



Net Zero by 2050:

ONE PLAN. TWO OBJECTIVES.

**HOW GREEN GROWTH CAN BUILD THE
NORTHERN POWERHOUSE**

Summary Report
July 2024

Supported by



/01. Contents

/01. CONTENTS	2
/02. EXECUTIVE SUMMARY	3
/03. INTRODUCTION	7
/04. NORTHERN POWERHOUSE INDEPENDENT ECONOMIC REVIEW (NPIER)	9
/05. THE NET ZERO ECONOMY	14
/06. NET ZERO IN THE NORTH; RECOMMENDATIONS	20

/02. Executive Summary

The plan we present helps to illustrate how the nation's agenda for reaching net zero provides significant opportunities to create green jobs and economic growth here in the North of England.

The National Infrastructure Commission, co-located across Leeds and London, will be strengthened as the National Infrastructure and Service Transformation Authority (NISTA), bringing it together with the IPA, has set out clearly that infrastructure is key to the net zero transition (alongside the wider challenge of resilience to climate change). We agree with their analysis in the National Infrastructure Assessment about the critical role of private funding alongside public investment nationally. More of the most significant decarbonisation challenges and new opportunities for generation, from nuclear to tidal, are here in the North of England. Significant projects have been highlighted in this plan which need to be deployed at pace. This means everything from Environment Agency approvals to financing models all working together in a joined-up way.

That is why it is so critical that our Metro Mayors play a leading role. Each of our recommendations will involve Metro Mayoral Combined Authority and local council action; building on the legacy of cities like Newcastle-upon-Tyne who led the way with their Warmzone over a decade ago to improve energy efficiency, through to the ambition of South Yorkshire Energy launched by Mayor Coppard; a partnership with the private sector and academics that will maximise investment, jobs and supply chain development in the area's leading clean-tech sector.

Across all of the net zero transition, including areas which have higher and lower rates of leverage on public investment, there is a projected average in the North of £2.65 of private investment for every £1 of public money and the creation of an additional 168,000 jobs. In industrial decarbonisation, the Cambridge Econometrics scenario we have commissioned shows that until 2050 around 80 per cent private investment can be achieved versus only 20 per cent from the public finances.

As the new Government has announced its approach through its National Wealth Fund, we here will demonstrate how we can maximise the amount of private investment which can be generated. We are clear that institutions included in that fund, notably the UK Infrastructure Bank, must make proper use of Treasury Guarantees to maximise their role for unlocking institutional investment, alongside other methods of funding.

On grid, we know that there is huge investment to be deployed in enabling generation and storage in the run up to 2030. However, we must also make use of those locations, including here in the North, where there is capacity to connect without any delay.

This report builds on the 'Net Zero Scenario' set out in Transport for the North's Independent Economic Review¹. Within this, five main categories were identified whereby decarbonisation could yield significant economic benefits. We have set out our specific recommendations for each of these categories below.

Energy

- a) **Complete procurement by Great British Nuclear from two separate businesses of three small modular reactors (SMRs) each**, unlocking a significant export opportunity and bolstering our energy security. Due to previous delays in making these decisions, the costs for these SMRs will fall in future Comprehensive Spending Review periods and so there is no unplanned requirement for budgeting for this expenditure in this current Parliament.

The North is already benefitting from the growth of the nuclear supply chain, including Sheffield Forgemasters and Rolls-Royce SMR headquarters in Manchester. There are many ways to generate net zero electricity, not least through interconnectors supplying nuclear power from overseas markets, but these do not produce high quality jobs in the North as SMRs will do. Carbon has been offshored for the last decade with the consequential loss of manufacturing – we have an opportunity with SMRs to re-build our manufacturing heritage through the building of low carbon infrastructure.

- b) **Develop our wind capabilities from the North East down to the Humber.** Building on the success of the turbine blade factory in Hull we should now look to make even larger components for the offshore sector, while growing Greenport 2 with initial funding in the Hull and East Yorkshire devolution deal. We can re-allocate under-spends from previous competitive funding rounds for offshore wind infrastructure to fill the current funding gap.
- c) **Invest in a turbine supply chain for the tidal barrage on the Mersey**, which should be a development priority both within the city region and across the North.

¹ Transport for the North (2016). The Northern Powerhouse Independent Economic Review
<https://transportforthenorth.com/wp-content/uploads/NPIER-Core-Messages.pdf>

Industry

- a) **Continue to make huge strides in carbon capture use and storage (CCUS)** as part of the wider push towards industrial decarbonisation. From the Mersey to Teesside, we have seen the development of successful clusters here in the North of England but are still awaiting the final go ahead for Track 1 deployment. This is whilst the Humber - the UK's largest industrial cluster, with major emitters from Selby through to Immingham - is awaiting key decisions on the deployment of the Track-2 cluster. A decision with accelerated consenting and powers to put pipes in the ground with GB Energy will unlock £15 billion of private investment from Drax, CO2 brought by vessel, Phillips 66 and other businesses working in partnership with Viking alongside a Track 1 extension as an option.
- b) **Expand green hydrogen production, storage and distribution** to ensure the maximum opportunities for industrial decarbonisation are achieved. This should be through specifically targeted support to develop long-term sustainable business models.

Transport

- a) **Turn the North into a centre for the production of Sustainable Aviation Fuel (SAF)**, supporting jobs for those who work in refineries producing jet fuel today, and ensuring that - as production capability develops globally - the UK aviation sector is able to decarbonise at pace. As local authorities review their arrangements for waste disposal, they have the choice to ensure that the North can provide feedstocks for new SAF plants. The Government's commitment to this sector, evidenced by the Sustainable Aviation Fuel Bill announced in the King's Speech, is welcome.
- b) **Deliver a consistent programme of rail electrification.** Extending the TransPennine Route Upgrade to include Hull to Selby is a way to create further scale in the North's electrification portfolio, as well as delivering a key element of the Northern Powerhouse Rail portfolio. Supply chains can then plan for growth and deliver the necessary capacity based on this programme of work.
- c) **We make the UK a leader in building battery and hydrogen trains** through our world-class train factories in Goole and in Newton Aycliffe, alongside their supply chains, making the former a centre for innovation with a facility to bring R&D activity there and the latter delivering the all-electric HS2 fleet.
- d) **Guarantee the supply of hydrogen for commercial vehicles such as buses**, provided by East Bradford Hygen and N-Gen facility

- e) **Increase procurement of electric and hydrogen buses across areas with franchising**, supporting the ability of Northern suppliers and those across the wider UK to produce buses at scale.

Built Environment

The UK has an ageing building stock which represents a substantial change for energy efficiency. There are several measures proposed by the Net Zero Strategy to decarbonise the building stock and heating systems.

- a) **Deliver retrofit of domestic and commercial buildings at pace, and with the necessary funding and skills support**, including a 75% reduction in public buildings emissions by 2037, whilst securing a UK and Northern supply chain for heat pumps, insulation and other technologies. If this is delivered in conjunction with energy companies, households can pay via their bills (rather than through a traditional loan set up) which increases eligibility and affordability.

Land Use

Land use will need to shift to favour low-carbon agriculture which will require investment in agriculture and forestry sectors. We need to deliver substantial decarbonisation of agriculture, with a tripling of tree planting rates to 30,000 ha per year by 2035 and the restoration of at least 25,000 ha of peatlands by 2035.

- a) **Back propositions including the Northern Forest**, which seeks to deliver 50 million extra trees, leveraging private investment through public backing.

/03. Introduction

Net zero is a global challenge but it is also a huge economic opportunity for the North of England.

Ten years ago, in 2014, the then Chancellor George Osborne set an ambitious agenda to address the huge economic gap in productivity terms between the North and London & the South East. The Northern Powerhouse Partnership was set up in 2016 to convene business in support of that goal, and here we lay out what business and private investors can do if we have the full support of the UK Government, the UK Investment Bank, Metro Mayors and local government collectively.

Our proposition is simple: **we must maximise efforts to cut carbon emissions, and adapt to climate change, in such a way that addresses economic disparities at the same time.** We need a strategy to achieve our decarbonisation targets which is not focused on offshoring our emissions by exporting jobs in steel-making and other industries (adding to, not removing, global emissions), but by exploring green growth opportunities here.

Two hundred years after the North of England fuelled Britain's first Industrial Revolution with our coal powered factories which made us a global trade power, we are now competing globally to develop innovations and export opportunities in emerging green sectors. The North has a comparative advantage; thanks to our manufacturing excellence, our carbon intensive industrial clusters are working to decarbonise through our growing expertise in nuclear and other renewable energies. We will build on our existing capabilities whilst also developing new industries in emerging technologies.

In 2019, the then Energy Minister Chris Skidmore set legally binding targets to achieve net zero by 2050. There is cross-party consensus on the issue, as demonstrated by the Conservative-Liberal Democrat coalition (which helped secure the Siemens wind turbine blade factory in Hull) and the Labour government before it. The net zero agenda is now bringing together policymakers, businesses, regulators and civil society to create long-term change. It is also underpinning economic transformation for Northern cities like Hull, as the nuclear sector has for decades in towns like Warrington and Whitehaven.

The North has an opportunity to lead the transition by capturing more of the supply chains than we managed in the early stages of the net zero economic race. This will secure higher productivity, create good jobs, and re-industrialise the North. We have commissioned independent analysis which shows that **every £1 of public money can leverage another £2.65 of private investment**, close to the Government's stated target for returns from the National Wealth Fund. We can expect even more in some sectors, with industrial

decarbonisation till 2050 at around 80 per cent private investment versus only 20 per cent public.

It is time for the net zero debate to be properly aligned with the economic ambition to transform the North. This is about jobs for working people in so-called 'left behind' towns such as Grimsby and Blyth, as well as huge growth sectors in our great cities for those in knowledge intensive jobs, including in our world-class universities.

Public support for this huge transition is dependent upon securing a just transition, in which those who work in those areas most at risk of economic dislocation, such as a blast furnace in Scunthorpe or an oil refinery in Cheshire, are front of the queue for the new jobs we can and must create.

The evidence used by Cambridge Econometrics was based on the situation as it existed under the last government. As the intentions of the new government become clearer, the assumptions of what may be possible, and so the maximum leverage of private investment based on public spending, could indeed change. This plan has been prepared in a period of flux, but does include the role of the National Wealth Fund including the UKIB and GB Energy, which we feel are particularly important and are critical institutions for the North.

This is our business-led plan for green jobs and growth, building the Northern Powerhouse in the same year as our nation achieves net zero.

/04. Northern Powerhouse Independent Economic Review (NPIER)

The original NPIER published in 2016 laid out a transformational scenario which set out the scale of the prize to be won if the North successfully capitalised on its strengths and overcame barriers to growth. This prize was a boost to the economy of 850,000 additional jobs and £100 billion in additional GVA by 2050 compared with a ‘business as usual’ scenario².

More specifically, it identified four prime capabilities and three enabling capabilities. Notably and of relevance to this paper, energy was one of the prime capabilities with the North’ expertise around generation, storage, and low carbon technologies and processes, especially in nuclear and offshore wind, all recognised. In 2016, the NPIER noted how well placed the North is to seize the opportunity of net zero, which crosses over with the North’s further manufacturing prime capability. However, the review also established the significant barriers to the North reaching its potential and capitalising on its capabilities.

Barriers to the North and its productivity

The UK’s productivity problem is so acute because regions, including across the North, do not have as productive cities as in comparable advanced economies, including across continental Europe.

The refresh published in 2023 set out four individual change scenarios which model the impact of what different approaches to advancing the North may look like. They consist of Technology and Innovation, Inclusive Productivity, Development Supply and Net Zero. The NPIER finishes with the New Transformational Scenario which would be the result of all four scenarios being realised by 2050.

Importantly, without any of these change scenarios the North’s current trajectory is strong jobs growth, with unemployment and economic inactivity projected to continue to decline. However, productivity growth is low and has worsened since the business-as-usual scenario set out in the original NPIER. The baseline benchmark is the foundation of the NPIER’s modelling and illustrates the outcomes if a ‘policy off’ or business as usual approach is

² Transport for the North (2016). The Northern Powerhouse Independent Economic Review
<https://transportfornorth.com/wp-content/uploads/NPIER-Core-Messages.pdf>

employed between now and 2050. The following section will detail the net zero scenario which demonstrates what can be gained through pursuing this agenda.

Net Zero Scenario

The net zero scenario considers the effects of the implementation of a 2050 plan such as the one advanced later in this work in relation to the decarbonisation of the built environment, transport system, energy generation, industry, waste and agriculture by 2050. Though we should be mindful of the uncertainties in econometric modelling, we have commissioned additional work to inform this report. This explores in more detail some of the assumptions in the original Northern Powerhouse Independent Economic Review on the proportion of private investment which could be attracted, the headlines of which are highlighted below.

The following table illustrates the broad areas based on the national Net Zero Strategy whereby decarbonisation can achieve economic benefits as listed in the NPIER³.

Table 1: Summary of the decarbonisation categories which will yield economic benefits

Decarbonisation Area	Summary
Industry	<p>Net zero requires a major shift in how industry makes goods and consumes energy. Therefore, its technology strategy to 2050 focuses on three primary areas:</p> <ul style="list-style-type: none"> - Development and adoption of industrial digital technologies - Better energy management - Reuse of materials <p>The scale of opportunity for the North in this regard is significant given that over 50% of the UK’s industrial carbon emissions are within six spatially-concentrated clusters of activity, of which three are in the North (Teesside, the Humber Estuary and Cheshire/Merseyside/Deeside). These three locations have been identified as areas of focus for investment in hydrogen, carbon capture and storage along with other technologies over the long term.</p>

³ Transport for the North (2023). The Northern Powerhouse Independent Economic Review <https://transportfornorth.com/wp-content/uploads/Economic-Scenarios-for-the-NPIER-Final-Report-for-Publishing.pdf>

	<p>Of the £4 billion per annum of the investments in the industry sector allocated to the North of England, we now assume 20% (£0.8 billion) is public investment (primarily to funding publicly owned CCUS and hydrogen infrastructure and grants/tax incentives to accelerate fuel switching) and 80% (£3.2 billion per annum) from the private sector.</p>
Energy	<p>For the UK to reach its 2050 decarbonisation goals, renewable energy sources will need to constitute a much larger share of the energy mix than now. The North will require significant investment across a range of sectors to achieve this.</p> <p>Of the £10 billion per annum of investments in the energy sector allocated to the North of England, we assume £3 billion is public investment (primarily in direct funding of national energy generation and supporting low-income households in the energy transition) and £7 billion is private investment.</p>
Transport System	<p>A decarbonisation strategy set out by Transport for the North focuses on surface transport and sets out a trajectory whereby a 56% reduction in emissions should be achieved between 2018-2030 and a 96% reduction between 2018-2040. The following key themes support this target:</p> <ul style="list-style-type: none"> - Uptake of zero emission vehicles - Uptake of hydrogen vehicles - Demand management and digital substitution - Decarbonisation of freight transport and logistics industry - Rail decarbonisation - Modal shift to active travel, public transport and micro mobility. <p>We assume that £4 billion per annum investments in the transport sector are allocated to the North of England, of which £1.2 billion is public investments (primarily in upgrading public and active transport infrastructure at the required scale and pace) and £2.8 billion is private investment.</p>
Built Environment	<p>The UK has an ageing building stock which represents a substantial challenge for energy efficiency. There are several measures proposed by the Net Zero Strategy to decarbonise the building stock and heating systems.</p> <ul style="list-style-type: none"> - Phasing out the installation of new gas boilers by 2035

	<ul style="list-style-type: none"> - Incentivising heat pump installations - Reducing direct emissions from public sector buildings by 75% by 2037. <p>£3 billion per annum in investment in the built environment sector is allocated to the North of England. Of this, we expect £0.8 billion to be covered by public investments (primarily in decarbonising public buildings and supporting low-income households in the transition to green buildings) and the remaining £2 billion is expected from private investment.</p>
<p>Land Use</p>	<p>Farming practices will need to shift to favouring low carbon agriculture and the country will need to increase rates of woodland and peatland restoration/ creation alongside maintaining food production and security. This will require investment in agriculture and forestry sectors. The Net Zero Strategy commits to substantial decarbonisation of agriculture, with a tripling of tree planting rates to 30,000 ha per year by 2035 and the restoration of at least 25,000 ha of peatlands by 2035.</p> <p>We assume £1 billion per annum of investments for decarbonising the land use sector are allocated to the North of England, of which 50% (£0.5 billion) is public investment (primarily in directly funding environmental restoration and grants to encourage sustainable land use practices) and the remaining 50% (£0.5 billion, primarily in sustainable agriculture and offsetting) would be private investment.</p>

The importance of clear and certain policy

Overall, these areas represent a significant opportunity to leverage both public and private investment into net zero. It is perhaps more important that government commitments to achieve net zero remain firm to instil confidence in business, than being prescriptive about the amount of public investment to be made each year. If the private sector is confident that the policy environment will remain stable, and that returns are possible, they will commit investment. Having said that, we remain confident that public investment will leverage in a higher ratio of private investment than originally envisaged in the NPIER.

As highlighted by our Powerhouse 2050 report published in 2017 the North has generated over forty percent of the UK’s electricity for many years, with the M62 belt of coal fired power stations now almost all closed, with the exception of a re-purposed Drax, and offshore wind taking its place. Three of the six largest industrial clusters by emissions are

situated within the North with the Humber being the largest, which contributes to us generating a quarter of the UK's total CO2 emissions per annum (90m tonnes). This presents a significant challenge in transitioning these clusters to a net zero position while maintaining competitiveness within the sector. But tackled ambitiously, it also presents a huge opportunity to transition the region to be at the heart of clean power generation.

With employees in net zero related fields generating 1.7 times more GVA than the UK average (CBI, 2023), government investment into the net zero economy is vital to drive productivity in the North. It is emphatically clear that the North has an asset base compatible with leading the net zero transition. From offshore wind, to nuclear, to carbon capture, use and storage the opportunities are abundant. Moreover, failure to grasp the opportunities to decarbonise and enable clean growth of existing high carbon industrial activity within the North risks being a huge own goal environmentally and economically. The alternative to decarbonisation would be cessation of activity at home, and exporting emissions to parts of the world which have fewer controls on emissions currently, with added transport emissions, or invest now to sustain the current jobs and add to them.

The NPIER demonstrates the headline impacts of the Net Zero Scenario by 2050 compared to the outcomes of the Baseline Benchmark. It details the potential of net zero to provide £23 billion of additional GVA growth to 2050, 168,000 more jobs and an additional £1,500 of additional productivity per worker over the forecast baseline.

Given these outcomes, this report will analyse the current state of the Net Zero Economy in the North, highlighting major successes, areas of opportunity, and the scale of the intensive carbon producing sectors of the economy.

/05. The Net Zero Economy

In our own previous research, we considered Foreign Direct Investment in the North of England, and this highlighted significant strengths in investment related to net zero. Foreign investment into renewable energy in the North of England has increased from \$6.95 billion between 2012-16 to \$20.25 billion 2017-21 – a 193% rise. It is worth noting, however, that the 2012-16 figure was boosted by a single project worth \$1.2 billion. On the reverse, coal, oil and gas appear to have suffered from the shift to green alternatives, dropping from \$1,299 million between 2012-16 to \$471 million between 2017-21.

In this work, we have looked at projects and opportunities in light of the levels of leverage which have been identified as obtainable by the additional econometric based analysis undertaken on the Net Zero scenario in the NPIER. For example, RedCAT in Lancashire, a support programme for low carbon commercialisation, is led by the East Lancashire Chamber of Commerce and has achieved £11.5 million of investment and sales for £2.2 million of public investment.

In terms of industrial decarbonisation, the figures on the total quantum of private investment is within Track 1 £5 billion from Hynet on the Mersey and adding in Track 2 £15 billion unlocked through access to Carbon Capture and Storage across the Humber, of which £2 billion is at Drax power station.

As we assess the opportunities for net zero to grow in the North, and to raise productivity here, we have published a paper of technical analysis which accompanies this plan. Specifically, we have highlighted areas with overall net zero strengths already present, and so where there may be the strongest basis for smart specialisation.

Table 2: Top 10 ITL2 regions for GVA from the net zero economy as a proportion of total GVA

ITL2 Region	Net Zero GVA as % of total
North Eastern Scotland	9.2%
Gloucestershire, Wiltshire and Bath/Bristol area	5.8%
Northumberland, and Tyne and Wear	5.1%
Cornwall and Isles of Scilly	4.5%
Berkshire, Buckinghamshire and Oxfordshire	4.2%
East Yorkshire and Northern Lincolnshire	4.1%
East Anglia	3.7%
Lincolnshire	3.3%
Tees Valley and Durham	3.2%

Dorset and Somerset	3.1%
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Source: Analysis of The Data City data on net zero companies across the UK

Reflecting on the overall proportion of the economy, the North East of Scotland has the highest proportion of net zero jobs as a proportion of its total employment base.

In terms of the North of England we can see Northumberland and Tyne and Wear (a major centre for the offshore wind catapult in Blyth for example), followed by the Humber (East Yorkshire and Northern Lincolnshire; home to the Hull blade factory and Grimsby as a major support base for offshore wind) then Tees Valley and Durham.

Table 3: Top 10 ITL2 regions for employment from the net zero economy as a proportion of total employment

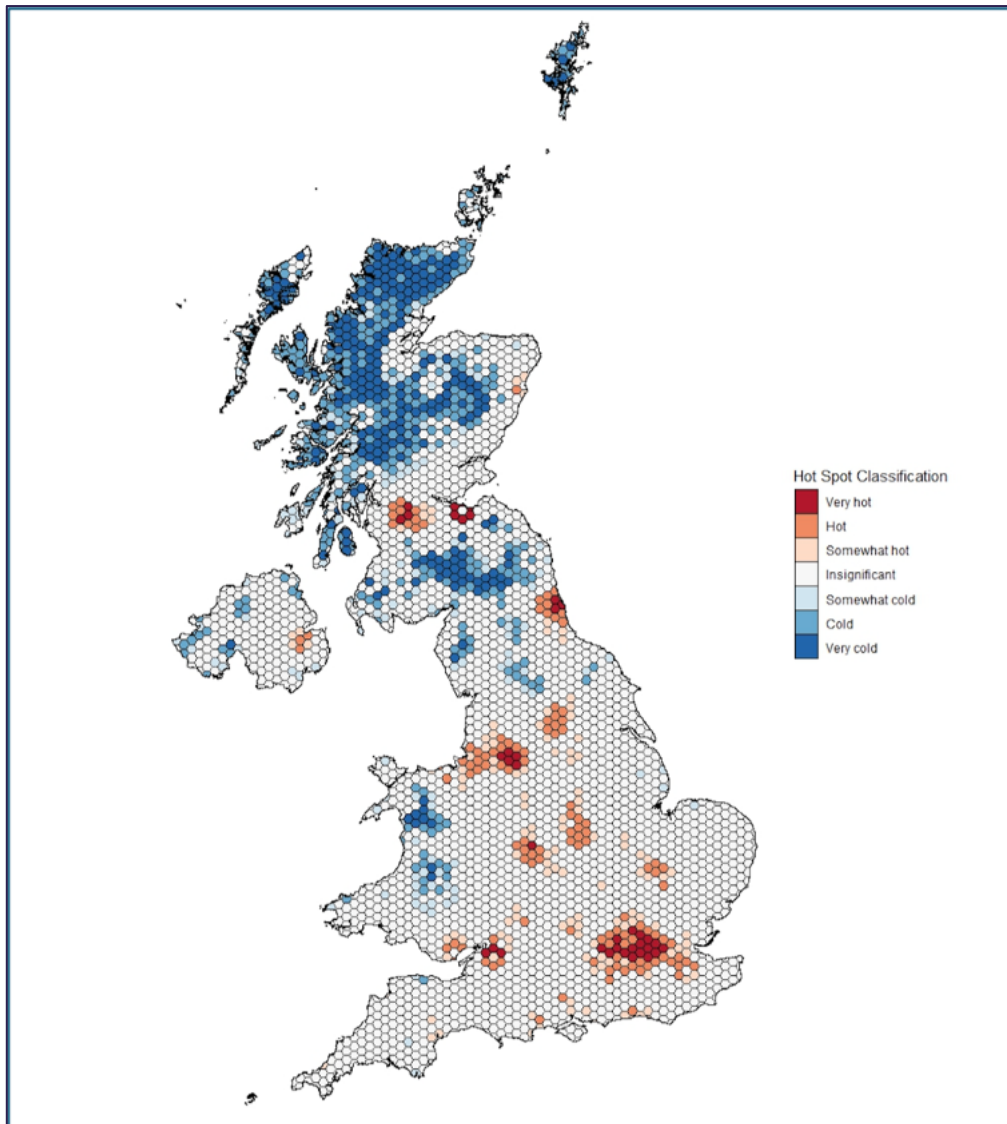
ITL2 Region	Net zero jobs as % of total
North Eastern Scotland	16.5%
Cheshire	4.8%
Inner London – West	4.1%
Gloucestershire, Wiltshire and Bath/Bristol area	3.9%
East Yorkshire and Northern Lincolnshire	3.6%
Berkshire, Buckinghamshire and Oxfordshire	3.2%
Inner London – East	2.6%
Northumberland, and Tyne and Wear	2.6%
Surrey, East and West Sussex	2.1%
Cornwall and Isles of Scilly	2.0%

Source: Analysis of The Data City data on net zero companies across the UK

The significant importance of North East Scotland, with an institution that links it to Northumberland with the Offshore Wind Catapult, is a significant outlier position of strength. In the case of the North, Cheshire comes out next followed by the Humber then Northumberland and Tyne & Wear.

The reflection we can draw from these results is geographic concentration which makes the self-evident point that the net zero NPIER scenario will produce uneven results; some places will gain more, others may capitalise less. Next, we have looked at a more granular level within travel to work areas.

Figure 1: Hotspot Analysis of the Net Zero Economy



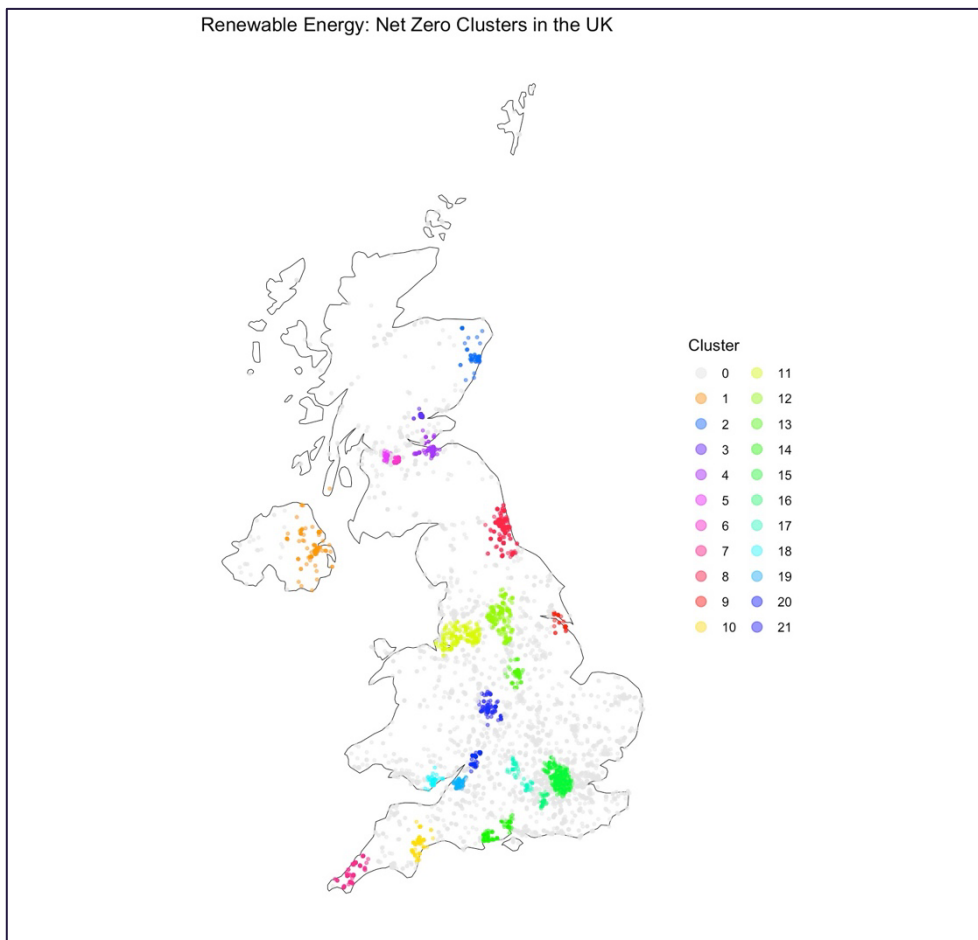
Source: Produced by The Data City

Note: A 'Very hot' confidence level is 95%, 'Hot' is 90%, 'Somewhat hot' is 85% and vice versa for the coldspots. Each hexagon cell is 10km.

The map above represents the hotspots identified out of the entirety of the UK's net zero economy. If the number of companies in the cell is much greater than expected we would classify this as a hotspot. Conversely, if the number of companies in a cell is much lower than expected this is classified as a coldspot. There are 7 areas which have at least one 'very hot' hotspot. As one might expect, London has multiple hotspots and we can say with a 99% level of confidence that this is a statistically significant number of hotspots. However, this must be caveated with the fact that we believe some companies use a London address for their registered address, possibly their accountant or solicitor's address, without having a

presence in the city themselves and this may have some effect on the confidence level and number of hotspots. Places including Manchester, Birmingham, Newcastle upon Tyne, Edinburgh and Glasgow all have an area which we are 99% confident has a statistically significant number of net zero companies. There are also several locations in the North with which we can be 95% confident that there is a statistically significant number of net zero companies such as Liverpool, Warrington, Leeds, and Sunderland. Interestingly, the geospatial distribution of firms between Liverpool and Manchester has been identified in the hotspot analysis. It should be noted that this analysis highlights where the SMEs and concentration of businesses are rather than specific clusters or places where the primes set out in the NPIER are located. The Humber hasn't been identified as a hotspot when looking at all net zero companies. However, it proves to have a cluster when looking at renewable energy. Given the Humber's renewable offshore wind capabilities which are predominantly forged by Siemens Energy and Ørsted it is unsurprising that it is home to a renewable energy cluster.

Figure 2: Renewables Spatial Clusters



Source: NPP analysis of The Datacity Data

Renewable energy is one of the biggest subsectors of the net zero economy. In total, there are 5,905 companies across 10,291 sites. The prevalence of the renewable energy sector is illustrated by the plethora of grey dots on the map. Given the scale of this subsector, to determine a cluster there must be 80 or more companies which are spatially co-located. Under this parameter, 21 clusters were identified. In total, the North has 4 distinct clusters with the cluster surrounding Leeds likely including companies in Sheffield. In the North East, Sunderland and Newcastle upon Tyne constitute a cluster.

For further information on clusters, please see the analytical report published alongside this summary report.

Small Modular Reactors (SMRs)

Within the net zero economy there are specialist supply chains, particularly in manufacturing, which do require specialist capabilities.

Rolls-Royce SMR have invested in innovation capability, including at the AMRC in Sheffield, to do the work now to support them to get to point of starting to build their reactors in a factory environment before deploying them on site.

There are also existing supply chain assets for similar capabilities, including Sheffield Forgemasters, in the city. This gives South Yorkshire a significant head start in attracting the future supply chains in SMR and demonstrates that many capabilities in Net Zero related opportunities are existing parts of the advanced manufacturing prime capability.

Carbon intensive industry

We have also looked at those areas with clusters of carbon intensive industry which can and must be decarbonised. Economic activity and employment is potentially at risk should the transition to net zero result in a displacement from those areas currently reliant on carbon-intensive industries.

Focusing specifically on the North of England, there is data available for 1,262 operational sites situated in the North. For local authorities in the North, on average there are approximately 20 carbon-intensive sites, with the highest number in the East Riding of Yorkshire (199). Across the North each ITL2 region has a high proportion of either productivity, number of sites, or employee counts. For instance, while Cheshire doesn't outperform its counterparts across the aforementioned factors, it is the most highly

productive ITL2 region in the North. Additionally, whilst East Yorkshire has the highest number of sites, it does not have comparatively high employee, GVA and productivity levels. Therefore, there is not a uniform trend in the North of high GVA or high employee counts across companies. A notable trend across companies was the spatial distribution of companies. Most companies in the carbon intensive industries are located in industrial areas. To analyse productivity, we analysed GVA and employee data which was available for 700 sites (55% of all sites). Across the region's carbon intensive industry, there are generally high productivity rates with the highest at £104,000 GVA per job in Cheshire and lowest at just under £43,000 GVA per job in East Yorkshire. Overall, the average productivity rate is £108,000 GVA per job across the North. Therefore, the carbon intensive industry in the North represents a positive challenge and opportunity for the North's transition. Moreover, most carbon intensive companies being located in the industrial heartlands of the North speaks to the importance of ensuring places with a sizeable carbon intensive industry aren't left behind in the transition to net zero. Its scale is substantial and the importance of including and adapting this sector shouldn't be understated.

/06. Net Zero in the North: Recommendations

Support the transition of workers in carbon intensive sectors related to our prime economic capabilities, largely in energy, to new green jobs. Whether it be oil refineries such as the Phillips 66 Humber facility or Stanlow in Ellesmere Port, or the former coal-fired power station at Drax in Selby, we need to secure jobs for workers at these facilities. The workforce at these sites faces real risks if we do not have a credible plan for their future.

Put an end to deindustrialisation and the offshoring of emissions to reach net zero targets artificially. The UK must cut our emissions without exporting manufacturing and carbon intensive jobs. Decarbonising the end product would allow us to keep jobs in the steel industry and other sectors.

Commit to large-scale expansion of our nuclear capabilities. The North has a strong nuclear heritage in West Cumbria and in Warrington at Birchwood. Sellafield in Cumbria, previously home to Calder Hall and the Windscale plants before their closure, is of the generation of energy without carbon emissions.

Unleash private sector investment by maximising the potential of catalytic public funding. Our asks of government, of our Metro Mayors and of industry are designed to unlock private investment, including from the insurance sector underpinned by Treasury guarantees issued by the UK Infrastructure Bank. This would generate tax revenues which could be re-invested, securing additional growth - and even higher Treasury revenue – in the long-term. We would call upon the Office for Budget Responsibility (OBR), with the support of the National Infrastructure Commission, to calculate the benefits of these decisions for the nation's finances over future decades.

Energy Propositions

The NPIER highlights that for the UK to reach its 2050 decarbonisation goals, renewable energy sources will need to constitute a much larger share of the energy mix than now. The North will require significant investment across a range of sectors to achieve this. It is expected that around 50% of the £500 million investment required in new offshore wind and nuclear capacity will be located in the North. However, the location of the facilities themselves is less important than that of the associated manufacturing supply chains.

Our recommendations:

- a) **Complete procurement by Great British Nuclear from two separate businesses of three small modular reactors (SMRs) each**, unlocking a significant export opportunity and bolstering our energy security. Due to previous delays in making these decisions, the costs for these SMRs will fall in future Comprehensive Spending Review periods and so there is no unplanned requirement for budgeting for this expenditure in this current Parliament.

The North is already benefitting from the growth of the nuclear supply chain, including Sheffield Forgemasters and Rolls-Royce SMR headquarters in Manchester. There are many ways to generate net zero electricity, not least through interconnectors supplying nuclear power from overseas markets, but these do not produce high quality jobs in the North as SMRs will do. Carbon has been offshored for the last decade with the consequential loss of manufacturing – we have an opportunity with SMRs to re-build our manufacturing heritage through the building of low carbon infrastructure.

- b) **Develop our wind capabilities from the North East down to the Humber.** Building on the success of the turbine blade factory in Hull we should now look to make even larger components for the offshore sector, while growing Greenport 2 with initial funding in the Hull and East Yorkshire devolution deal. We can re-allocate under-spends from previous competitive funding rounds for offshore wind infrastructure to fill the current funding gap.
- c) **Invest in a turbine supply chain for the tidal barrage on the Mersey**, which should be a development priority both within the city region and across the North.

Industry

- a) **Continue to make huge strides in carbon capture use and storage (CCUS)** as part of the wider push towards industrial decarbonisation. From the Mersey to Teesside, we have seen the development of successful clusters here in the North of England but are still awaiting the final go ahead for Track 1 deployment. This is whilst the Humber - the UK's largest industrial cluster, with major emitters from Selby through to Immingham - is awaiting key decisions on the deployment of the Track-2 cluster. A decision with accelerated consenting and powers to put pipes in the ground with GB Energy will unlock £15 billion of private investment from Drax, CO2 brought by vessel, Phillips 66 and other businesses working in partnership with Viking alongside a Track 1 extension as an option.

- b) **Expand green hydrogen production, storage and distribution** to ensure the maximum opportunities for industrial decarbonisation are achieved. This should be through specifically targeted support to develop long-term sustainable business models.

Transport

- f) **Turn the North into a centre for the production of Sustainable Aviation Fuel (SAF)**, supporting jobs for those who work in refineries producing jet fuel today, and ensuring that - as production capability develops globally - the UK aviation sector is able to decarbonise at pace. As local authorities review their arrangements for waste disposal, they have the choice to ensure that the North can provide feedstocks for new SAF plants. The Government's commitment to this sector, evidenced by the Sustainable Aviation Fuel Bill announced in the King's Speech, is welcome.
- g) **Deliver a consistent programme of rail electrification.** Extending the TransPennine Route Upgrade to include Hull to Selby is a way to create further scale in the North's electrification portfolio, as well as delivering a key element of the Northern Powerhouse Rail portfolio. Supply chains can then plan for growth and deliver the necessary capacity based on this programme of work.
- h) **We make the UK a leader in building battery and hydrogen trains** through our world-class train factories in Goole and in Newton Aycliffe, alongside their supply chains, making the former a centre for innovation with a facility to bring R&D activity there and the latter delivering the all-electric HS2 fleet.
- i) **Guarantee the supply of hydrogen for commercial vehicles such as buses**, provided by East Bradford Hygen and N-Gen facility
- j) **Increase procurement of electric and hydrogen buses across areas with franchising**, supporting the ability of Northern suppliers and those across the wider UK to produce buses at scale.

Built Environment

The UK has an ageing building stock which represents a substantial change for energy efficiency. There are several measures proposed by the Net Zero Strategy to decarbonise the building stock and heating systems.

- b) **Deliver retrofit of domestic and commercial buildings at pace, and with the necessary funding and skills support**, including a 75% reduction in public buildings emissions by 2037, whilst securing a UK and Northern supply chain for heat pumps, insulation and other technologies. If this is delivered in conjunction with energy

companies, households can pay via their bills (rather than through a traditional loan set up) which increases eligibility and affordability.

Land Use

Land use will need to shift to favour low-carbon agriculture which will require investment in agriculture and forestry sectors. We need to deliver substantial decarbonisation of agriculture, with a tripling of tree planting rates to 30,000 hectares per year by 2035 and the restoration of at least 25,000 hectares of peatlands by 2035.

- b) **Back propositions including the Northern Forest**, which seeks to deliver 50 million extra trees, leveraging private investment through public backing.