NEW ECONOMICS FOUNDATION

POWERING THE JUST TRANSITION

PUTTING WORKERS AND UNIONS AT THE CENTRE OF INDUSTRIAL CHANGE IN YORKSHIRE AND THE HUMBER

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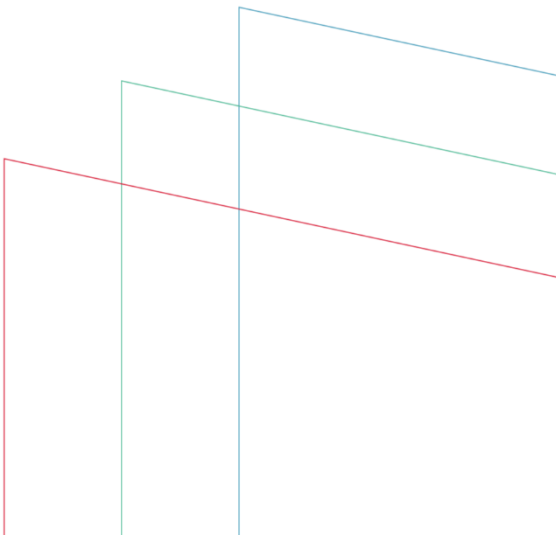

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EXECUTIVE SUMMARY

> Information [should be] cascaded up rather than down. If it came from bottom up and people could actually see what was happening, they'd be able to see the accountability and it would probably help people to say, 'well I've got some impact in that, I'm able to do that.' But at the minute… they feel helpless.
>
> Ian Kemp, Storekeeper at Liberty Steel

The UK faces an uneven decarbonisation challenge, with some regions and industries under particular pressure to reduce emissions. Many of the places and communities most acutely affected are also the least equipped to shape transition plans that deliver a good deal for workers.

Yorkshire and the Humber has suffered from decades of industrial decline, but it still relies disproportionately on carbon-intensive industries including steel, cement, chemicals, energy generation, and food and drink production. We find that around **360,000 jobs – 15% of all jobs in the region – are in sectors that have high or very high emissions**, meaning that these jobs are likely to be affected by the move to a low-carbon economy.[1] According to recent research from the Grantham Institute, 260,000 workers across the region have skills that will be in low demand in a low-carbon economy and therefore must upskill or retrain or risk being left behind.[2]

Workers and trade unions are understandably sceptical of the rhetoric around transition, given that past transitions – notably the decline of mining and manufacturing – have scarred communities and left a trail of social and economic destruction in their wake. This time must be different. The layers of distrust that often characterise inter-regional, inter-movement, and industrial relations must be peeled back by a concerted effort to make this transition fair.

This report gives an overview of the challenge of ensuring a just transition to a low-carbon economy – that is to say, an industrial transition that empowers workers and communities through the process itself – in Yorkshire and the Humber. We review the current status of industry and associated emissions and consider what the climate emergency – as declared by many of the region's local authorities – might mean for workers. Many workers are in crucial industries that should be protected and helped to decarbonise while others may need to be retrained and supported into different sectors. After almost a year of Covid-19 restrictions, unemployment in Yorkshire and the Humber was 20% higher than the year before. A just transition as part of a green recovery could provide decent, secure work for people moving out of carbon-intensive industries as well as those at the sharp end of the pandemic, often more marginalised

workers. An inclusive, just transition is an opportunity to address inequality in the labour market that leaves some – often women and racialised groups – more exposed to low pay, poor conditions, and precarious work.

This is not an exhaustive analysis of the various paths to a low-carbon economy. As we argue throughout, **decarbonisation plans and local industrial strategy must be co-designed with workers and communities**. We look at the scale of the challenge across the highest emitting industries and at current plans to cut emissions. We also propose recommendations to make the process of transition more inclusive, as well as ideas for increasing the availability of good quality jobs.

We then discuss the risks of relying on industry-led initiatives, which bet heavily on 'techno-fixes' such as carbon capture and storage (CCS) rather than a transformative, economy-wide approach informed by workers and communities. We argue that technological innovation in particular industries will be important, but we must focus on creating new **good, green** jobs that can reduce emissions *now*. A just transition is an opportunity to adapt and protect jobs, but also to create thousands more in the range of sectors needed in a more equitable and low-carbon future.

To demonstrate how industries face different just transition challenges, we use three case studies: the **steel industry**, which needs urgent support to decarbonise and retain jobs producing the material needed for low-carbon infrastructure; **aviation**, which faces the triple threat of climate change, automation, and the long-term impact of Covid-19; and **public transport**, where opportunities to expand and improve the quality of inherently green jobs are at risk. We undertake further research to build evidence for a just transition and highlight ways of generating new good, green jobs that are accessible to all.

This report has been informed by 12 in-depth interviews and several wider meetings with union officials and workers from sectors that are likely to be affected by the transition in various ways, from bus drivers to steelworkers. A key theme was that workers were being left out of the conversation. They felt that decision-makers should urgently include workers to ensure their support but also because, as those closest to the *work*, they could actively contribute to developing various transition pathways. This supports NEF's longstanding argument that "the currency of a rapid and consensual transition is trust."[3] Rebuilding trust requires concrete action to make the just transition a reality. While the precise shape of plans should be the subject of careful and place-specific co-design, we propose some ideas we think are fundamental to the process. Plans should:

- Invest in low-carbon training, jobs, and infrastructure to prevent 'stranded' communities, ensuring these are accessible to all.
- Establish and properly fund locally led just transition partnerships to engage workers, unions and employers in social dialogue and find ways to include more marginalised and non-unionised workers.
- Hold employers to account for their just transition plans as well as their decarbonisation plans, ensuring these are co-designed with workers.
- Apply just transition principles throughout their supply chain, considering their impact on workers and communities in the UK and globally.
- Take a precautionary approach to climate action, prioritising proven methods of reducing emissions *now* over future technological solutions.
- Honestly assess which industries should be prioritised for support to decarbonise and which should be phased out with a just transition for workers.

1. INTRODUCTION

Given the urgency of the climate crisis and the UK's commitments under the Paris Agreement on Climate Change, industrial change is necessary and inevitable. There is a risk that whole swathes of the industrial heartlands will bear the costs if that change is not carefully planned with workers and communities at its core. UK industrial policy has generally not given due consideration to workers and communities. Successive waves of mishandled deindustrialisation have left a profound lack of trust. Rebuilding trust is essential to ensure the necessary support for ambitious climate action and to make that action relevant and fair to frontline communities.

Across Yorkshire and the Humber, many local economies and community identities have been historically attached to a particular industrial unit, whether coal mine or steel plant. The closure or decline of those sites caused social and economic upheaval that has not been addressed by the growth of the service sector or piecemeal retraining programmes. Older workers can recall the damage wrought by deindustrialisation from the 1980s onwards, but younger workers have seen the impact on their parents' generation as well as their own experience of limited opportunities. Moreover, recent closures have followed similar patterns, with gaping holes left by the last deep coal mine in Kellingley and the steelworks in Redcar, both closed in 2015. A just transition could break this pattern, as long as it genuinely involves workers and communities in the decisions that affect them, enabling them to meaningfully shape the process to benefit people, places, and the wider environment.

1.1 DEFINING A JUST TRANSITION

The concept of a just transition originated in the union movement in North America and has recently been taken up by environmental groups, governments, and businesses. The International Trade Union Confederation (ITUC) defines a just transition as "decent work, social inclusion, and poverty eradication while reducing emissions in line with global commitments on tackling climate breakdown".[4] This broad definition situates the just transition in the wider struggle for social justice and global equality, recognising that some states bear more responsibility for creating and therefore addressing the climate and ecological crises. The UK's wealth was built on fossil-fuel extraction and has contributed disproportionately to the impacts of global heating, which have mainly been felt in the Global South. A UK transition that recreates this dynamic through a new 'green extractivism' globally is not really just.[5] This principle informs our arguments, although we focus more narrowly on the particular challenge for carbon-intensive sectors in Yorkshire and the Humber – how do they decarbonise without leaving workers and communities behind?

The just transition is a key commitment under the Paris Agreement and will feature at this year's Conference of the Parties (COP) in Glasgow. However, the UK's nationally determined contribution (NDC) does not mention it, except in reference to Scotland's Just Transition Commission –whose recommendations the Scottish government has largely ignored.[6] For the term to have meaning, it must move out of corporate social responsibility commitments and into real case studies that demonstrate the compatibility of climate action and workers' rights. Yorkshire and the Humber has the potential to develop such a case study, and in turn to influence national policy.

Acknowledging that the need for transition itself has been imposed on workers by the climate crisis, a just transition should give them a sense of agency over *how* the transition evolves. In this respect, it is principally a process rather than an outcome. It is nonetheless useful to have some parameters to guide this process, which can be adapted to local contexts. In this report we make some recommendations aimed at bringing workers and communities along, rather than stranding them like the miners and manufacturers of previous generations.

> Politicians and governments can have all the wonderful ideas they want but it doesn't resonate with workers on the ground, because they're not involved in the debate… It's vitally important that we get those workers and their trade unions involved.
>
> Peter Davies, GMB Union

2. INDUSTRY AND ENERGY IN YORKSHIRE AND THE HUMBER

Yorkshire and the Humber has a proud history as an industrial powerhouse, providing much of the energy and materials for the UK's economic growth since the nineteenth century. Today its greenhouse gas (GHG) emissions reflect the region's centrality to UK industry: it consumes more gas for non-domestic purposes than any other region,[7] and is the third-largest emitter per capita (after Wales and Northern Ireland), responsible for over 10% of national emissions.[8] As we discuss, the challenge to reduce these emissions will have serious implications for jobs in energy-intensive industries: 360,000 people work in high or very-high-emitting sectors and 260,000 will need to upskill or retrain to work in a low-carbon economy.

Table 1: Yorkshire and the Humber has the highest industrial, commercial, and public emissions per capita in the UK

End-user carbon dioxide emissions (Mt CO_2) per capita by region, 2018

Region	Industrial, commercial and public	Domestic	Transport	LULUCF*	Total
UK	2.0	1.5	1.9	-0.2	5.2
Wales	4.0	1.6	2.0	-0.1	7.5
Scotland	2.4	1.6	2.0	-0.8	5.3
Northern Ireland	2.5	1.8	2.1	0.2	6.7
England	1.8	1.4	1.9	-0.1	5.0
North east	2.9	1.5	1.7	-0.5	5.7
North West	1.9	1.5	1.9	0	5.3
Yorkshire & Humber	3.1	1.5	2.0	-0.1	6.5
East Midlands	2.4	1.5	2.2	-0.1	6.1
West Midlands	1.8	1.4	2.1	-0.1	5.2
East of England	1.5	1.4	2.3	0	5.2
London	1.2	1.2	0.9	0	3.2
South East	1.3	1.5	2.2	-0.2	4.7
South West	1.5	1.4	2.1	-0.1	4.8

* *Land Use, Land Use Change and Forestry*

Source: UK regional and local authority CO_2 emissions statistical release[9]

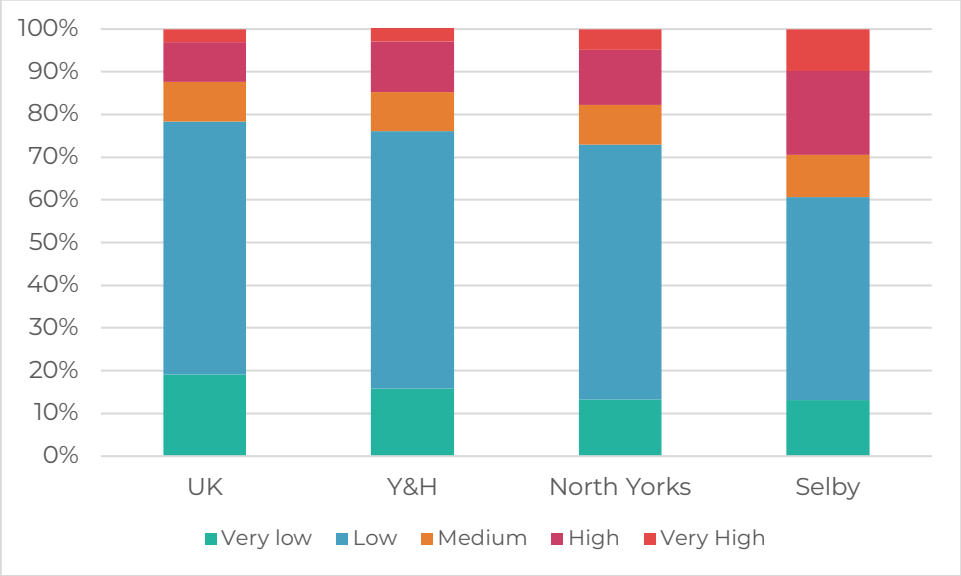
In 2015, the Trades Union Congress (TUC) and European TUC commissioned a report that detailed the region's industrial emissions, making the case for inward investment in technologies to usher in a low-carbon future.[10] The following five years did not see the investment – principally in CCS – that the report had hoped for. Many of the obstacles identified then – lack of capital, uncertain policy environment, skills shortages – persist today.

2.1 TRANSITION-VULNERABLE JOBS

The region's energy consumption and associated emissions reflect the importance of heavy industry and power generation to the local economy. We have analysed all employment sectors in Yorkshire and the Humber and categorised them into five categories based on their emissions per job: very low, low, medium, high, and very high. We found that there are more jobs in the high and very high emissions categories than the national average: 15% versus 12% across the UK. Around **360,000 people in Yorkshire and the Humber work in high or very-high-emitting jobs** that are likely to be affected by the transition to a low-carbon economy. There is also likely to be a knock-on effect on many thousands more indirect jobs associated with these industries. If we zoom in closer to North Yorkshire, the proportion of workers in these sectors increases to 18%, while in Selby, as an example of a smaller area dominated by energy-intensive industry, 30% of jobs are in the high and very high emissions categories. This reflects the large number of employees in the manufacturing sector (7,000), road freight transport (1,750), and electricity production (1,000). Figure 1 shows the uneven distribution of carbon-intensive jobs within Yorkshire and the Humber and compared to the UK as a whole.

Figure 1: Carbon-intensive jobs are disproportionately distributed within the UK and within Yorkshire and the Humber

Proportion of very low to very-high-emitting jobs in UK, Yorkshire and the Humber, North Yorkshire, and Selby, 2019



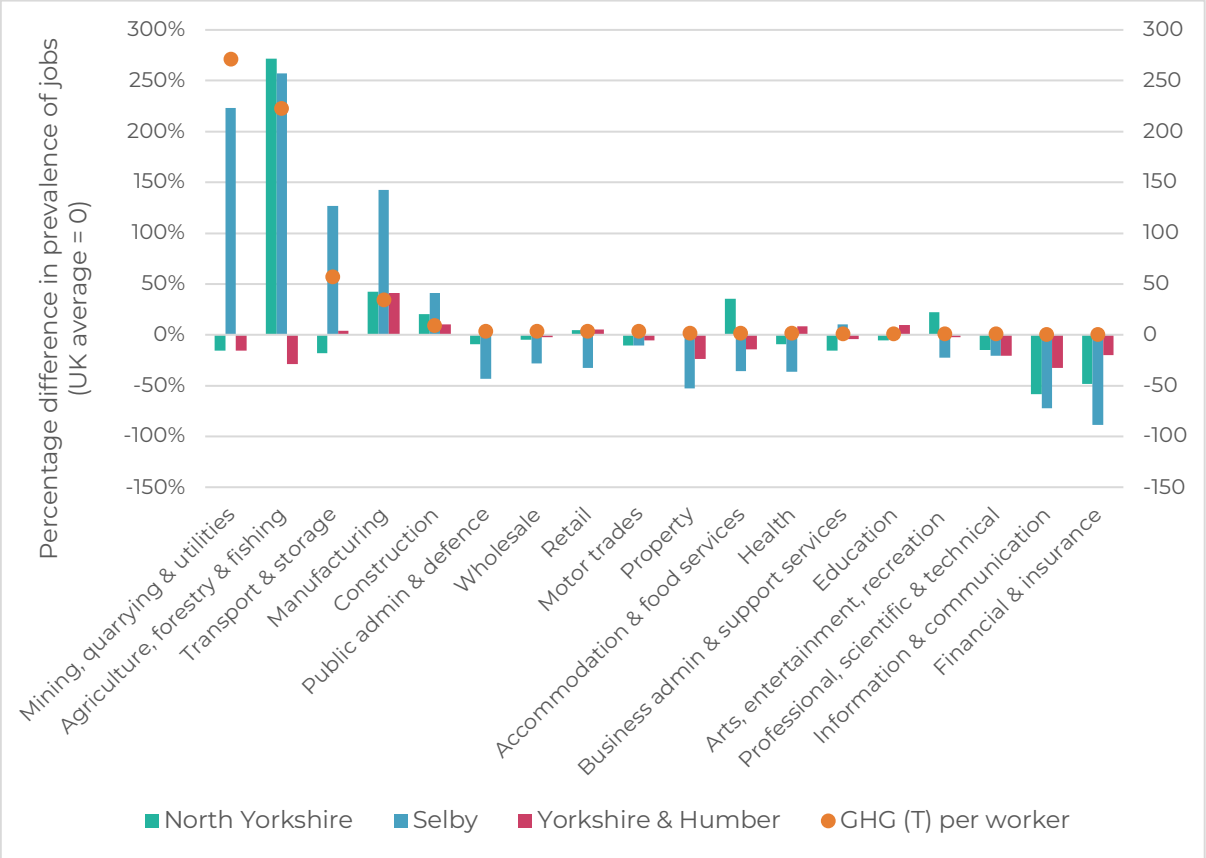
Very high emissions >0.4 KT (GHG) per job
High emissions = 0.008-0.39 KT (GHG) per job
Medium emissions = 0.005-0.0079 KT (GHG) per job
Low emissions = 0.00095-0.0049 KT (GHG) per job
Very low emissions <0.00094 KT (GHG) per job

Source: NEF analysis of ONS emissions inventory and Business Register of Employment Services data[11]

Figure 2 shows the prevalence of jobs in broad industrial groups in Selby, North Yorkshire, and Yorkshire and the Humber compared to the country as a whole. At regional level, the comparative prevalence of high-emitting jobs is not particularly striking, but if we focus on Selby again, the data is more extreme: there is a significantly higher proportion of jobs in the top five emitting sectors (per worker) and a lower proportion of jobs in the lowest emitting sectors. This demonstrates that **transition-vulnerable jobs are unevenly distributed throughout the region** and that some areas, particularly those whose economies rely on large employers with high emissions – as in Selby – could be particularly affected.

Figure 2: Selby has a much higher proportion of jobs in the most emitting sectors than the UK average

Percentage difference in prevalence of jobs, with GHG per worker, in broad industrial groups in Selby, North Yorkshire, and Yorkshire and the Humber compared to the UK average (0 on y axis is UK average), 2019

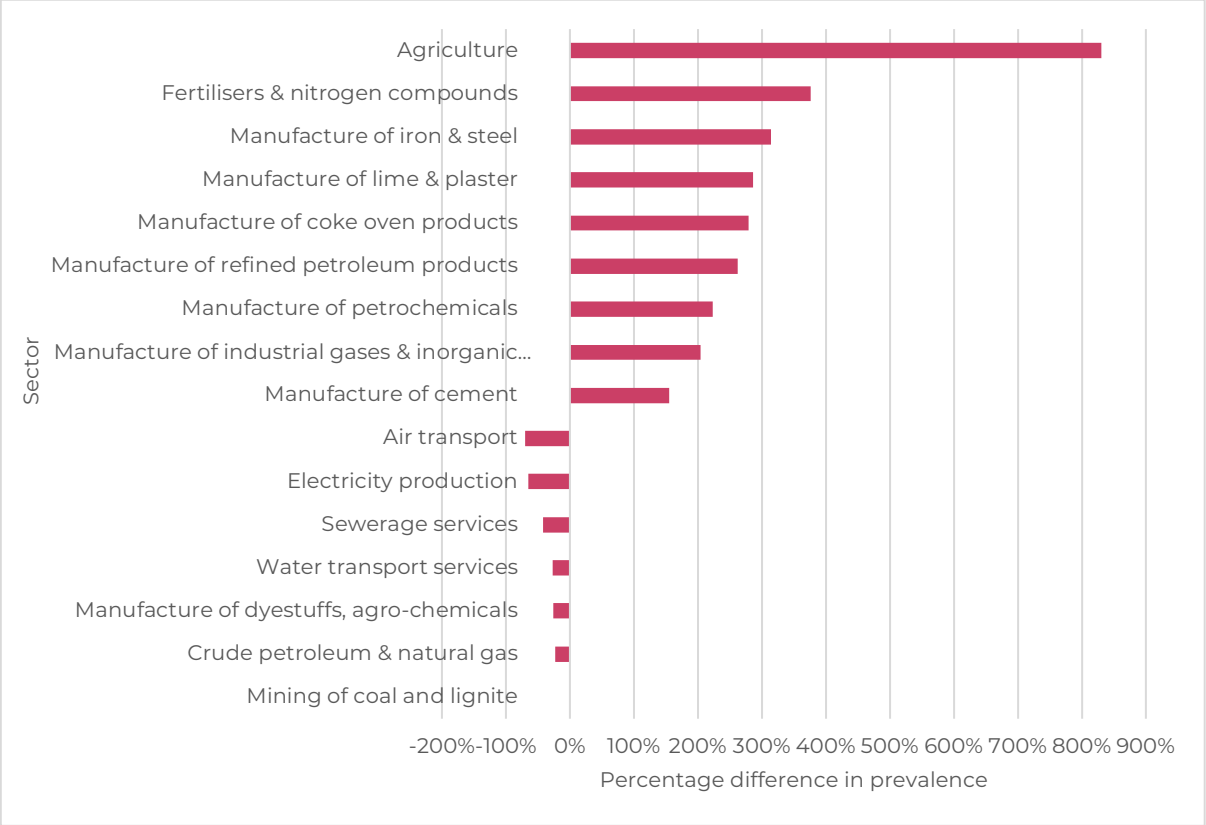


Source: NEF analysis of ONS emissions inventory data and Business Register of Employment Services data

Although the comparison between Yorkshire and the Humber and the national average does not appear dramatic at the level of broad industrial groups, a further breakdown of sectors is more telling. Figure 3 shows the prevalence of jobs in the 16 top emitting sectors per worker in Yorkshire and the Humber compared to the wider UK. Nine of those sectors are overrepresented in the region, with agriculture jobs over eight times more common, manufacturing of iron and steel over three times more common, and manufacturing of various chemical products between 1.5 and 3.8 times more common than across the UK.

Figure 3: Nine of the sixteen top emitting sectors are overrepresented in Yorkshire and the Humber

Percentage difference in prevalence of jobs in Yorkshire and the Humber in top 16 emitting sectors compared to UK average (0 on the x axis is the UK average)



Categorising jobs as transition-vulnerable simply because they are in emissions-intensive sectors is a fairly crude measure, **but these industries will have to change their operations dramatically or face closure. Both scenarios have implications for the people they employ.** There are also industries that are not themselves responsible for high emissions but are linked in the supply chain to industries that are already transitioning: for example, the move to electric vehicles (EVs) will affect the 18,000 people who work in the region's motor repair industry. Even more indirectly, there are many more jobs in ancillary services that depend on carbon-intensive industries, notably food and accommodation, where workers are more exposed to low pay and less likely to benefit from the relative protection of a union.

Another way of calculating transition-exposed jobs is by looking at the green skills needed to make the transition happen. The Grantham Institute estimates that 22.2% of jobs in Yorkshire and the Humber will be affected either positively or negatively: **10.9% have skills that will be less in-demand while 11.3% have skills that match with future jobs**.[12] This skills-based approach suggests that the transition could leave 260,000

workers worse off. This is lower than the total number working in high and very high-emitting jobs because there is some overlap between the skills required in energy-intensive industries and low-carbon industries.

The Grantham Institute's analysis shows that almost 20% of those needing to reskill are in the most deprived areas, **demonstrating the need to create good, green jobs (Section 3.1) in the same locations where jobs are likely to be lost**, and to provide workers with clear pathways into them.

2.2 THE IMPACT OF COVID-19

The restrictions and reduced demand associated with Covid-19 temporarily reduced employment through the furlough scheme as well as permanent layoffs. The same dynamics affected skills provision, with fewer people taking up apprenticeships, training, and university places. Before the pandemic, there were around 2.3 million jobs in Yorkshire and the Humber and 115,000 unemployed. By the end of 2020, unemployment had increased by 20%, with 16–17-year-olds and 50–64-year-olds worst hit.[13] In February 2021, there were 43,000 fewer people on the payroll than in February 2020.

Table 2: Employment statistics for Yorkshire and the Humber 2019/2020 and 2020/2021

Year	Number of people unemployed (all ages)	Number of young people unemployed (16–24)	Number of people on furlough	Number of people claiming Universal Credit	Redundancy rate (per thousand)	Overall unemployment rate
2019/2020	118,000 (Nov–Jan)	45,000 (Nov–Jan)	N/A	116,390	5.0	4.4% (Nov–Jan)
2020/2021	138,00 (Nov–Jan)	46,000 (Nov–Jan)	329,300	228,350	7.9	5.1% (Nov–Jan)

Source: NEF analysis of ONS data

The full impact of the pandemic on the labour market will only be clear once the furlough scheme ends. If that happens suddenly, without a further iteration of support for the affected sectors of the economy, there is likely to be a spike in the unemployment rate as certain businesses can no longer afford to keep staff on. After the 2008 crash, it hovered between 7% and 10% for several years in Yorkshire and the Humber.[14]

Some sectors may not recover to pre-pandemic employment levels for months or years, if at all. Jobs in transport (particularly aviation), high street retail, and in sectors

dependent on or supporting office-based working are especially vulnerable to long-term change. **In some cases, workers in sectors with an over-supply of labour may need to retrain to join different job markets**. This is supported by evidence that businesses are increasingly making workers redundant rather than holding them on job-retention schemes. In Yorkshire and the Humber, redundancy rates between November 2020 and January 2021 reached a five-year high, 32% higher than during the same period the previous year.[15] Redundancy rates were highest in administration and support services (31 per thousand) and accommodation and food (21 per thousand); most high-emitting sectors were significantly less affected, with the exception of manufacturing at 19.5 per thousand which translates to 5,304 jobs in the region. While many pandemic-affected jobs may not be employed by the region's big emitters, they should nonetheless be involved in a just transition as part of a place-based industrial strategy.

Covid-19 has affected the quality as well as the number of jobs, with a disproportionate impact on people in precarious work and the efforts by some businesses to fire and rehire staff on worse terms and conditions, most recently in the case of British Gas (Centrica). We interviewed striking British Gas workers who were concerned that Centrica has also used the pandemic to curb trade union activity, leading to distrust among members. These practices undermine the trust that is so crucial for the genuine social dialogue that needs to underpin the just transition.

2.3 CASE STUDIES: THE NEED FOR AN INDUSTRY-SPECIFIC JUST TRANSITION

Transition challenges vary across industries. The next section looks at three case studies to demonstrate the importance of tailoring plans to the range of contexts: the steel industry is one of the most energy-intensive but also crucial to the transition; aviation jobs are reeling from the impacts of automation and Covid-19 as well as the need to reduce the sector's enormous emissions; and public transport offers an opportunity to expand and improve green jobs with the right investment.

2.3.1 Case study – Steel

The steel industry offers one example of where urgent action to decarbonise could protect jobs and reinvigorate British industry. For generations, steel has been central to UK industry and to many communities, although the sector has seen a gradual decline since the 1960s. Despite the UK's track record of mishandling deindustrialisation, we can learn from the government's 1967 decision to take a majority stake in the largest steel operators to smooth the transition of over 150,000 workers. This cushioned the

impact on workers both in terms of the pace of change and in providing training and compensation packages. It is hard to imagine the government making such an intervention today, but the steel industry again stands at a critical juncture, and its future relies on decisive government support for this next transition.

Steelmaking is one of the most carbon-intensive industrial processes. Emissions are heavily concentrated in the UK's two blast-furnace sites: Scunthorpe and Port Talbot. British Steel's Scunthorpe site employs approximately 3,000 people and supports many thousands more jobs in the supply chain. UK steel has struggled to compete with an oversupply of cheap (and more carbon-intensive) steel on the international market and with European producers who benefit from lower energy prices. As a result of Brexit-imposed EU import quotas, the sector now faces further uncertainty.

Scunthorpe steelworks has had a tumultuous history although its acquisition in 2020 by Chinese firm Jingye promised new investment and stability. British Steel is part of the Zero Carbon Humber Partnership and appears to be pinning its decarbonisation hopes on that project's blue hydrogen and CCS plans. Its owners are reportedly reluctant to make the promised £1.3bn investment infrastructure in Scunthorpe and Teesside in the context of the government's net-zero agenda, and in particular the Climate Change Committee (CCC) recommendation that all UK steel should be made without coal-fuelled blast furnaces by 2035. British Steel's CEO has reportedly said "Jingye wants to spend its money wisely, and a clear direction from ministers would undoubtedly help. Bosses are even wondering if support might be offered to help the company go green."[16]

In South Yorkshire, Liberty Steel faces more immediate uncertainty as its main financial backer has collapsed, risking almost 2,000 local jobs. Liberty Steel uses electric arc furnaces instead of much more energy-intensive blast furnaces and makes a range of products from recycled scrap steel. Much of this scrap is imported while the UK also *exports* much of our domestic scrap, contributing to emissions from transport. The steel melting process still requires burning gas. **The Rotherham plant alone releases over 75,000 tonnes of GHG emissions per year.** Furthermore, Liberty's plants rely on business from the oil, gas, and aerospace sectors, which will be dramatically affected by the transition. There is an obvious place for secondary steel in a low-carbon economy, supplying industries such as wind turbine and electric vehicle manufacture. It is also crucial to decarbonise the process by using more renewable energy and domestic scrap steel.

> I've been [at Liberty Steel] since 1980, since I left school. I'm lucky, I'm at the end of my career but... Talking to the lads who are in their mid-twenties, it's like what's going to happen to them? They've got mortgages to pay, they're trying to bring their families up… Worst case scenario, the company goes under and we take a lot of local businesses with us... For every one job there's probably four more in the local area that will go... I can remember when the pits were closed with nothing to replace them.
>
> Ian Kemp, Storekeeper at Liberty Steel

We cannot meet our climate targets without greening our steel sector.[17] **The industry needs a credible plan to decarbonise, co-designed with unions and accompanied by significant investment**, particularly in replacing coking coal with hydrogen. The alternative is the further decline of UK steel, with job losses and disastrous consequences for communities, while our emissions are simply offshored to other steel-producing countries. This would be a catastrophic missed opportunity to meet the growing demand for green steel for low-carbon infrastructure and to level up the region by protecting good, unionised jobs in domestic steelmaking.

The government has indicated its support for a transition through the Industrial Energy Transformation Fund and the Clean Steel Fund, but much of this support is not available until the mid-2020s. Given the pressures facing steel businesses and the long investment cycles, funding should be brought forward as part of a wider green recovery.

> There is a lot of nervousness and a lot of work has to be done. When you talk to people in the steel industry, they are significantly anxious that they have to be greener in order to survive.
>
> Simon Coop, Regional Co-Ordinating Officer for Unite
>
> We've seen the steel industry sold off to three multinationals and each time we're promised huge investment… but what they're really doing is waiting for their hand out from government… so more subsidies for the steel sector is what's needed… Big business is not going to do this – it's got to be government… [Workers] worry about their industry disappearing because it's got a large carbon footprint but the conversation they need to be involved in is how we continue as an industry within that debate.
>
> Peter Davies, Senior Organiser at GMB

2.3.2 Case Study – Aviation

As of 2019, there were around 5,100 people directly employed in aviation in Yorkshire and the Humber and another 4,100 in jobs that rely on the sector, making up 0.5% of the region's total jobs. These are mainly centred on three major airports: Leeds Bradford, Doncaster Sheffield, and Humberside which, in 2019, served a combined 5.6 million passengers.[18]

The Covid-19 pandemic hit the aviation industry hard. NEF modelling suggests that travel restrictions and aviation business decisions led to the loss of approximately 27% of aviation jobs in 2020, equivalent to 1,400 directly and 1,100 indirectly employed workers.[19] As of February 2021, an estimated 42% of the remaining workforce was on the government's furlough scheme.[20] While some of those furloughed will return to work when international travel resumes, others risk losing their jobs when the furlough scheme ends.

There are strong indicators that aviation workers losing jobs in 2020 and 2021 now face a permanent change. In the short term, three key non-climate-related factors drive this:

1. The International Air Transport Association (IATA) projects that passenger numbers will not return to pre-pandemic levels until 2024 at the earliest[21] – creating a demand shortfall and a long-term reduction in aviation employment.
2. The aviation industry has seen a long-term decline in employment intensity (the number of jobs per passenger) as a result of automation and shifts in customer demand towards low-cost airlines. This decline was particularly evident following the 2008 financial crisis, and may be repeated following the pandemic, with aviation businesses already consolidating operations, and government reports signalling imminent further automation.[22]
3. The Covid-19 crisis has resulted in the widespread adoption of video-conferencing for work, meaning a likely decline in business travel, potentially by up to 36%.[23] This would adversely affect aviation workers, as business travel involves more jobs per passenger than other aviation activities.

In this context, the economic case for expanding Leeds Bradford Airport (now on hold) looks doubtful. Leeds University scientists have estimated that the planned expansion would result in an additional 1,227 kilo tonnes of GHG emissions by 2030, a figure incompatible with both Leeds's and the UK's climate targets. The CCC is clear that technological solutions alone will not reduce aviation emissions sufficiently to meet the UK's international climate obligations and recommends capping growth in airport capacity.[24] After considering the impacts of Covid-19, automation, and climate constraints, airport expansion is unlikely to make a material contribution to employment in Yorkshire and the Humber.

Covid-19 has entailed structural shifts in the economy that will change the nature of employment in aviation. Government must establish the policy infrastructure for a just transition, involving affected workers and communities and paying attention to local needs and vulnerabilities. In 2020, NEF worked closely with aviation unions to establish some principles including the following:

- Creating a bespoke, sector-wide, crisis support plan and package for aviation, with oversight from a new sector panel with representation from unions, businesses, and government.
- Committing to a union-negotiated limit on redundancy rates across the sector.
- Delivering a new skills and employment strategy, including conversion of the furlough scheme into a new job-reskilling programme that protects employment while workers are supported to transition into alternative roles.
- Accelerating the government's review of aviation sector tax arrangements and introducing new mechanisms that ensure a fair contribution from all employers to the costs of the retraining programme.
- Ensuring a fair public return on bailouts. Taking equity stakes in all large businesses bailed out in the aviation sector and attaching the right to take further stakes (warrants) with any other financial support. Attaching conditions to all financial support to suspend shareholder dividends, end excessive executive pay and unethical tax practices, and require investment in decarbonisation.

2.3.3 Case study – Public transport

Transport is the largest source of CO_2 emissions in the UK, accounting for 27% in 2019.[25] It is widely recognised that we need to change the way we travel, and the government has taken some strides in, for example, banning the sale of new petrol and diesel cars from 2030, a date which we believe should be brought forward. Increased support for EVs and a charging infrastructure is important, but we must also reduce car journeys and private car ownership. Replacing all conventional cars with EVs would come at an unacceptable cost to communities and environments where the necessary rare earth metals are mined. EVs should be rolled out as part of a holistic transport system that includes the expansion and decarbonisation of public transport.

Public transport jobs are already green jobs on the basis that fewer cars are needed because they exist. But significant investment is needed to create many more and to make sure they are *good* – the average bus driver in Yorkshire earns £10–£11 per hour – and green*er.* The North has suffered from historic underinvestment in public transport, with **Yorkshire and the Humber receiving almost five times less funding per capita than London.**[26]

The pandemic has compounded this situation, with transport operators and workers uncertain about their future once government support packages expire. Without intervention, the region's bus services would probably not have survived the last year, and unions fear that bus companies will resort to cutting services, terms and conditions, and jobs without further government funding. Companies are reportedly not filling vacancies at the usual rate in order to prepare for reduced services when the money runs out.

> The canteen talk is that we're not going to have jobs in 6 months… the next 6-12 months [are] absolutely critical as to whether or not this time next year we have a public transport system… It's that desperate. And if we do have public transport, it will be watered down, it will be expensive because fares will go up and car usage will go through the ceiling… if you take clean, green buses off the road and you're putting more cars on the road… that will decimate the low carbon plans.
>
> Phil Bown, Regional Officer for Unite

The profit motive of private operators means that bus companies are unlikely to make the required investments in staff and services without significant government intervention. In South Yorkshire and West Yorkshire, the mayor could choose to franchise the bus system, regulating the market by setting routes, service levels, and prices. Improving the cost, availability, and reliability of buses would make it easier for low-income communities to access employment, and mayorally mandated terms and conditions for bus workers would improve the quality of these low-carbon jobs.[27]

The government has committed to investing £48bn in rail over the next three years. Our previous research estimates that £18.9bn should be spent on critical rail connectivity in the North as well as widespread electrification.[28] IPPR estimates that expanding and bringing pipeline projects forward could create 129,000 jobs nationally in rail, and a further 12,000 through improved electrified bus services. But opportunities are being missed: Scarborough bus manufacturer Plaxtons has already invested in electric buses, but has recently made redundancies due to lack of orders.

> Government talks about green transportation but they're not moving on it… it will generate jobs in places like Scarborough where there's only really a choice between seasonal work or a major employer like Plaxtons.
>
> Andy Cullen, Unite learning officer

There are transformative opportunities to expand the mass transit system in Sheffield and finally deliver one in Leeds, the largest city in Europe without one. Investing in tram and light rail infrastructure could create decent jobs to offset recent losses. Wabtec, a Doncaster rail engineering company has recently made 350 redundant and is

threatening more. The situation in Doncaster demonstrates the importance of place-based industrial strategy. With other nearby sites also suffering, one of the area's last remaining industries is in crisis. Without investment in high-quality jobs, apprenticeships, and a training and skills ecosystem, it is losing high-skilled, decently paid jobs to the insecure and low-paid work offered by the burgeoning logistics and warehousing industry. Many of those recently made redundant from their rail engineering jobs – electricians, mechanics, welders, fitters – have skills that could be applied in public transport projects if there was a strategy to connect local capacity to local jobs and, crucially, to support manufacturing.

> It's either unemployment or working for little above the minimum wage in warehouses… Government and the local enterprise partnership… need to invest in training people and in industry and in making things – in manufacturing. Nothing has been done for decades and that's why it's warehouse central round here… if we don't make things the UK will become a warehouse for the rest of the world.
>
> Harriet Eisner, Regional Officer, Unite

Taxi drivers are another group at risk from an *un*just transition. There are nearly 23,000 licenced taxis and private hire vehicles in Yorkshire and the Humber.[29] The vast majority of these are private hire vehicles, whose drivers – in many cases – are subject to the notorious employment practices of Uber and similar apps. They are now having to invest in expensive hybrid and EVs to operate in low-emissions zones. Greater support for these workers to transition is crucial. This means incentives, such as subsidies and generous scrappage schemes, to encourage drivers to switch to EVs. But it also means preparing many of those drivers to retrain and transition into jobs, potentially in the expanded and decarbonised public transport system, which will mean fewer taxis on the roads. Workers are not unaware that their industries and jobs will need to adapt to a low-carbon future, but until they are brought into the conversation they will understandably worry about change.

> When you talk to those taxi drivers, they're not denying that [the transition]'s got to happen but… We've just got to do more to take these workers and their families with us. Otherwise it just means nothing.
>
> Peter Davies, Senior Organiser for GMB

2.4 THE RISKS OF AN INDUSTRY-LED TRANSITION

Given its industrial past and present, decarbonisation plans in Yorkshire and the Humber tend to rely heavily on technological solutions. While the region should clearly have a green industrial future, this should not distract from the "rapid, far-reaching and

unprecedented changes in all aspects of society" required to limit global warming to 1.5°C.[30] **Efforts to reduce energy demand, improve efficiency and alter the way we work, travel, and consume will be crucial for creating new jobs and meeting climate commitments.**

Scaling up clean, renewable, and sustainably sourced energy is a priority. The Humber is central to the government's offshore wind strategy, and the recent announcement of a £75m investment in North Lincolnshire's marine energy park – 12 years after it was first proposed – is a much-needed boost to domestic renewables manufacturing capacity. This development is expected to create 3,000 jobs, building on the success of the Siemens Gamesa wind turbine factory that employs 1,000 people and plans to expand. Decarbonising and reorienting local steel production towards turbine manufacturing would not only further green the supply chain but also protect thousands of well-paid jobs and economic resilience in steel communities.

Table 3: Planned investments in decarbonisation projects

Project	£	Stage	Sector	Expected jobs
Able Marine Energy Park	£500m – has secured £75m from government	AMEP expects quays to be available for lease in Q4 of 2022	Port development for offshore wind manufacturing and storage facility	3,000
Zero Carbon Humber Partnership	Secured £75m (public and private) for the feasibility stage	Aims to construct a hydrogen test facility by 2025 and fit Drax Power Station with CCS by 2027	Blue (derived from gas) hydrogen production and CCS	Expects to protect 55,000 jobs and create 49,000 in the future
Northern Endurance Partnership	Secured £52m for both NEP and Net Zero Teesside	Aims to commission initial anchor projects by 2026	CO_2 storage in the North Sea to serve Humber Zero and Net Zero Teesside led by BP with Equinor, Shell, National Grid, Eni, and Total	Unannounced
Siemens	£200m	First phase planned to open 2023	Rail factory	700
Humber Zero	£1.2bn	Secured £25m for CCS development; aims to remove 8m	CCS and hydrogen to decarbonise the Immingham Industrial Cluster	Expects to protect 20,000 jobs

		tCO_2 p/a by the mid-2020s		
Siemens Gamesa factory expansion	Unannounced	Planning permission	Offshore wind manufacturing	Unannounced

So-called negative emissions technologies have a more chequered history: the TUC's 2015 report aimed to help secure the future of the White Rose CCS project, which was cancelled later that year due to inconsistent government policy and ultimately the withdrawal of financial support. A new consortium of some of the region's biggest emitters now plans a 'net-zero industrial cluster' by 2040 through the Zero Carbon Humber Partnership.[31] This project involves a network of trans-regional pipelines for hydrogen and captured carbon emissions and foresees Drax Power Station becoming the world's first negative-carbon power station by 2030. The project expects to protect 55,000 jobs and create 49,000 new ones, which sounds like a good deal for workers. However, the role of negative-emissions technologies remains controversial among climate scientists and environmental organisations for reasons we will expand on.

Table 4 shows the 25 highest emitting sites in Yorkshire and the Humber, which together emitted over 19 million tonnes of CO_2 in 2019.

Table 4: Steel, cement, glass, chemicals, and power generation dominate Yorkshire and the Humber's industrial emissions

Verified emissions of the top 25 emitters in Yorkshire and the Humber

Site	Industry	CO_2 emissions (KT) 2019	CO_2 emissions (KT) 2018
Scunthorpe Integrated Iron & Steel Works	Steel	4525	5074
VPI Immingham	Gas power station	3362	3372
Saltend Cogeneration Company Limited	Gas power station	2773	2733
Humber Phillips 66 Refinery	Oil refining	2075	2112
EP SHB Limited	Gas power station	1992	1345
Lindsey Oil Refinery	Oil refining	1230	1474
Keadby Power Station	Gas power station	803	1026
Drax Power Station	Coal and biomass power station	726	4139
South Ferriby Works	Cement	342	299
BP Chemicals Ltd (sold to INEOS in 2020)	Chemicals	340	341
Tronox Pigment - CHP Plant	Cement	187	206
Ardagh Glass Ltd	Glass	154	152
Guardian Industries UK Limited	Glass	141	143
Ardagh Glass – Wheatley	Glass	110	107
Saint-Gobain Glass Ltd	Glass	97	108
Liberty Speciality Steels – Rotherham	Steel	75	87
Ardagh Glass – Headlands	Glass	68	67
AGC Leeds	Glass	65	62
Solenis – Bradford	Chemicals	59	75
Centrica Storage Ltd	Gas	58	21
AGC Knottingley	Glass	56	57
Rotherham Container Glassworks	Glass	48	47
Stoelzle Flaconnage Limited	Glass	34	33
Outokumpu SMACC Site	Steel	30	41
Glanford Brigg Generating Station	Gas power station	20	17
TOTAL		19370	23678

Source: EU ETS registry data[32]

The decarbonisation plans proposed by some of these big industries are principally designed to sustain existing business models rather than to find the most effective and fairest route to cutting emissions. This approach precludes a system-wide stocktake to assess where and how various technologies should be used. For example, blue hydrogen produced by burning gas features prominently in existing plans but it prolongs the role of gas companies in the economy. Energy experts say it is misleading to class blue hydrogen as low carbon as it risks locking in high-carbon infrastructure and jobs.[33] Instead, the UK should focus on green hydrogen produced by renewable energy but, given the high energy demand involved, even this technology should only be used when cheaper, more efficient paths to decarbonisation are unavailable.

The urgency of the climate crisis and the fate of thousands of workers cannot be wagered on market-led technological fixes, many of which remain unproven at scale. The nuclear industry's current travails in the context of limited and uncertain government support are instructive for policymakers tempted to over-rely on expensive solutions like CCS and hydrogen. We acknowledge that the government *is* going down this route and that hundreds of millions in public funds are already committed. But given that we are currently headed for a temperature rise of 3 degrees and that climate change is irreversible, **we argue for a precautionary approach that prioritises action to reduce emissions now while also skilling and moving people into jobs that support a greener, fairer, and more resilient economy**.[34]

2.5 THE ROLE OF NEGATIVE EMISSIONS TECHNOLOGIES

The total emissions of the region's largest emitters have halved since 2015, mainly due to the phasing out of coal-fired power generation. In particular, Drax Power Station has gone from being one of the UK's largest coal-plant operators, and the region's single biggest emitter, to mainly burning biomass in the form of wood pellets. As a result, Drax went from producing 22.7 million tCO_2 to below 1 million tCO_2 in 2019.[35] This excludes the 12.8 million tCO_2 emitted from burning biomass, which Drax describes as "biologically sequestered carbon".

The UK and EU Emissions Trading System consider energy generated from burning biomass to be carbon neutral. It is therefore classed as a renewable source eligible for government subsidies. Drax alone received £832m of public funds in 2020 for burning biomass.[36] However, a significant weight of academic research contradicts the definition of bioenergy as carbon neutral. A 2016 review of 19 research articles estimated the net or lifecycle emissions from forest-derived biomass burning for electricity generation at 43 (±26) gCO_2e/kWh.[37] Notably, the UK biomass industry primarily sources its wood from other continents, transported via sea-freight, an industry which itself faces a significant decarbonisation challenge. This feature likely places UK biomass production at the higher end of the range of lifecycle emissions estimates. In addition to direct emissions, the production of biomass from forestry also comes with a significant opportunity cost – that is, a cost when considering the other potential uses for the land. In its natural state, mature woodland with healthy soils represents a carbon sink. When converted to rapid growing biomass production this sink is degraded and will take many years to recover its full potential even after biomass production has ceased.[38] This is sometimes called a 'carbon debt', which can further increase the net emissions associated with biomass.[39]

In addition to the carbon cost of converting mature forests to rapid growing monocultures, there is an array of social costs. These include loss of biodiversity, loss of

natural resources for poorer rural communities, and loss of natural resilience to impacts of climate change such as floods and drought.[40] **It is crucial to ensure that the energy transition in wealthy countries like the UK does not come at the expense of climate justice elsewhere**. The CCC is clear that burning biomass should only play a role in the UK's low-carbon future if it is bioenergy with carbon capture and storage (BECCS), if sources are sustainably managed, and if it does not come at the expense of forests as natural CO_2 sequestration or of food security. It also acknowledges that the current bioenergy industry does not meet these conditions.[41] Furthermore, the CCC's scenarios are themselves problematic as they are based on the assumption that burning biomass can be considered carbon neutral, which scientists widely dispute. Policymakers should therefore be wary of over-relying on this method of accounting and the technologies it supports in shaping the region's decarbonisation plans.

Beyond the concerns over the sustainability of biomass, there are doubts that CCS will be technically and economically viable at the scale and in the timeframe needed to limit global warming to the 1.5 or well below 2 degrees committed to under the Paris Agreement.[42] **The Intergovernmental Panel on Climate Change (IPCC) has emphasised that the next decade is vital in meeting this target**. The long lead-in times for CCS projects mean that we will not know whether they can fulfil their ambitious targets until it is too late to change course. CCS should not be used as an insurance policy for overshooting our climate targets or in place of drastic mitigation action now, but rather as a focused and limited response to specific decarbonisation challenges, such as the steel industry.[43] There are so far no active CCS plants in operation in Europe. In the 26 CCS plants in operation globally, 81% of captured carbon is used to generate revenue from enhanced oil recovery, making the process economically viable but actually contributing to increasing emissions.[44] The oil price crash in 2020 demonstrated the fragility of this calculus. Petra Nova, the only CCS-fitted power plant in the USA was mothballed amid falling revenue and evidence of underperformance. The Institute for Energy Economics and Financial Analysis reported that the facility had consistently failed to meet carbon capture rates and raised serious questions about the viability of similar projects.[45]

> CCS is counter-intuitive. Burning carbon is not the future, no matter what form it takes... The mentality of the proponents is that it's going to create jobs in the way energy used to in the 70s and 80s and it isn't. It's short-termism. The engineering now is much less labour-intensive, you wouldn't get anything like the same number of jobs.
>
> Anonymous union officer

The Humber's two CCS projects have recently received £34m of the government's £1 billion Carbon Capture Usage and Storage (CCUS) Infrastructure Fund. However, given the technology's track record-record of prohibitive costs and under-delivery, it is doubtful that the UK's investment and policy position will be sufficient. As an indication of the potential costs, fitting the Canadian Boundary Dam coal-fired power plant with a facility to capture CO_2 after combustion cost approximately US$455m and each tonne of CO_2 costs $100 to capture. In six years it captured 3.4MtCO_2 at an estimated cost of US$56m per year.[46] **These costs suggest that any CCS development should be focused on crucial, hard-to-abate industries, like steel, rather than power generation where wind and solar offer a cheaper alternative.** We believe that hinging the urgent action of climate change mitigation on the rapid success of these technologies with little historical precedent entails significant risks for workers, whose jobs may not be protected in the long term.

3. TOWARDS A JUST TRANSITION

The UK's decarbonisation challenge is spatially uneven, with regions like Yorkshire and the Humber disproportionately reliant on carbon-intensive industry while also suffering from the protracted fallout of deindustrialisation over the last few decades. A just transition must therefore be rooted in particular places, albeit underneath a coherent national framework. In the absence of a clear national strategy, local bodies are taking the initiative to set out their own climate action plans.

The new Yorkshire and Humber Climate Commission aims to tackle the climate crisis through a partnership of local authorities, businesses, utilities, unions, environmental groups, and universities. The Commission recognises the region's outsized contribution to the UK's emissions through its energy-intensive industries, and the particular challenge of ensuring that workers in those industries are not left behind by plans to decarbonise. The Commission may not have the power to overhaul the industrial planning process but, by meaningfully engaging with those who have a stake in the outcomes, it can influence that process. It should use this opportunity to demonstrate what a truly **just transition** in the region could look like and to advocate for **greater devolution of resources and power over local industrial strategy**. The Commission has rightly made the just transition one of its core planks. Our interviews with workers and unions suggest it now **needs to design mechanisms to meaningfully engage those affected** in delivering ambitious, fair, and inclusive climate action.

3.1 CREATING GOOD, GREEN JOBS

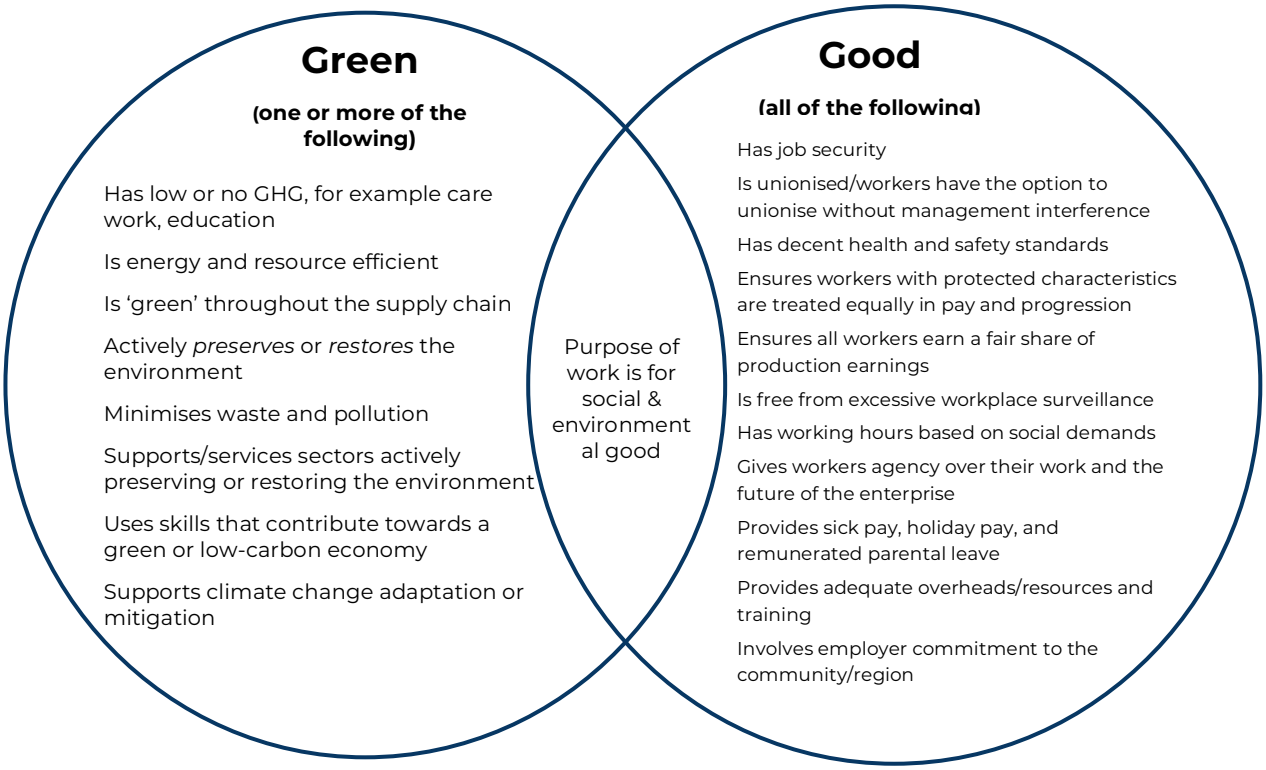
We have discussed some of the just transition challenges facing the region's heavy industry. Some businesses will be able to adapt and decarbonise; others will need to radically change their activities or wind down. In both cases, **it is crucial to ensure that workers are supported to either upskill within the new context of their industry or to retrain and move into good, green jobs elsewhere**. Alongside these transitioning workers, there will also be workers from sectors affected by the pandemic or by longer-term trends like increasing automation, notably in aviation. Finally, a just transition must consider future workers who will need credible routes into the various jobs required both during the transition period and in a future low-carbon economy.

So what is a good, green job? Deindustrialisation in the North and elsewhere has led to an increase in low-paid, precarious, and insecure work. Women and racialised minorities are disproportionately likely to occupy these jobs. **The transition must instead create jobs that are decently paid, secure, unionised, and accessible to all.**

We define green jobs, and therefore, green skills, broadly to include overtly green industries, such as renewable energy, nature restoration, and retrofitting buildings as

well as inherently low-carbon and vitally important sectors, such as public transport, health, care, and education. These sectors are already green as they produce low emissions. Expanding them would displace activity from more energy-intensive sectors, but they must also be made to be *good*. Creating new jobs and improving their pay and conditions would fill the existing gaps and strengthen social resilience but could also address inequality in the labour market as women and racialised groups are overrepresented in these sectors. Investing in care, for example, could reduce the gender employment gap by four percentage points and raise the overall employment rate by five percentage points, while producing 30% less greenhouse gas (GHG) emissions than an equivalent investment in construction.[47] Agriculture, which employs over 12000 people in Yorkshire and the Humber, is also associated with huge emissions and poor-quality jobs but is critical to sustaining life. A transition to lower-carbon and more ecologically friendly food-growing and production could create skilled, decent jobs for some of the most marginalised, often migrant, workers. Figure 4 provides criteria for jobs that are both good and green.

Figure 4: Framework for good, green jobs



Responding to the economic fallout of the pandemic, NEF's winter plan set out proposals to create around 1.1m good, green jobs through an 18-month investment in shovel-ready energy and transport projects, as well as expanded social infrastructure

such as teaching, care, and nursing assistants.[48] Recent research commissioned by Friends of the Earth argues that 24,000 green apprenticeships could be created in Yorkshire and the Humber over three years, to prevent the economic scarring of long-term unemployment on young people.[49] The Local Government Association estimates that the region could see 100,000 new jobs in low-carbon electricity and heat, energy efficiency, alternative fuels, low-carbon vehicles and infrastructure, and other low-carbon services by 2030.[50] Addressing the gaps in health and care could create many thousands more. Using the wider definition of a good, green job, the Institute of Public Policy Research (IPPR) estimates that 1.6m jobs could be created nationally over the next decade.[51]

4. RECOMMENDATIONS

We have argued throughout this report that the just transition is a process rather than a fixed outcome, and we hope that further research and solutions will involve workers, unions, and communities. We recognise that as an independent advisory group, the Yorkshire and Humber Climate Commission does not control the levers of industrial change but urge it to influence the planning process wherever possible and to use Yorkshire and the Humber as a case study for a truly just transition. Based on previous work and interviews for this briefing, we suggest some initial recommendations for policymakers and some specific to the Commission's work.

Government should:

- **Prioritise action to ramp up proven methods to reduce emissions *now*, creating thousands of jobs in low-carbon sectors**.
  Given the importance of dramatic climate action in the next decade, decarbonisation plans should not over-rely on technologies projected to deliver in the late 2020s–2030s. Taking a precautionary approach should focus on measures to phase out fossil fuels, improve efficiency, expand renewable energy, and reduce demand as well as investing in inherently low-carbon sectors like public transport, care, and health.

- **Establish robust measures to monitor the success in reducing emissions and protecting jobs against negative emissions technologies' projected trajectories**.
  These should include milestones – for example near-term targets for proving that carbon capture rates are realistic – that projects need to reach long before their distant completion dates to qualify for further public funding.

- **Honestly assess which industries can and should be supported to decarbonise and which should be phased out during the transition.**
  Some energy-intensive industries will remain viable and important in a low-carbon economy, for example steel and agriculture. Given the economic uncertainty facing UK steel, government should bring forward the Green Steel Fund and urgently support the sector to reduce its emissions and protect jobs. This calculation will not apply to all industries and relying on industry-led plans will inevitably shore up the status quo even where greener alternatives exist. Where this is the case, government should support a social dialogue with

employers and workers to ensure a just transition while winding down unsustainable activities.

- **Ensure that a just transition in the UK does not come at the expense of global climate justice.**
  Just transition principles must apply throughout the supply chain, considering the impact of increased resource extraction on workers, communities, and the environment beyond our borders.

- **Ensure mayors are fully empowered to transform regional public transport.**
  Where they don't already exist, mayors should be given powers to franchise bus services, and they should deploy these powers to invest in electric buses, increase services, and improve pay and conditions. They should also mandate social value in procurement, supporting the four manufacturing plants in Yorkshire that already specialise in low-emissions and EVs and boosting jobs and communities.

- **Create a Just Transition Fund to resource essential non-capital local and regional transition efforts.**
  There is currently inadequate funding and capacity for the region to implement an effective just transition plan. Yorkshire and the Humber should receive financial support, outside of infrastructure expenditure, to enable reskilling, capacity building in local authorities and Local Enterprise Partnerships (LEPs), mapping transition needs, and engaging workers and unions in the process.

The Yorkshire and Humber Climate Commission should:

- **Establish a mechanism to engage workers across sectors and localities in co-designing a just transition roadmap.**
  The Commission should set up an engagement working group or use an existing vehicle like the TUC's Just Transition Taskforce, to bring workers in the most affected sectors into transition planning conversations. This could be piloted in one site or area before being rolled out across the region. It should also develop ways to engage non-unionised and more marginalised workers.

- **Conduct or commission further research into the green skills gap.**
  One of the greatest challenges in the transition to zero emissions is ensuring that enough workers in the right places have the skills to furnish a low-carbon

economy. Further research is needed to understand the current baseline and where skills provision should most appropriately be directed. This should include an analysis of the gaps in existing low-carbon sectors, such as health and care.

- **Lobby for the region's devolved adult education budgets to prioritise green and low-carbon skills.**
  The Commission should work with unions, employers, local authorities, LEPs, and skills providers to ensure that there is enough training capacity to equip new entrants into the labour market and workers transitioning from both energy-intensive and Covid-affected sectors into good, green jobs.

- **Ensure employers participating in the Commission adopt just transition principles, including by signing up to the ITUC's pledge on just transition to decent jobs, and engage employees and relevant unions in decarbonisation plans.**
  If the Commission's commitment to a just transition is to be taken seriously, participating employers should commit to making their decarbonisation plans fully transparent to employees and engaging in meaningful social dialogue to co-produce solutions.

- **Hold a regional just transition conference in advance of the planned regional climate summit.**
  This union-led regional event would socialise the concept of just transition among a wide range of workers and get their input into the plans that the Commission will present at COP26.

5. CONCLUSION

The Yorkshire and Humber Climate Commission plans to "support, guide and track delivery of ambitious climate actions across the region", emphasising the importance of a just and inclusive transition.[52] This report describes some of the challenges and opportunities particular to Yorkshire and the Humber as it plots a course to a low-carbon future. Given the large number of jobs reliant on energy-intensive industry, it is crucial that this course is co-designed with the workers and communities involved. The just transition will not happen on its own. It requires careful planning and resourcing or is likely to be seen by workers as a token gesture. It will not happen overnight, which is why we have explained that we must invest in new skills and industries and existing low-carbon jobs as well as phasing out or adapting polluting sectors.

Much of the current momentum to decarbonise is led by the region's big industrial employers and emitters. Their profit imperative skews plans towards technological solutions, principally CCS and blue hydrogen, which will not be deployed until the mid–late-2020s at the earliest. Some of these industries will be central to the low-carbon transition and need urgent support to decarbonise and protect jobs, for example the steel industry which employs 8,000 people in Yorkshire and the Humber. Furthermore, there are clear opportunities to offset Covid-19-related job losses by supporting the region's manufacturing capacity to furnish projects key to a low-carbon recovery, including the switch to electric buses and the expansion of mass transit. But this does not mean that every polluting industry should be propped up by the promise of negative emissions technologies, especially where there are obvious alternatives.

Given the need to drastically reduce emissions *this decade*, we suggest a precautionary approach should not over-rely on these solutions, but rather honestly assess which industries should be supported to adapt and which should be phased out as part of the transition. Workers in this latter group should be supported into other sectors, with no loss of terms and conditions. Job creation and skills provision should be geared towards the urgent work of retrofitting buildings, installing renewable energy, improving public transport and active travel infrastructure, restoring nature, and reducing waste through a more circular economy. Beyond this, we use a wider definition of green jobs to include low-carbon sectors such as health, care, and education – jobs that the pandemic has revealed to be crucial to sustaining our society but woefully undervalued. Creating new jobs in these sectors and ensuring they are secure and decently paid is not only essential for a green recovery, but has the co-benefits of contributing to a healthier, fairer, and more resilient economy.

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