

5th November 2020

The Nuclear sector and opportunities in South Yorkshire

Purpose of Report

This paper sets out a potential UK Atomic Energy Authority opportunity for the region to position itself as central to the growth of the UK's Nuclear Industry, to create high value jobs, grow new businesses and support existing businesses to adapt.

Thematic Priority

Business Recovery and Growth and Housing and Infrastructure

Freedom of Information

This paper will be made available under the SCR Publication Scheme.

Recommendations

LEP Board Members are asked to note the opportunity and endorse early stage work to develop a submission to a UK Atomic Energy Authority proposal for South Yorkshire to be part of the Government's plans to commercialise and develop Nuclear Fusion technology.

1. Introduction

- 1.1** The UK Atomic Energy Authority (UKAEA) has written to all Councils and Local Enterprise Partnerships setting out their intention later in autumn to publish a detailed site specification for the development of a new Nuclear Fusion Reactor prototype. It is anticipated that a formal opportunity to bid will come within weeks and before Christmas. This is part of the The Spherical Tokamak for Energy Production (STEP) programme - a UKAEA and UK Government initiative to accelerate progress towards commercially viable fusion power, through design and construction of a prototype fusion reactor by 2040. It is expected that this proposal will align with the Government's anticipated Energy White Paper. This is expected to signal a commitment to expansion in renewables, including hydrogen and nuclear power through large scale reactors, small modular reactors, advanced reactors and fusion.
- 1.2** Over its lifetime, this project has the potential to be of significant scale; creating jobs, high value businesses and delivering on the UK's Net Zero target. The scale of the opportunity could be huge with major national investment being targeted at the R&D, construction and engineering of a Prototype Reactor. Benefits include the development of an entirely new supply chain to deliver the project, huge opportunities for businesses in the region to access opportunities and an employment boost of a high skilled research and engineering workforce.

- 1.3** The existing capabilities in the region (including the Nuclear AMRC, the new UK Atomic Energy Authority facility and large businesses such as Forgemasters), our strengths in construction, civil engineering and manufacturing means South Yorkshire has a strong offer to pitch to the UKAEA for the region to be a key part of the Government's nuclear investment plan.

2. Proposal and justification

2.1 The nuclear industry in context

The UK alone capitalises on a domestic market worth an estimated £75 billion and global markets estimated at £100 billion (waste and decommissioning) and £1.2 trillion (new build) up to 2035.

The UK's civil nuclear sector is amongst the most advanced in the world, from fuel production, generation, new build, research through to decommissioning, waste management and transportation and a highly developed regulatory system.

The global outlook on nuclear energy production is equally positive.

In the OECD's World Energy Outlook 2019 a scenario is established that suggests electricity generation from nuclear increases by almost 62% by 2040 to 4409 TWh, and capacity grows to 601 GWe. The World Nuclear Association proposes the addition of 1000 GWe of new nuclear capacity by 2050 to provide 25% of global electricity demand.

2.2 The UKAEA opportunity – nuclear technology including fusion. Conventional nuclear power generation is well proven and commercialised. The next commercial development will be to produce small modular reactors that provide power in a more localised and responsive setting.

Fusion technology on the other hand remains the furthest away from full commercialisation – but the most transformational if harnessed. Whilst the science of nuclear fusion is proven, the ability to harness it in a commercial setting is not. The challenge is now an advanced manufacturing and engineering problem rather than just a science one. This was the rationale for the establishment of the UKAEA facility at the Advanced Manufacturing Park in Rotherham.

UKAEA aims to transform fusion from an expensive science experiment into a viable commercial energy source. The key is to develop a reactor that produces more energy than needs to be put in to get the fusion reaction going. Based on current research activities, fusion power could potentially be on the grid by the middle of the century. STEP is a project focussed on the design, build and operation of the world's first fusion plant to supply electricity.

The UKAEA proposal to establish a Nuclear Fusion Prototype Reactor somewhere in the UK presents an opportunity for the region to establish itself a key player in the UK nuclear sector.

2.3 The region's capabilities demonstrate we have a strong offer

- **The Advanced Manufacturing Innovation District (AMID).** Home to The University of Sheffield's Advanced Manufacturing Research Centre (AMRC), the Nuclear AMRC (NAMRC), the UKAEA's Fusion Technology Research Facility and the AMRC Training Centre. AMID is a nationally significant asset that continues to attract engineering companies, manufacturers and value chain businesses to the region to work with our skilled engineers, graduates and technicians, with experience of working on major projects.

- **Industrial and research collaboration.** The University, the Catapult Centres and the Local Enterprise Partnership and the local councils have experience of working with companies including Boeing, BAE Systems, McLaren, Rolls-Royce, Sheffield Forgemasters and smaller supply chain firms; enabling them to tap into the research capabilities the region hosts.
- **Locally based assets with national reach.** The Nuclear AMRC has a national footprint with centres in the North West (focusing on modular construction for Nuclear, and other, structures) and Derby (focusing on Control & Instrumentation and Digital Environment), as well as office space at the Menai Science Park and South West Nuclear Hub in Bristol. Both the NAMRC and AMRC are part of the High Value Manufacturing Catapult which enables reach back across a variety of sectors and other institutions, meaning we can ensure the best solutions are brought to the programme.
- Strong links with the UKAEA already exist with the Nuclear AMRC who work on a number of fusion related projects, either directly with ITER, Tokomak Energy or through competitively won UKAEA tenders. The region holds strong links to the nuclear supply chain through the Nuclear AMRC's work with 1400 companies nationwide via the Fit4Nuclear programme, and also through BEIS funded programmes including the Advanced Modular Reactor programme and the ISCF Low Cost Nuclear programme (UK SMR).

2.4 It is proposed that:

- The LEP Board signal their support for this opportunity to be fully explored in the context of how it can deliver on the Strategic Economic Plan objectives; looking not just at the physical site opportunities but the business, skills and productivity gains to be secured with the region playing a full part.
- A small working group with representation from across the four local council areas, the MCA Executive Team and the Nuclear AMRC be established with the objective of preparing a 'pitch' to the UKAEA.
- That the Business Recovery and Growth Board and the Infrastructure and Housing Boards' engage directly in the process from a supply chain, innovation, business growth and site selection perspective.
- That the region adopts an open position at the outset to working with places outside of South Yorkshire to build the best UK solution – with the region at the heart of that.

3. Issues to consider

- 3.1 South Yorkshire capabilities in context.** It is unlikely that there is any one site/location in the UK that can fulfil all of the requirements of the UKAEA process. The requirement to align research and development capabilities, a skills pipeline, an emerging supply chain and bespoke site requirements makes it a genuinely open competition. Initial informal discussions suggest that the region has a strong case to make but that there are locations in the UK, including in the North West in which we are part of a 'nuclear arc' of businesses and research capabilities.
- 3.2 Phasing of any opportunity** - the expectation is that in the first instance a relatively small group of engineers, scientists and support staff would start to be located in the successful region – with the footprint and economic growth potential growing organically.

- 3.3 Site selection process** - the UKAEA are yet to publish their formal guidance but there will be expectations around access to water, connectivity, national power grid links and a complex set of regulatory challenges. There may not be a specific site within South Yorkshire that fully meets the requirements. The working group would be expected to review the potential for sites in the region as a priority.

4. Consideration of alternative approaches

- 4.1** The region does not need to submit a proposal.

However, the potential benefits of engaging early with the process and setting out the capabilities of the region from a research, engineering, manufacturing, construction and civil engineering perspective as well as a potential site location for the UKAEA prototype fusion reactor facility make this an opportunity that should, at least, be fully explored. It is likely that even without LEP support that other partners in the region may choose to submit a proposal.

5. Implications

5.1 Financial

This report notes a potential opportunity to bid for project funding in the future. There is no resource currently earmarked to the development of the bid. Should there be appetite to pursue the opportunity an exercise will be undertaken to determine how a bid could be developed and what resource may be required.

5.2 Legal

Unknown at this stage, pending details of the bidding criteria being released

5.3 Risk Management

Unknown at this stage, pending details of the bidding criteria being released

5.4 Equality, Diversity and Social Inclusion

Unknown at this stage, pending details of the bidding criteria being released

6. Communications

- 5.1** Communications activities will be considered following the outcome of this early discussion.

7. Appendices/Annexes

- 7.1** Appendix 1 - Letter to LEPs and Councils from the UKAEA.

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Background papers used in the preparation of this report are available for inspection at: 11 Broad Street West, Sheffield S1 2BQ

Other sources and references: