
Moorside Clean Energy Hub

# Building a new Clean Energy Economy in Cumbria and the North West

June 2020

“There is a clear vision for the whole sector where research and development will combine with long established expertise answering global, national, regional and local calls for action. This is a ground up approach recognising that we proudly call ourselves the centre of nuclear excellence because previous generations pioneered, often first of a kind technology.

Our trusted, tried and tested track record makes Copeland the most logical demonstrator site for advanced and small modular reactors but the vast land mass available means large scale energy generation and other clean fuel manufacturing are all priorities and the recent Energy Systems Catapult report, Nuclear for Net Zero, has said that going ahead with a further 10GW of an established GW design for the UK is a low regret decision.”

Trudy
Harrison
Member of Parliament
for Copeland

# Why Now? Why Us?

A dramatic reduction in carbon is needed to meet the UK's 2050 Net Zero commitment. Nuclear power generation can play a key part in the UK's energy mix, providing affordable, reliable low-carbon energy.

The Energy Systems Catapult report 'Nuclear for Net Zero' says that a further 10GW of GW-scale new build of an established design is a low regrets option, provided costs reduce. And that SMR and AMR programmes should be brought forward.

Through the work of many of those in the Moorside Clean Energy Hub on **Hinkley Point C**, the UK has an established detailed GW design - the UK EPR (which will produce less waste and will be simpler to decommission, compared to AGRs). We can see the impact of learning in productivity improvements between Unit 1 and Unit 2. At **Sizewell C**, engineering work has been carried out to replicate the established design in different ground conditions: £4bn can be saved by not doing things again and valves at Sizewell C are being designed to enable the power station to provide low carbon heat as well as electricity. We can bring the established design, work on heat, and all of this experience from Hinkley Point C, to Sizewell C, to **Moorside**. This offers a great opportunity to co-locate SMRs and AMRs with UK EPRs, to benefit from the experience, operational team and shared site costs, and enable work to start quickly in Cumbria.

In 2019, **Hinkley Point C** completed the base of Unit 1. Now, ahead of schedule, it has completed the same milestone on its second identical reactor, Unit 2. And the **Sizewell C** DCO has been accepted by PINS.

## Hinkley Point C powering ahead

£1 = £2.27

£1 spent by the project is currently generating £2.27 in regional value

Productivity benefits between Units 1 and 2 of the project include:

**45%**

The time saved for the installation of steel – 45% faster on Unit 2

**30%**

the prefabrication of the liner cup floor – 30% faster on Unit 2

**50%**

50% reduction in installation time for cooling system components

**85%**

85% efficiency saving has been made in relation to the concrete pours

The workforce and supply chain have learned how to build UK nuclear. Hinkley Point C is not only on time, but has also started delivering a host of economic benefits.

**Sizewell C** is the follow-on project from Hinkley Point C. By replicating its design, and working with the same key supply chain partners, Sizewell C will benefit from more certain costs and schedule, lowering the cost of capital and the cost to the consumer.

**The Moorside Clean Energy Hub** plans to use all this work – design, replication, the unique experience of powering ahead on a big nuclear build on a timely and effective basis, use of nuclear to power industry – to develop **Moorside**.

And go a step further, as well as serve as a pathway to the future, by offering to host SMRs and AMRs alongside the UK EPRs – so the UK nuclear industry can explore its full potential to contribute to the need for a clean and resilient energy system as we recover from Covid 19: the hub will create linkages with emerging technologies, such as green hydrogen and energy storage.


## Hinkley Point C

# 10,300

Job opportunities created to date…

On track to meet the ambition of creating 25,000 during the construction phase of the project.

# 40%

Of the workforce recruited from the local area…

Against a target of 34% during the construction phase of the project.

# £119m

Of community investment delivered to date…

Against a target of providing £130 million of investment to support the community in areas such as economic development, tourism, health, leisure and infrastructure.

# 664

Apprentices trained on the project to date…

On track to meet the ambition of training 1,000 during the construction phase of the project.

# £1.67bn

Spent with companies in the South West to date…

Against a target of £1.5 billion during construction.

# Skills, Jobs and Supply Chain

Currently, Hinkley Point C is achieving 64% UK supply chain in construction. Sizewell C is aiming for 70% in construction and higher in operations, with many of those in the Moorside Clean Energy Hub committed to investing further to build capabilities in the UK. This includes planning to develop facilities across the North of England to deliver the electrical, instrumentation, mechanical and piping systems that are essential to Sizewell C, creating close to 5,000 new jobs in the process.

We expect Moorside to act as a further locally-based opportunities-multiplier, working with the experienced nuclear (and wider) supply chain in the region. Our experience at Hinkley Point C, and the experience we are building in the East of England with Sizewell C, tells that a project at Moorside has the power to draw organisations together and increase innovation, business creation and collaboration between organisations, growing skills and careers.

Hinkley Point C will invest £14bn in the UK economy during construction. To date, the regional economy has already been boosted by c. £1.7bn.

1.

Competitive Levelised Cost of Energy (LCOE) of £30-60/MWh for long-term base load power (depending on Government decision on the financing model).

2.

Establishes foundation for pioneering UK nuclear industry and meet infrastructure investment goals.

3.

Helps meet UK net zero carbon target alongside national energy security and independence.

4.

Significant private sector participation with potential for off-balance sheet treatment post-COD.

# Industrial Cluster, Grid Route and Working with Offshore Wind

The principal objective of **The Moorside Clean Energy Hub** will be to use the electricity and heat generated at Moorside to create lasting economic impact and social benefit. Ideas under consideration include:

- Using low-carbon power and heat from nuclear generation for industrial processes
- Making hydrogen, synthetic fuels and, if it becomes the future of clean shipping, ammonia
- Linking the energy hub with maritime opportunities, including exploring the provision of electricity and heat to freeports
- Provision of heat, chilled water and power

There are several development sites along the Cumbria coast and beyond that could also benefit from the Clean Energy Hub. And heat and electricity from the hub could be used to meet needs at adjoining Sellafield and other sites in the region.

We are exploring a different route to the previous National Grid proposal, sending power up to Scotland and down to the Midlands and South (the southern route is likely to use HVDC cable technology, similar to that operated by the National Grid between Hunterston in Scotland and Deeside in North Wales).

We are looking at sub sea options and to optimise the connection with planned offshore wind developments.

This approach helps to reduce the consenting issues associated with the previously proposed onshore overhead transmission line.

# Innovation, Modularisation and Digitisation

The Hinkley Point C civils team have spent almost a decade developing construction practices that are designed to maximise both the lessons learned from preceding projects and the use of data and technology to support safe and efficient delivery.

This has not only changed the work in the field, but also the skills required. Ultimately, it leads to the development of new qualifications and attracts new talent to the industry. This progress can be leveraged for Moorside.

**Modularisation:** Structures and elements are broken down into components, which can be manufactured in factory environments giving improved working conditions, quality control and reduced dependence of the weather. Examples include steel reinforcement for concrete and large metallic embedded structures.

**Innovation:** Many of the practices at Hinkley Point C are recognised as industry-leading and the civil team are already looking at developments and improvements for Sizewell C, which can be taken into Moorside. This includes having a directly employed workforce, which is rare in the construction industry, to help secure the behaviour and cultures needed.

**Digital Modelling:** Linking the model to the programme to allow reliable assessment of complex sequences and schedules.

We plan to build on this at Sizewell C, and with Moorside hope to supplement the already significant nuclear construction capabilities in Cumbria and the North-West.

# Energy Security: Controlling the Energy Transition

A decision on Moorside will enable the UK to control its own future energy system without an excess reliance on imports:

Take control of its electricity requirements and provide bandwidth to export electricity to Europe or use it to power new technologies.

Unleash the power of renewables by ensuring there is baseload stability in the system.

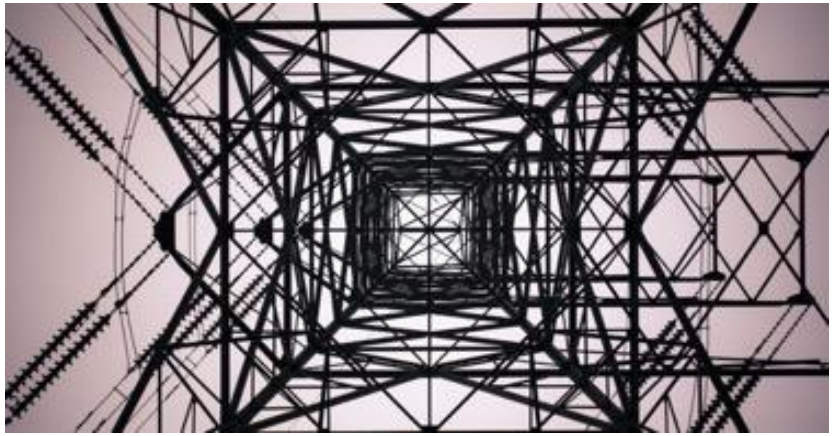
Develop the right tools to deliver UK's low-carbon future.

# Reducing the Cost of Electricity

## Financing Costs

Approximately two-thirds of the Hinkley Point C strike price relates to the cost of financing (i.e. the price of rolling up interest, and of the risk allocation in the project).

Of this cost, more than half can be seen as a 'first-of-a-kind' nuclear construction risk premium. A 'next-of-a-kind' project such as Sizewell C and then Moorside has a reduced risk premium and this can be combined with a financing arrangement, such as the RAB model, to attract infrastructure investors at a low cost of capital.



With a lower cost of capital for Sizewell C, the LCOE for the project could range **between £30/MWh (full Government funding) to £60/MWh (a Thames Tideway Tunnel-like RAB model).**

For Moorside, we assume that the cost estimates would be in a similar range.

## Construction Costs

The construction costs for next-of-a-kind UK EPR projects such as Sizewell C and Moorside will be reduced through replicating the Hinkley Point C design.

There are two significant elements of construction cost:

- equipment costs such as steel, aggregate, and others. For a second-of-a-kind project, the characteristics and quantities can be drawn from detailed design and be "firm"; and
- cost of labour, which in turn can be reduced as productivity increases. We had earlier highlighted productivity improvements from Unit 1 to Unit 2 at Hinkley Point C, and this will improve further by using the same experienced team and building to the same design.

For instance, replication savings for Sizewell C are estimated to be in the region of **£4bn** compared to Hinkley Point C.

We would expect Moorside to benefit from similar replication savings.

The 2018 Nuclear Sector Deal sets an ambition for the nuclear sector to deliver 30% cost reduction by 2030. The consortium believes that replicating the Hinkley Point C design, and having an appropriate financing model in place, will result in a much lower cost of electricity for Moorside.

# Deliverability

The Clean Energy Hub at Moorside is considered to represent a deliverable proposal. The Government's National Policy Statement considers a wide range of topics, to confirm the 'in principle' suitability of the nominated site for new nuclear power generation. This support has been recently reaffirmed by Government through its response to the consultation on the nomination of sites suitable of deployment before 2035.

This conclusion is borne out by the initial feasibility analysis carried out by the Moorside Clean Energy Hub, which confirms that UK EPRs - an established design - could be sited at Moorside. Additionally, we are confident that there are opportunities to host SMRs and AMRs at the site, building a true nuclear ecosystem, as part of the energy hub.

The Moorside Clean Energy Hub has been seeking advice from the Copeland Borough Council, Cumbria Local Enterprise Partnership and Britain's Energy Coast Business Cluster to develop these proposals.

Finally, the legacy of prior site investigations and local engagement can be drawn on to accelerate the project. There are clear opportunities for investment into early works which would help optimise the Moorside programme whilst providing tangible immediate and legacy benefits for local people and the wider region.

# British Developed, Built and Owned

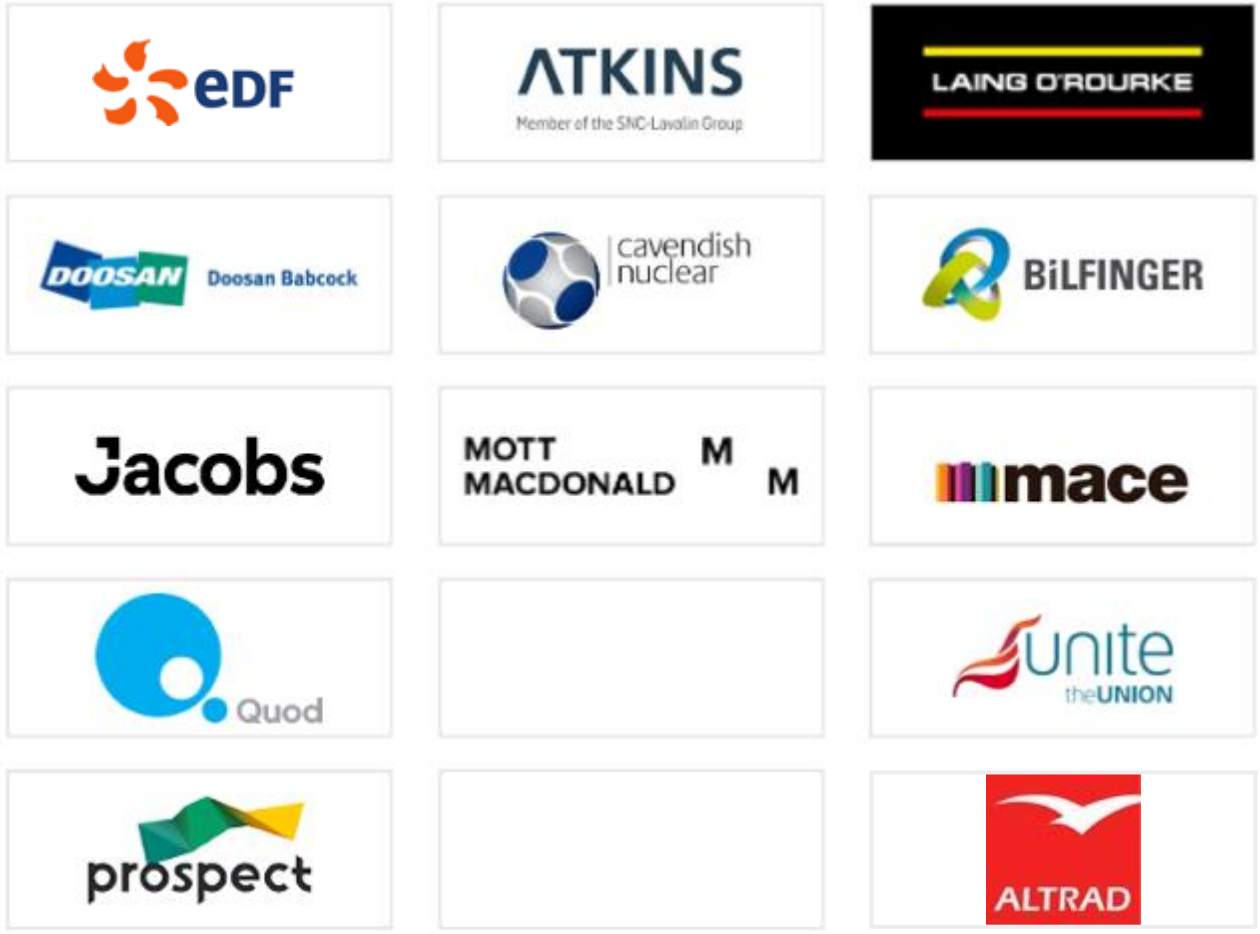
The Moorside clean energy project is being promoted by a consortium of the UK nuclear industry and others. If Government considers the Moorside development proposals to be viable, discussion will be needed on funding development activities.

The Moorside nuclear project, with its strong development team, support from key local stakeholders and promise to level-up the north, will represent an attractive investment proposition.

We have already seen significant interest from the financial investor community for the Sizewell C project and expect to see similar (or even higher) level of interest to be a stakeholder in the Moorside project.

Eventually, we see the project being majority or wholly-owned by institutional investors, retail investors and Government, making Moorside a British-owned symbol of excellence, which heralds our transition to a low-carbon future.

# Moorside: The North West's New Clean Energy Hub




A consortium of leading UK construction, engineering and nuclear specialists, along with leading unions, has come together to further unleash Britain's low-carbon potential by promoting a Clean Energy Hub in the home of UK nuclear, the North West.

At a high-level, **The Moorside Clean Energy Hub** will explore:

- developing a new nuclear project with twin UK EPRs, replicating Hinkley Point C's approved design, utilising an experienced project development and supply chain
- hosting small modular reactors (SMRs) and advanced modular reactors (AMRs)
- creating linkages with emerging technologies, such as green hydrogen and energy storage

A principal objective will be to use the power and heat from the Clean Energy Hub to contribute to industry in the North West, while lowering carbon emissions and reinforcing Cumbria's credentials as the premier location for clean energy generation.

The consortium will leverage the strengths of the North West (which already has a skilled nuclear workforce, supply chain, and industry to drive consumption of low-carbon heat and power) whilst providing the region an economic boost and mitigating the effects of Covid-19 (and economic cycles) which have hit the region hard.

Atkins

*"We are heavily involved in the Hinkley Point C programme and see first-hand the impact such projects have in terms of skills development and jobs both at local and national level as well as across the full skills spectrum. There is sometimes a misconception that because those reactors are of foreign technology, most of the high-end work is carried out abroad. This is simply not the case and we can vouch that most of the engineering is done in the United Kingdom by companies such as ourselves."*

MEH Alliance

*"There is strong international evidence that it is possible to deliver a lower cost new build programme through a fleet approach…We will create a legacy of improved skills and supplier capability in the UK by transferring our experience, capability and capacity to SZC, and other future nuclear investments such as Moorside, including Small Modular Reactors (SMRs), at lower cost and with less risk."*

Sizewell C Supply Chain Partners

*"We know first-hand the job and growth opportunities a nuclear project can generate for businesses across the country. We are also aware of the fragility of the nuclear supply chain and the harm caused by the current uncertainty over the UK's nuclear future.*
*At this time of national emergency, moving forward with projects that guarantee jobs and rejuvenate the UK economy has never seemed so important."*

Moorside Clean Energy Hub

Laing O'Rourke

*"Britain has seen a renaissance in Nuclear construction with the development of Hinkley Point C (HPC) in Somerset. This nationally important infrastructure project puts £200m per month into the economy and supports more than 2,500 UK businesses…We have seen at first hand the creation of an entirely new sector, a British Nuclear industry supply chain involving firms across the UK. But that supply chain is fragile and risks being lost when the project at Hinkley comes to an end…While the construction industry faces challenges with Coronavirus, it can also provide the foundations for the recovery."*

Jacobs

*"The UK nuclear industry supports over 60,000 highly skilled jobs and is essential to generating clean energy as part of our low carbon future. That future will only become reality if new nuclear capacity can be unlocked. One quarter of nuclear jobs are in Cumbria and the Moorside proposal brings together commercial and public sector partners with the experience, skills and technology to deliver new nuclear energy and strengthen the supply chain across the whole country"*

Mott MacDonald:

*"As an established supplier of engineering-related services to nuclear, renewable and low carbon programmes in the UK, including the Hinkley Point C, Sizewell C, Wylfa Newydd and previous Moorside projects, we are really excited by the plans to develop a Clean Energy Hub at Moorside in Cumbria. The hub will have an important role to play in balancing the country's energy needs as we strive to meet net zero targets by 2050. It would provide around 7% of the UK's current power demand and contribute to the decarbonisation of heat and transport, helping us to meet UN sustainability goals and contributing to local social outcomes. We look forward to supporting EDF and working closely with other leading companies to make the hub a reality."*

Moorside Clean Energy Hub