energy supplies for Scotland’s households, communities and business...”^x

Their proposal for doing so, is by adopting a “just transition” approach. But what exactly is a just transition, and how exactly does it fit in within the context of *Scotland net zero 2045*?

Unlike conceptualising the construct of “net-zero”, there is no clear-cut way to account for a “just transition.” As a construct, the notion of a “just transition” was first recognised in the United States during the 1990s in relation to the “Superfund for Workers” - established on behalf of the Oil, Chemical and Atomic Workers’ Union (“OCAW”) Members to combat the rising rates of unemployment in the energy sector^{xi}.

Subsequently, it was not until the International Labour Organization’s (“ILO”) “Guidelines for a just transition towards environmentally sustainable economies and societies for all”, framework was released in 2015, that the practical application of the “just transition” re-emerged in social dialogues - nearly two decades after the *Superfund for Workers* rhetoric.

The ILO framework was the first guideline to be produced with the express purpose of enabling countries to effectively plan and coordinate their low-carbon labour-force transitions sustainably, and not at the cost of the local population. In turn, at the COP26 “Just Transition Declaration”^{xii}, which built upon the outputs of the United Nations “Solidarity and Just Transitions Silesia Declaration” member states unanimously agreed the pressing need to include people-centric and equitable transition approaches at the heart of global policy reforms; irrespective of developmental status. And in the context of Scotland, the “just transition” is the tool/mechanism utilised by the Scottish Government to deliver its net zero 2045 object in the most equitable, economically prosperous and “managed” way without adversely impacting on the lives of the Scottish population^{xiii}.

In the context of this research paper, we have opted to adopt the Scottish Government’s own definition: “[It] is both the outcome – a fairer, greener future for all – and the process that must be undertaken in partnership with those impacted by the transition to net zero^{xiv}.”

At the heart of a just transition is the notion of justice; often termed energy, environmental or climate justice when associated with a net zero transition. Walker defines environmental justice’s two central tenets as: “1) how some consume key environmental resources at the expense of others and 2) how the power to affect change and influence decision-making is unequally influenced”^{xv}. Relating this squarely to energy Sovacool and Dworkin define energy justice as creating a “global energy system that fairly disseminates both the benefits and costs of energy services, and one that has representative and impartial energy decision-making”^{xvi}. Achieving this aim demands a focus on four types of justice^{xvii xviii}:

Distributional: The equal distribution of costs and benefits across society.

Procedural: The meaningful involvement of different sections of society in the decision-making processes that govern the distribution of costs and benefits.

Recognition: The balanced recognition of different sections of society in this decision making process.

Restorative: The remediation of past injustices and amelioration of future injustices.

Scotland has in recent years adopted a strong commitment to delivering a just transition and this is having an important influence across all forms of net zero policy making. A core focus here too has been on skills and jobs, which are at the heart of questions around the equitable distribution of capital and agency. Informing Scottish Government's policy making has been the Just Transition Commission who outline 24 recommendations clustered around four themes:

1. Pursue an orderly, managed transition to net- zero that creates benefits and opportunities for people across Scotland. Delivery of this must be a national mission
2. Equip people with the skills and education they need to benefit from the transition
3. Empower and invigorate our communities and strengthen local economies
4. Share benefits widely and ensure burdens are distributed on the basis of ability to pay

Responding to these the Scottish Government recently launched Draft Energy Strategy and Just Transition Plan^{xix} which gives us a sense of what is likely to be implemented in Scotland and the associated impact on jobs. We briefly outline some of the more detailed policies presented in this consultation that will likely have an important bearing on employment:

- Reskilling of oil and gas workers by funding an [offshore energy skills passport](#) through our Just Transition Fund.
- A £75 million investment in the National Manufacturing Institute Scotland (NMIS).
- Expanding the Supply Chain Development Programme to improve the capacity, capability and development of Scottish supply chains.
- An ambition for 2 GW of community owned energy by 2030. This currently stands at 82 MW^{xx}.
- £500 million Just Transition Fund will support the northeast and Moray to become one of Scotland's centres of excellence for the transition to a net zero economy.
- The 2021-22 to 2025-26 Infrastructure Investment Plan (IIP) contains £9 billion for environmental sustainability and the net zero transition.

Key uncertainties about a net zero transition

Across both the UK and Scotland there also exist key question marks over what direction these sectoral transformations will take towards achieving net-zero. The key areas of transformation where there is greatest uncertainty are as follows:

Supply and Generation

- Scale of hydrogen production, its underlying source (e.g. green, blue or brown H₂) and what it will be used for (e.g. heavy transport, heating, industrial process etc.)
- Scale of onshore versus offshore wind deployment, given the current moratorium on new onshore wind in England.
- Potential for tidal power generation, with a strong emphasis on tidal stream in the North of Scotland.
- Longevity of domestic oil and gas production, and extent to which this is coupled with engineered carbon removals (e.g. CCS).

Transmission and Distribution

- Capacity and roll-out of power network to facilitate decentralised generation, demand electrification and transfer of power from centres of supply to demand (e.g. North to South).
- Potential for existing gas network to facilitate storage and transfer of hydrogen.

Storage

- Feasibility and cost-effectiveness of engineered removals (e.g. direct air capture with CCS etc.), and associated deployment versus natural forms of carbon sequestration via land-use change (e.g. peatland restoration, afforestation).
- Most cost-effective and easy-to-deploy forms of electricity storage, and extent to which decentralised storage (e.g. EVs) can be aggregated to form utility-scale storage.

Demand

- Prevalence of “car culture” status quo underpinned by deployment of EVs versus a move away from individual automotive transport and towards active travel and low-carbon public transport.
- Extent of dietary change, especially away from milk and dairy, and towards vegetarian or vegan diets, as well as meat substitutes.
- Appetite of domestic households to retrofit existing buildings to net zero standards, given lack of support, high-cost, long-payback and associated levels of disruption.
- Feasibility and cost-effectiveness of low-carbon air travel versus other alternatives for long-distance travel (e.g. rail, ferry, coach etc.). Extent to which consumers will reduce air travel.
- Extent of consumer engagement in demand-side management, smart technology and micro-generation.

Cross-cutting

- Depth and breadth of UK ownership of product and service supply chain, in particular the manufacturing of net zero products (e.g. wind turbines, heat pumps, EVs) versus importation.
- Skills and employment capacity of UK supply chain to install, maintain, decommission etc. the necessary net zero infrastructure.

Scotland versus UK sectoral transformations

The uncertainties listed above have relevance to both the UK and Scotland. However, the sectoral impacts of net zero on jobs in Scotland may be different to the UK on three counts. Firstly, the Climate Change Emissions Reduction (Scotland) Act (2019) legally binds Scotland to becoming a net zero society by 2045, relative to 2019 CO₂ greenhouse gas (“GHG”) emissions outputs. This is five years earlier than the rest of the UK, meaning sectoral cuts will be faster and potentially more disruptive for Scotland than for the rest of the UK.

Secondly, the CCC explain how Scotland has significant devolved powers over transport, buildings, agriculture and land use, and finally waste (see Figure 5). Sectors where powers are largely reserved by UK government include electricity, CCS, industry and engineering carbon removals. As outlined above devolution means that Scotland has some devolved powers that may result in some divergence in terms of the pace and direction of decarbonisation – and associated disruption to Scotland’s economy and society – versus the wider UK. For example, Scotland has a more ambitious target versus the UK on cutting car-km travelled, with a 20% reduction by 2030^{xxi}.

Thirdly, the makeup of Scotland’s economy does not perfectly mirror of the UK’s. It may therefore experience more or less disruption from emission cuts versus the wider UK. For example, it has a long history of oil and gas extraction in the North Sea, which has historically accounted for a larger share of GDP in Scotland. Conversely, renewables make up for a large share of GDP in Scotland versus the UK. It is also important to note the structural differences in the challenges associated with decarbonisation in Scotland versus the UK. Take for instance housing, where the average EPC of

Scottish homes is worse than the UK^{xxii}, whilst Scotland also has many more homes off the gas-grid; the latter posing both an opportunity and challenge to decarbonising its homes.

3 The low paid workforce in Scotland

This section provides an overview of the types of jobs that we are considering as low paid for this analysis.

There is no set definition of a low paid job but we know that being in a relatively low paid job is a determining factor for poverty risk^{xxiii}. Both hourly pay and hours worked are key factors^{xxiv}. The Annual Survey of Hours and Earnings (ASHE) published by the ONS is the official source of data on earnings in the UK, and has data disaggregated to Scotland level^{xxv}. We have used this data to provide a list of low paid jobs in Scotland, and combined this with data from the Annual Population Survey (APS), also produced by the ONS, to provide job numbers and gender disaggregation.

Existing analysis on the impact of net zero on jobs has used the coded disaggregation of occupations known as Standard Occupational Classifications (SOC). SOC codes exist in a hierarchy, with high level descriptions of occupations at the top (one-digit) level (e.g. code 7 refers to sales and customer service operations) and detailed descriptions of jobs and related tasks at subsequent (multiple digit) levels (e.g. code 7111 refers to retail cashiers and check-out operators i.e. four-digit level).

ASHE has data both on hourly pay and hours worked, and the two can be combined to look at weekly and annual earnings. The data is much more complete for hourly pay and we will concentrate on this metric in the first instance.

Given there is no set definition of low pay, we have simply looked at the lowest 10% of jobs by hourly pay. An alternative approach would have been to use the real living wage rate for 2022 of £9.90 an hour but, in this instance, it felt like this would limit the scope of the analysis too far.

For this analysis, we are using ASHE data at 4-digit SOC. This is the lowest level of publicly available data made available by the ONS and provides relatively detailed breakdowns of occupational characteristics and provides insight into low pay jobs that would be lost at 3-digit SOC level¹.

Appendix A goes through a number of steps that result in this final list of jobs that are in scope for this analysis and Figure 6 provides the initial list of occupations that will be used later in this report.

Retail and hospitality jobs feature prominently in the list of low paid workers, although as a standalone occupation, care workers and home carers are the largest low paid sector with over 75,000 workers in Scotland. The vast majority of low paid occupations have a majority female workforce.

Figure 6: Low paid jobs in Scotland, ordered by number of jobs

SOC code	Description	Size of workforce*	Proportion of workforce who are women**
6135	Care workers and home carers	76,600	81%
7111	Retail cashiers and check-out operators	72,500	79%
9263	Kitchen and catering assistants	37,700	60%
7112	Sales and retail assistants	29,200	60%
8214	Delivery drivers and couriers	24,700	7%

¹ For example, food preparation and hospitality trades would be on the borderline of being included in a low pay definition at 3-digit SOC level, but a number of occupations at 4-digit SOC are clearly within scope, with waiters and waitresses actually coming top of the low pay ranking at 4-digit SOC level looking at hourly pay.

9223	Cleaners and domestics	24,400	76%
9264	Waiters and waitresses	23,600	73%
3232	Early education and childcare practitioners	18,300	92%
6113	Educational support assistants	17,000	98%
9131	Industrial cleaning process occupations	15,600	81%
9265	Bar staff	15,400	58%
8111	Food, drink and tobacco process operatives	13,000	44%
3432	Sports coaches, instructors and officials	12,000	29%
4216	Receptionists	12,000	88%
8213	Taxi and cab drivers and chauffeurs	9,400	33%
7114	Pharmacy and optical dispensing assistants	9,300	87%
6112	Teaching assistants	8,300	83%
6111	Early education and childcare assistants	8,200	100%
6211	Sports and leisure assistants	8,100	37%
6222	Beauticians and related occupations	7,800	99%
5435	Cooks	7,700	55%
9266	Coffee shop workers	6,900	65%
6221	Hairdressers and barbers	6,600	85%
6213	Air travel assistants	5,700	74%
6129	Animal care services occupations n.e.c.	5,500	89%
9267	Leisure and theme park attendants	4,500	58%
9269	Other elementary services occupations n.e.c.	4,400	27%
6114	Childminders	4,000	95%
9261	Other elementary services occupations n.e.c.	3,800	27%
9261	Bar and catering supervisors	3,800	n/a
9221	Window cleaners	3,300	39%
4135	Library clerks and assistants	3,200	84%
9219	Elementary administration occupations n.e.c.	3,100	58%
9241	Shelf fillers	3,100	55%
9232	School midday and crossing patrol occupations	3,000	53%

*Occupations with fewer than 3000 workers are not shown in Table 1, but are considered in later analysis.

** Highlighted cells show occupations that have a majority female workforce

4 Existing analysis of the impact of net zero on jobs

Our preliminary mapping of the policy literature suggests a tendency across all governments in the UK to assume that the transition to net zero will help grow and support good quality^{xxvi xxvii}, ‘well-paid’ jobs^{xxviii xxix}.

Green-biased changes to the occupational structure of employment will reportedly lead to a raft of new and ‘adapted’ jobs – and, with it, a need to upskill and reskill workers^{xxx xxxi}. Alongside the opportunities created *en route* to net zero, there will be lower demand for some jobs through the phasing out of carbon-intensive industries^{xxxii}. It is not sufficiently clear from analysis to date however how these occupational shifts will impact low paid jobs.

Given that we have already identified low paid jobs at the 4-digit SOC level (Figure 5), it is possible to gain some insight here from two recent analyses of jobs (at the 4-digit SOC level) and the transition to net zero. The first focuses on ‘green’ jobs. The second on ‘brown’ jobs. We then analyse the overlap with low paid jobs.

Development of a three-category ‘GreenSOC’

Recent research on green jobs and skills in Scotland, undertaken by researchers at Warwick and Strathclyde Universities for Skills Development Scotland, included the development of a ‘GreenSOC’^{xxxiii}. This new GreenSOC uses an adapted ‘three category classification of green occupations that draws on a broad definition that recognises a range of occupations in which new green jobs can emerge and existing jobs can change through greening. The three categories of ‘green’ jobs in the GreenSOC are:

1. New and emerging green jobs
2. Existing jobs with enhanced green skills and knowledge
3. Existing jobs that have increased demand due to the transition to net zero

The GreenSOC identifies jobs within each category at the 4-digit SOC level. Around 40% of jobs in Scotland, based on an analysis of Scottish Labour Force Survey (LFS) data, are ‘green’ jobs.

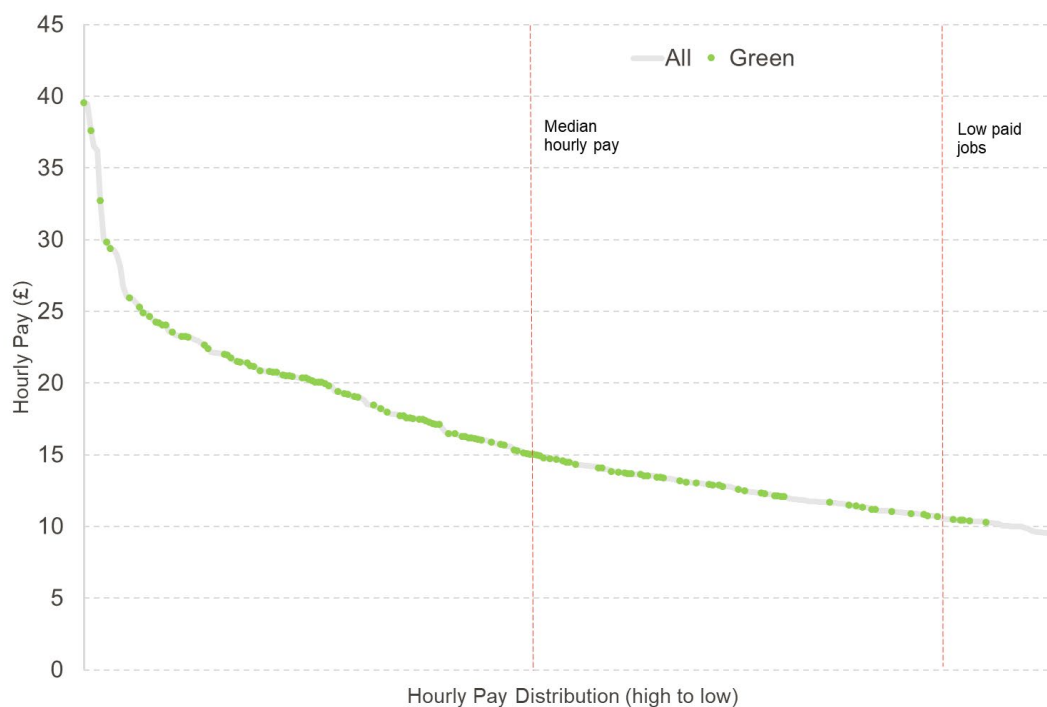
Our mapping of low paid jobs onto the GreenSOC (see Table 3) highlights that just three are ‘green’ jobs. There is therefore little overlap between green jobs and low paid jobs, if the GreenSOC is used to identify green jobs.

Figure 7: Low paid jobs that are classified as ‘green’ jobs based on the ‘GreenSOC’

SOC	Description	‘Greensoc’ category
8141	Assemblers (electrical and electronic products)	Increased demand
8214	Delivery drivers and couriers	Enhanced skills
8111	Food, drink and tobacco process operatives	Enhanced skills

Figure 8 shows GreenSOC jobs (green dots) and non-GreenSOC jobs (grey dots) plotted on the earnings distribution. Notably, whilst there are GreenSOC jobs along most of the earnings distribution, there is a noticeable tail of low paid non-GreenSOC jobs.

Figure 8: GreenSOC jobs (green dots) and non-GreenSOC jobs (grey dots) by hourly pay



Resolution Foundation analysis on ‘brown’ jobs

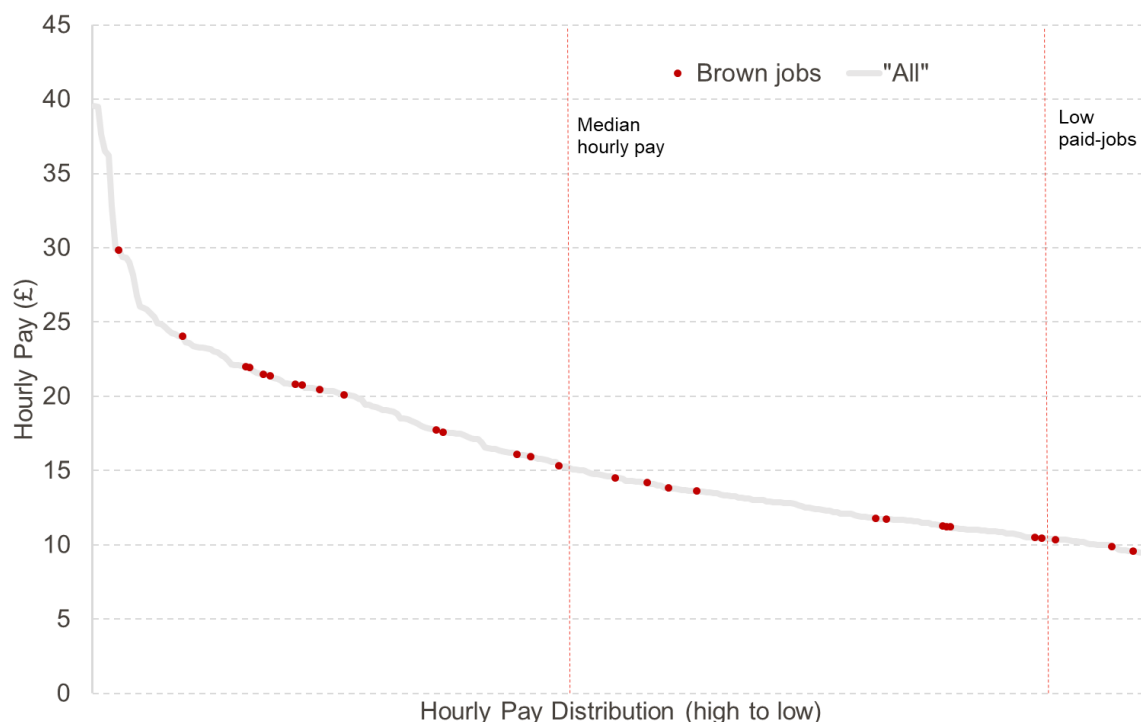
As part of its Economy 2030 enquiry, the Resolution Foundation’s analysis of ‘green’ jobs produced similar results to the GreenSOC analysis. The Resolution Foundation also produced an analysis of so called ‘brown’ jobs i.e. jobs that that are highly carbon intensive and likely to see a reduction in demand.

We have mapped across their findings onto our list of low paid jobs, and again find some yet limited overlap.

Figure 9: Low paid jobs that meet the brown jobs definition

SOC	Description
6213	Air travel assistants
9131	Industrial cleaning process occupations
6212	Travel agents

Figure 10: Brown jobs according to Resolution Foundation analysis



Both these analysis look at the tasks and skills required for these jobs and assess their relevance to the net zero transition. The lack of overlap onto low paid jobs reflects the fact that few low-paid jobs exist within either ‘green’ or ‘brown’ sectors. However, they do not capture the impact on the café next door where workers in these sectors buy their lunch every day. Nor does it capture the impact of changes that may be needed to make to equipment in the café to make it more energy efficient to meet new regulations. These costs may be substantial and call into question the financial sustainability of the business. There is clearly potential for impacts outwith ‘green’ and ‘brown’ sectors.

Section 5 takes a step back from looking at job tasks and skills and looks at the jobs that feature in our low pay definition and explores why these might be impacted by the transition to net zero.

5 Alternative experimental methods of looking at the impact of net zero on low paid jobs

This section considers the potential for the transition to net zero to impact low paid jobs due to the knock on effect on businesses that are not on the front line of the net zero transition.

It is important to make clear that analysis of the impact on jobs in this section can only look at the potential for disruption, and is not a prediction of the disruption that will take place. For example, some businesses may already be in premises that meet all the requirements of net zero policy. The café next door to a ‘brown’ employer may lose most of its customers only to find a ‘green’ employer moving in the next week and demand increasing. This analysis is helpful in terms of identifying the reasons why jobs may be at risk, but does not provide a full analysis of the net impact on jobs.

There is no pre-existing method to do this analysis that we have been able to find and replicate for Scotland and hence this analysis is experimental in nature. We intend to test the method and findings with a group of stakeholders as part of the dissemination of this report and the write-up will be appended to this report on publication.

We are using two alternative, but complementary, approaches to look at the potential impact on jobs from net zero.

1. The first looks at understanding emissions connected to businesses, which employ low pay workers. This provides an assessment of why these businesses may be impacted by net zero. The risk to jobs comes from either lower demand or changes required by the business to be net zero compliant.
2. The second approach uses data on the Scottish economy to understand how the low paid jobs could be impacted by the loss of jobs specifically in the oil and gas sector. This analysis is particularly pertinent to the North East where a lot of these jobs are concentrated. The main impact we will be looking for is how wage spending impacts on those sectors that we know employ low paid workers (induced effects).

Approach 1: Understanding emissions connected to businesses which employ low paid workers

In order to understand the full scope of how net zero may affect businesses that employ low paid workers, we have used a methodology often used by industries and businesses to understand their own emission footprint. Emissions that can be linked to a business are split into three categories: Scope 1, Scope 2 and Scope 3:

Scope 1 emissions

These are “direct” emissions – those that a company causes by operating the things that it owns or controls. These can be a result of running machinery to make products, driving vehicles, or just heating buildings and powering computers.

Scope 2 emissions

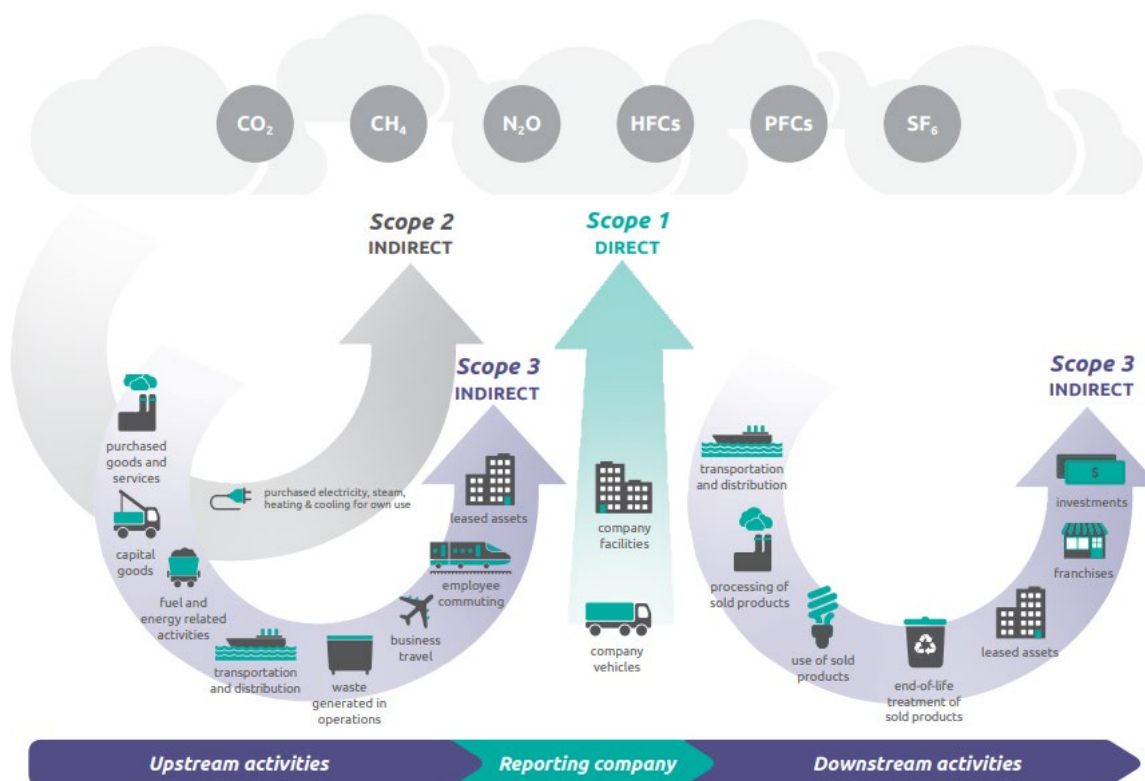
These are “indirect” emissions created by the production of the energy that an organization buys. Installing solar panels or sourcing renewable energy rather than using electricity generated using fossil fuels would cut a company’s Scope 2 emissions.

Scope 3 emissions

These are also indirect emissions – meaning those not produced by the company itself – but they differ from Scope 2 as they cover those produced by customers using the company’s products or those produced by suppliers making products that the company uses.

Figure 11 also disaggregates the Scope 3 emissions into upstream and downstream activities, reproduced from the Greenhouse Gas Protocol website.

Figure 11: Overview of GHG Protocol scope and emissions across the value chain



Source: [GHG Protocol](#)

All businesses are likely to have scope 2 emissions, and ultimately lowering scope 2 emissions is dependent on Scottish Government efforts to decarbonise the energy system. For this analysis we are concentrating on Scope 1 and 3 emissions due to the fact that the companies/organisations will be the main actor in making changes that affect these emissions, and hence these have the greatest potential impact on the businesses cost base.

To help simplify the next stage of analysis, we have grouped low paid jobs that do not feature in either the GreenSOC or brown jobs analysis in Section 4 into categories (see Appendix B). Where possible, we have grouped jobs into industry categories (e.g. retail, hospitality). However, the nature of Standard Occupational Classification means that some jobs are cross sector and any impact will be dependent on which industry they are in. There are also some occupations that we have termed miscellaneous as they do not fit easily into a categorisation. Figure 12 further results of limiting the analysis to show those categories that have more than 5,000 employees².

² The emissions for sectors smaller than 5,000 workers appear elsewhere in Figure 12.

Figure 12: Emissions from sectors with low paid jobs not captured in previous analysis

Categories	Scope 1 emissions produced on site	Scope 3 upstream emissions	Number of low paid jobs in Scotland
Retail	Heating/cooling and lighting of premises.	Supply chain could be very carbon intensive. Customer and commuter travel to premises. Transportation of goods to premises. Products sold become waste after use, if not re-used or recycled.	104,800
Food and Beverage Services	Heating and cooling is a key part of food storage and preparation tasks. Heating/cooling and lighting of premises.	Suppliers include food production (i.e, agriculture) and food and drink manufacturing processes. Customer and commuter travel to premises. Transportation of goods to premises. Food and packaging waste.	95,100
Human health and social care	Heating/cooling and lighting of premises.	Commuting and patient/client travel	85,900
Education	Heating/cooling and lighting of premises.	Commuting and pupil travel	42,300
Services to Buildings (cleaning activities)	Heating/cooling and lighting of premises. (contracting companies may have own premises). Emissions from vehicles (contracting companies may have own vehicle fleet).	Supply chain typically relies on products derived from energy and carbon-intensive chemical manufacture. Customer and commuter travel to premises.	27,700
Arts, entertainment and recreation (not including travel)	Heating/cooling and lighting of premises.	Customer and commuter travel to premises.	27,800
Personal services (hair and beauty)	Some processes are dependent on heat (e.g. hairdressers). Heating/cooling and lighting of premises.	Customer and commuter travel to premises.	14,400

Misc SOC (not aggregated)			
Taxi and cab drivers and chauffeurs	Vehicle used as part of job.		9,400
Animal care services occupations not elsewhere classified ³	Heating/cooling and lighting of premises.	Customer and commuter travel to premises.	5,500
Cross sector			
Receptionists	Heating/cooling and lighting of premises.	Customer and commuter travel to premises.	12,000

Figure 13 summarises the reasons for emissions noted in table 5 along with a description of the possible impact on the business.

Figure 13: Summary of emissions and possible impact on business

Reason for emissions	Impact on the business of mitigation measures
Heating and cooling in processes.	Goods may need to be replaced. May need to switch energy source – for example, gas cooking to electric.
Heating/cooling and lighting of premises.	Energy efficiency of buildings may need to be improved
Customer and commuter travel to premises	<p>Could be a number of alternatives/combinations:</p> <ul style="list-style-type: none"> • Travel by car but clean (EV) • Travel via a more energy efficient mode (e.g. active travel, public transport) • Company brings the service/product to you instead, workers work from home <p>Without changes made, demand for product/service/availability of commuting labour force would reduce.</p>
Waste processes	Rules on the separation, storage and disposal of waste may increase costs.
Transportation and distribution of goods	Rules on HGV emissions may impact on costs. Depends on alternatives (e.g. rail freight) and ability to lower emissions from HGV vehicles.
Suppliers are from potential high emission industries	Costs of goods may increase due to changes made in those sectors and supply of some goods may reduce. Customers may demand that the supply chain is low emission.
Vehicles used as part of job	Transition to electric cars or change in transportation/logistics to limit emissions.

As an illustration of how Net Zero policy can ripple beyond the targeted sector and affect low paid jobs, here we look at the (now delayed) **Deposit Return Scheme**. This provides a recent relevant example of the impact on low pay sectors (retail, hospitality) due to efforts to mitigate waste in a

³ This includes care for animals in kennels, stables zoos, training and grooming services and some care and control services, not otherwise classified in SIC 613: Animal Care and Control Services

polluting sector (manufacture of drinks) and the difficulties in the attempts of the government to fully recognise and mitigate that impact.

The scheme is designed to improve recycling rates for liquid containers along the polluter pays principle, with producers being asked to fund the scheme so that the containers that they put on the market can be recycled. Retailers will charge and refund the deposit, and act as a return point for any eligible container.

Low pay workers feature in all the industry sectors that will be impacted by the Deposit Return Scheme. Food, drink and tobacco process operatives feature in the 'greenSOC' definition, and retail and hospitality workers feature in our own analysis (table 5).

In July 2019, the Scottish Government published a Full Business and Regulatory Impact Assessment (BRIA) for the deposit return scheme where it described a number of anticipated impacts on businesses (Figure 14).

Figure 14 – Impact on Producers, Retailers and Hospitality taken from the Deposit Return Scheme BRIA^{xxxiv}

Sector	Stated impacts in the BRIA
Producers	“Producers contribute to the Scheme Administrator’s operating costs and will incur capital and operating costs associated with labelling and distribution changes.”
Retail	“The costs of operating the return points include staff time, the value of any lost retail space, miscellaneous supplies and maintaining and operating Reverse Vending Machines. As the operator of these return locations will be fully reimbursed, no overall net benefit or loss is anticipated.”
Hospitality	<p>“Impacts on the hospitality sector: no significant impacts anticipated. In general, the impacts on the hospitality sector will be the same as discussed above for other retailers”.</p> <p>“Establishments operating a “closed loop”⁴ would be responsible for meeting the deposit costs paid to the wholesaler but would not receive deposits paid from the consumer. Instead, they have to wait for these to be paid by the Scheme Administrator. Depending on how long this takes, there could be a small potential cash flow impact”.</p> <p>“It is likely that there would be some degree of natural wastage as result of customers taking the container away or breakages....this analysis suggests that the financial loss would not be significant”.</p>

The stated intention was to recompense retail and hospitality businesses for additional costs incurred. Operationally however, the amounts paid out would not be linked to any assessment of costs for individual businesses.

The impact of any additional, non-recompensed, costs will differ depending on the business. Some will be able to absorb additional costs, but for others it could be the tipping point that makes the

⁴ “A “closed loop” would operate where the container stayed on the premises and was returned to the original retailers without a deposit being charged. Instead the deposit would be applied to purchases made by the relevant establishment from the producer or wholesaler, and the establishment would be able to claim it back from the Scheme Administrator following the collection of containers”

whole business unviable. The impact on employees will be dependent on how the business is able to respond.

These issues should not be seen as a critique of the scheme overall, but it does raise a number of points relevant to this work:

Firstly, as far as we are aware there has not been an assessment on the number of jobs that could be placed at risk in the production sector where the intended costs would be felt, and in the retail and hospitality sector where unintended costs could be felt.

Secondly, and probably as a result of this lack of analysis on jobs, the Deposit Return Scheme does not feature in any reports from the Just Transition Commission despite their being implications for jobs in the affected sectors.

Whilst the analysts who produced the original BRIA may feel that the risks to jobs are too low to merit such an analysis, it is clear that businesses have felt that the risks to their businesses have been understated throughout the development of the deposit return scheme^{xxxv}. Future analysis of the impact on businesses should extend to the impact on jobs, particularly given the high proportion of low paid workers in these affected sectors.

Approach 2: Understanding the impact of reduced spending from workers in jobs that will be lost in high emission sectors

This second approach starts from a very different basis than the first approach. This analysis makes use of Scottish economy input-output tables which provide a guide to how spending between sectors is linked. Other economic actors are also included in the modelling, including households. In particular, we are interested in looking at how earnings from those working in the oil and gas sector are spent, known as induced impact. This is particularly relevant when thinking about the North East where the reduction in jobs in 'brown' sectors may lead to a reduction in demand for local services, including our low pay sectors.

It is important to note that our analysis is a simplified model of how the economy works. A reduction in demand due to the shutdown of one sector may not mean that demand is lost altogether. Workers may move to another sector, and spend their money in the same way. It therefore can only give a guide to potential impacts.

Input-output (IO) modelling is a commonly used tool for estimating the impact of a change in final demand for a sectors goods and services across the economy. We have used IO analysis to hypothetically remove the oil and gas sector from the Scottish economy to understand the impact and linkages of the oil and gas sector to other sectors across the economy.

The removal of the oil and gas sector was modelled in two parts. A more technical description of the IO modelling analysis is provided in Appendix C.

First, we completely removed the Mining support service activities sector (Standard Industrial Classification (SIC 09); which provides support activities for petroleum and natural gas extraction. Nearly 99.8% of SIC 09 activity is linked to petroleum and natural gas extraction⁵, so we modelled the removal of the total sector, through removing all of the output of SIC 09 from the economy.

⁵ BRES employment data shows that 99.7% of employment in SIC 09 in 2018 was in SIC 091: Support activities for petroleum and natural gas extraction, and the remaining 0.3% was in SIC 099: Support activities for other mining and quarrying.

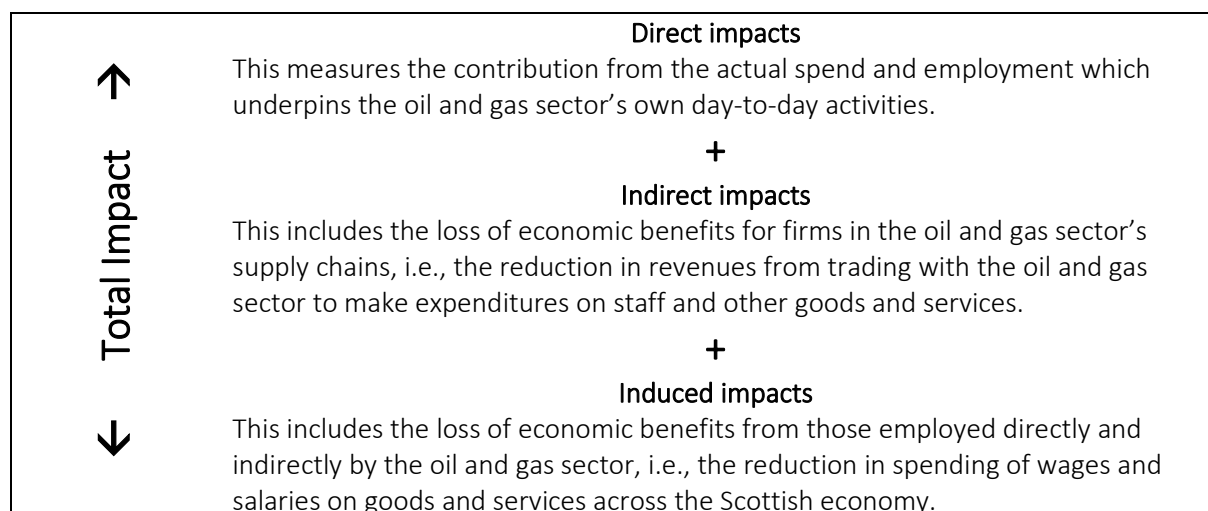
However, oil and gas activities are also linked to sectors across the economy, not just to SIC 09. For example, food and beverage services operating in an area of high oil and gas activity will generate some business from serving employees from the oil and gas industry. Therefore, these linkages with other sectors need to be accounted for to understand the full impact of the disappearance of the oil and gas sector. This was examined in the second part of our analysis, looking at the impact of the oil and gas sector on other sectors across the economy. Because the oil and gas sector is assumed to be extra-regio (i.e. outwith Scotland’s defined economic activity base), this was modelled through a shock to exports, where we reduced a sectors exports by the percentage of their rest of UK exports going directly to offshore oil and gas. This negative export shock was modelled as a reduction in the final output of the sector. Not all sectors export to offshore oil and gas, so only those sectors that do export to offshore oil and gas received a direct shock to their output.

Due to the focus of this report on low skilled non-green jobs, we only present results for three specific sectors: retail, accommodation and food and beverage services as we know that these sectors feature many low paid workers. All jobs in these sectors are included in this analysis, unlike in the previous approach where we were able to pinpoint specifically the low paid roles within these sectors.

While there is no direct impact in any of these sectors, as they do not export to offshore oil and gas, all three sectors experience indirect and induced effects from the removal of the oil and gas sector.

Our analysis provides estimates of the direct, indirect, and induced impacts of removing the oil and gas sector. See Figure 15

Figure 15: Direct, indirect, and induced effects explained



The largest effects are seen in the retail sector (Figure 16). Accounting for the indirect and induced effect, the disappearance of the oil and gas sector could impact nearly 5,400 full-time equivalent (FTE) jobs – 3.15% of total retail sector FTE jobs.

The food and beverages services sector experiences the next largest impact from the removal of the oil and gas industry (Figure 17). Including both indirect and induced effects, the food and beverages sector could impact on 3,000 FTE jobs, roughly 2.5% of total employment in the sector.

The accommodation sector experiences the smallest impact of the three sectors examined (Figure 18). The indirect and induced effects estimate that the disappearance of the oil and gas sector could impact 970 FTE jobs, 1.7% of total employment in the accommodation sector.

These numbers do not estimate the full effect of decarbonisation on retail and hospitality, and they must not be misinterpreted in this way. They do however provide evidence that some disruption to jobs in these sectors is possible.

Figure 16 – Economic impact of removing the oil and gas sector on the retail sector

SECTOR 47 – Retail	Employment (FTE)	% of Sector Employment
Direct	0	0%
Indirect	-686	-0.40%
Induced	-4,691	-2.75%
Total	-5,377	-3.15%

Source: FAI calculations using Scottish IO table (2016 and 2019) and Scottish Supply and Use satellite account table (2016).

Figure 17 – Economic impact of removing the oil and gas sector on the food and beverage services sector

SECTOR 56 – Food & beverage services	Employment (FTE)	% of Sector Employment
Direct	0	0%
Indirect	-100	-0.09%
Induced	-2,618	-2.48%
Total	-2,818	-2.57%

Source: FAI calculations using Scottish IO table (2016 and 2019) and Scottish Supply and Use satellite account table (2016).

Figure 18 – Economic impact of removing the oil and gas sector on the accommodation sector

SECTOR 55 – Accommodation	Employment (FTE)	% of Sector Employment
Direct	0	0%
Indirect	-225	-0.40%
Induced	-745	-1.31%
Total	-970	-1.70%

Source: FAI calculations using Scottish IO table (2016 and 2019) and Scottish Supply and Use satellite account table (2016).

These estimates have been modelled using the mid specialisation purchase data from the Supply and Use satellite account for Scottish offshore oil and gas. The results when using the alternative low and high specialisation scenario data have been included in Appendix C as a robustness check for these estimates.

6 Reflections for Scottish Government strategy going forward

This report has largely focussed on approaches to understand the potential negative impact of the net zero transition on low paid jobs. It is clear that there needs to be more focus on the ripple effects through to low paid industries and employees by government policy makers. However, the analysis needs to go beyond identifying those jobs at risk.

As discussed in the introduction, simply protecting low paid jobs falls short of meeting the dual priorities of the Scottish Government to reduce carbon emissions and reduce poverty. Low paid workers need to be able to transition into well paid jobs in order for both ambitions to be realised.

Growth in low paid jobs are already identified by the GreenSOC analysis in Section 4 of this paper (Assemblers (electrical and electronic products), Delivery drivers and couriers, Food, drink and tobacco process operatives). An increase in demand for these sectors could theoretically lead to improvements in pay and conditions, but there is no guarantee that this will indeed be the case.

However, the real potential for improved pay due to the net zero transition comes from the potential for workers in other low paid sectors to take advantage of the growth in demand for 'green' jobs, for example in the renewables sector. It is reasonable to assume that workers would require retraining and reskilling in order to be able to take advantage of these opportunities.

The Scottish Government seems to be emphasising these opportunities. For example, the recent Fair Work Action plan states that:

“Fair Work and tackling inequality are at the heart of Scotland’s economic and social programme and are key to a just transition to a net zero wellbeing economy.”

Fair Work Action Plan^{xxxvi}, published in December 2022.

However, analysis of current Scottish Government and Skills Development Scotland strategies does not find evidence of specific and targeted support to enable retraining and reskilling of low paid workers that would enable this to happen. For example, there is little in the Fair Work Action Plan actions that relates to the net zero transition. The policy actions that mention net zero are focussed on fair work conditionality for Just Transition fund recipients – a not unhelpful policy, but unlikely by itself to widen access to higher paid work for current low-paid workers.

The plan does go on to say:

“We are also ensuring that access to Fair Work, and widening access to high value work more generally, is a priority when developing the upcoming Just Transition Plans and the next Climate Change Plan.”

Since the publication of the Fair Work Delivery Plan, a draft Just Transition Plan for the energy sector has been released, along with discussion papers for transport, agriculture and construction sectors. None of these address the challenge of widening access to the sector for people currently engaged in low paid work in the sectors we have highlighted in this research. The next Climate Change Plan is yet to be released.

On a more positive note, the Just Transition plans and advice do consider low income consumers, and the potential benefits for communities of spreading the gains from economic opportunities fairly, both of which could benefit low paid workers. However, there is clearly more that can be done to look at the impact on low paid workers.

7 Conclusions

The clear conclusion from this work is that proper consideration of low -paid workers is absent from the current policy approach to the net zero transition. The scale of the potential impact on low paid workers does not feature in analysis commissioned or published by government. There appears to be an assumption made that the transition to net zero will benefit all yet the blueprint for the realisation of benefits for low paid workers has not been provided.

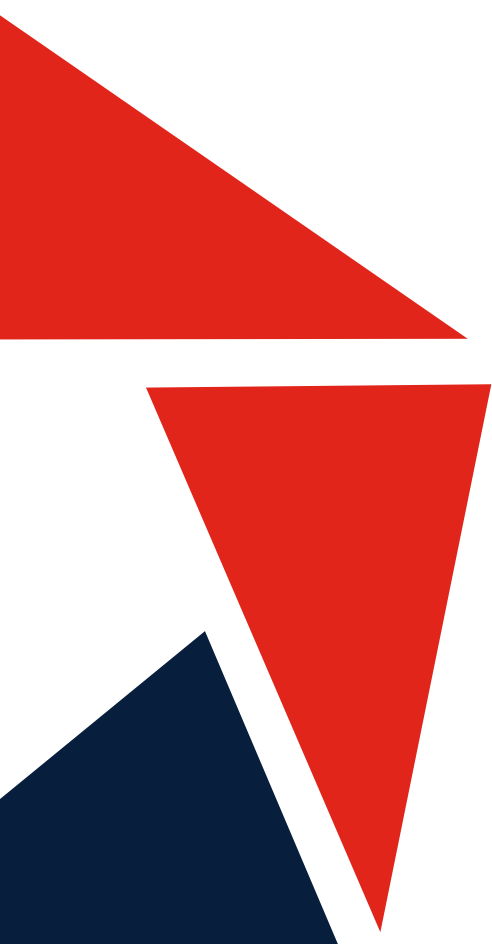
Our analysis has provided examples of frameworks which can start to help identify why and how low paid workers could be affected. There is further work that could be done to refine estimates of the number of jobs impacted, and the potential for offsetting impacts due to growing green sectors in the rest of the economy increasing demand for goods and services from low pay sectors.

The potential for harm to low paid workers is uncertain, due to both the uncertain delivery path of Scotland's efforts to reduce emissions and due to the countervailing impacts that may boost demand for the services of low paid workers. However, this is more than just about avoiding harm: the net zero transition could provide opportunities for low paid workers if the right support is in place to ensure they can choose to take advantage of new higher paid opportunities. Given both that statutory targets exist for both climate change/net zero and poverty, the absence of a joining up of delivery (beyond well meaning words) would be a missed opportunity.

Understanding the impact of the transition to net zero on low paid jobs

Appendix A: Low Paid Jobs Identification

September 2023



8 Appendix A: Low Paid Jobs Identification

Here we go through a number of steps to pull together a list of occupations at 4-digit level that we believe encompasses low paid jobs in Scotland.

Step 1: Use ASHE data for Scotland to produce an initial list of low paid jobs in Scotland.

Table 1 provides a list of the bottom 10% of jobs, by hourly pay, as reported by ASHE data at 4-digit SOC level for Scotland.

Table A1: List of occupations in bottom 10% of median hourly pay

Description	Median hourly pay (£)
Waiters and waitresses	9.50
Coffee shop workers	9.50
Hairdressers and barbers	9.50
Leisure and theme park attendants	9.53
Air travel assistants	9.57
Bar staff	9.60
Beauticians and related occupations	9.62
Shelf fillers	9.64
Launderers, dry cleaners and pressers	9.70
Animal care services occupations n.e.c.	9.83
Industrial cleaning process occupations	9.89
Retail cashiers and check-out operators	10.00
Sales and retail assistants	10.00
Cleaners and domestics	10.00
Textiles, garments and related trades n.e.c.	10.01
Cooks	10.04
Kitchen and catering assistants	10.05
Vehicle valeters and cleaners	10.07
Tyre, exhaust and windscreen fitters	10.19
Elementary administration occupations n.e.c.	10.21
Pharmacy and optical dispensing assistants	10.25
Receptionists	10.25
Assemblers (electrical and electronic products)	10.32
Playworkers	10.34
Other elementary services occupations n.e.c.	10.35
Bar and catering supervisors	10.35
Travel agents	10.36
Delivery drivers and couriers	10.41
Elementary cleaning occupations n.e.c.	10.42
Food, drink and tobacco process operatives	10.44

Step 2: Use UK hourly-pay data to identify missing data.

As is often the case with Scottish data, we have a relatively high number of missing data points, largely due to the size of the sample for Scotland. 112 out of 412 SOC codes at 4 digit level do not

provide an estimate of hourly pay. The UK data is more complete and is only missing 12 codes and we have cross-referenced the missing Scottish data 4-digit SOC codes with the bottom 10% of low paid jobs in the SOC 4-digit UK data.

Table A2: Additional low paid jobs from the UK hourly-pay data

Description
Tailors and dressmakers
Collector salesperson and credit agents
Childminders
Visual merchandise and related occupations
Window cleaners
Florists

Step 3: Use UK weekly earnings data to identify additional jobs

Earnings are dependent on both hours and pay. There are two reasons why a job that does not have low hourly pay would have low weekly pay: 1) hours on offer for the post are limited 2) a significant proportion of those who carry out these jobs work part-time.

The Scottish data for weekly pay, as already mentioned, contains a lot of missing data so again we look to the UK data.

Table A3: Additional low-paid jobs from UK weekly earnings data

Description
Exam invigilators
School midday and crossing patrol occupations
Care escorts
Sports coaches, instructors and officials
Company secretaries and administrators
Sports and leisure assistants
Housekeepers and related occupations
Educational support assistants
Teaching professionals n.e.c.
Teaching assistants
Library clerks and assistants
Early education and childcare practitioners
Elected officers and representatives
Early education and childcare assistants
Care workers and home carers
Taxi and cab drivers and chauffeurs

Step 4: Cross check against self employed

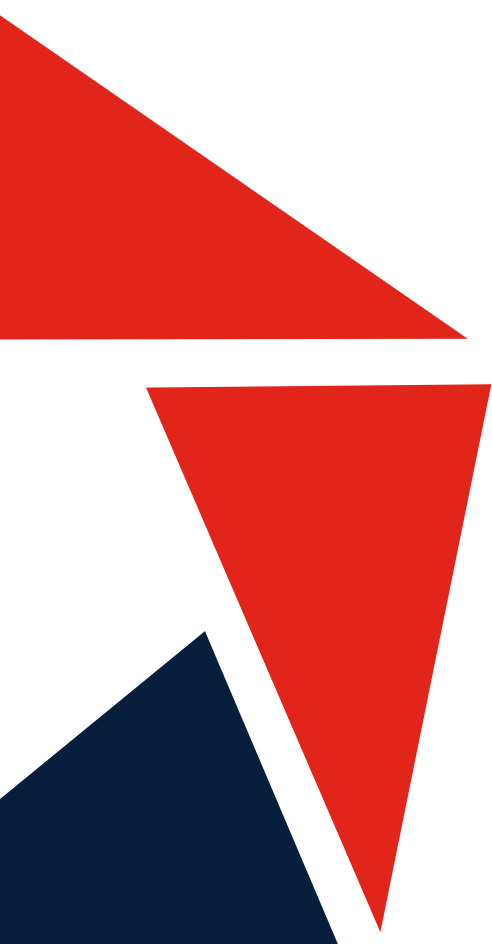
Data on earnings for the self employed is difficult to find and is not picked up in ASHE which is based on PAYE data. The Annual Population Survey does give us information on the number of people who are self-employed, but not their earnings (it does include an earnings estimate for employees in the same industries). We have looked at this data to see whether there are categories where employees are low paid that have a high number of self-employed workers and cross checked this with our list.

Hairdressers, beauticians and animal care services all have self-employment of over 50% and feature as low pay workers in both lists. There were no other occupations that fitted our low pay criteria that had a high proportion of self-employed, although pay was missing for some occupations (e.g. dancers).

Understanding the impact of the transition to net zero on low paid jobs

Appendix B: Low Paid Jobs Categorisation

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9 Appendix B: Low Paid Jobs Categorisation

Already categorised in section 3	
Industrial cleaning process occupations	15,600
Delivery drivers and couriers	24,700
Travel agents	600
Air travel assistants	5,700
Food, drink and tobacco process operatives	13,000
Assemblers (electrical and electronic products)	-

Food and beverage services (SIC 56)	
Waiters and waitresses	23,600
Coffee shop workers	6,900
Kitchen and catering assistants	37,700
Bar Staff	15,400
Cooks	7,700
Bar and catering supervisors	3,800

Retail (SIC 47)	
Retail cashiers and check-out operators	29,200
Sales and retail assistants	72,500
Shelf fillers	3,100
Visual merchandise and related occupations	-

Human Health and Social Work (SIC 86,87,88)	
Care workers and home carers	76,600
Care escorts	-
Pharmacy and optical dispensing assistants	9,300

Education (including early years) (SIC 85)	
Early education and childcare assistants	8,200
Childminders	4,000

Playworkers	1,100
Teaching assistants	8,300
Educational support assistants	17,000
School midday and crossing patrol occupations	3,000
Exam invigilators	700

Cleaning (Services to Buildings) (SIC 81)	
Elementary cleaning occupations n.e.c.	-
Cleaners and domestics	24,400
Window cleaners	3,300

Maintenance and repair of motor vehicles (SIC 45.2)	
Tyre, exhaust and windscreen fitters	800
Vehicle valeters and cleaners	1,300

Arts, entertainment and recreation (SIC 91,93)	
Sports coaches, instructors and officials	12,000
Library clerks and assistants	3,200
Sports and leisure assistants	8,100
Leisure and theme park attendants	4,500

Other personal service activities (SIC 96)	
Hairdressers and barbers	6,600
Beauticians and related occupations	7,800

Cross sector	
Company secretaries and administrators	-
Receptionists	12,000
Elementary administration occupations n.e.c.	3,100

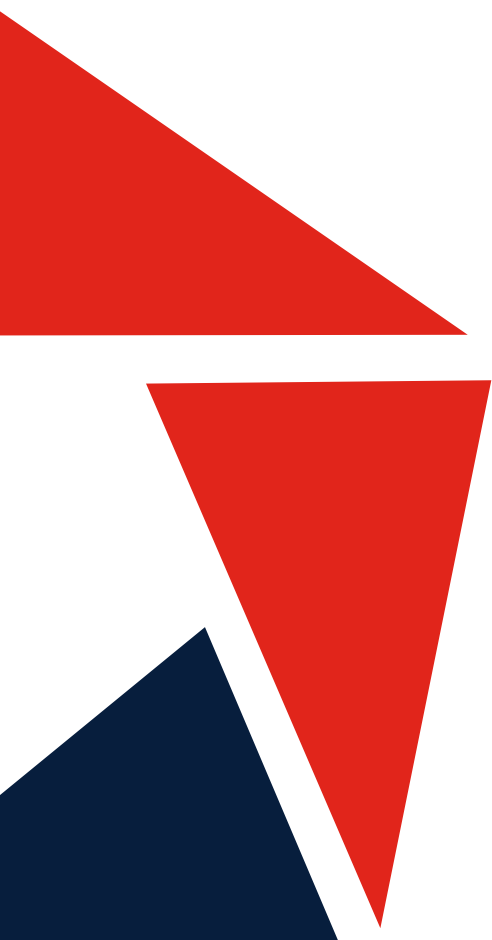
Other elementary services occupations n.e.c.	4,400

Misc	
Housekeepers and related occupations	2,800
Collector salesperson and credit agents	800
Launderers, dry cleaners and pressers	1,800
Elected officers and representatives	1,600
Tailors and dressmakers	1,200
Textiles, garments and related trades n.e.c.	800
Florists	800
Animal care services occupations n.e.c.	5,500
Taxi and cab drivers and chauffeurs	9,400

Understanding the impact of the transition to net zero on low paid jobs

Appendix C: Input-Output Modelling

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10 Appendix C: Input-Output Modelling

Methodology

Input-output modelling was used in this report to estimate the economic impact of the Scottish oil and gas sector. This modelling methodology is well established and dates back to 1951 and has widespread use in Government and academia. The Scottish IO table is derived from national accounts and captures the flow of economic activity across Scotland.

Our model estimates the impact of the removal of the oil and gas sector from the Scottish economy. As offshore oil and gas is not included within the oil and gas sector in the Scottish IO table, we have had to estimate the size of the offshore oil and gas activities and linkages within the Scottish economy, to model the impact of the total sector's disappearance.

This was conducted in two parts. First we have removed all of the output of SIC 09: Mining support service activities, as nearly 100% of this sector supports oil and gas extraction activities.

Secondly, we have generated a negative output shock by reducing exports for the remaining sectors in the Scottish economy that export to offshore oil and gas. While the Scottish IO table does not include offshore oil and gas, the satellite accounts provide estimates of the supply and use of goods and services of oil and gas industry, including trade estimates of the supply chain links between the offshore and onshore economies. The most recent satellite data (2016) was used to calculate the proportion of exports to the rest of the UK (2016 IO table) by sector that go to offshore oil and gas. As it is not included within the IO table, exports to the Scottish offshore oil and gas sector are captured in exports to the rest of the UK. These proportions were then applied to the 2019 IO table and exports to the rest of UK were reduced by these sectoral proportions going to offshore oil and gas.

Our estimates model the direct, indirect and induced impacts of the removal of the oil and gas sector in Scotland for three specific sectors across the Scottish economy with a high level of low pay non green jobs: retail, food and beverages services and accommodation.

The removal of the oil and gas sector results in no output from the oil and gas sector. This is the direct impact. As the direct impact is specific to the oil and gas sector, there is no direct impact on our sectors of interest, following the disappearance of the oil and gas sector.

The oil and gas sector purchases goods and services in order to undertake its activities. These suppliers, in turn, purchase goods and services from their own suppliers and so on, down the supply chain. This is known as the indirect impact.

Employees are required to produce the additional output associated with both the direct and indirect impacts. These employees are paid wages, which are spent on goods and services around Scotland. This results in additional output and employment. This is known as the induced impact.

Robustness checks

The following tables (C1-C3) provide modelling estimates using the low, mid and high specialisation scenario purchase data from the Supply and Use satellite account for Scottish offshore oil and gas. These provide a robustness check to the main estimates, calculated using the mid specialisation purchase data.

Table C1 – Economic impact of removing the oil and gas sector on the retail sector (low, mid and high specialisation scenarios), current prices (2019)

SECTOR 47 – Retail	Output (£m)			GVA (£m)			Employment (FTE)			% of Sector Employment		
	low	mid	high	low	mid	high	low	mid	high	low	mid	high
Direct	0	0	0	0	0	0	0	0	0	0%	0%	0%
Indirect	-33	-40	-86	-21	-25	-54	-572	-686	-1,476	-0.33%	-0.40%	-0.86%
Induced	-237	-272	-481	-150	-172	-304	-4,088	-4,691	-8,297	-2.39%	-2.75%	-4.86%
Total	-270	-312	-567	-171	-197	-358	-4,660	-5,377	-9,773	-2.73%	-3.15%	-5.72%

Source: FAI calculations using Scottish IO table (2016 and 2019) and Scottish Supply and Use satellite account table (2016).

Table C2 – Economic impact of removing the oil and gas sector on the food and beverage services sector (low, mid and high specialisation scenarios), current prices (2019)

SECTOR 56 – Food & beverage services	Output (£m)			GVA (£m)			Employment (FTE)			% of Sector Employment		
	low	mid	high	low	mid	high	low	mid	high	low	mid	high
Direct	0	0	0	0	0	0	0	0	0	0%	0%	0%
Indirect	-4	-5	-9	-2	-3	-5	-76	-100	-177	-0.07%	-0.09%	-0.17%
Induced	-120	-138	-244	-66	-76	-135	-2,281	-2,618	-4,630	-2.16%	-2.48%	-4.38%
Total	-124	-143	-253	-68	-79	-140	-2,357	-2,818	-4,807	-2.23%	-2.57%	-4.55%

Source: FAI calculations using Scottish IO table (2016 and 2019) and Scottish Supply and Use satellite account table (2016).

Table C3 – Economic impact of removing the oil and gas sector on the accommodation sector (low, mid and high specialisation scenarios), current prices (2019)

SECTOR 55 – Accommodation	Output (£m)			GVA (£m)			Employment (FTE)			% of Sector Employment		
	low	mid	high	low	mid	high	low	mid	high	low	mid	high
Direct	0	0	0	0	0	0	0	0	0	0%	0%	0%
Indirect	-10	-11	-15	-6	-7	-9	-204	-225	-303	-0.36%	-0.40%	-0.53%
Induced	-31	-36	-64	-19	-22	-39	-649	-745	-1,317	-1.14%	-1.31%	-2.31%
Total	-41	-47	-79	-25	-29	-48	-853	-970	-1,620	-1.50%	-1.70%	-2.85%

Source: FAI calculations using Scottish IO table (2016 and 2019) and Scottish Supply and Use satellite account table (2016).

Definitions

The key results of our model are changes in output, GVA, and FTE employment.

Output refers to the value of sales of all goods and services produced in an economy. This is most easily thought of as similar to the turnover of firms. However, output is selected over turnover because a large amount of activity is not undertaken by just firms (e.g. Public Sector Spending). The key difference between Output and GVA is that value of intermediate goods is included in the calculation of output where they are not included in the calculation of GVA.

Gross value added (GVA) is the value of all final goods and services produced, and is a measure of the contribution to an economy. GVA is a preferred measure to output as a firm could buy £1m of goods and sell these on for a further £1m – clearly no additional value has been created. GVA can be expressed generally as the difference between revenue from sales and the cost of inputs.

Full-time equivalent (FTE) employment considers the importance of full-time and part-time employees. One FTE job equates to one full-time employee working for one year, or, alternatively, two-part time employees working half the number of full-time hours for one year.

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