Nuclear in the Northern Powerhouse

INVEST IN GREAT
BRITAIN & NORTHERN IRELAND

"Almost half the UK's civil nuclear jobs are in the Northern Powerhouse."

Source: Nuclear Industry Association jobs map

Welcome
to the home of UK civil nuclear

Markets. Expertise. Connectivity.

The Northern Powerhouse is the beating heart of the UK's leading civil nuclear industry. It was where the industry began with the world's first civil nuclear plant, and today is home to the global-leading centre for decommissioning at Sellafield, two existing nuclear power stations, the headquarters of the industry regulator – the Office of Nuclear Regulation – and a key area of operation for all of the UK's major nuclear companies.

Nowhere else in Europe is so much nuclear expertise so concentrated, with unparalleled access to a world-renowned skills base and pioneering expertise in nuclear research and development. Hundreds of companies and investors in the nuclear industry – including global leaders such as **URENCO, Westinghouse, Sellafield Ltd, EDF Energy, National Nuclear Laboratory** and **NuGen** – already benefit from the geographic proximity and easy connectivity to build **more efficient and reliable supply chains, readily access customers** across the UK, and access **a pool of highly-skilled people** attuned to the specific needs of the nuclear industry.

The Northern Powerhouse is spearheading industry innovation, with the region being chosen to establish the world-leading **Nuclear Advanced Manufacturing Research Centre (NAMRC)**; the UK-China **Joint Research and Innovation Centre (JRIC)**; and the **High Temperature Facility (HTF)** for materials testing.

Here you'll also find the largest and most connected community of nuclear academics and researchers anywhere in the UK. The Northern Powerhouse is the centre for skills and education, including The National Skills Academy for Nuclear and the National College for Nuclear. Nearly half of the UK's civil nuclear industry is employed within the Northern Powerhouse, and there exists a vast range of vocational courses, apprenticeships, graduate and postgraduate courses, helping foster and retain world-class expertise within the region. R&D in cutting-edge nuclear developments is enhanced by the vibrant and dynamic collaboration between universities, nuclear organisations and companies.

As the nuclear renaissance continues to gather pace, the UK is set to embark on a significant civil nuclear build programme. The opportunities within the Northern Powerhouse for organisations looking to succeed within the nuclear sector are now, more than ever, unmissable. Come and join us to benefit from a wealth of customers, talent, skills, operational excellence, market access, unrivalled nuclear experience and a concentration of specialist nuclear companies you simply will not find anywhere else.

Our key markets

1. Decommissioning
2. New-build programmes
3. Full fuel cycle services
4. Current fleet operations

Investing in the Northern Powerhouse

The UK Government is committed to building a Northern Powerhouse that enables the great cities and towns of the North of England to pool their strengths and realise their enormous potential. The Government is spending £13 billion on transport in the Northern Powerhouse to improve connectivity, as well as funding groundbreaking scientific projects and supporting exciting arts and sports ventures.

Within the nuclear sector, ambitious companies are recognising that the North of England's unique expertise and capabilities, exceptional access to markets and central location is needed for their global or regional headquarters.

£350billion

The Northern Powerhouse has a GDP which, if it were a country, would make it the 21st largest economy in the world

Where civil nuclear began and continues to flourish

From the start of the industrial revolution, to the first artificial splitting of the atom in 1917, to the isolation of graphene in 2004, the North of England has always been at the forefront of science and technology. And this combination of pioneering spirit, bold ingenuity and manufacturing know-how is still evident in the region's dynamic and growing civil nuclear power sector.

In fact, **the world's very first civil nuclear programme began in the Northern Powerhouse**, marked by the opening of Calder Hall power station, close to Sellafield in West Cumbria, in 1956. Nowhere else in the world can boast the civil nuclear history of the Northern Powerhouse. And the lessons learnt from our pioneering programmes – and developments since – are what make us both world leaders and the epicentre of the UK's expertise. Today, the Northern Powerhouse is using all this experience and expertise to **make nuclear power safer, more efficient and more purposeful** in a fast-changing world. The extensive history in nuclear has led to a deep and broad supply chain being established in the Northern Powerhouse. Many major companies including Amec Foster Wheeler, Jacobs Engineering, Atkins, Rolls-Royce, and Nuvia, have a significant presence in the region. The presence of these companies in turn creates more commercial opportunities across the supply chain.

"The Northern Powerhouse has strong ties to the UK civil nuclear heritage. From Birchwood we are central to many of our clients and key stakeholders, and our office in Westlakes, near Whitehaven, services some of our flagship projects for key customers such as Sellafield Ltd, the Low Level Waste Repository and the National Nuclear Laboratory."

Keith Collett, Nuvia CEO

Nuvia

Providing a complete range of nuclear services

Nuvia's heritage dates back to the beginning of the UK nuclear industry, and today provides essential nuclear services to a range of Northern Powerhouse, UK-wide and international clients.

The company employs around 1000 people, with capabilities covering the full project lifecycle: engineering, procurement and construction (EPC), programme management, consultancy, operations, decommissioning, radiological protection and various enabling products. Clients range from commercial organisations, to government bodies and international agencies. This diverse work is made possible due to the advantageous Northern Powerhouse ecosystem, a robust supply chain and a far-reaching network of resources, including Europe's largest private-sector health physics team.

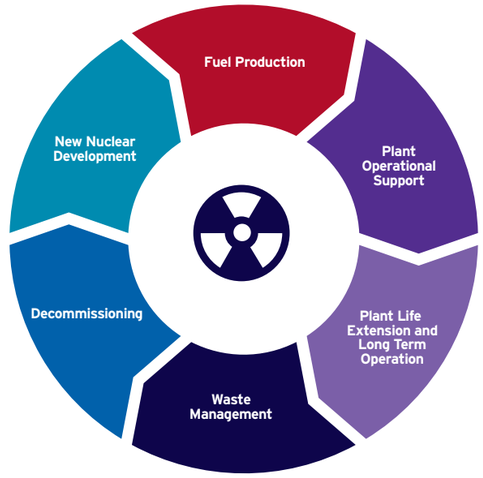
www.nuvia.co.uk

Across the full fuel cycle

Addressing the complex challenges of the nuclear fuel cycle needs careful consideration and expertise. The Northern Powerhouse is the only area in the UK with full fuel cycle capabilities, undertaking everything from uranium enrichment to fuel manufacture, fuel processing, waste management and decommissioning, all operated by global leaders such as URENCO and Westinghouse.

The region's development of fuel designs, improvement of spent fuel processes and creation of advanced fuels for new reactors are vital for the continued security of the UK's nuclear power supply, and have led to companies from within the Northern Powerhouse adopting a global advisory role so that this expertise can be shared worldwide. Meanwhile, companies investing here benefit from the connectivity and transport links provided in the Northern Powerhouse, as well as the unrivalled diversity of sites within the region that allow specialist companies to collaborate with maximum efficiency.

Nuclear in the Northern Powerhouse



Westinghouse Nuclear

Meeting the UK's nuclear fuel requirements

Westinghouse is a US company with a long history in the Northern Powerhouse. Their Springfields fuel manufacturing site has the advanced technology to generate fuel for all major designs of nuclear reactors worldwide – and most of the fuel requirements for the UK's nuclear power stations are met by this facility. Springfields main activities involve the manufacture of oxide fuels, uranium recovery services and the decommissioning and demolition of redundant plants and buildings.

www.westinghousenuclear.com

URENCO

World-leading uranium enrichment

URENCO, founded in the UK in 1970, uses world-leading centrifuge technology to provide the uranium enrichment services needed by nuclear customers worldwide to generate low carbon nuclear energy. This pivotal area of the fuel supply chain culminates in the sustainable generation of electricity for consumers across the UK and around the world.

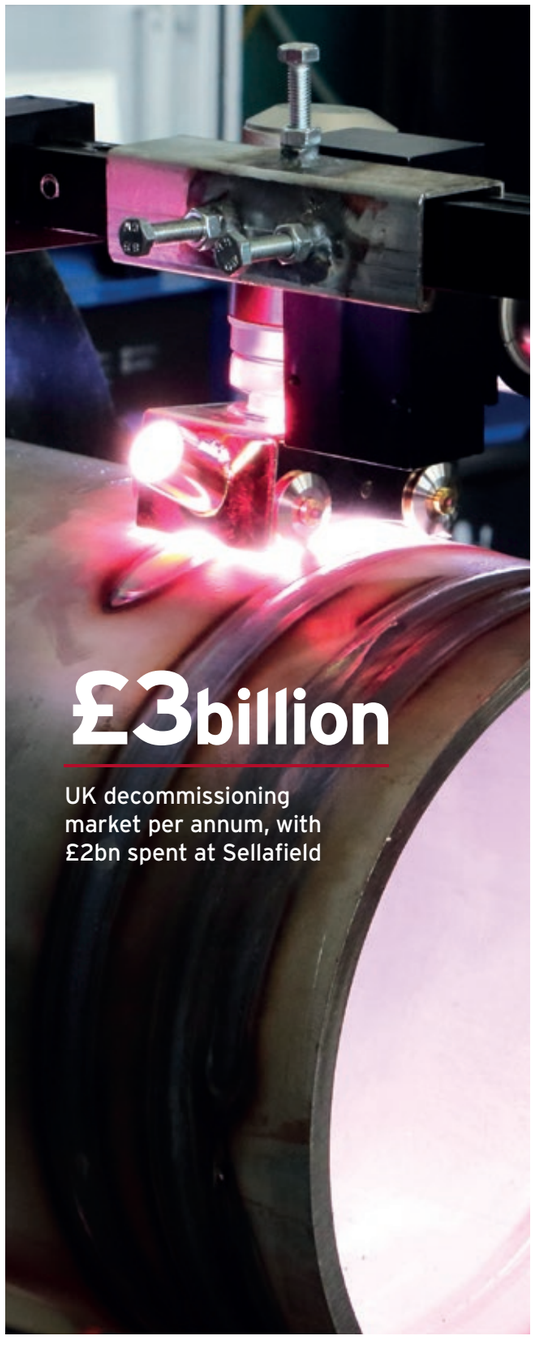
www.urenco.com

World leaders in decommissioning

As the first country to employ civil nuclear energy, it's hardly surprising that the UK leads the world in the decommissioning process. And the Northern Powerhouse leads them both: Sellafield, West Cumbria, is the home of UK decommissioning capability and a centre of excellence recognised worldwide; and the Nuclear Decommissioning Authority (NDA), located in Cumbria, is responsible for a budget of approx. £3 billion annually – setting the overall UK decommissioning strategy.

Sellafield Ltd is the organisation responsible for the safe operation and clean-up of the Sellafield site on behalf of the NDA. Sellafield itself is the largest nuclear complex in Western Europe, delivering a nationally important mission – to ensure the safety and security of the UK's nuclear legacy and progressively decommission some of the world's oldest facilities. Covering just two square miles, the Sellafield site is home to more than 200 nuclear facilities and employs more than 10,000 people – and thousands more within the supply chain. On behalf of the UK Government and taxpayers, Sellafield Ltd's objectives are to progress decommissioning and clean-up, deliver high hazard reduction and encourage high standards in health, safety, security, and environmental performance. With an annual budget of around £2 billion and a work plan for the next 100 years, Sellafield Ltd drives operational excellence, innovation and collaboration models for the whole nuclear industry.

Decommissioning is an ever growing discipline – and of paramount importance as increasing numbers of older reactors go offline in the UK and worldwide. Being chosen as a supplier to Sellafield Ltd enables companies to not only enjoy being part of a significant market and a world-class ecosystem, but to also gain the international credibility that can open access to projects both locally and overseas. These opportunities are increasingly lucrative, with the global decommissioning market estimated to be worth £50 billion per annum by 2020, with between 82 and 145 reactors retired by 2030 (mostly within Europe).



Nuclear power stations in the UK

Existing nuclear power stations

1. Hunterston B Power Station
2. Torness Power Station
3. Hartlepool Power Station
4. Heysham 1 & 2 Power Stations
5. Hinkley Point B Power Station
6. Dungeness B Power Station
7. Sizewell B Power Station

Fuel plant

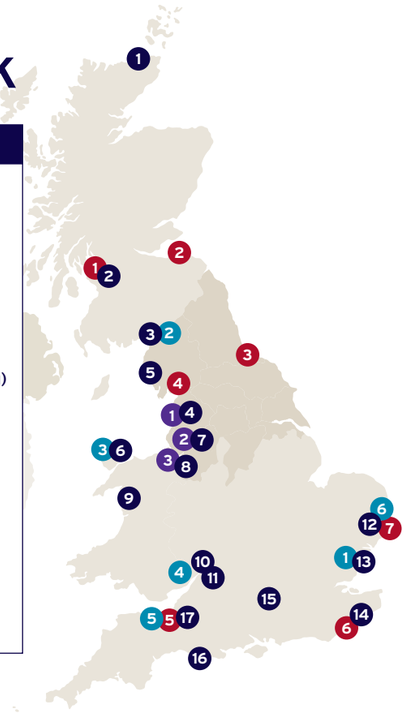
1. Sellafield (Fuel Fabrication)
2. Springfields (Fuel Manufacturing)
3. Capenhurst (Fuel Manufacturing)

Proposed new build sites

1. Bradwell Power Station
2. Moorside Power Station
3. Wylfa Newydd Power Station
4. Oldbury Power Station
5. Hinkley Point C Power Station
6. Sizewell C Power Station

Decommissioning sites

1. Dounreay
2. Hunterston A Power Station
3. Chapelcross Power Station
4. Sellafield (Decommissioning)
5. Low Level Waste Repository
6. Wylfa Power Station
7. Springfields
8. Capenhurst (Decommissioning)
9. Trawsfynydd Power Station
10. Berkeley Power Station
11. Oldbury Power Station
12. Sizewell A Power Station
13. Bradwell Power Station
14. Dungeness A Power Station
15. Harwell
16. Winfrith
17. Hinkley Point A Power Station



Calder Hall

The world's first power plant that's now 50% fuel free

The painstaking task of removing tens of thousands of fuel rods from the world's first nuclear power station is halfway to completion. Workers at Sellafield's Calder Hall, West Cumbria, have now finished unloading fuel from the second of its four reactors, leaving two left to empty.

The defuelling programme began in 2011 and is scheduled for completion in 2019. Once finished, this will allow the station to be fully decommissioned.

Calder Hall began powering homes and businesses with carbon-free electricity in 1956, the year it was opened by the Queen. It closed in 2003, following 47 years of safe operations – 27 years longer than was originally planned.

Glyn Thomas, Sellafield Ltd's head of Calder Hall, said: "The programme is going really well with a gradual but sustained acceleration in defuelling rates since we began in 2011.

"We have two more reactors to empty before our target completion date of 2019. This will allow time for the fuel to be reprocessed in the Magnox Reprocessing plant, which will complete its operations in 2020.

"Our success is down to the hard work of the team at Calder Hall and those in the supporting areas of the Sellafield site. I'd like to say a big thank you to them all."

www.sellafieldsites.com

The centre of British new-build

There is a growing UK and worldwide demand for energy that's low carbon, reliable and cost-effective. And so today, 60 years after the Northern Powerhouse built the world's first civil nuclear plant, we witness a renaissance in the building of civil nuclear power plants.

Industry has set out proposals to develop 18GW of new nuclear power at six sites in the UK, across England and North Wales, where Horizon Nuclear Power, owned by Japan's Hitachi Ltd, proposes to build 2 ABWR reactors at Wylfa. An ambitious next-generation power station is planned at Moorside, West Cumbria, creating opportunities directly in the Northern Powerhouse, but the connectivity we have will allow all new-build projects to take advantage of the specialist expertise and capabilities provided by companies in the region.

Investors in the Northern Powerhouse will also be ideally positioned to service some of the numerous international projects in the pipeline. Worldwide investment in new nuclear is set to hit a staggering **£930 billion over the next 20 years**, ensuring a growing demand for the engineering services, hardware and skills at which the Northern Powerhouse excels.

"The UK is ideally placed to assist and advise nations looking to responsibly develop new civil nuclear power programmes."

Tom Greatrex, Nuclear Industry Association

NuGen

A new-build project to safeguard the UK's energy security

NuGen is a UK nuclear joint venture between Toshiba and ENGIE. NuGen's Moorside Project aims to develop a new generation nuclear power station that will generate up to 3.8GW of low-carbon electricity from a sustainable source. Located in West Cumbria, North West England, Moorside will generate enough electricity to power more than 6 million homes – equivalent to 7% of the UK's electricity requirements.

NuGen plans to build three Westinghouse-designed AP1000® nuclear power plants with the first scheduled to come online in the mid-2020s.

West Cumbria is the UK's nuclear heartland with over 70-years' experience in nuclear – more than one-third of the UK's civil nuclear sector is based in the region.

Moorside will be the largest ever private sector investment in the region and will bring a major socio-economic boost, creating 14-21 thousand jobs over the lifetime of the project and sustaining over 1,000 jobs during an operational life of 60+ years.

NuGen wants this inspirational project to benefit the entire region – creating jobs, developing infrastructure in the region and delivering economic security for thousands of people.

www.nugeneration.com

"We are working closely with Government to take Moorside forward, which will be Europe's largest new nuclear power station. The project will be transformational – it will become the engine of the Northern Powerhouse."

NuGen CEO, Tom Samson

Darchem Engineering

Supplying to Sellafield and Hinkley Point

Darchem Engineering, based in the North East of England, is a subsidiary of US company Esterline Technologies Corporation. The company has been awarded an approximate £100 million contract to supply and install stainless steel liners for reactor, fuel pool and other smaller tanks and sumps at the new Hinkley Point C power station, along with reflective metal insulation – where Darchem is a leading global supplier, with their equipment fitted to over 170 nuclear plants – and various other specialist fabrications.

This recognition follows on from a £50 million contract awarded in 2015 to manufacture over 1,000 specialist intermediate-level nuclear waste storage containers at Sellafield. Parent-company Esterline has long appreciated the potential that Darchem has within the Nuclear Industry and, recognising the skills and expertise contained within the company, financed the construction of a new purpose built £8 million factory to help them realise their ambitions.

www.darchem.co.uk

"I am delighted to see our long-term commitment to the UK nuclear industry is being recognised in our selection as the preferred bidder for Hinkley. This contract will enable Darchem to expand its already significant apprentice programme."

Billy Meijer, Managing Director, Darchem

Outokumpu

Providing high performance stainless steel for the nuclear sector

Part of the global Outokumpu group, Sheffield-based Outokumpu Stainless Distribution (OSD) is the UK service centre for stainless steel plate, sheet and coil products. The company provides high-performance steel products for a variety of sectors, and has a long history supplying the nuclear decommissioning market.

The company has already provided steel for one-off projects such as Sellafield's six new pile fuel cladding silo doors – each weighing over 12 tonnes – and for higher-volume products such as intermediate level waste containers. They also have international expertise, with the group supplying nuclear new-build projects around the world including France, China and the US.
To prepare for UK new-build opportunities, the OSD team entered the Nuclear AMRC's Fit For Nuclear programme in summer 2015.

OSD is working to supply material for Moorside Nuclear New Build in West Cumbria, and the team are at advanced stage with a number of potential enquiries and new customers linked to Hinkley Point.

www.outokumpu.com

"Being part of the waste and decommissioning supply chain means we're used to working with high levels of control over the traceability and integrity of the steels we produce...when it comes to building nuclear power stations in the UK, we saw it as a market to be in."

Simon Marsden, Commercial Manager, Outokumpu

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Universities in the Northern Powerhouse – training more STEM graduates than rest of country combined

The right skills

A world-class nuclear industry requires the right combination of vocational skills, theoretical understanding, engineering and advanced research. The Northern Powerhouse is one of the few places that supplies it all, ensuring investors to the region can source the skills they really need.

Vocational training

Specialist nuclear apprenticeships, vocational colleges and undergraduate courses ensure a pipeline of the right skills to service the sector.

The existing capability will soon be boosted by The National College for Nuclear, opening to provide training programmes across the skill base.

University sector

A large number of Northern Powerhouse universities provide specific nuclear science and technology education leading to graduate and postgraduate qualifications. The list is long and extensive but includes the universities of Cumbria, Lancaster, Leeds, Liverpool, Sheffield and Manchester.

"Our Warrington Head Office grants us access to some of the best technical talent in the industry... the local education institutions are actively working in partnership with industry to produce graduates and apprentices of exceptional quality."

Keith Collett, Nuvia CEO

Research capability

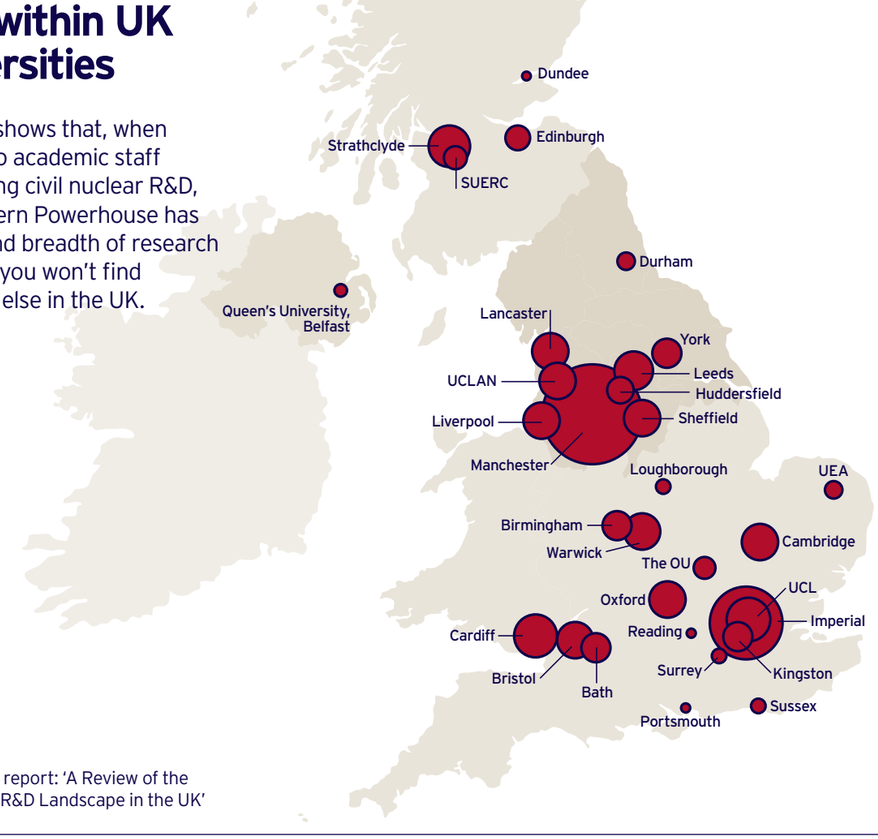
Nowhere else in the UK has the Northern Powerhouse's breadth and depth of research experience. World-leading universities and laboratories, such as Manchester's Dalton Institute, provide the postgraduate research and innovation that help keep the Northern Powerhouse at the cutting-edge of nuclear developments, but nuclear research in the region is by no means confined to the university sector. The UK's National Nuclear Laboratory (NNL) operates state of the art, world-leading research facilities that would cost at least £1.5 billion to replicate, and which are capable of handling uranium, plutonium, spent fuel and highly active waste, amongst other nuclear materials.

Amec Foster Wheeler's Nuclear Analytical Services laboratory is Europe's largest commercial radiochemical analysis laboratory and provides independent testing facilities for all aspects of radioactivity analysis. The laboratories also include an open access, high-temperature facility (HTF) for testing materials used in current and future nuclear reactors that can include small modular reactors and Generation IV systems. The HTF is a partnership that includes NNL, EDF Energy, URENCO, the Universities of Manchester, Bristol and Oxford, the Open University and Imperial College London.

The diversity of institutions and facilities within the region combines to create a vibrant and dynamic research community made up of scientists and engineers from the national lab, academia and industry. Businesses all benefit from this thriving research excellence and talent pipeline, and new research and innovation centres continue to choose the Northern Powerhouse as their location of choice.

Civil nuclear R&D within UK Universities

This map shows that, when it comes to academic staff undertaking civil nuclear R&D, the Northern Powerhouse has a depth and breadth of research capability you won't find anywhere else in the UK.



Source: HMG report: 'A Review of the Civil Nuclear R&D Landscape in the UK'

Joint Research and Innovation Centre

A pioneering collaboration between the UK and China

The UK-China Nuclear Joint Research and Innovation Centre (JRIC) was announced in 2015 as a jointly-funded collaboration to develop innovative nuclear technologies, facilitate world-leading research projects and strengthen UK-China relations. The UK and China have jointly committed £50 million to the Centre over a five-year period. The project is being led on behalf of the respective governments by the UK National Nuclear Laboratory and the China National Nuclear Corporation.

The Centre, which will be based in the North West, is also set to play an important role connecting companies and universities within the Northern Powerhouse with the rest of the UK. This unique collaboration will establish a partnership with the UK and Chinese nuclear energy sector to deliver beneficial R&D projects on a number of different areas of work across the entire fuel cycle.

"The JRIC will allow more cooperation in scientific research, technology, and throughout the whole nuclear industrial chain."

Qian Zhimin, China National Nuclear Corporation

The National College for Nuclear

Delivering the specialist skills for the UK's nuclear revolution

The flagship National College for Nuclear (NCfN) forms a cornerstone of the UK Government's response to growing developments and concerns in the world of energy. It's a strategic partnership between industry, national regulators, skills bodies and training providers, revolutionising the way training for the nuclear sector is delivered while ensuring the UK maintains its global reputation for quality, safe and reliable civil and defence operations.

"It's expected the nuclear industry will need 30,000 new employees over the next decade – and the Nuclear College will equip young people with the skills they need."

Matt Hancock, MP, Former Minister for Business

When it opens in late 2017, the state-of-the-art college will boast a collaborative campus, virtual reality centre – including virtual laboratories and virtual engineering suites – radiation and chemistry laboratories, computer-equipped training rooms and a flexible learning/event space. It is estimated 7,000 learners will have accessed the college by 2020.

www.ncfn.ac.uk

Opportunities in the Northern Powerhouse

The Northern Powerhouse is a global hub of commerce, science, technology, entrepreneurship and innovation, with over one million businesses located here and attracting thriving international investment. Foreign Direct Investment levels are growing at twice the rate of the rest of the UK, due in no small part to the region's universities, which undertake some of the most cutting-edge research in the world.

The region is home to seven international airports flying directly to **254 destinations worldwide**; there are 12 major ports; a high-speed train network (including the forthcoming of HS2 link) that connects the North efficiently with London and the South East; and modern, reliable intercity links across the Northern Powerhouse.

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International airports within the Northern Powerhouse

But it's not only persuasive facts that make people want to do business here. From the renowned beauty of the Lake District to the world's most famous football teams, the North of England is recognised, admired and visited by people from all over the world.

The United Kingdom offers the supportive environment that investors need; at 20%, our headline tax rate is the lowest in the G7 and joint lowest in the G20. We enjoy a worldwide reputation for the fairness of our regulatory system, and our employment environment is flexible, open, and business friendly.

20%

UK headline tax rate, lowest of G7 nations

It is clear that this is a place where businesses and industry prosper and there are many opportunities to set up a nuclear business here.

Our network of UK specialists includes a team who are based in the North of England, ensuring expert local insight into projects, local government and businesses can be quickly and reliably provided. We look forward to working with you and showcasing the Northern Powerhouse.

For further details or to discuss the potential for an initial meeting, please email: nph@trade.gsi.gov.uk

5 reasons to invest in the Northern Powerhouse

1. A world-class specialist cluster

Join hundreds of successful nuclear companies already enjoying the benefits of a specialist ecosystem.

2. High-level skills and experience

Benefit from a wealth of universities and colleges working closely with industry to supply the right depth and breadth of skills.

3. Full fuel cycle capabilities

Choose the only region in Europe offering full capabilities for more efficient supply chains and operations.

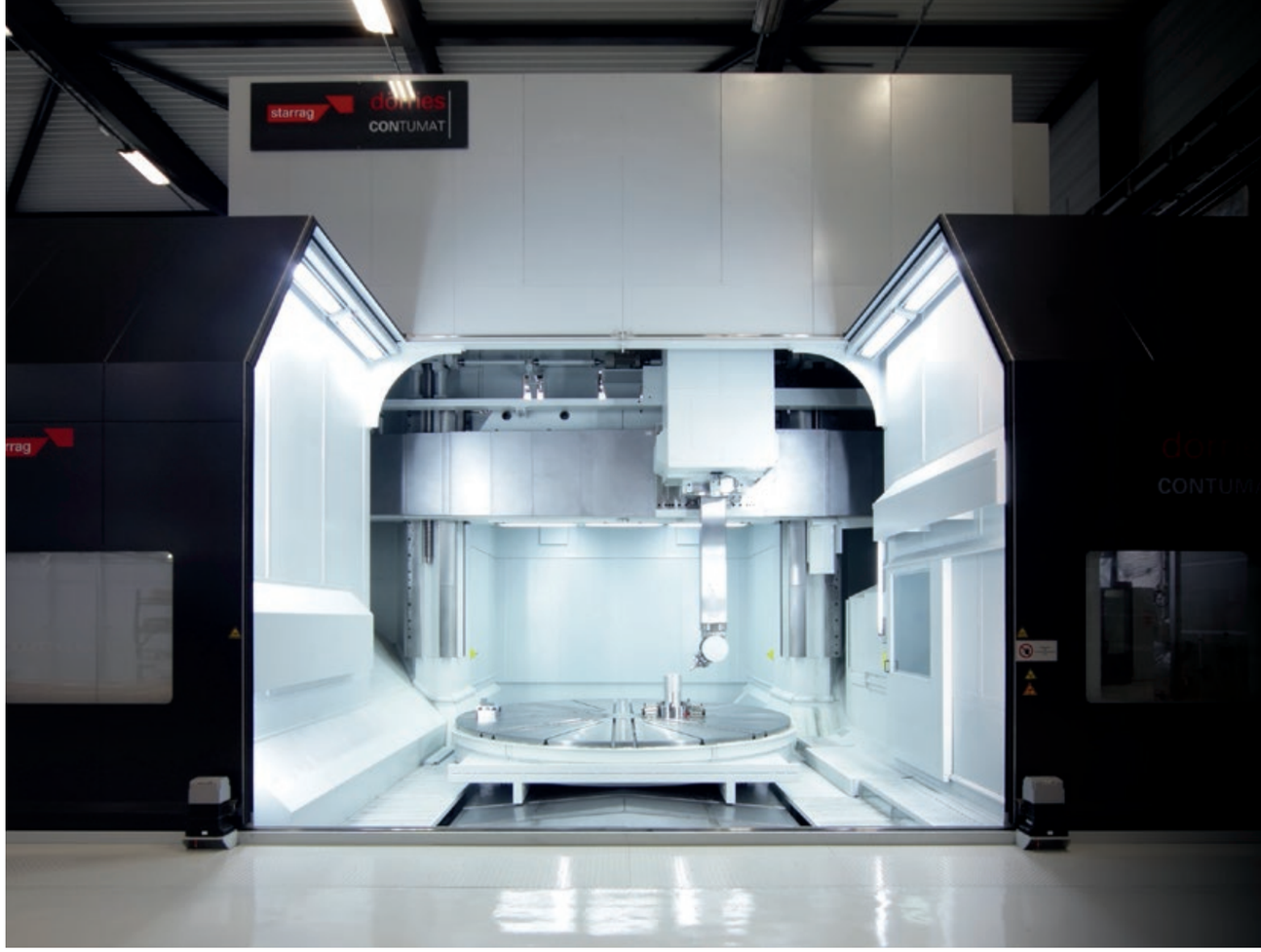
4. A growing UK market

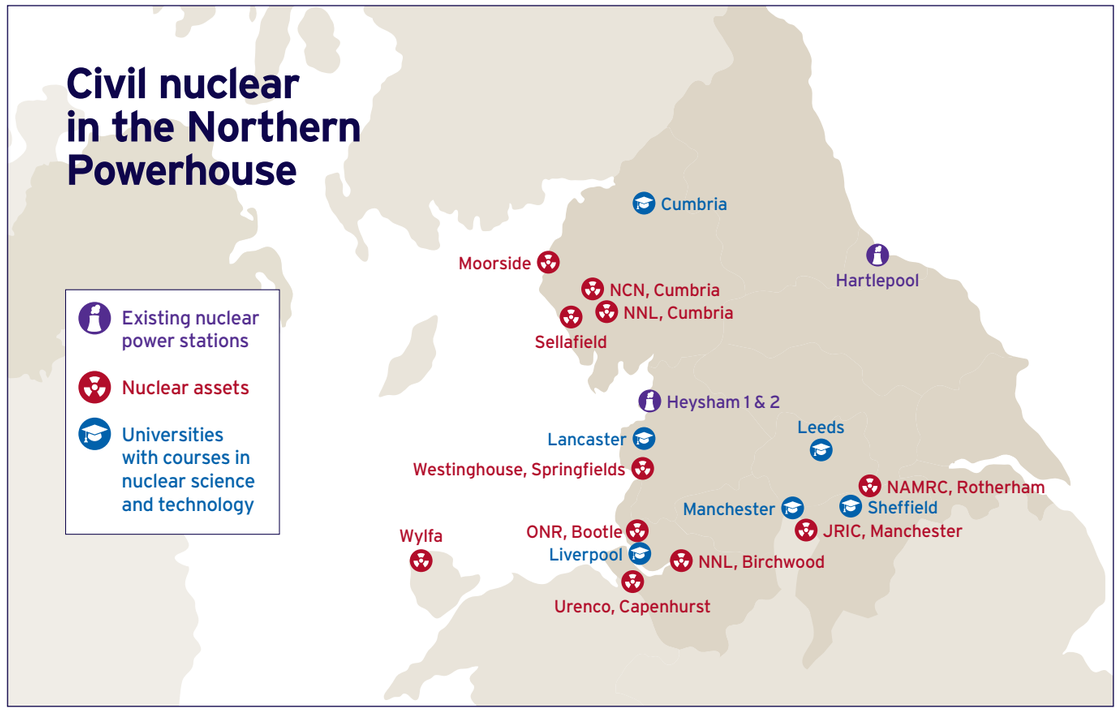
Be part of the UK nuclear industry as it goes from strength to strength over the coming years.

5. Support for investment

Get started with global support, tailored advice and a wide range of initiatives designed to makes investing in the Northern Powerhouse simple.

Discover how to invest in the Northern Powerhouse's world-leading nuclear sector at nph@trade.gsi.gov.uk





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Department for International Trade

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DIT
The UK's Department for International Trade (DIT) has overall responsibility for promoting UK trade across the world and attracting foreign investment to our economy. We are a specialised government body with responsibility for negotiating international trade policy, supporting business, as well as delivering an outward-looking trade diplomacy strategy

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Published February 2017 by Department for International Trade.

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