

Net Zero North

A submission to the 2020 Comprehensive Spending Review

Net Zero North (NzN) will connect the Northern Powerhouse's science assets, skills providers, and businesses to forge a green recovery from Covid-19. It will put the UK at the forefront of the global drive for net zero carbon.

A £300m investment by government will:

- upskill the northern workforce through 16,000 student-years of net zero training delivered by Further Education colleges in towns, cities and rural locations
- increase Northern Powerhouse GVA by £1.5bn by creating and securing jobs in a sector that is growing 4 times faster than the rest of the economy
- contribute 20% of the reduction in carbon emissions in the North of England by 2030 required to put the region and country on track to achieve net zero by 2050.

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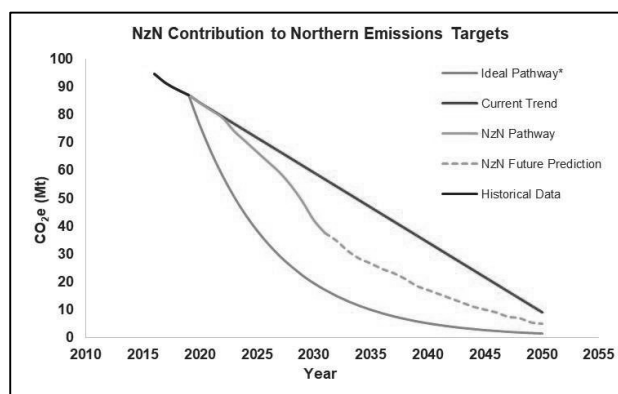
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Summary

The Northern Powerhouse has a unique mix of industries, science and research capabilities, infrastructure and environmental assets, making it the best place in the UK to lead our transition to a net zero economy. While there are high concentrations of carbon intensive industries and people in left behind parts of the region as well as ingrained social, economic and environmental challenges, 35% of jobs in the North are in low carbon sectors and the region generates 50% of England's renewable energy. The North is perfectly placed to address economic transformation to a clean net-zero economy through an integrated and innovative approach, supporting the transformational vision of an extra 800,000 jobs in the Northern Powerhouse by 2050, set out in the Independent Economic Review (NPIER).

NzN will connect companies such as Siemens, Sellafield and Unilever with the research and science base of the N8 Universities, Teesside University, Manchester Metropolitan University, University of Chester and other northern HEIs (collectively, the N8+ Universities), Research Technology Organisations (RTOs), and Further Education (FE) college networks such as the LTE Group, NCG and Luminare. It will accelerate economic growth and recovery from the Covid-19 pandemic by creating new jobs in the green economy and upskilling the workforce in left behind parts of our towns, cities, rural and coastal places. It will create new pathways into work and support firms to innovate and adopt low carbon business models.

By 2030, NzN will reduce emissions by around 17Mt CO₂e p.a., and will deliver around 20% of the overall reductions needed on the ideal path to net zero¹.



These accelerated reductions will be achieved through three parallel, pan-Northern projects addressing the needs of businesses through multi-stakeholder collaborations:

Sustainable hydrogen economy - *positioning the UK as global leaders in the exploitation of hydrogen for net zero*

- NzN will link existing and proposed northern hydrogen industry assets and capabilities with the region's unique strengths in nuclear and renewable energy technologies. Innovation, adoption and development of sustainable hydrogen technologies will be positioned to drive clean growth in multiple sectors of the economy.

Grow smarter - *managing land for net zero by reducing emissions and increasing carbon capture*

- NzN will reduce carbon emissions by revolutionising the way we use land; creating new ways to use agricultural material as ingredients in the household goods and high-value chemicals industries supply chain, optimising natural assets for carbon storage, climate change resilience, biodiversity and wellbeing, and creating new opportunities for the visitor economy.

Skills and productivity - *creating the workforce for a northern green economy*

- NzN will create the "NzN Skills Alliance", bringing N8+ together with FE college networks, industry and other stakeholders to deliver an "NzN Skills Escalator" for people in all parts of the Northern Powerhouse, including skills hubs for industry-linked doctoral students. These Hubs will be established in Teesside (hydrogen) and at Eden North/Morecambe (Grow Smarter), with outreach links to FE colleges and the public in towns, cities, and communities across the North.

¹Data courtesy of Tyndall Centre, University of Manchester: <https://carbonbudget.manchester.ac.uk/reports/>

The challenge and the opportunity

NzN is grounded in an evidence-based understanding of the North's strengths, opportunities and challenges. The region's N8+ Universities, a wide network of Further Education colleges, industry partners and other public and private sector bodies working together can add value to national efforts to create a cleaner, more inclusive economy. NzN is built on existing collaborations and delivery structures which can deliver at pace and scale while bringing in new business partners, for example, the N8 AgriFood Resilience Programme which has developed a network of academics and industrial stakeholders and helped secure over £62m of funding to support research into food security, through a series of pump-primed projects and programmes.

The North of England punches below its economic potential, with levels of productivity, private sector investment, R&D activity, skills, and business start-ups all lower than the national average. Despite pockets of high performance, too many of the North's cities, towns, rural communities and coastal locations are left behind, trapped in a low-skills, low-innovation, low-productivity cycle.² The economic impact of the Covid-19 pandemic risks making this situation worse. At the same time, there is an urgent need to accelerate the shift towards a net zero carbon economy. The UK has set a challenging target to bring greenhouse gas emissions to net zero by 2050, which will require all parts of the country to transform how their economies work. Covid-19 has led to an unparalleled drop in carbon emissions but, despite seeing a massive fall this year, the concentrations of CO₂ in the atmosphere and warming of the planet will not stabilise until the world reaches net-zero.

The Northern Powerhouse has concentrations of science assets linked to industrial clusters that can drive the UK's transition to net zero. We can put the UK at the forefront of multi-billion pound global growth opportunities, simultaneously addressing our region's long standing economic and social challenges. By taking a place-based approach, combining R&D investment into economically underperforming places, a greater focus on translational research, and linking public investment more closely to industrial R&D activity,³ these assets can also 'level up' areas with weaker economies.

But the North faces a particularly challenging starting point. Higher levels of carbon intensive businesses than the English average⁴ mean it needs to decarbonise faster than the rest of the country to keep pace with national targets. Its poorly connected business and skills base limits the ability of firms to introduce innovative and efficient low carbon technologies and processes at the scale and pace needed.

The two most significant and immediate economic opportunities to drive a green recovery and form regional innovation clusters are found at the intersection of the N8+ universities' world-class science assets, businesses that can compete at national and international scales, and strategic investments by local and national actors from the public and private sectors. These are:

- positioning the UK to lead the world in adoption of hydrogen (our "**Sustainable Hydrogen Economy**" project); and
- driving a revolution in the use of land in the North of England (our "**Grow Smarter**" project).

Both projects have been developed in consultation with businesses. They will support large companies and SMEs to move up the value chains driven by research-supported innovation creating new sustainable business models in key growth areas for low carbon products and services. For these two innovation opportunities to be translated into broad based economic growth, they must be underpinned by a major investment in creating the workforce for a northern green economy (our "**Skills and productivity**" project). Recent analysis of the performance and adoption of innovation in the North⁵ has highlighted

²Northern Powerhouse Independent Economic Review, TfN, 2016

³The Missing £4bn, Nesta 2020

⁴IPPR, Net Zero North, 2017

⁵R&I in the Northern Powerhouse, prepared for TfN by Cambridge Econometrics. Private Communication.

that businesses in the region often struggle to capture value from knowledge creation due to weaknesses in, and engagement with, local and regional networks. SMEs in particular find it difficult to access and participate in these networks and have less access to innovation activity. Our skills project will kick start a vibrant and resilient green innovation ecosystem across the Northern Powerhouse, better engaging SMEs, large businesses, RTOs, FE colleges and universities.

Financial Summary

NzN is asking for £300m from Government, broken down as follows:

NzN Programme Element	Nature of the investment ⁶	Amount
Sustainable Hydrogen Economy	Research and Innovation – large-scale innovation and research to support and leverage existing, and planned, capacity and capability in demonstrators and other assets in the region	£90m
Grow Smarter	Research and Innovation – large-scale innovation and research for innovation and scaled-up adoption of near-to-market technologies	£60m
Skills and Productivity	Resource - Investment to support the development of the “NzN Skills Escalator”, through enhanced provision and access to existing programmes, development of new programmes, and collaboration with industry to support lifelong learning objectives	£135m
	Research and Innovation – skills hubs to support level 8 training in Sustainable Hydrogen Economy and Grow Smarter	£15m
Total Investment		£300m
Research and Innovation		£165m
Resource		£135m

⁶ Consolidated Budgeting Guidance: 2020-21, HM Treasury, p.148.

Sustainable Hydrogen Economy

Positioning the UK as global leaders in the exploitation of hydrogen for net zero

The NPIER identifies energy as a prime capability for the North, due to the region's expertise around generation, storage, and low carbon technologies and processes, especially in nuclear and offshore wind.

There is a pan-Northern opportunity to bring together the region's research expertise, industrial capacity, and planned major investments in nuclear energy, offshore wind energy, and tidal power with significant industry pull for new green hydrogen production and storage processes. NzN will establish the region as a testbed for sustainable hydrogen use by industry (including in green transport, industrial decarbonisation, and heating of residential and commercial buildings). This would position the Northern Powerhouse as a global leader in the generation, storage, and usage of green hydrogen, an industry which is expected to create 221,000 jobs and contribute £18bn to GVA in the UK per year⁷.

Leading industry partners and RTOs have committed to this project, such as Sellafield Ltd (Cumbria), TWI (Middlesbrough), Centre for Process Innovation (CPI; Redcar), to work with N8+ to capitalise on this opportunity. Together, we will deliver solutions more quickly to sectors where adoption of hydrogen technologies has not previously been prioritised. In particular we will:

1. Optimise **blue hydrogen** (use of fossil-fuel derived hydrogen with carbon capture offset) for rapid market growth, acting as a bridging technology to green hydrogen. This bridging approach will allow us to focus immediately on the removal of industry barriers: design of hydrogen 'compatible' materials, data on degradation and operating procedures, and the design, development, and testing of an intelligent and safe hydrogen transmission system.
2. Establish **green hydrogen** for a longer-term scaled up solution. N8+ and industry hydrogen expertise will collaborate with low-carbon energy suppliers, (Sellafield for nuclear as well as onshore and offshore wind farms), to test the feasibility of a green hydrogen supply, working with existing **pilot scale** testing facilities across the North.
3. Solve **hydrogen storage and distribution** at scale. Through innovation collaborations we will develop novel technology and systems for safe scale-up.
4. Work with industry partners to drive innovation through the supply chain and remove barriers to adoption of hydrogen in applications for industrial; transport; commercial buildings and homes.

Intended outcomes

- Driving the levelling up agenda by creating a globally competitive innovation-led hydrogen economy in left behind parts of the North.
- Supporting efforts to make the UK a scientific superpower, by leading the development of hydrogen technologies in support of government's efforts to reach net zero carbon emissions by 2050.

⁷All party parliamentary group on hydrogen report, July 2020

Grow Smarter

Managing land for net zero by reducing emissions and increasing carbon capture

The NPIER and Science and Innovation Audits identify advanced manufacturing and materials as pan-Northern strengths, particularly when coupled with the bioeconomy and clean growth. Optimising manufacturing and production while maximising our stewardship of the landscape – capturing carbon, promoting biodiversity, and enhancing ecosystem services (e.g. for flood prevention, water quality, and wellbeing and health), will create a productive and environmentally sensitive Northern rural economy.

The large expanse of natural assets in the North, close to the major cities, industrial hubs and rural areas, gives the North a unique opportunity to reimagine the way we use land at scale for economic and environmental benefit. Improving urban and peri-urban environments will deliver quality green spaces, new business opportunities and increased resilience to climate change for the region's 15 million citizens.

Industry is demanding more sustainable material inputs for their products. The North has the capacity and capability to respond, creating a Northern chemical and raw materials supply chain, whilst supporting regenerative land-use for production, with significant economic and environmental benefits.

Changes in land-use for net zero demand a holistic view to understand trade-offs in different places, to make the best possible choices for the climate and the economy. NzN will bring together a unique cross-sector collaboration of rural, urban and peri-urban land managers and owners, primary producers, local authorities, civil society, and industry to create high-quality sustainable jobs across the whole region.

This collaborative endeavour will be supported by key material assets such as the newly funded National Innovation Centre for Rural Enterprise (NICRE) at Newcastle University as well as key natural assets including 88% of England's peat, 28% of England's forest, and 49% of all England's water-courses.⁸

We have commitments from our commercial partners at Unilever (Wirral), PZ Cuzzons (Salford), BASF (Cheshire), and Procter & Gamble (Newcastle upon Tyne) to work with us to *manage land use for net zero by reducing emissions and increasing carbon capture*. In particular we will focus on:

1. Developing and **pilot-scale testing** of novel, sustainable feedstocks for bio-derived bulk materials and high-value chemicals to circularise the Northern household products and chemicals industries.
2. Driving carbon reduction across the northern rural economy by supporting the development of **vertical farming and other innovative technologies** in peri-urban spaces, reducing agricultural land use footprint, freeing up land for other purposes and creating shorter food supply chains.
3. Supporting the increased use of natural assets in the North of England to **sequester carbon at scale** for removing carbon from the environment, supporting biodiversity, enhancing wellbeing for visitors to our rural and coastal spaces and opening up new business opportunities for the visitor economy.

Intended Outcomes

- Supporting Northern businesses to move more quickly to new, more sustainable business models and market sectors.
- Supporting the Northern household products and high-value chemicals industries in creating sustainable land-use models to underpin their future growth
- Driving the levelling up agenda by supporting innovation-led growth in rural and peri-urban parts of the North which currently have weak links to the North's research and innovation infrastructure. .
- Making the UK a scientific superpower in sustainable land use for net zero carbon emissions by 2050, by supporting practically-focused science in the production of bio-derived materials and carbon sequestration, which have potential for significant global growth.

⁸ A Plan for Nature in the North of England, IPPR North, June 2020

Skills and productivity

Creating the workforce for a northern green economy

One in four employers are expecting to make redundancies because of Covid-19. NzN offers a strategic opportunity to bring together a trailblazing collaboration of Universities, Colleges and employers to up-skill these Covid-19 displaced workers into good quality jobs in vibrant clean industries. This will be a fundamentally new way of establishing HE and FE collaborations within a place-based educational ecosystem. It will also train workers in the Northern Powerhouse for making the transition to low Carbon products, services and processes. Many firms will struggle to adapt and survive in the new economic environment and to make the transition to net zero. This is particularly the case for businesses located in left behind towns and rural communities which do not currently have easy access to the critical technologies, services, and skills needed to adapt. We will establish an integrated net zero skills and productivity programme focused on NzN training at levels 3-7 and “ecopreneurship” skills to support the next generation of business leaders.

We propose to:

1. Establish the “**NzN Skills Alliance**” as a collaboration of experts from HE, FE, RTOs and industry, to map existing NVQ3-7 NzN training provision including apprenticeships; identify future green economy needs; and design and pilot new and innovative ways of offering training through FE and HE.
2. Create an **NzN skills escalator** based on work of the NzN Skills Alliance and offering integrated NzN training provision with incentives for upskilling and progression through Apprenticeship or HE pathways.
3. Establish a “Sustainable hydrogen” skills hub **in Teesside** and a “Grow smarter” skills hub at **Eden North in Morecambe**. The skills hubs will be home to cohorts of doctoral students registered with N8+ Universities and supervised jointly by HEI and industry-based supervisors. Both hubs will develop outreach programmes, opening up a range of opportunities to potential employees and the public in left-behind towns such as **Blackpool and Blyth**.

Intended Outcomes

- Delivery of an integrated NzN training environment uniquely linking FE and HEI institutions with reach into all parts of the North through existing and new facilities.
- Delivery of 16,000 student-years of new training provision by FE colleges and 60 doctoral studentships.
- Creation of a highly skilled Northern Powerhouse green economy workforce spanning NVQ3-7 and up to PhD (level 8), supporting the economic recovery from Covid-19.

Appendix 1: Project partners as of September 2020

