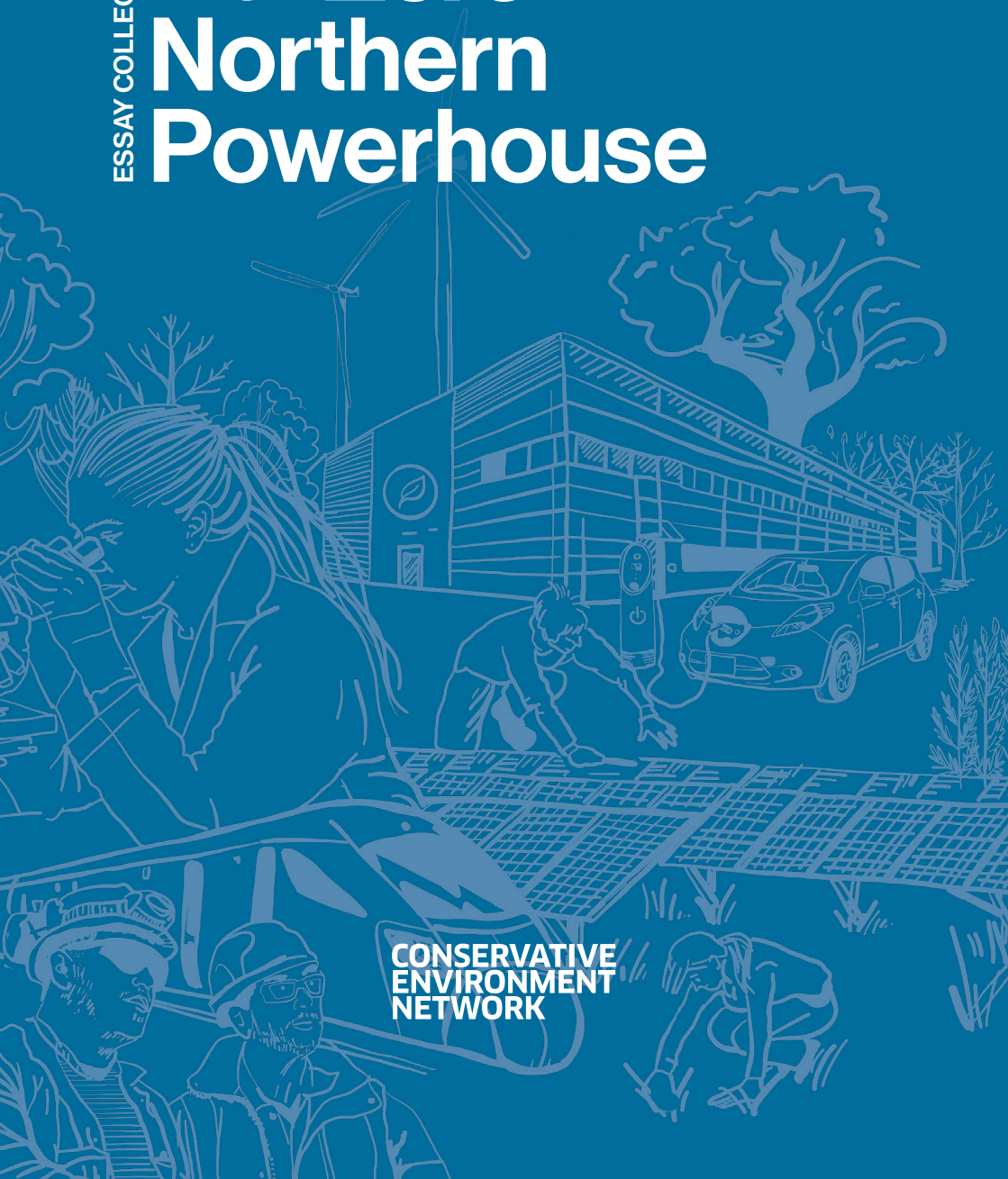
ESSAY COLLECTION

# Net Zero Northern Powerhouse



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NETWORK

The Conservative Environment Network (CEN) is an independent forum, Parliamentary caucus, and grassroots organisation for conservatives who support conservation and decarbonisation.

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# Net Zero Northern Powerhouse

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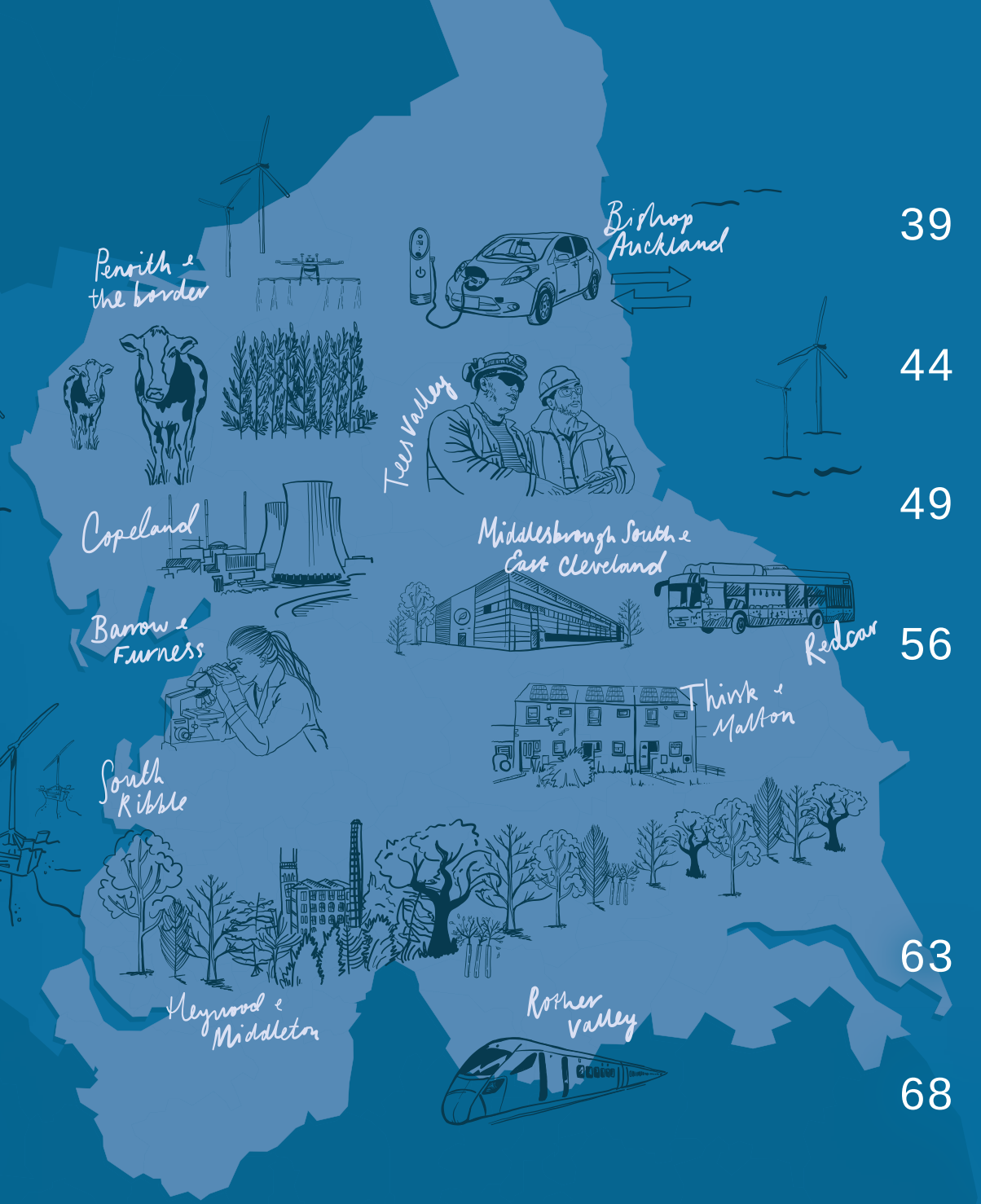



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# Foreword

The North of England was the birthplace of the industrial revolution, powered by coal. It is now set to be the birthplace of the green industrial revolution, powered by clean renewable energy. From o shore wind and hydrogen, to carbon capture and electric vehicles, the region is home to world-leading innovations, conceived in northern minds and built by northern hands.

This essay collection sets out a vision for a Net Zero Northern Powerhouse which is already on its way to being realised thanks to the Government's new 10 point plan. As this government seeks to deliver our 2050 net zero target, we must ensure that we bring everyone with us, and that it bene ts all areas of the country. Our net zero mission is core to the levelling up agenda. It will create new opportunities for all of our communities in the clean industries of the future.

As conservatives we know that industry and business can be our allies in delivering our environmental goals. That's why we have supported them to innovate and decarbonise, through schemes like the £170 million Industrial Decarbonisation challenge, which has supported innovations in carbon capture and hydrogen in Teesside, Merseyside and Humberside. Over the next decade, we will build on that with a £1 billion investment in carbon capture infrastructure in four industrial clusters.

As the Prime Minister has said, ‘we owe it to future generations to build back better’. As part of this mission, we must level up and ensure that investment and opportunity reaches all corners of our United Kingdom. We’ve set out plans to boost connectivity and improve transport links, with additional funding such as the £500 million Restoring Your Railways Fund and £5 billion for cycling, walking and buses.

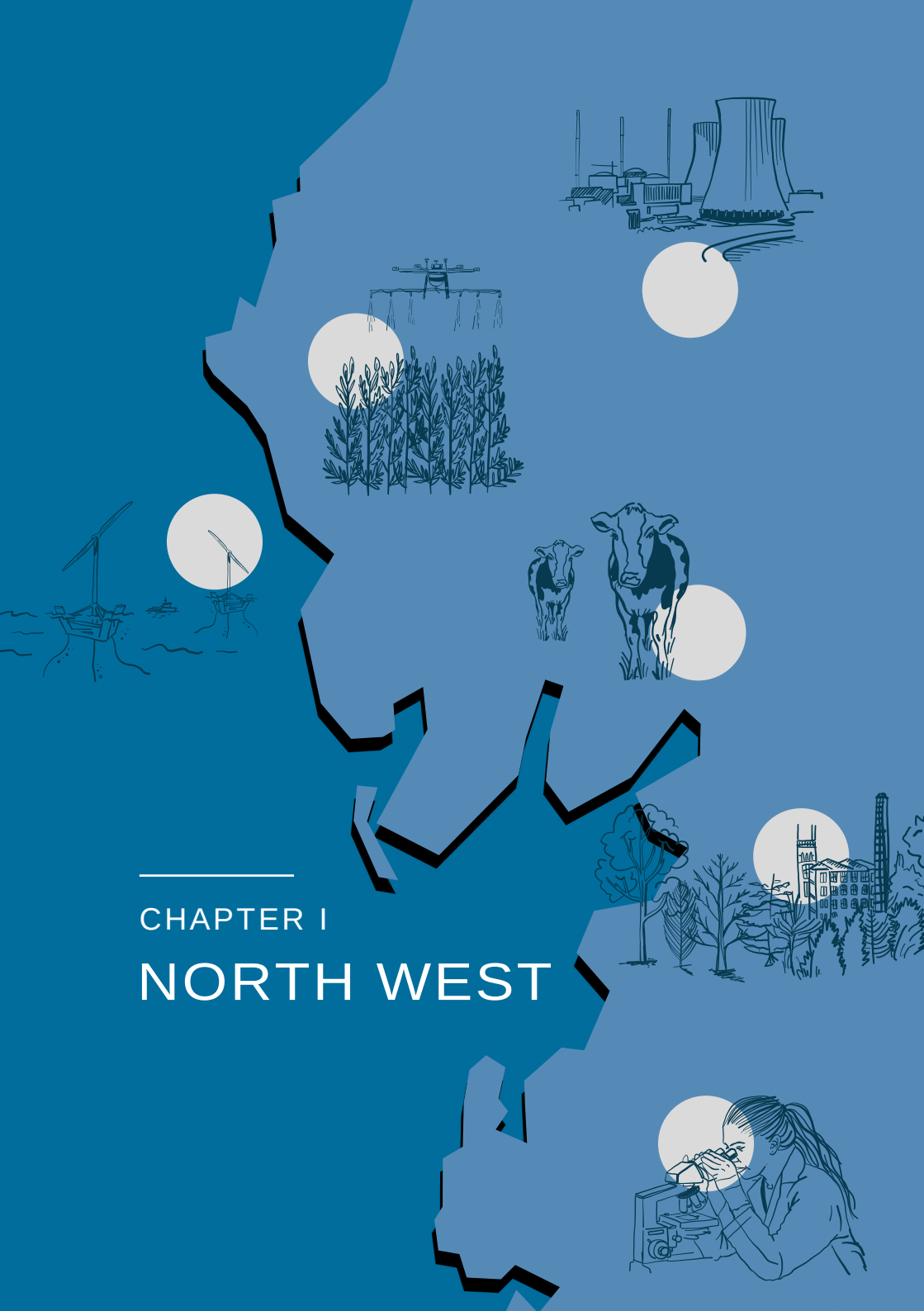
We are committed to ensuring the bene ts of net zero are felt locally. We want to ensure all homes are warm, all drivers have access to a public electric chargepoint, and all streets are lined with trees. That’s why we will also invest in giving people the skills they need to deliver these improvements in their communities.

We have an exciting prize before us. A net zero Britain which leads the world in tackling climate change. A thriving, clean economy, supporting skilled and secure employment across the UK and exporting its expertise and technologies around the world. And greener, more prosperous communities, where homes are warmer and cheaper to run, and where people have access to beautiful green spaces.

The Net Zero Northern Powerhouse will be the catalyst for the green industrial revolution - and this government is committed to giving it the tools to succeed.

Luke Hall MP

Minister of State for Regional Growth
and Local Government



CHAPTER I

# NORTH WEST

Dr Neil Hudson MP

# Agritech and the future of climate-friendly farming

Dr Neil Hudson was elected MP for Penrith and The Border in 2019 and sits on the Commons Environment, Food and Rural A airs Select Committee. Neil is a quali ed veterinary surgeon with specialist clinical and research quali cations. He trained at Cambridge University's Veterinary School. Neil has worked in veterinary practice in the UK and Australia and in the Veterinary Higher Education sector. Neil is a Fellow of the Royal College of Veterinary Surgeons and a Principal Fellow of the Higher Education Academy.

In 2001, Neil spent a period as a Veterinary Inspector during the Foot and Mouth Crisis. Neil is the  rst vet in the Commons since 1884 and brings extensive professional experience to help inform policy in areas such as education, rural a airs, animal welfare, science and health.

The passage of the Agriculture Act through Parliament into law clearly demonstrates this Government's commitment to reaching net zero greenhouse gas emissions by 2050. This Act will provide the necessary legislative framework to achieve this ambitious goal in our farming sector. An important tenet of the Agriculture Act is the introduction of Environmental Land Management (ELM) schemes which, through the concept of public monies for public goods, will support farmers to adopt innovative agritech and farming practices that bene t both agricultural productivity and the environment.

The new ELM schemes act as a useful and exciting vehicle to provide funding to those who manage land and water to deliver public goods. The overwhelming majority of participants in ELM will likely be farmers.

It is proposed that tier one of the scheme will be aimed speci cally at farmers and will pay for actions that the majority of farmers can take across their land, such as nutrient, pest and soil management.

Crucially, the Government recognises that environmental bene ts can be provided across farms, rural properties and estates, woodland, and other open or green spaces. Many landholdings and farms will embrace not only land that is farmed, but also wetlands and woodlands. The ELM schemes will enable farmers to receive revenue from unproductive pieces of land by creating new habitats, which will support pollinators and store excess rainwater in order to improve agricultural productivity on neighbouring farmland.

To make the ELM schemes a success there needs to be signi cant buy-in from a wide range of farmers and other land managers. The more uptake, the better the opportunity to maximise the environmental bene ts of the scheme. The Tenant Farmers' Association and the National Farmers' Union have been consulted closely during this process and it is essential that their voices, along with other stakeholders, are heard during the changeover from the old payment system, to ensure payments are as smooth as possible and that there is no 'cli edge'.

Tiers two and three of the ELM schemes could fund projects which include ood mitigation. Sadly, Cumbria is uniquely vulnerable to changes in weather including extreme ooding and storms. Measures such as tree planting can help with ood mitigation, but this must be done sensibly and consultatively so as to ensure that it is the 'right tree in the right area'. These are all examples of large collaborative projects which would allow us to improve the health of our environment, as set out in the 25 Year Environment Plan, while helping us to deliver our commitment to achieve net zero emissions by 2050.

The National Farmers' Union is also committed to helping the country reach this goal by aiming for net zero greenhouse gas emissions across all agricultural production by 2040. It plans on achieving this through improving farming's productive e ciency, changing land use to capture more carbon and boosting renewable energy.

In the progressive move to innovate, new techniques in agriculture that could be adopted include GPS-targeted input application, agricultural drones, hydroponics and livestock management apps. These new innovative techniques need not necessarily radically change the way in which hard-working farmers already operate; they are suggestions that could help them with time-management and e ciency. In theory, all of these technologies could potentially be funded through the ELM scheme, or the productivity capital grants scheme which is also being established by the Agriculture Act.

It is vital that high quality agricultural education is sustained in Cumbria and the wider United Kingdom. Newton Rigg College in my constituency of Penrith and the Border is one such institution, where a strategic review is currently being carried out by the Further Education Commissioner. I have triggered this Government-led review in order to try and save the college, as the current owners have indicated they are withdrawing from running it. Colleges such as Newton Rigg are not only integral to their local and regional communities, but in this case the college is vital for the national economy. Levelling up northern communities was a key part of the Government's 2019 manifesto and the continued success of Newton Rigg is an example of what can be achieved.

Further to making sure education is a priority in our local area, there should be a focus on more local and sustainable food supply chains. A key issue which has been thrown into sharp relief during the Covid-19 pandemic is food security.

We can draw some good out of this dreadful crisis, namely by harnessing the awareness that the British public now have and the value they place on the food supply chain. We all now value the key workers who keep food on our tables, be they farmers, transport workers, vets, meat processors or supermarket workers, to name but a few.

The Commons' Environment, Food and Rural A airs Select Committee, on which I am privileged to sit, has recently  nished an inquiry into Covid-19 and food supply which has highlighted the importance of producing good, local, healthy, sustainably-produced food with a secure and responsive supply chain. This will also help reduce transport emissions too. Encouraging shops and supermarkets to have central displays of local, in-season produce would be a positive way forward. There are now powers in the Agriculture Act for ministers to give  nancial assistance for 'ancillary services' such as these. Furthermore, the Government's 'Farming for the Future' policy paper, which was produced in February 2020, outlines that the Government is developing a new research and development package to encourage interest in new technologies and innovations, which could help deliver farmer-led solutions to problems around food sustainability.

According to government statistics, agritech is a thriving industry in the UK, employing over half a million people. Investment in these innovative technologies could create more high-skilled jobs, as well as make the farming industry itself more e cient and pro table, supporting the sector which underpins much of the rural economy. Recent funding announcements for Cumbria have been very welcome. For example, the Cumbria Local Enterprise Partnership (CLEP) is set to receive £10.5 million to fund two projects that will help support its economic recovery from the Covid-19 pandemic. One such project is a Vertical Farming Centre of Excellence at Lillyhall, Allerdale, which will receive £5.5 million. The centre will create one of the largest integrated vertical farming operations in the UK.

Vertical farming is a method by which plants and produce are grown by stacking the plants. This is achieved by using growing shelves suspended on a wall or fence, which uses much less space than growing the plants on the ground, thereby maximising the available land. The Centre of Excellence will be a carbon neutral facility and it will be a net generator of power through technologies such as wind, solar and green energy from waste. The site will provide international research and teaching facilities, as well as providing educational programmes for schools on nutrition and health, linking into public health campaigns along with visitor facilities for the public. This will complement Cumbria's existing exceptional food production in meat and dairy, create 360 new jobs, unlock £48.8 million of private sector investment and create a 70,000m² carbon neutral facility. Furthermore, the Zero Carbon Cumbria Partnership will fund a ve-year programme of action aiming to make Cumbria the rst carbon-neutral county in the UK, in a way that bene ts communities and is led by them.

'Public goods' that are recognised in the Agriculture Act also include animal health and welfare. As an MP who is also a veterinary surgeon, I am passionate about the UK promoting and upholding high welfare standards for animals. In the UK, we have fantastic farmers and high animal welfare standards, which are part of our values as a country. We can be a beacon to the rest of the world in this regard.

High standards of animal welfare, speci cally disease control, may also be able to play a role in reducing carbon emissions into the atmosphere. One research study from 2013 has highlighted the potential bene ts of endemic disease control in reducing greenhouse gas emissions. The authors make a strong case for endemic disease control. It is important to point out that farming does produce greenhouse gas emissions; we must face that fact and not blame farmers for this reality.

Ruminants will continue to emit greenhouse gases but it is possible that the use of certain husbandry techniques can e ectively reduce the negative impact on the environment.

In this way, rewarding the farmers for high animal welfare with environmental bene ts is a winner on many fronts. It is also important to remember the important role farmers play in looking after the environment as ‘stewards of the countryside’, and to bear in mind that green grass and pastures, both lowland and upland, also act as carbon stores.

So, in partnership with farmers and landowners, we can move towards net zero in a consensual manner. If we can achieve tangible environmental gains such as  ood mitigation and improved air quality, whilst producing good healthy locally-derived food, then we can achieve our goals together.

Trudy Harrison MP

# Backing the nuclear industry

Trudy Harrison was elected to become Copeland's  rst female and  rst Conservative MP in February 2017. Upon leaving Wyndham Comprehensive, Trudy started her career at the Sella eld nuclear site, working in a variety of roles. The decline of her village life motivated Trudy's interest in local politics and prior to her election, she worked on sustainable community projects.

Her parliamentary roles have included being a member of the Education Select Committee, Co-Chair of the Apprenticeship Delivery Board, member of the All-Party Parliamentary Group (APPG) for Nuclear Energy, Autism and the Fourth Industrial Revolution. Trudy has also acted as Private Parliamentary Secretary to the Ministry of Defence, Department for Transport, Department for Education and most recently to the Prime Minister.

In October 1956, a signi cant moment took place in Cumbria. A crowd of several thousand people, including scientists and statesmen from almost 40 di erent countries, gathered at Calder Hall to witness the Queen open the UK's  rst civil nuclear power station.

That 'epoch  de ning moment' as it was described marked the start of a legacy for the North West – the region has since become known for its nuclear expertise, playing host to the site at Sella eld, the National Nuclear Laboratory and a number of large businesses in the industry.

However, nearly sixty  ve years later, we have reached the point where we need another of those moments. The nuclear industry has been in decline in the UK for a number of years. But Hinkley Point C has presented us with the chance to reverse this decline, revitalising the industry and creating a clean energy hub here in the north west.

And the Government's recent 10 point plan commits the UK to further nuclear power stations.

As this essay sets out, backing new nuclear doesn't just mean providing the UK with clean energy; it means accelerating the UK's journey to net zero by 2050; it means the creation of thousands of jobs from Cumbria to Cornwall; it means stepping up to become a global leader with huge export opportunities; and it means taking control of our own energy supply as we leave the EU at the end of this year.

For all this to happen, however, we need to face the facts. As things stand in the UK, there are eight operating nuclear power stations providing the UK with approximately 20% of its energy supply. By the end of 2030, all but one of these will have been retired. There is only one new nuclear power station – Hinkley Point C – currently under construction, with another – Sizewell C – waiting in the wings. The Cumbrian nuclear industry, and indeed the UK's, will disappear before our eyes if we don't build on the commitments in the 10 point plan and begin construction of new nuclear plants.

We have the opportunity, as a Conservative Party elected with an overwhelming majority, to kickstart a new nuclear revolution. We have spoken about 'building back better' as we recover from the pandemic. This is the perfect opportunity to do so.

In June 2019, I was proud to be part of a Party that became the  rst major economy in the world to commit to net zero by 2050. Yet for the UK to reach this target, one report has highlighted that 10GW of nuclear is needed. Hinkley Point C will provide 3.2GW. That means we need at least three more new nuclear power stations to get there.

If we are realistic about getting to net zero by 2050, nuclear is not an option. According to many technology pathways for net zero, including one modelled by the Climate Change Committee, it is a necessity.

Here in the North West, we play host to many other renewable technologies – a thriving o shore wind sector, onshore wind, biomass, and solar. Yet, while extraordinary progress has been made with these technologies, they on their own are currently not likely to get the UK to net zero. Indeed, we continue to rely on imported gas and coal to ensure our energy needs are met, although this is declining. Nuclear therefore has to play a part. It is not dependent on the wind blowing or the sun shining and will provide the  rm clean power that the country requires.

While complementing existing technologies, it will also enable the development of new technology. Heat generated by gigawatt nuclear power stations could be used to produce hydrogen. The skills established by those working on these stations could be transferred to the creation of small and advanced modular nuclear reactors. It could be used to power direct air capture, a negative emissions technology vital for o setting residual emissions from hard to decarbonise sectors. The development of nuclear fusion could also be quickened. This is why the new funding as part of the 10 point plan to help develop advanced and small modular nuclear reactors is so crucial.

New nuclear doesn't just mean nuclear therefore. It could mean establishing a clean energy hub across the North West, further helping our journey to net zero.

Yet to get to this point we need to prioritise what we can do now – gigawatt nuclear. If we do not, there will be none of this new technology. Hinkley Point C has begun this process, Sizewell C would continue it and the possibilities from there are then endless.

Alongside propelling the UK forward on its journey to net zero, new nuclear will also create thousands of highly skilled, long-term, secure

jobs here in the North West, where we could leverage the expertise and skills the region possesses.

Hinkley Point C has already created over 10,000 job opportunities, which will rise to 25,000 during the construction phase. Sizewell C will do the same. This includes thousands here in the North West where both projects combined will ultimately spend over £3.5 billion.

However, while Hinkley Point C has revitalised our nuclear industry, without another project to turn its attention to, this industry will once again wither away. Instead we should imagine what the skills of these many thousands of people could help the UK achieve – they could be the ones to kickstart not just this new nuclear revitalisation but the development of future technology. But right now the industry stands on a cli edge.

That is why recently at the Trades Union Congress, an emergency motion was brought raising concerns over the future of the UK nuclear fuels industry and in particular the Spring elds Fuels site in Lancashire. This site has the capability to produce all the fuel needed for our nuclear power stations here in the UK – but without backing for new nuclear these 4,000 Spring elds jobs could go.

With thousands of job losses happening across the country as a result of the pandemic, backing an industry that will create thousands seems a no-brainer.

For villages and towns that have often felt left behind here in the North West, the revitalisation of the nuclear industry is a tantalising prospect.

Indeed, acting on behalf of left behind communities was why I got into politics.

Living in the small Cumbrian town of Bootle, I was witness to the decline of village life; it is why just before being elected as Copeland's Member of Parliament in 2017, I worked on sustainable community projects, aiming to breathe new life into Bootle for future generations.

The results of the 2019 General Election demonstrated how we need to deliver for such communities. Many of them placed their trust in us and we are expected to deliver. Indeed, one think tank suggested the election hinged on how we appealed to the 'Workington man' – little would they have known that Workington was the  rst town in the whole of the UK to be the recipients of nuclear energy in 1956.

What better way is there for us to deliver than to back new nuclear and facilitate the creation of a clean energy hub here in the North West, bene ting communities such as Bootle and Workington. The construction of Hinkley Point C provides a perfect example; there has already been over £119 million of community investment around the site, transforming local infrastructure and connectivity while facilitating economic development in areas such as tourism, leisure and health.

With the right backing, the same could happen here and on a much larger scale.

With the development of expertise and technology, we can also turn our attention outwards. As the Party in power, one of our priorities is to create a global Britain.

Many countries are in the early stages of exploring nuclear. If we were to drive the UK industry forward in the next decade, as the 10 point plan commits us to doing, we will be able to export these skills and technologies around the world. This is especially important as we negotiate new relationships with the EU and countries across the globe, forming new Free Trade Agreements and alliances.

And as we leave the EU, nuclear will also allow us to take control of our own domestic energy supply. We will no longer be reliant on imports from overseas which often come from dirty energy sources. Instead, with a north west clean energy hub, we can look forward to a future in which the UK is in complete control, pioneering the development of new nuclear and clean technology.

When I left college in the early 1990s, I took a job on the Sella eld nuclear site where I worked for years in a variety of roles. Yet for those leaving college now, such opportunities may not be possible.

That is why it is vital to give nuclear the green light. It could also lead to the creation of a clean energy hub across the north west, propelling us forward on a clean industrial revolution to net zero, creating thousands of jobs and putting pride back into our communities.

We were elected on a manifesto promising action. When it comes to nuclear power, we have an opportunity to create another ‘epoch de ning moment’. It is now or never – let’s ensure it is now.

Simon Fell MP

# Net zero skills and the case for tidal barrages

Simon Fell was elected as the MP for Barrow and Furness in December 2019. He is currently a member of the Home A airs Select Committee. Prior to becoming an MP, Simon was Chair of the Barrow and District Credit Union, and ran a communications business before becoming director of Cifas, an anti-fraud organisation. Locally, Simon has been campaigning for Cumbria to be recognised as the heartland of Britain's green industrial revolution, promoting its o shore wind, hydrogen, and nuclear infrastructure and also the potential for tidal energy o  its coast.

Cumbria has a rich industrial history with extensive rail links, several ports, and nuclear facilities which have led the country's nuclear industry. At its heart is the nuclear facility at Sella eld and the BAE facility in Barrow. Cumbria's coast also hosts one of the largest o shore wind farms in the world.

However, Cumbria feels left behind. Like much of the industrial north, it su ers from poor transport and connectivity. An ageing and declining population, from an already small base, leads to signi cant challenges in delivering many public services e ectively, from schools to healthcare and law enforcement. While local population numbers haven't kept up with the rest of the country, neither have infrastructure improvements or opportunities for local young people.

Travel to work times in Cumbria are relatively good, but travel to work areas are signi cantly restricted. This reduces the attractiveness of Cumbria as both a place to live and work, and also makes it much more di cult to attract the industrial, retail and leisure o erings required to change the population and demographic trajectory. Similarly, we don't have enough educational institutions to attract young people to the area to learn and create a pipeline of talent, which would lead businesses to base themselves here too.

Despite that, West Cumbrians have used the term 'Britain's Energy Coast' for the last two decades. Sella eld is host to nuclear power. Robin Rigg wind farm delivers electricity on to land at Workington. And o the coast of Barrow lies around 156km $^2$ of o shore wind farms, vying with Hull as the largest o shore wind farm in the world. The fourth o shore wind auction set for next year o ers the opportunity for signi cant expansion of both sites. Barrow also hosts a gas terminus and battery storage.

West Cumbria now has the opportunity to build, operate and host a further green energy source, with nascent plans for a total of three tidal barrages running from Heysham in Lancashire to Barrow, across the Duddon Estuary, and from north of Maryport across the Solway Firth.

The combination of three Cumbrian barrages would provide 10GW of installed low-carbon capacity and generate an estimated 19.8TWh (6.6% of home electricity usage). This not only supports the government's e orts towards net zero by 2050, but also brings diversi cation and resilience to our energy network. The three Cumbrian proposals alone could be enough to remove our reliance on electricity imports and move us to being a net exporter.

If we're prepared to look past solely energy production, the barrages have the potential to also bring with them signi cant infrastructure bene ts. For comparatively little additional cost, roads, railways and cycleways can be constructed on top of the barrages which would be transformational for Cumbria.

The initial proposal across Morecambe Bay would halve the journey time and the road miles to Barrow from the M6, delivering signi cant productivity bene ts and removing some of the barriers to growth in West Cumbria. This route is currently served by the A590 – a single and dual carriageway road which serves residents and heavy industry. In poor weather it  oods and Furness is cut o , and road tra c accidents often shut this important artery for hours at a time.

This scheme - and ones like it - will help the UK tackle climate change and reach net zero, drive innovation, research and development in energy in Cumbria, and level up a neglected part of the North. More importantly, it will put meat on the bones of what levelling up means - connecting communities in a meaningful way, creating jobs and building on skills clusters, and strengthening the social infrastructure that we so badly need in our left behind towns.

We have the natural resources locally in our tides and wind that will be vital in a net zero economy, and we should ensure that Cumbrians bene t by supporting the creation of green jobs locally. If we want to reach net zero by 2050, we need to start investing in our workers, both present and future, to ensure they start learning the skills required now.

The Government has shown its determination to help people of all academic backgrounds compete in the jobs market, with its Lifetime Skills Guarantee providing free courses for adults without A-levels or equivalent quali cations.

We should be more strategic in identifying skills gaps and trying to address them through schemes like this, providing longer-term job security where we know opportunities will exist. The Climate Change Committee has highlighted that a “low-carbon skills gap” remains in many sectors which could hinder decarbonisation. For example, only 5% of mechanics know how to  x an electric vehicle.

People who already have technical quali cations need routes to reskilling, too. This is how we ensure that the bene ts of a net zero economy reach all corners of the country, and leave no one behind. This could include reforming training standards to make it easier to transition between industries to improve skills range and employability, so a person could more easily step o  an o shore oil rig platform onto an o shore wind platform should they so choose.

In 2019, according to the International Renewable Energy Agency (IRENA), 63% of global renewables jobs were based in Asia. As this sector grows rapidly, we must ensure we grasp the opportunity to manufacture, assemble and innovate these technologies here in the UK. The North of England is home to the world’s largest  o shore wind sector, and should be a natural home for most of those jobs too. IRENA’s research also shows that women make up just 12% of the UK’s renewable energy workforce, lower than the global average at 33%. The o shore wind sector deal commits the industry to increase the number of women into the UK supply chain. The government can support this, as well as its wider recruitment and training policies, by tailoring its recovery employment schemes such as the Kickstart Scheme or the Lifetime Skills Guarantee towards areas where the long-term jobs are.

But it’s not just today’s adults who will be spearheading our transition to a net zero economy. Children who are in school today will be part of this e ort when they grow up, and they are arguably the most engaged generation when it comes to climate change.

Embracing this enthusiasm for change by allowing schools to become net zero specialist academies and promoting the Green Flag Award will help to foster the next generation of highly skilled, environmentally minded workers.

Successive Conservative governments have aspired to create greater parity between technical and academic skills, which are equally valuable in di erent occupations. One of the most recent initiatives in this area, the creation of Institutes of Technology, o er another opportunity to marry net zero with skills. Indeed many jobs in burgeoning net zero industries are in STEM, and so the next round of funding from the Department for Education (DfE) for Institutes of Technology should include one, if not more, Net Zero Institutes. There are many employers in the North, from Nissan to the new National Hydrogen Transport Centre, that would make excellent partners for such a venture.

Furthermore, we should ensure that our apprentices have all of the latest training to  t right into a net zero economy, with courses to make them pro cient in electric vehicle mechanics, chargepoint installation and heat pump retro tting. A comprehensive Net Zero Skills Review by the DfE could explore all of these avenues in more detail, and ensure we embrace all opportunities that our net zero target has to o er. The new Green Jobs Taskforce is an important step in the right direction, and with this new coordination between BEIS and DfE ministers, alongside skills sector representatives, the government can make real progress towards supporting the learning pathways needed for the green jobs of the future.

The Prime Minister's 10 point plan for a green industrial revolution is certainly a game-changer. If we are serious about levelling up and meeting our net zero target, then we also need to look seriously at mixes of infrastructure and investments in the skills of tomorrow, particularly in the North of England.

Katherine Fletcher MP

# Unlocking the next generation of clean energy innovators

Katherine Fletcher was elected as the MP for South Ribble in 2019 and is the Prime Minister's Trade Envoy to Mozambique. Before becoming an MP Katherine worked in a variety of jobs including infrastructure, construction, IT consultancy and she also ran her own small manufacturing business in the North West, exporting around the world. For a short period Katherine helped with the setup of the Northern Powerhouse Partnership. She is a quali ed Field Guide (Safari Ranger), who has lived and worked in Mpumalanga and Limpopo in South Africa and Mozambique.

The North of England has a key role to play in clean technology. Yes yes I hear you cry - we have heard this before, but let me make the case plainly. What do we have in abundance? We are blessed with plenty of hills, wind, rain and water, as well as geographical centrality in the UK, meaning we are  ve hours to both Aberdeen and Exeter. We also have miles of coastline, strong tides and plenty of space for industry to grow and develop, with room to maneuver. Alongside all that we have a history of energy generation for centuries, and thus many skilled engineers, mechanics and innovators. With that in mind, what do the following proposals for clean tech innovation need? I will let you spot the correlation.

The North of England's proud history is rooted in technological and industrial innovation.

Out of the collieries across the Lancashire Coal eld came the fuel which powered humanity into modernity. From our wet and windy hills came the water that lled our canals, and drove the water wheels in our earliest factories. It was the North which was home to much of the pioneering fossil fuel-based technology which instigated great leaps in progress to tackle the many threats to human life that we had lived with for millenia, from vaccinating against several deadly diseases to warmer, safer homes. It was also the North that hosted Britain's rst nuclear energy generation. But with much of that progress has come anthropogenic climate change: our greatest long-term challenge.

Now, the North is leading in low-carbon technologies including emerging forms of renewable energy. The Government should play a key role in supporting those innovative northern enterprises to ourish, and in exporting that expertise to the rest of the world.

Renewable energy has been one of the greatest success stories of the past decade under Conservative leadership. Wind has shot up from 3% of the electricity generation mix in 2010 to 20% nine years later. In place of nite and carbon-intensive energy sources has come the rise of clean renewable technologies, particularly wind and solar.

These technologies have radically changed the game of electricity production, cutting the power sector's emissions to 64% below their 1990 levels. They have also signi cantly cut the price of new electricity generation as the costs have come crashing down with each Contracts for Di erence (CfD) auction. CfDs incentivise investment into renewables by protecting developers from the volatile wholesale prices of electricity, which reduces their cost of capital and so leads to cheaper energy for consumers. By limiting the contracts available, projects had to compete to bid the lowest price, incentivising innovation to drive down costs. This mechanism has led to new wind and solar power projects which cost less than electricity generated from new gas power stations.

This all means fewer carbon emissions, but also more money in people's pockets, as lower wholesale electricity costs begin to be re ected in household bills. What are termed 'green levies' make up just over a tenth of our energy bills in total, but the funds raised from these are invested in energy e ciency measures (reducing energy wasted to ultimately reduce bills) and early-stage support for renewable technologies. Cheap, clean electricity will also be vital for the many other sectors of the economy that need to be electri ed to reach net zero, such as transport.

Furthermore, the low-carbon economy has been creating thousands of jobs right across the country, growing at two to three times the rate of the mainstream economy before the pandemic, adding more than 460,000 jobs. This is not to forget the deep well of skills and experience in the net zero nuclear industry. From Ynys Mon to the tip of Cumbria, many are already employed in the North West nuclear arc.

But renewable energy technologies need to continue evolving and improving. In 2018, one of the economic advantages cited by the Climate Change Committee of committing to net zero earlier than other countries, as we did, was that we would gain a  rst mover advantage in new clean energy markets. If we act now to maintain this advantage as more and more countries set their net zero targets, we could be exporting those new technologies from supply chains based in the North of England. There are three key renewable technologies, where we have pre-existing strengths, which the government could support to turbocharge clean energy innovation as part of a green recovery.

Firstly, wind power. The Prime Minister recently set out his vision for the UK to become the 'Saudi Arabia of wind power', with £160 million of investment for ports and factories across the country to manufacture the next generation of wind turbines, forming the  rst point of his 10 point plan for a green industrial revolution.

In order to maximise the opportunity from our - ahem - breezy weather, the wind turbines of tomorrow need to be bigger, more resilient, and able to  oat so we can capture energy whilst out in deeper seas. The North of England is home to several wind farms already, including Walney Extension o  the Cumbrian coast and Hornsea One, which will be the largest in the world, o  the Yorkshire coast. We are already truly global leaders in this technology, but we must continue to innovate and invest in our supply chains to retain that title and reap the economic bene ts.

Secondly, marine energy. With the second highest tidal range in the world, the UK is currently a world leader in marine technologies, exporting our marine expertise to 25 countries. According to the trade association RenewableUK, the UK's wave and tidal stream industries could bring economic bene ts worth £5.4 billion by 2040 and support 12,000 jobs. Most of these would be in coastal areas which are also central to the government's vision of 'levelling up'.

Thirdly, geothermal. Though there are no volcanoes in the UK, it has recently been assessed that there are over 2 million gigawatt hours of low carbon energy stored in mine workings across the UK that could provide low-carbon heat for buildings. A £9.4 million geothermal project in Caerau, Wales, will cut bills by £100 per year for up to 150 local homes thanks to their old coal pit providing cheap, low-carbon heat, with ambitions to eventually supply 1,000 homes in Wales'  fth most deprived ward. We should aim to replicate this successful project in former coal  elds across the North of England. By supporting this emerging technology, we could establish a whole new geothermal energy industry in the UK. I'm sure the wonderful circularity of this is not lost on the reader. Those holes in the ground dug by brave, hard-working miners, providing coal for industrial development and domestic heating, could now e ciently heat the homes of their descendants.

How do we get there? In regard to the less established technologies, one option could be to reform the CfD auctions to create an additional small pot speci cally for new technologies to enable small-scale deployment in a fashion that also encourages competition and innovation. At present, geothermal, wave, and tidal stream projects are still emerging technologies, and so they struggle to compete with cheaper, more established renewables like wind and solar. The cost of wind declined from £120 per megawatt hour to £39.65 per megawatt hour in just four years thanks to the CfD. Now we need to give these newer technologies the same opportunity.

This is important because we will need a range of technologies to get to net zero. Innovation in energy storage will also be crucial for net zero as we will need to store excess energy when it is particularly windy and sunny for later use. Baseload utilising hydroelectric anyone? We have lots of hills containing lots of reservoirs too. With the global shift towards electric vehicles, battery technology will be certainly sought after internationally, producing a space in the market for new designs and new more e cient ways of storing electricity. With the right innovations and development, electric car batteries could also provide  exible capacity to the grid and reduce households' bills, by charging up at o -peak times and even selling electricity back to the grid when demand is high. The provision of smart meters and the enabling of half hourly settlement of electricity bills would encourage the uptake of these  exible technologies and maximise their bene ts, by enabling prices to more closely re ect power availability on the grid.

Another solution could be a new Innovative Power Purchasing Agreement (IPPA), which could provide a market mechanism for developing local renewable energy projects, such as small-scale tidal and wave devices in UK waters.

Under an IPPA, a corporation would agree to pay above the market price – at a level set by the Government – for the more expensive energy generated by a wave and tidal stream project. Those additional costs would then be reclaimable by the corporate as a tax rebate.

This policy supports companies who need early-stage investment in smaller-scale projects to prove that their technologies can work, and thus drive it down the cost curve to commercial competitiveness. Since these agreements are often directly between businesses and the nearby generators, they would also boost local supply chains. Investing in the early market and supporting innovation are vital to establish these new domestic industries.

The Northern Powerhouse could see a next-generation wind turbine designed, its materials manufactured, and nally assembled in the North using northern steel, to be erected in the North or Irish Sea, transported down south, or even exported to other countries. The local workforce would, as usual, take pride in their highly skilled work, and the bene ts would be felt in local communities, thanks to the ingenuity of northern businesses.

We should also further boost research and development spending, to build on the excellent recent announcement of a £1 billion net zero innovation fund. Consolidating our leadership position on science is the way to keep our levelling up, net zero, and global Britain agendas moving forward. That is why I also welcome the £300 million World Class Labs funding scheme to upgrade scienti c and research labs across the country. The Prime Minister rightly said that “though we are no longer a military superpower we can be a science superpower”, as he set a target to increase total R&D expenditure to 2.4% of GDP by 2027.

I am happy that the Science and Technology select committee, of which I am a member, is currently conducting an inquiry into the UK's plan to set up a British equivalent of the American government's 'Defence Advanced Research Projects Agency' (DARPA) to better focus public R&D spending on critical strategic priorities. Historically most renewable energy R&D spending has come from industry, rather than the state, so it is vital that a signi cant portion of this spending uplift is targeted on clean energy innovation, encouraging more renewables companies to register their intellectual property here in the UK, helping UK businesses stay at the forefront of innovation, and supporting our net zero target.

The Net Zero Northern Powerhouse can both enhance our communities and help the country reach its climate goals. We have the industrial and technological know-how to make a success of ambitious projects in every sector that needs to be decarbonised. Supporting research and innovation in the low-carbon economy to deliver the next generation of clean technologies is the  rst step to harnessing the scienti c prowess we have in this country. The UK Government has  rmly backed a clean and resilient economic recovery as part of a green industrial revolution. Let's get on with it now.

Chris Clarkson MP

# The Northern Forest – the legacy we have begun to build

Chris Clarkson was elected to be the MP for Heywood and Middleton in December 2019. He is a member of the Science and Technology Select Committee and the Tory Reform Group. Prior to becoming an MP, Chris worked as a corporate development manager and consultant, and was also a Salford City Councillor. Chris successfully campaigned to ensure that the streets of new developments are lined with trees, which the government committed to following the introduction of his Ten Minute Rule Bill on the topic.

In July I had the pleasure of bringing forward a Ten Minute Rule Bill to the House of Commons that would require building developers to ensure that the streets of major new developments are lined with trees. As Franklin D. Roosevelt put it: “Forests are the ‘lungs’ of our land, purifying the air and giving fresh strength to our people.”

I now  nd myself in the excellent position of talking further about trees and the Northern Forest, which encompasses our community forests in the North: the Mersey Forest, White Rose Forest, HEYwoods and our very own City of Trees here in Greater Manchester.

The creation of the Northern Forest has never been more necessary in order to secure a future for generations to come.

It's essential that policies and practices are in place to protect trees and woods, to safeguard and bu er ancient woodland and to stimulate new planting.

Back in November 2018 the then-Forestry Minister David Rutley planted the  rst government funded tree of the Northern Forest down the road from my constituency in Radcli e, where they began the planting of 200 saplings as part of the government's £5.7 million investment.

The Woodland Trust and the partnership behind the forest estimate that it will cost £500 million to develop the Northern Forest, by planting 50 million trees over 25 years. This will treble the current planting rates across the area. As an area, we have less than 8% tree coverage, one of the lowest in the country, so it's ideal territory for the new forest. As a major infrastructure project, the prediction is that it will generate around £2.5 billion worth of social, economic and environmental bene ts.

Put simply, trees are good for us in many ways. The presence of trees and other greenery in our environment has a discernible e ect on the physical and mental wellbeing of all of us, being inextricably linked to cleaner air and increased physical exercise. Trees also play a central role in nature's recovery and in addressing climate change.

The planting of trees is also crucial in our  ght against climate change, as trees store carbon and could therefore make a contribution to the Government's aim of eradicating the UK's net greenhouse gas emissions by 2050.

That's why the Prime Minister announced recently that he wants to plant 30,000 hectares of trees a year by 2025 - the ninth point in his 10 point plan for a green industrial revolution.

The plan seeks to accelerate the vital work needed to restore our natural ecosystems with the establishment of 10 long-term landscape recovery projects over the next four years. This will help the government work towards its ambitious target to restore 30% of the UK to nature by 2030.

Reaching net zero will also require the construction of new low-carbon infrastructure and the development of innovative low-carbon industries. Northern England already hosts the majority of our o shore wind sector, but other projects supporting our net zero goal can also help levelling up. We need to work creatively with our private sector partners to level up northern communities by promoting new industries and infrastructure projects, including the creation of new forests. Delivering green Covid-19 recovery packages will also play a vital role in boosting economic growth in our region and stopping climate change.

One of the key pillars of the net zero vision for the future is the new Environmental Land Management (ELM) scheme - the cornerstone of our post-Brexit land management policy which will be delivered by those who already know best how to create and maintain our landscapes: our farmers and land managers.

The Government is committed to co-designing the ELM scheme with farmers, to create something that allows farm businesses to thrive alongside providing environmental improvements. Policy discussions were paused due to the Covid-19 pandemic, but the latest consultation ran into the summer of this year.

The policy will be formed of three levels: tier one, which farmers can really engage with, focuses on encouraging environmentally sustainable farming, agroforestry and related actions to create environmental bene ts;

tier two will support land managers in the delivery of locally targeted environmental outcomes which may need to utilise spatial targeting and local planning; and tier three could be focused on delivering landscape-scale land-use change, where such projects drive added value over and above what can be delivered through tiers one and two.

So the agronomic and environmental potential is huge. The ELM scheme, replacing the Basic Payment Scheme and Countryside Stewardship funding, should streamline the funding systems available to land managers, and focus the goals of our farming and forestry communities towards creating positive environmental change.

Forestry and land management rely on plentiful water supplies and the good management of watercourses. Water is the most vital element and is essential to life. Forests and woodlands have a close relationship with our water resources, and forest management and water quality are closely linked. Sustainable forest management is essential to ensure the supply of good-quality fresh water, to deliver protection from natural hazards such as ooding or soil erosion, and to safeguard aquatic animal life.

On tree planting in particular, WaterUK, the trade association for UK water companies, have included an ambitious commitment to plant 11 million trees in their net zero 2030 route map. This is part of a wider commitment to improve the natural environment, to support their goal of achieving a carbon neutral water industry by 2030. The joint proposals will see trees planted on around 6,000 hectares of land across England, together with work to restore original woodland and improve natural habitats that themselves capture carbon.

Some of this land is owned by the water companies themselves, and additional land will be provided by partners such as local authorities, the National Trust, the Wildlife Trust and the RSPB. Their support for the Northern Forest is going to be key, and will reinforce other sustainable land management activities that can bene t water  ows, and the quality and ecology of our waters.

Local authorities in Greater Manchester, Northumberland and Cumbria were selected by the government in August 2020 to help kick-start nature's recovery on a countrywide scale. As part of this, our combined authority in Greater Manchester will receive a share of £1 million of funding to set up a Local Nature Recovery Strategy pilot study, in conjunction with Natural England.

These  rst pilots will help map the most valuable sites and habitats for wildlife in their area and identify where nature can be restored. This could see the creation of wild ower habitats for pollinators, green spaces for people, or new woodlands and wetlands which are important for both healthy communities and in the  ght against climate change.

This will kick-start our green recovery with practical, locally led solutions, bringing a broad range of groups of people together to identify and agree priorities for restoring nature. Our City of Trees will become a beacon for this important work.

The Northern Forest garnered initial support from the Government, but ultimately has to be  nanced and delivered by the private sector. As we rebuild from coronavirus, green investments o er high economic returns and create high-quality jobs that young people want to do.

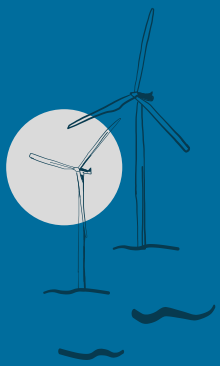
We should encourage companies to align their own corporate strategies for going zero carbon with the opportunity that planting trees o ers to o set emissions in local areas.

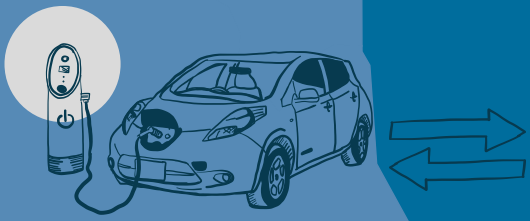
If, as predicted, the Northern Forest will o set around 7 million tonnes of carbon once planted, this could really help to make a dent in a corporation's carbon footprint.

Bringing in private partners will help companies to invest in their local areas, and bene t them by bolstering their green credentials in their annual reports. Corporate social responsibility programmes could also be included in the future plans to expand the forest, with businesses providing sponsorship for planting schemes.

The Northern Forest could also be a generational opportunity for developers to not only add to the forest but to better integrate trees into the built environment, creating a network of urban trees that leads out into denser woodland. Many of us living in urban areas during lockdown have come to value our nearby green spaces and joined up walking routes, particularly when driving was restricted. More people should be able to walk out of their front doors and nd nearby woodland to get lost in, including those living in cities. Natural landscapes are a selling point when it comes to properties. In fact there is plenty of evidence that greenery increases the value of a home. Homebuyers will see the added value in nearby woods for health and wellbeing in the future post-Covid world.

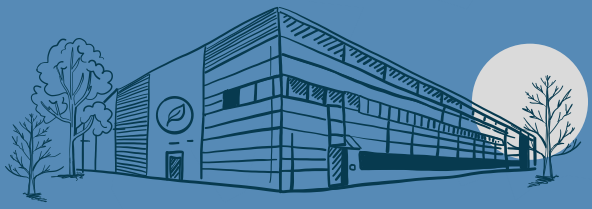
The Northern Forest will be an extraordinary legacy for our area as we work towards our net zero goals for this generation and beyond. Let's maximise this opportunity to plant trees that last and also have an enduring impact on the shape and wellbeing of our communities.





CHAPTER III

# NORTH EAST



Jacob Young MP

# The potential of the hydrogen economy

Jacob Young was elected as the  rst ever Conservative MP for Redcar in December 2019. He was an apprentice before studying Chemical Engineering, and then worked in the chemical industry on Teesside as a Process Operator for a major Petrochemical Company. He was previously a local Councillor and school governor. Jacob is currently the Chair of the All-Party Parliamentary Group for Hydrogen.

Hydrogen presents a huge economic opportunity in the North East and for the whole of the UK. It will play a prominent role in supporting the Government's levelling up agenda and will be the fuel that ensures the UK reaches its net zero target and makes the Northern Powerhouse central to this national mission. We already have a  edgling hydrogen economy, with several innovative businesses working in this area and widespread interest from local authorities, the UK Government and the devolved administrations. By investing in this infant industry now, as the government has committed to do in its 10 point plan, hydrogen produced in the North of England will become one of the core pillars of our national green economic recovery.

The Climate Change Committee (CCC) agrees that we will need hydrogen in various sectors including shipping, heavy-duty transport, energy storage and heating our homes.

In their net zero technical report, the CCC states that it might not be possible to import hydrogen at a cheaper cost than producing it here, and all of their net zero scenarios involve a level of hydrogen production in the UK. The North East has all of the core strengths to make hydrogen a UK success story, meaning we'll be exporting it to the growing list of countries who see a signi cant future role for hydrogen in their low-carbon economies. This would result in thousands of direct jobs in industrial clusters where hydrogen can be produced most cost-e ectively, supporting more jobs in the wider supply chain and levelling up communities like mine in Redcar and Cleveland.

Many other countries are investing in hydrogen as part of their post-Covid-19 stimulus packages and the UK cannot risk falling behind. This is why I was pleased that the Government committed to invest £240 million into the technology as part of the Prime Minister's plan for a green industrial revolution. The UK has a number of strengths and a strong history with energy. We are in a prime position to roll out large-scale hydrogen technology and we must seize this opportunity before it is too late. We must make sure that we do not repeat the mistake we have made with some other clean technologies, letting other countries develop the intellectual property and build up home-grown industries, and waiting to import the technology here. We need to secure these jobs of the future here in the UK, which means we need ambitious policies to commercialise hydrogen production and attract private investment.

In particular, we are potential world leaders in electrolysis - a technology which would enable us to produce green hydrogen from water using renewable electricity. In fact, the North of England will soon host the world's biggest electrolyser manufacturing plant which is being built in She eld by ITM Power.

Electrolysers will be able to produce green hydrogen from surplus solar and wind power, helping to improve the e ciency of renewable energy and balance the electricity grid.

We are already witnessing  rst-hand how hydrogen can create jobs in places like Redcar and Cleveland and the wider Tees Valley. The Secretary of State for Transport, Grant Shapps, recently announced Britain's  rst hydrogen train to revolutionise rail with trials, and that the Tees Valley is set to host the UK's  rst hydrogen transport hub, bringing together industry and academia to help create hundreds of green jobs. This will be funded by a £23 million 'Hydrogen for Transport Programme' investment that will see the funding of new hydrogen buses, refuse trucks and hydrogen refuelling stations. Given our position as the UK's  rst hydrogen transport hub, Tees Valley would be the ideal place to conduct a £50 million hydrogen bus trial, similar to the government's all-electric bus town competition, helping to tackle air pollution whilst also proving the viability of this emerging technology.

In order to continue promoting this agenda and ensuring that we can fully harness the potential of hydrogen, the Government must act swiftly and publish a cross-departmental strategy for unleashing the hydrogen economy early in the new year. The All-Party Parliamentary Group (APPG) on Hydrogen, which I chair, released a report in July which took evidence from almost 100 organisations looking at the role of hydrogen in the UK's economic recovery. The report called on the Government to increase investment in hydrogen production, distribution, technologies and infrastructure across the UK.

As Chair of the APPG, I have heard from a number of innovative organisations who are investing in the future of hydrogen, by buying hydrogen buses, trialling hydrogen in shipping, supporting hydrogen in steel manufacturing, and blending it with natural gas for heating.

To deploy hydrogen in home heating, we need large-scale trials to demonstrate safety and bring down costs, which is why I welcome the government's aim to trial a Hydrogen Town by 2030. The trials should be in industrial clusters such as Teesside where hydrogen infrastructure is needed for industry. Hydrogen currently remains expensive and relatively untested, however, with the right policy framework, we can bring down costs, create high-paid jobs, and deliver our net zero target using energy produced here in the UK.

An example of an excellent hydrogen project in Teesside is the H21 programme led by Northern Gas Networks (NGN), focused on demonstrating that the existing UK gas grid can be repurposed to carry 100% hydrogen, to meet the 2050 objective of the UK reaching net zero emissions. Heat contributes a third of our annual CO2 emissions, and how we decarbonise this key contributor, when 83% of domestic homes currently use natural gas for heating and cooking, remains unclear. Through a series of projects, the H21 programme is delivering evidence in support of a transition to a 100% hydrogen future for the gas network.

The H21 programme is demonstrating that the UK's existing gas network can safely carry hydrogen, for use by homes and businesses, and Teesside's vast industrial heritage makes it a natural home for this project. I'm delighted that earlier this year NGN along with Redcar and Cleveland Council announced that the world's  rst trial of hydrogen in an existing gas network would take place in South Bank in my constituency, with more than £10 million investment.

But as with all major projects and new technology, it is essential that this scheme has the backing of local people. In the coming months, more information will be shared with the community about the potential of hydrogen and plans for the site.

NGN's project is mirrored in Fife where SGN are building a new hydrogen gas network to power 300 homes. Both of these initiatives are possible, because of the innovative work at Worcester Bosch and Baxi, who have created the next generation of hydrogen boilers. We have to continue to remind ourselves that, like with so many things that we now take for granted, Britain is leading the way in this critical green technology.

There are several new policies that the Government should consider to boost this vital green industry. For example, amending the Gas Safety Management Regulations to allow gas companies to support hydrogen blend gas mixes, and introduce a localised mandate requiring a certain proportion of gas supplied in the area to be hydrogen. As mentioned above, it is crucial that we ensure hydrogen has consumer support, so we could begin trials to discover consumer attitudes to and the costs of using hydrogen for heating. Meanwhile, the Government could continue to encourage innovation through further research, development and deployment funding - particularly for green hydrogen to retain our world leading position - which will be key to our economic recovery and building market demand.

Investment in hydrogen technology will spark a green industrial revolution and help to level up places like Teesside, that once led the world in carbon-heavy industries. In the 19th Century, William Gladstone branded the emerging steel industry that sat on the southern banks of the River Tees, an 'Infant Hercules'. If we choose to fuel the Northern Powerhouse with hydrogen, our transition to a low-carbon and more regionally balanced economy will come sooner and we will create a new Infant Hercules, to lead the world again.

Dehenna Davison MP

# Putting the North at the centre of global green trade

Dehenna Davison was elected as the MP for Bishop Auckland in December 2019. She is currently a member of the Home A airs Committee, the European Research Group, and the parliamentary council for the centre-right think tank the Northern Policy Foundation. She is also on the board of the Blue Collar Conservatives. Prior to becoming an MP, Dehenna worked for a start up helping to secure funding for companies investing in research and development.

Leaving the European Union has  nally restored the United Kingdom's sovereignty over our trade policy. We've already struck a deal with Japan, the third largest economy in the world. Not only was the deal agreed in record time, it was tailor made for Britain and goes far beyond the deal we had with Japan through the EU. It grants our farmers greater access to the Japanese market, ensuring that iconic British products are recognised and protected in Japan, and providing an important stepping stone for the UK joining the Comprehensive and Progressive Agreement for Trans-Paci c Partnership (CPTPP) – one of the largest free trade areas in the world. What is more, our new deal contains world leading and cutting-edge digital provisions, bringing huge bene ts not only to our tech companies, but also businesses in every sector as well as SMEs.

The Department for International Trade is currently negotiating a number of ambitious trade deals, and I am con dent that we will reach agreement with other like-minded countries. In particular, I'd like to see Global Britain embrace this once in a generation opportunity to promote and export our many world-leading clean technologies, most of which are manufactured in the North of England, supporting jobs here at home and selling other countries cost-e ective solutions to tackle climate change.

The freedom to do more trade with countries outside of the EU was one of the key reasons many people in communities like mine in Bishop Auckland chose to vote for Brexit in 2016 (and again in 2019). International trade is one of the key drivers of economic growth. It has brought immense wealth to the UK and other nations over the centuries and has lifted countless people out of poverty in the last few decades alone. But our trade policy is not only about boosting our exports around the world, worth over £600 billion at the moment, and cutting prices for consumers and businesses here in Britain. It can also be leveraged to deliver on other key agendas that the Government is prioritising, such as levelling up opportunities across the UK - especially in the North of England - and reaching net zero emissions by 2050.

We have a chance to get the Northern Powerhouse ring on all cylinders by backing the many low carbon industries which have been born and raised in the North. These technologies will be needed not just by the rest of the UK to meet our net zero target, but by the international community too as it delivers the Paris Agreement on climate change. Selling other countries clean technologies made here in Britain helps them to cut their emissions. It demonstrates that the free market and economic growth are not at odds with protecting the environment – it is a deeply conservative way to tackle climate change.

These technologies will also be key to helping our local economies recover and creating high quality and high paid jobs. The Local Government Association estimates that County Durham could see 10,119 direct jobs in the low-carbon and renewable energy sector by 2050, with tens of thousands more across the whole North of England. These jobs in the clean, high-tech industries of the future are exactly the sort of opportunities young people in my constituency can get excited about.

According to  gures from the Department for International Trade from February this year, there are positive signs of export growth in goods and services from the North. In 2018, it exported £13.2 billion worth of goods, and was the second fastest growing region in terms of services exports. However, the number of exporters remained low at only 4,300.

We could turbocharge our exports by encouraging more small and medium-sized enterprises to set up and begin selling their goods and services overseas. The Government could introduce a suite of policies to boost UK-based low-carbon start-ups and grow domestic supply chains, particularly in the renewables sector. This support will also help deliver a green economic recovery across the region.

The North already has many clean tech success stories. It is the home of the world's largest o shore wind sector and is set to pioneer new clean technologies like carbon capture and green hydrogen. More than a quarter of all electric vehicles sold in Europe last year were made in the North East, according to Invest North East England. We should back our green businesses in the North East by helping them to export more goods and services abroad. I am encouraged that in our free trade negotiations, there are dedicated chapters for SMEs, making it easier for entrepreneurs – including those in green technology – to trade with the rest of the world.

The global economy is seeing exponential growth in demand for clean energy, which is getting cheaper to produce the more of it we build. We should be capitalising on that opportunity. The UN Environment Programme and Frankfurt School found that 184GW of renewable energy capacity was added globally in 2019, 20GW more than the previous year. By 2050, the International Renewable Energy Agency (IRENA) estimates that there will be a seven-fold increase in annual renewable power generation to 47,000 TWh by 2050.

This renewables investment is a massive employment opportunity. The Global Wind Energy Council has predicted the wind industry alone could create 900,000 jobs worldwide this decade. With the right renewables export strategy, many of these high skilled and high wage jobs could be based in the North of England.

To seize the initiative, I would like to see the Government expand its North East International Trade team to include clean growth specialists. The current team does a fantastic job supporting local businesses to grow their exports, and to understand and access new markets to sell their products. They have experts in a range of sectors from engineering and manufacturing to technology and infrastructure. A new team of clean growth specialists would be able to focus on growing all exports in the low carbon economy, helping businesses with export training, business planning, network building, and market research.

We've heard from the Prime Minister and the Chancellor of the Duchy of Lancaster that this Government is committed to moving more departments and civil servants out of London and into the areas which have been frozen out of decision-making for too long.

By providing more on-the-ground expertise, o cials from the Department for International Trade based in the North could strategically assess local clean export opportunities, build international relationships, and ensure that export  nance reached the clean export projects that needed it.

As well as boosting capacity to promote clean tech overseas, the Department for International Trade could introduce favourable export policies for low-carbon businesses. We should be using our new Free Trade Agreements, for example, to open up access for our o shore wind sector into the large global markets from the USA to Australia. And we should ensure that our clean energy exports receive a larger share of UK Export Finance.

Northern clean technologies should also be clearly on show during the COP26 UN Climate Summit which the UK is hosting next year in Glasgow. As other countries come to the UK to discuss their e orts to tackle climate change, we should be promoting wind turbines and EVs produced in the North of England to help them to achieve their targets.

At COP26, we should also be demonstrating to policymakers the UK's policy framework for tendering new clean energy capacity, which has driven down renewables costs through competition and innovation. The widespread adoption of these policies will be vital for stimulating markets for UK renewables companies and boosting our exports.

The North East was the home of the  rst industrial revolution. Through our net zero target we can bring industry back to the communities that used to power the rest of the UK, and once again export goods made in the North to the rest of the world, also cementing the North East's role in the green revolution.

Simon Clarke MP

# Greening heavy industry for a productive net zero economy

Simon Clarke was elected as the MP for Middlesbrough South and East Cleveland in June 2017. He was appointed as Exchequer Secretary to the Treasury in Summer 2019, before moving to the Ministry of Housing, Communities and Local Government as Minister of State for Regional Growth and Local Government, a post he held from February to September 2020. He was previously a member of the Treasury Select Committee, and led the Parliamentary campaign for the UK to adopt a net zero target.

Britain is an industrial nation. It built much of the modern world through its position at the forefront of the industrial revolution, with much of the iron and steel being manufactured and exported from the North. Steel from Middlesbrough, which was described by William Gladstone as an ‘infant Hercules’ in recognition of its place at the heart of the revolution, was used to construct the Sydney Harbour Bridge in 1932.

Much of the UK’s heavy industry remains in the North today, though the exports in this sector are not what they once were. This industrial decline has led many communities, particularly those considered to be part of the ‘Red Wall’, to feel left behind as the UK shifted to a service-based economy and young people moved to major cities looking for work.

Last year, those same communities entrusted the Conservatives with their vote, in large part because of our promise to level up the whole country as we leave the European Union. This agenda is even more crucial now that we are faced with the economic fallout of Covid-19 lockdowns.

Simultaneously, we are beginning our three-decade-long journey towards net zero greenhouse gas emissions - a world leading legislative target which I  rst championed over 18 months ago, with a letter which went on to be signed by 190 Parliamentarians. Though the industrial revolution brought incalculable prosperity to Britain and indeed the world, it has also released huge amounts of carbon emissions into the atmosphere. We have been witnessing the consequences of this process over the last few years with greater and greater frequency and intensity. Now we have an opportunity, however, to address both of these challenges: to back the Prime Minister's vision for a new green industrial revolution that both tackles climate change and brings back jobs to industrial powerhouses like my constituency of Middlesbrough South and East Cleveland.

The North East is already leading the way on this agenda. As my Tees Valley colleague Ben Houchen discusses in his essay, Teesside has an advanced plan to become the world's  rst zero-carbon industrial cluster, which I hope will receive some of the £1 billion funding for capture capture and storage (CCS) clusters announced in the 10 point plan. Required by every possible scenario to meet our net zero target, CCS will capture the carbon emissions from power and industrial plants in Teesside and store them safely under the North Sea. To deliver our climate goals, CCS will be required not just in the UK, but by countries across the world.

Harnessing the proud industrial heritage of Teeside to pioneer CCS technology will lead to the creation of 5,500 direct jobs here in the North and safeguard many more in heavy industry, with additional employment potential from export opportunities.

There are further opportunities for greening heavy industry besides CCS, however. Promising new technologies are emerging that could completely decarbonise emission-intensive manufacturing processes such as those used to make cement and steel. These remain some of the hardest sectors to decarbonise, and make up 10% and 17% of the UK's industrial emissions respectively. I hope the UK - and Teesside speci cally - can be at the forefront of developing and demonstrating these new techniques.

Primary steel production currently relies on very high temperatures and the use of coking coal, which is very high emitting. Some steel is already made by electric arc furnaces, for example in Rotherham and Scunthorpe, which can be lower carbon as a result of a decarbonised electricity grid. In future we could make more green steel using electric arc furnaces, which manufactures new steel products from recycled ones (secondary steel). Or we could use green hydrogen, made from renewable energy, as a fuel instead of coking coal (primary steel), as was demonstrated in a breakthrough in Germany by steel company ThyssenKrupp a year ago.

The route for decarbonising cement is di erent. The cement industry has already been successful in reducing its carbon footprint by over half since 1990 and is seeking to reduce them by four  fths by 2050. The 30 billion tonnes of concrete produced each year is made by mining limestone and then heating it up to a temperature of around 1,370 degrees Celsius. Not only does heating the limestone produce emissions, but the limestone itself releases signi cant amounts of calcium carbonate.

Traditional cement emits almost 816 kilograms of carbon dioxide for each tonne made. However, due to recent innovation, other materials can now be used to create cement, for example magnesium silicates, which do not release emissions when burned.

Investing in these new green industrial techniques should form a central part of our economic recovery, because it will both support the delivery of net zero and the levelling up agenda, creating multiple environmental and economic bene ts. In its 2020 progress report to Parliament, the Climate Change Committee (CCC) warned that economic recovery policies must avoid 'locking-in' emissions or climate risks. We have to avoid investing in new emission-intensive industries and manufacturing processes, such as coal-powered steel furnaces, which would be releasing carbon for decades to come. Instead, we must back our industries by supporting greener manufacturing processes, which will support jobs while bringing emissions down.

At present, the UK's steel and cement industries face higher costs when competing on the global market, in comparison to countries like China. However, with more countries demonstrating continued commitment to the goals of the Paris Agreement and more countries (including recently China) setting net zero targets, low-carbon products like green steel will be in increasingly high demand. If we take this opportunity to go full throttle in greening our heavy industry, we can gain a  rst mover advantage on the global market.

The global steel market is valued at $2.5 trillion, of which around 50% is sourced from China. The UK is more likely to be competitive in these green industrial processes because of our world-leading science and engineering expertise. Anticipating the next industrial trend will help the UK compete, securing new jobs for the UK and supporting the existing 52,000 people employed in the UK steel industry.

Greener steel production will support other net zero investments we're making in the UK. The Prime Minister announced at this year's Conservative Party Conference that the UK will be aiming to establish itself as the 'Saudi Arabia of wind power' and will (quite rightly) encourage more of the supply chain for o shore wind manufacturing to be based in the UK. Turbines producing renewable energy are obviously good for the environment, but being mostly made up of steel, they have their own carbon footprints too. Using green steel to construct these giants is undoubtedly the right thing to do, making them a more attractive product for domestic use and as exports to other countries. Moreover, as car companies like Toyota seek to cut down on their carbon emissions, they will also need green steel to make their cars.

The Government clearly recognises the need to cut emissions from heavy industry and the potential economic bene ts from doing so. The £250 million clean steel fund, announced last year, aims to place the sector on a pathway to net zero by supporting new technologies and processes that can transition the sector to lower carbon iron and steel production.

That fund, which was announced before the pandemic, was a great boost for the Net Zero Northern Powerhouse. Now, though, there is an urgent need for more action and initiatives to ensure we build back a greener industrial base. The Government was right to provide support to Celsa Steel (UK) Ltd to enable the company to continue trading and save up to 800 jobs, with a loan that required a commitment to setting environmental and net zero targets. While we must protect livelihoods in the short term, we should be thinking about how to maintain jobs in the longer term, too.

Here in Teesside, our Conservative Mayor, Ben Houchen, has committed as part of his reelection manifesto to bring steelmaking back to Teesside, following the closure of the Redcar steelworks in 2015, which was devastating to our local community. Steelmaking underpinned our area's industrial heritage, but to bring it back to Tees Valley now we must become global pioneers in innovative green steel. Not only will producing the low-emission steel that the UK and other countries will need in the coming years provide more secure jobs, but they will be jobs that our community can be truly proud of: they will not only be exporting steel made on Teesside to the whole world again, but helping solve the global problem of climate change.

To make this vision a reality, the Government should provide support for demonstration plants in industrial clusters like Teesside, including electric arc furnaces which use electricity rather than coal to heat up and melt recycled steel scrap into new products. The global metal recycling market is forecast to grow 7% by 2027 as demands grow for material for the automotive and construction sectors with decreased emissions. Using some of the £1 billion Net Zero Innovation Portfolio funding announced in the 10 point plan, the Government could also provide greater funding for research and development into technologies and processes that reduce the carbon emissions involved in industry. This could include carbon negative cement, where carbon dioxide which would otherwise be released into the atmosphere is captured and injected into the cement.

As well as supporting the 'supply side', government policy should also drive demand up progressively for greener products. For example, it could phase in mandates for a percentage of green products in public procurement, through the Government Buying Standards. This would incentivise companies to compete to o er the best priced and highest quality product. The percentage could then rise as the products become cheaper to produce and more abundant as the market grows.

To encourage innovation, support could be paired with regulation in the form of embodied carbon building standards. Embodied carbon building standards would set a limit on the emissions caused by extracting resources for construction, transportation, maintenance, deconstruction, disposal and so on. Such a policy would reduce the carbon emissions from the construction, and create a market for green steel and cement.

In order to avoid any negative impact on our industries in the form of being undercut by dirtier products made in countries without stringent climate policies, the Government could apply a border carbon adjustment mechanism on all imported carbon intensive goods. Not only would this prevent our e orts from being undermined, it may encourage other countries to reduce the level of carbon in their products to gain access to the UK market. Such a tax would represent a huge step forward in tackling carbon leakage.

These are just some of the policies that the Government could implement to support heavy industry as part of a wider long-term, green and resilient economic recovery that delivers on two of our key agendas. We must seize this opportunity to harness generations of expertise in heavy industry, rooted in the culture of industrious northern towns and cities like Middlesbrough, by building back better and greener.

Ben Houchen

# Teesside at the heart of a Net Zero Northern Powerhouse

Ben Houchen was elected as the  rst Mayor of Tees Valley in May 2017. As Mayor, Ben worked with partners from around the globe to launch the Net Zero Teesside project. As part of his ambition to create clean energy jobs he also made o shore wind, green steel making and the hydrogen economy part of his policy platform. In 2020 the Government announced Tees Valley as the home of the UK's national Hydrogen Transport Hub.

Levelling up, the Blue Wall, net zero, and the Northern Powerhouse - all are well-known slogans within the Westminster bubble, but how will they improve things for ordinary people? Politicians, civil servants and journalists are drawn to catchy names for often complex government programmes, but the public are typically more sceptical.

People in the North of England are perhaps even more sceptical of government promises and programmes than anyone else. Our serious northern demeanour aside, we have shown in 2016 and 2019 that we are willing to cast aside decades of political orthodoxy if it ceases to serve our interests. As the Conservative in the North with the largest electoral mandate, this rightly puts a great deal of pressure on me to deliver and to demonstrate results.

Historically, the Conservative Party was the party of the environment, and we have been keen to burnish our clean and green credentials too. The caricature of Tories as polluting tycoons who put pro t before planet couldn't be further from the truth, but that doesn't stop our detractors from promoting it every time we try to bring reason and a sense of proportion to the environmental debate.

Across the UK, from Teesside to the Thames, Conservatives are leading on projects that will protect our natural environment for generations to come, and doing so in a way that promotes jobs, growth and businesses. Opposition Labour  gures make a lot of noise about a Green New Deal and climate justice - perhaps this is because they know that we are delivering on these issues while their party, paralysed by hard-left dogmatism, is powerless to help.

Whether your idea of protecting the environment is cutting carbon or ensuring our nation's unique and beautiful landscapes are preserved for future generations, there is nothing more conservative than a sound and economically sustainable record of environmental stewardship.

When past generations, especially in the Northern Powerhouse region, created and worked in the heavy industries that propelled Britain to become the world's  rst industrial nation, they did so for the right reasons, including to support their families, but their understanding of the environment and their impact on it was limited. Today, we do not have to choose between economic growth and protecting the world we live in, indeed for areas like the Tees Valley green and growth go hand in hand. We don't just plan to make our own transport and industry carbon neutral - the technology we are developing will mean the whole world can do this.

Zero emission vehicles are a great example of a low carbon technology taking o . Just a few years ago electric cars were a curiosity - you might have heard of them but you were unlikely to have seen one. Now, they are a ‘must have’ for many people.

As good as electric vehicles are, right now they have a few drawbacks. These can be mitigated by developments taking place within the Northern Powerhouse, in particular in the Tees Valley. Hydrogen, as a fuel, and carbon capture utilisation and storage (CCUS) are not new. Indeed they have been on the cards for years. However, their application in the  eld of decarbonisation has only just started to gain awareness among the vast majority of the population.

Hydrogen powered vehicles, one of which I have had the privilege of driving recently, have a number of advantages over traditional fossil fuel cars and even their electric counterparts in certain situations. They can be just as clean and green, if not more so, than electric vehicles, with the same zero emission status but without the need for rare earth metals.

The demand for rare earth metals, which power many modern electronic devices from mobile phones to cars, shows no sign of slowing down. This requires massive mining operations which cause untold damage to the environment. Much of the world’s known supply of these rare elements is in China, making dependence on them a less than advantageous geo-political and economic situation.

Hydrogen of the grade that can power vehicles, on the other hand, is produced from water in a process known as electrolysis. The only by-product of burning hydrogen as fuel is, as we all learned in school, water. Hydrogen can also be derived from natural gas. The same natural gas that heats our homes and cooks our meals today is produced using a steam methane reformer, with the carbon emissions stopped from entering the atmosphere using CCUS technology.

The latter can be used in many of the same domestic and industrial applications as natural gas, but without the carbon cost.

One area of net zero that is perhaps even more important than those we encounter in person every day is industrial decarbonisation. It is easy to understand how walking, cycling or using a zero emissions car reduces your carbon footprint. However, when it comes to cutting out carbon in the products and energy we use by improving industrial processes, out of sight can be very much out of mind.

The Prime Minister's 10 point plan pledged to establish CCUS in two industrial clusters by the mid 2020s, with funding for four such clusters by 2030. As the home of a majority of the UK's energy intensive industry, the Tees Valley is the natural choice for the pioneering CCUS programme. Net Zero Teesside aims to be the UK's  rst zero-carbon industrial cluster. It has the backing of some of the world's biggest energy producers and will capture up to 10 million tonnes of carbon dioxide emissions, the equivalent to the annual energy use of over 3 million UK homes.

This project and the technology behind it aren't just essential for Teesside, but for the UK's manufacturing competitiveness and ultimately for global e orts to overcome the climate challenge. When the SSI Steelworks in Redcar closed in 2015, it contributed a large proportion of a 6% annual drop in UK CO2 output, and caused more than 3,000 jobs to be lost with it. If we do not successfully deliver Net Zero Teesside and similar projects, this is the fate that awaits almost all of our industries if we are to meet our climate obligations.

Jobs losses in an industry that modern Teesside, and many other communities, were built on hurt in a way that is hard to articulate. Successive generations of families had worked in iron and steelmaking.

For many people in Redcar the soul had been torn out of the town, so it is  tting that Net Zero Teesside will be built on the site of the former steelworks and create a comparable number of good jobs in the area. It will also secure the future of the Tees's other great industry, chemicals, on which thousands of families rely.

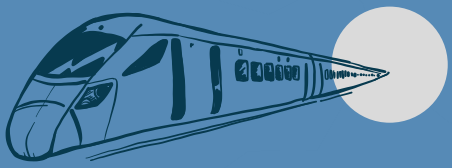
Across the North of England there is a great reverence for the engineering and manufacturing industries, and the skilled jobs they provide. People are proud of their roots in the industrial revolution, and they are excited for more jobs in the industries of the future. We built the world in the 19th century and we will use our technical acumen and legendary northern work ethic to decarbonise it today.

That is why the Conservative Party, and any other party that seeks to govern Britain, can only secure the parliamentary seats they need in the Blue Wall, formerly the Red Wall, by delivering real jobs in communities where industry is at least as important as the service sector.

Levelling up means investment in infrastructure and the relocation of civil servants to give the regions the leg up they need to compete with London and the South East. But, if levelling up is to truly mean anything to people outside of the Westminster bubble it also means creating the kind of jobs people can be proud of and support a family with. The kind of jobs that can only be supported in the UK with decarbonised industry, energy and transport. As he showed with his 10 point plan for a green industrial revolution, the Prime Minister gets this.

When the people of the North voted to take back control of our nation from Brussels, they did so because they wanted a better and more prosperous future.

By combining CCUS with revolutionary new policies like freeports, and further devolution over investment decisions, business support, and skills, we can fundamentally change the economy of the North for the better. A future where the Northern Powerhouse is a net contributor to the exchequer is within our grasp and beyond the vision of an increasingly metropolitan and elitist Labour Party.



CHAPTER III

# YORKSHIRE & THE HUMBER

Kevin Hollinrake MP

# Retro tting our homes and making them energy e cient

Kevin Hollinrake was elected as the MP for Thirsk and Malton in May 2015 and holds the position of Parliamentary Private Secretary to the Chancellor of the Duchy of Lancaster, Michael Gove. He is Co-Chair of the APPG for Fair Business Banking, Co-Chair of APPG for Poverty and Co-Chair of APPG for Yorkshire and Northern Lincolnshire. Kevin has a business background. He was a founder partner and now Chairman of Hunters Estate Agents, which is now one of the largest independent networks of sales and letting agents in the UK. In 2008 he founded Vizzihome and the search agent, Shoptility.com where he became Chairman in 2013. Kevin is a strong advocate of the small business sector and of the North, where he has been campaigning hard for more money for roads and rail which he believes is key to growing the Yorkshire economy.

As well as a global pandemic, we are facing several once-in-a-generation challenges at once: the largest economic recession on record, delivering on our promise to level up the whole country, and getting the UK on track to ending its contribution to climate change by 2050. Fortunately, there are policies at hand which can be part of the solution to all three, one of which is a whole house retro t campaign for social housing. I was pleased to see that making homes and public buildings more energy e cient and comfortable was included in the recent 10 point plan for a green industrial revolution. The North is a natural place to begin this campaign to rebalance historic investments in housing, and level up the quality of homes in the region in a way which reduces bills for those least able to pay.

Much of the debate on home energy e ciency is centred on the 200,000 new homes delivered each year, but the vast majority of greenhouse gases are emitted from our 29 million existing dwellings, 85% of which will still be occupied in 2050. Within this cohort are some of our most energy ine cient homes, also representing our quickest wins and lowest hanging fruit for retro tting.

Insulating more homes during this parliament will be critical to reaching net zero cost-e ectively. Energy use in homes accounts for roughly one  fth of the UK's greenhouse gas emissions. Energy e ciency measures like loft or cavity wall insulation enable people to use less energy while staying warmer. This cuts energy requirements for home heating, lowering demand for carbon-intensive natural gas and reducing the strain on our energy sector as we transition to renewables.

Energy e ciency is not just bene cial to the mitigation of climate change, it is also a very signi cant opportunity to alleviate the e ects of poverty on our lowest income households. Around 17% of UK housing stock is in the socially rented sector, over 50% of which is in the Energy Performance Certi cate (EPC) band C category or worse. On average, these households pay a fuel poverty premium of £252 per annum: because they are more likely to use pre-payment meters, perversely fuel poor households often face higher prices than better-o  households.

Cold homes also have a profound e ect on health and put an extra strain on the NHS. Of the average 35,600 excess winter deaths in Britain, 10,680 were attributable to a cold home according to the Coalition for the Energy E ciency of Buildings. This statistic may be even more important if Covid-19 stays with us for years to come. There have been multiple studies which suggested that colder temperatures during winter likely exacerbate the e ects of the virus. It goes without saying that the North has colder winters than the South, with the lowest temperatures up to four degrees lower in Yorkshire than London.

Furthermore, as more of us are spending more time at home to control the spread of the virus in the months ahead, we should ensure that it's a ordable to keep our homes warm and comfortable. The Energy and Climate Intelligence Unit found that leaky homes will see bills rise to an average of £124 per month during this winter lockdown while energy usage is high, compared with £76 per month for those in well-insulated homes.

I welcome the Chancellor's announcement this summer of a pilot £50 million Social Housing Decarbonisation Fund, which the government has committed to funding further in the 10 point plan. Given a successful initial rollout of this trial, HM Treasury could also expand it by means of private  nance solutions such as 'municipal green bonds' that could be utilised by councils to  nance a mass retro t of social housing. Combined with appropriate use of the planned £9.2 billion manifesto commitment to boost energy e ciency, this could raise the energy standard of all social housing to at least EPC band C by 2030.

If established with a long-term framework, such a scheme could also create many new local businesses and jobs. Many of the businesses who provide retro ts in Thirsk and Malton are small and medium-sized enterprises (SMEs), with almost 2,000 economically active people working in the construction sectors. Businesses of this size will be central to both the economic recovery and levelling up our country. In addition to the government's proposed planning reforms to enable more housing development, there is huge scope to create lasting, high-skilled, and well-paid jobs in the construction sector through social housing retro ts as well.

The retro t programme could also include the installation of low-carbon heating and renewable energy solutions, for example heat pumps and rooftop solar panels.

Removing unnecessary scal barriers to solar panels, such as unfavourable business rates and VAT on solar and battery installations, will support social housing providers to generate cheap energy in the summer which they can export to the grid. Expanding the capital grants scheme for heat pumps will help more homes bene t from lower upfront costs - the main barrier to uptake generally - and support a UK-based supply chain. This would provide a boost to businesses and investors across the North while cutting housing occupants' bills, and getting us on track to reach the new government target for 600,000 heat pumps to be installed each year by 2028.

As someone who had enjoyed the life-changing bene ts of starting and growing businesses before life in politics, I have often spoken in favour of expanding opportunities for our start-ups and scale-ups. SMEs not only create potentially hugely bene cial, life-altering opportunities for business owners but also employ more local workers and apprentices and contribute more to local good causes and communities. Perhaps these bene ts could be bolstered by means of a lower rate of VAT for local businesses who provide these retro t services locally.

Retro t policies are also highly popular amongst local residents. A survey commissioned by the Conservative Environment Network reveals that twice as many people support government investment in energy e ciency than road construction. Tax breaks, perhaps reduced rates of stamp duty, mortgages or council tax for more e cient buildings, would further provide powerful incentives and nudges towards sustained investment in our older housing stock.

Starting with social housing, a retro tting campaign would be an excellent way to build back better from the current economic crisis and build a clean Northern Powerhouse.

It would help to level up northern communities, and support people to upgrade their homes and cut their living costs, providing long-term work for countless SMEs, and reducing the burden of winter illnesses on the NHS. Simultaneously, retro tting will be a key part to achieving net zero by 2050, cutting emissions from one of the most challenging sectors.

Alexander Sta ord MP

# Net zero northern railways and the role of hydrogen

Alexander Sta ord is the MP for Rother Valley, the  rst Conservative to ever be elected to this seat. In Parliament, he champions the green recovery, having previously worked for WWF and Shell. As a member of the Business, Energy and Industrial Strategy select committee, he is a leading voice for hydrogen as a technology of the future and is excited by its great potential for use in cars, planes, trains, ships, factories, and homes. He believes a strong domestic hydrogen industry will help the UK to meet its net zero emissions target, transform left behind areas of the country, and become a major export for UK plc worldwide.

Hydrogen power has the potential to do for our economy what coal did for us in the 18th and 19th centuries – but in a green and sustainable fashion. There is no doubt that this transformational technology of the future will enable us to meet our net zero target by 2050. It is exciting to see that others now share my enthusiasm, with hydrogen breaking through into mainstream conversation and featuring prominently in the Prime Minister's 10 point plan for a green industrial revolution. Now is our chance to seize the narrative from the left regarding the green recovery and prove that we are committed to levelling up sustainably.

Since my election, I have called for a national hydrogen strategy so that we can become world leaders in the industry, exporting our technology and knowledge to the rest of the world.

With European nations laying out their plans for hydrogen, we cannot a ord to be left behind. In this ‘Great Game’ of international green supremacy, the Northern Powerhouse has a pivotal role to play. The Government’s new target for 5GW of low carbon hydrogen production capacity by 2030, one of the most ambitious targets in Europe, and the new £240 million Net Zero Hydrogen Fund are important  rst steps.

It is clear that the success of the UK’s national hydrogen strategy is inextricably linked to its location in the North, particularly in Yorkshire and the Humber. My constituency of Rother Valley is an area of historical heavy industry and mining. In the last four decades or so we have lost these industries and have struggled to replace them. As a result, we are often referred to as belonging to ‘left behind communities’, but this negative narrative is not representative of our story. Our manufacturing expertise remains second to none, and our ambition and drive is matchless. It is these skills which we hope to redeploy in the green revolution, and as such there is no better place to serve as the hub of the hydrogen industry.

Given that the only by-products of hydrogen fuel cells are water vapour and warm air, the importance of green hydrogen in cutting our carbon emissions both nationally and locally cannot be underestimated. For a region that has traditionally been associated with digging dirty fossil fuels out of the ground and burning them, the transition to a carbon free local economy would be remarkable. However, the bene ts of hydrogen in Rother Valley stretch far beyond contributing to the achievement of our net zero target. I term this ‘hydrogen’s virtuous circle’, on account of the green dividends dovetailing with my local priorities for jobs, transport and infrastructure, and integrating our area with the wider Northern Powerhouse project.

Some of the main issues in Rother Valley are the lack of high-quality, skilled jobs and the poor connectivity between communities. This comes up time and again in conversations with constituents, and my fellow Northern Powerhouse MPs report the same problems. Hydrogen presents a double bene t to our area, in that it can be produced locally, generating employment, but can also be used across the Northern Powerhouse to transform our woeful public transport network.

Addressing jobs  rst and foremost, the potential for a hydrogen revolution in South Yorkshire to rival the coal industry is immensely exciting. We have already made great strides in establishing ourselves as a national hub for the production of green hydrogen. For instance, I have been supporting the upcoming opening of the world's largest electrolyser factory, located in Meadowhall, She eld, which is on the border of my constituency. Hydrogen storage cylinders are also manufactured nearby. Rotherham, part of which is in my patch, is home to England's most northerly hydrogen refuelling station.

The region also has an onshore wind sector with the potential to expand, key to the production of green hydrogen, and our local city of She eld has two major district heat networks. South Yorkshire boasts a central location, with four motorways, including the M1 which runs through Rother Valley, and access to East Coast, Midland and TransPennine railway lines. Doncaster, a town with which many in the north east of my constituency identify, is a key logistics hub in the UK for both road and rail and has an adjacent airport. Additionally, She eld has a rich steelmaking heritage with two universities and a number of highly rated skilled apprenticeship courses which all focus on industrial expertise. Recently I met with the University of She eld's Advanced Manufacturing Research Centre, which is a world-leading hub of research and innovation centre on technologies such as hydrogen.

Importantly, devolution in England is gathering pace and I am in regular discussions with the She eld City Region who have a strong commitment to carbon reduction and to growing the hydrogen industry locally.

This is only the beginning. As we attract more investment and the local hydrogen industry grows, more companies will want to take advantage of our infrastructure, creating manufacturing jobs, graduate jobs, and supply chain jobs alike. In turn, South Yorkshire stands to reap high economic returns which will rejuvenate the local economy. In my recent adjournment debate against fracking, I declared that I envisioned, for example, “renewables plants in Dinnington and Maltby and specialist training colleges in Thurcroft and Aston. I want hydrogen factories in Orgreave and distribution networks in Hellaby.” Indeed, I intend to turn Rother Valley into Britain’s Hydrogen Valley.

Alongside jobs, the other core local issue is transport. Our buses and trains are unreliable, infrequent, and have limited reach. It can take nearly two hours on multiple buses to get from one part of my constituency to another, a journey which takes around twenty minutes in the car. This inaccessibility depresses the local economy because it makes it incredibly di cult to get to work and school, attend appointments, and go shopping. Such a transport desert limits constituents’ opportunities and reduces the amount spent locally. All hope is not lost, however. I rmly believe that hydrogen ts perfectly with the Government’s levelling up agenda and will be key in levelling up South Yorkshire’s failing infrastructure. Here, the focus on hydrogen shifts from local production to local use.

Hydrogen powered trains tie in with my campaign to reverse the Beeching cuts in South Yorkshire and re-open the South Yorkshire Joint Railway, a line which connects up important towns in Rother Valley.

Hydrogen trains are ideal for use on local lines where electri cation would be expensive or infeasible, and where the trains can be refuelled regularly. The use of hydrogen trains makes the reopening of smaller lines more likely because they are clean, quiet, and crucially achieve performance similar to an electric train but without the considerable infrastructure that electric trains require, such as overhead wires.

Only recently a hydrogen-powered train travelled on Britain's rail network for the  rst time, with these trains being made available to paying passengers by the end of 2021. I was pleased to see last year that Transport for the North had committed to introducing hydrogen-powered trains on its lines. This is vital for better connecting towns and cities along the northern corridor, unlocking the population of the Northern Powerhouse. In light of these developments, the case for reviving the South Yorkshire Joint Railway is very strong. The track already exists: we just need to install some platforms along the route.

It is not just train travel which will be transformed by hydrogen, but buses, lorries, and aeroplanes too. Hydrogen buses are a priority for our area. Wrightbus, for example, is building 3,000 hydrogen buses in the UK for use across the country by 2024 - the equivalent of taking 107,000 cars o  the road. If we secure hydrogen buses for South Yorkshire, we will be able to increase the number of services we operate due to cost saving on fuel and carbon emissions reductions downstream.

Similarly, the presence of the M1 in Rother Valley means that we have hundreds of polluting lorries rumbling through our area every single day. Hydrogen can revolutionise the haulage business, cutting fuel costs and improving local air quality. In aviation, with the Prime Minister calling for a British Jet Zero and Airbus announcing that its hydrogen-fuelled passenger planes could be in service by 2035, South Yorkshire has a chance to become Europe's centre of green aviation.

As the Prime Minister looks to  nalise the UK's national hydrogen strategy, I urge him to recognise South Yorkshire's potential and choose to centre the hydrogen strategy in our region. We already have considerable hydrogen infrastructure and local skills – we just need to be given a chance to shine. Initial support from the Government will give the green light to  nancing and delivery by the private sector, which will create countless jobs, cut emissions, and turbocharge the Northern Powerhouse. This will not only level up the North but position the UK as a world leader in hydrogen exports. Such an opportunity cannot be missed, and I join with my fellow authors to call for the launch of the northern hydrogen revolution.