Legacy Cost Reduction: Innovation - Supply Chain Engagement

Nuclear Sector Deal

BECBC
Britain's Energy Coast Business Cluster
Cumbrian collaboration with global reach

INDUSTRIAL STRATEGY

Acknowledgements

Thanks to the following organisations who have provided significant input into the production of this report by attending the Nuclear Sector Deal Meeting held by BECBC on 4 September 2019.

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Executive summary

"The United Kingdom has a rich heritage with world-leading businesses located around the country. Our cities, towns and rural areas have competitive advantages that will be essential to shaping our economic future." This is a direct quote from the UK's Industrial Strategy and is a statement which cannot be truer in any other sector than in nuclear, clean energy and defence. One of the great strengths of the nuclear industry is its regional clusters which include: Nuclear South West, North West Nuclear Arc, Wales Nuclear Forum, Northern Nuclear Alliance, East of England Energy Group (EEEGR) and Britain's Energy Coast Business Cluster (BECBC).

Our nuclear regions across the United Kingdom have created places of excellence as a result of an inter-generational affinity with this abundant low carbon energy source. This globally respected expertise dates back to the industry's birth in the early 20th Century and has included a number of humankind firsts, such as the first harnessing of nuclear power to create low carbon commercial electricity. Thanks to these pioneers and decades long commitment from our nuclear places, the UK today still derives over 20% of its electricity from nuclear. Looking to the future this demand could grow significantly due to climate imperatives and greater electrification of our power supplies.

One of the criticisms of the nuclear sector in recent years has been for its lack of innovation and the resultant cost and schedule implications. This is true of many parts of the nuclear fuel cycle, including waste management and decommissioning. This is one of the focus areas of our Nuclear Sector Deal which has brought industry leadership and Government together to shape a programme which will reduce the overall cost of our nuclear decommissioning legacy by 20% compared with current baselines.

This high level report outlines the findings of an industry engagement event held in Cumbria, a world renowned nuclear region, in September 2019, which attracted over 45 participants from 30 businesses, academic institutions, site licenced companies and laboratories. These were organisations that operate in the nuclear and wider clean energy supply chains. As organisations which have direct experiences of delivering capability and technology to the nuclear sector, the group considered what was required for successful outcomes to be achieved through the application and deployment of technology.

The commitment to take part in this event evidenced true collaboration and the organisations listed opposite are to be thanked for their time, honesty and willingness to contribute alongside their peers and competitors.

Ivan Baldwin
Chair
Britain's Energy Coast Business Cluster (BECBC)

Established in 2005, BECBC is a private sector led organisation based in Cumbria. It has over 320 members who range from microbusinesses and SMEs to global organisations, all with business interests in Cumbria and many associated with the nuclear and clean energy sectors.

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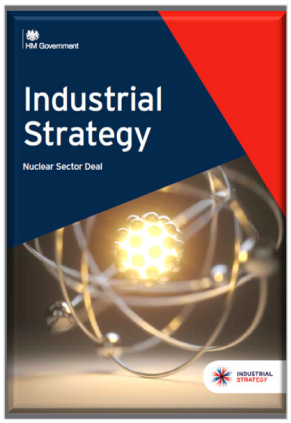
The Nuclear Sector Deal



The Nuclear Sector Deal was launched at Trawsfynnyd on 28 June 2018 as a joint-agreement between government and industry to drive higher productivity and inclusive growth throughout 'Nuclear UK'.

https://www.gov.uk/government/publications/nuclear-sector-deal/nuclear-sector-deal

The deal is 'owned' by the Nuclear Industry Council (NIC) which itself is co-chaired by the Energy Minister and the Chair of the Nuclear Industry Association (NIA). The deal is co-ordinated by a Programme Board and Programme Management Office and delivered through five working groups each of which is led by the private sector (see opposite).

The commitment to realise "savings of 20% in the cost of decommissioning compared with current estimates by 2030" as part of a broader goal to "improve taxpayer value from decommissioning" is the remit of Working Group #2, chaired by Simon Bowen (Cavendish Nuclear) and with representation from DBD Ltd, Cavendish Nuclear, EDFE, Wood, Britain's Energy Coast Business Cluster (BECBC)/NNL, YGN, BEIS, ONR, NDA, LLWR Ltd and Sellafield Ltd. The group has identified five workstreams – cost definition and measurement, commercial and operating models, enabling regulation, integrated waste management and legacy R&D.

The Legacy R&D workstream is chaired by Andy White (Wood) with representation from DBD Ltd, Britain's Energy Coast Business Cluster (BECBC)/NNL, University of Manchester, NDA and Sellafield Ltd. The purpose of the group is to "consider how R&D spending can be made most cost effective through targeting solutions to the biggest challenges and removing duplication across the pipeline and adjacent sectors."

Specific activities include:

- From the pipeline data – consider how to prioritise Innovation and Technology development funding to optimise Decommissioning and Waste Management programmes.
- Explore use of any and all funding routes to develop decommissioning techniques to reduce decommissioning costs.
- Determine how to encourage supply chain involvement in technology programmes both for UK programmes and for export:
  - to bring/and make it easier to use existing technology;
  - to support development programmes; and
  - to provide particular encouragement to SMEs local to existing sites as part of supporting sustainable local communities.

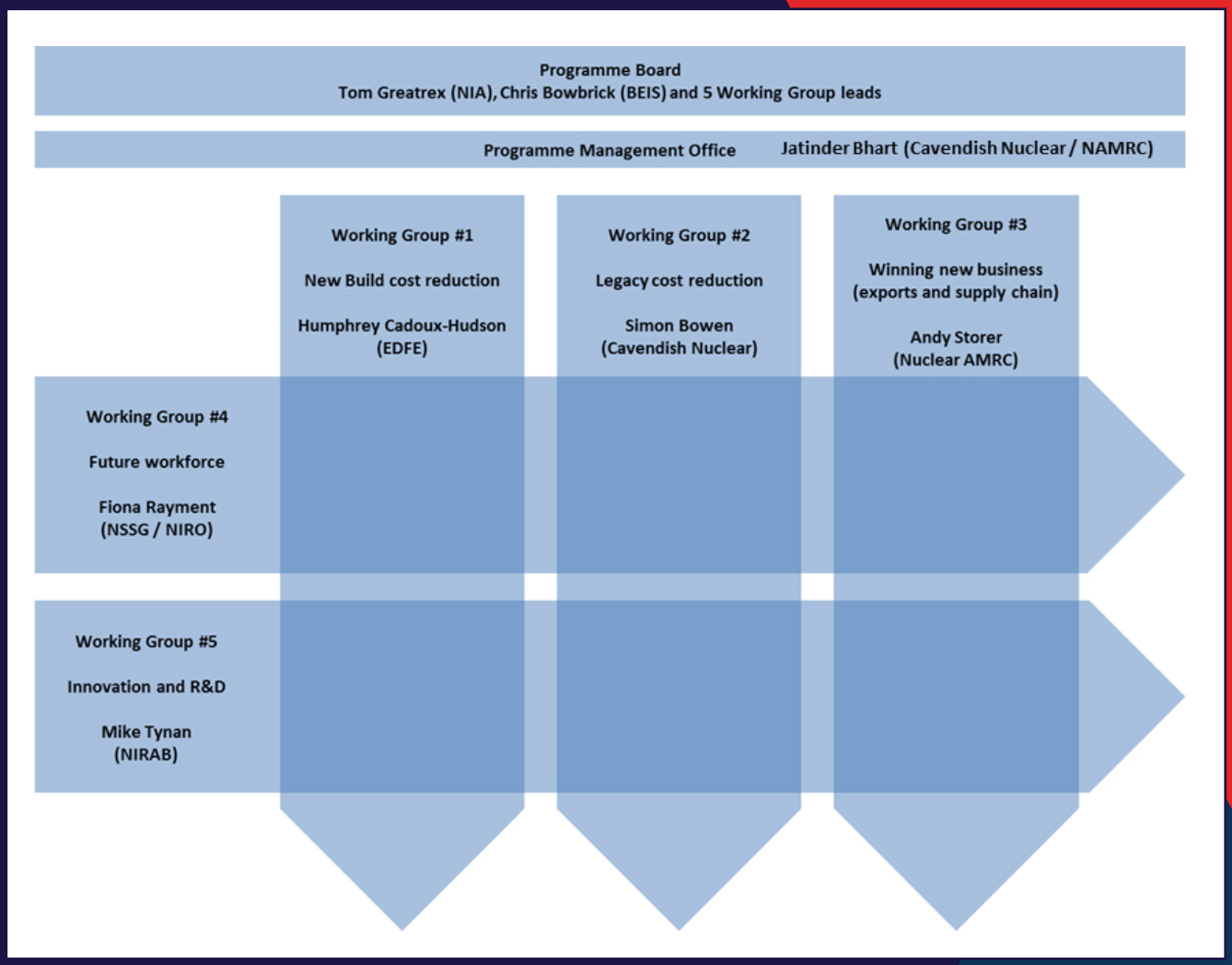
As part of this latter activity it was agreed to reach out to the supply chain through the Britain's Energy Coast Business Cluster. A facilitated workshop was convened on 4 September 2019 at Energus to address the following question:

"Supposing that legacy waste management and decommissioning is more effectively achieved through the application of technology, what needs to be true for successful outcomes to be achieved for all stakeholders?"

The four topics covered in this report were the main focus points generated by workshop attendees:

1. How do we define stakeholder scope and success?
2. How do we create the behaviours and culture to innovate?
3. How do we create visibility for opportunities to innovate?
4. How do we procure for innovation?

Governance and delivery for the Nuclear Sector Deal



Supply chain feedback

How do we define stakeholder scope and success?

Stakeholders in the Cumbrian nuclear sector range from government departments and their agencies, public and private sector organisations, trade unions, academia, local government and the local community.

For these stakeholders, what is the desired outcome of achieving the Legacy Cost Reduction target? Delivering the mission cheaper? Reduced dependency on public sector funding? Growing the whole cake while delivering decommissioning and waste management scope cheaper/quicker? The win-win is the culmination of all of the above in the application of technology to solve the sector's problems and meet the sector's targets in a way that benefits supply chain and local communities. This is particularly important in West Cumbria where the nuclear sector dominates the local economy.

The arena in which technology may be applied to deliver efficiencies is at the interface between "challenge holders", who are typically nuclear site licence companies and those looking to drive legacy cost reduction, and "innovators", the private sector supply chain organisations with financial goals and academia whose driver may be the development of intellectual property. The community's interests may be different, and those of Trade Unions different again. So, in the context of these perceptibly conflicting motivations, how can technology drive successful outcomes for challenge holders, innovators and the wider stakeholder ecosystem?

It is important that we consider innovation as a package of Knowledge/Intellectual Property, Skills, Experience and Technology (KSET) applied to challenges in new ways to deliver more successful outcomes. Technology is not the product. The product is defined by the successful outcomes desired by stakeholders and technology is one of the tools available to deliver this.

The challenge is not a technological one. We know that the KSET required to deliver innovation exists, and that there are challenges at Sellafield and in the wider domestic and global nuclear markets to which it could be applied. The challenge is one of behavioural and systematic change.

To facilitate this, the following circumstances must be created:

1. **Commercial frameworks:** which are supportive of the desired outcome(s) and reward the appropriate behaviours. Attempting to procure innovation through existing frameworks that are not set up to support this will not yield successful outcomes.

2. **Integrators or brokers:** between challenge holders and innovators to enable transparency of the opportunity for supply chain, particularly micro and small organisations, to bring innovation to the table.

3. **Advocates:** for doing things differently/challenging the status quo. Advocates, spokespeople and figureheads for the nuclear industry are perceived to be less visible than in other sectors. These individuals would communicate the benefits of innovation and technology, which is essential to driving change and encouraging the desired behaviours within challenge holder and innovator organisations. These champions also need to be embedded throughout the stakeholder ecosystem so that the system is ready to accept and support change when it happens.

4. **Agility:** the ability to accelerate the transition from idea to innovation. This requires agility within challenge holder organisations to identify the need for innovation and to "procure" it, and within the supply chain to respond to the challenge.

Authors:
Rob Ward, Nuclear Sector Development Manager of Copeland Borough Council (BECBC Shadow Board Member) supported by Catherine Eve of Centre for Leadership Performance

How do we create the behaviours and culture to innovate?

The discussion of behaviours focussed in on a mixture of making the enabling narrative for change and development visible and clear, whilst creating the mechanisms by which change can be initiated to build some momentum.

The case for change, and innovation, in the way we do business will need to be visible and crystal clear in order to be compelling and well understood. This does need to be shared in a way that resonates with the business community and therefore is described in their terms, from their perspective. Our behaviours need to be seen as an exemplar – we need to encourage success, make those successes visible, recognise that "failures" can be a sign of attempts to change and therefore should not necessarily punish failures. Our behaviours need to encourage those that we wish to see in others, and therefore we must be less conservative and more open to risk. We must act as customers in the same way that we expect our suppliers to act – we must seek to do things differently in the way we procure, manage and deliver.

The way we do business and act as customers will stimulate change and innovation – inherently the mechanisms we create to do business will create the landscape we all work within. We can procure to place operations and decommissioning in one lifetime contractual approach in some cases to create value in the supply chain – we can measure the true value of activity and delivery in a manner that focusses on a wider value driven goal – do we understand the "true value" goals from our value chains?

We can, as customers, make visible the whole landscape of opportunities arising in future and seek new ways of providing technical and delivery contractual solutions that bring new outcomes and organisation. The true value of a specific contract will often be much more than the immediate technical solution, but may be part of a wider social and economic value driven goal.

In doing so we can focus on wider economic and value development in the supply chain, contributing to local economic growth and industrial strategies and place making. We should drive the growth of the number and scale of innovative SMEs to bring new players and solutions, and lead our institutions to seed people into those small organisations to learn, and to contribute.

To be innovative in what we do, we must be more commercially minded in how we do it as a sector – to be less institutionalised and aligned to real sector and business goals – and overcome our natural conservatism.

Positive small steps are of course key – there are some great examples of small technical innovations and we must celebrate those, as well as learn from what made them successful. Joint working in tiger teams, skunk works, joint and collaborative working and problem solving should become more frequent.

It is not enough for us to expect others to innovate without our methods, activities and behaviours actually leading to the innovation we are seeking.

Author:
Ken McEwan of Cumbria LEP

How do we create visibility for opportunities to innovate?

The nuclear sector, and in particular decommissioning and waste management, has many complex and novel problems and works on an unprecedented scale (cost-base and duration). This, in a highly-regulated publically-funded business context with an absolute focus on right-first-time (risk and cost), drives conservatism and a 'not invented here' culture. Hence the nuclear challenge is fertile ground for genuine innovation but with the proviso that it is carefully nourished and harvested.

Innovation is broader than purely technical innovation – cultural, regulatory, delivery, contracting, financing, risk and safety innovation are equally as vital as technical innovation and can result in productivity gains and cost reduction realisation over a shorter timeframe. Such innovation can then contribute to the effective and efficient delivery of the domestic missions as well as spin-off into other sectors (e.g. oil and gas) and nuclear exports (to other countries with similar nuclear challenges).

Innovation is most effective when it is focussed, i.e. when it is responding to a genuine challenge. This means being open and transparent with both current and future challenges and framing them in such a way as to ensure maximum engagement and not to constrain potential solutions.

Areas for development include:

1. Framing of the challenge
It is important to understand fully the nature of the challenge if one is to have the best chance of a truly innovative and complete solution. Sometimes challenges are communicated without their full extent being understood or else already suggesting the potential solution. This constrains genuine innovation and challenge-owners should look to engage with potential solutions-providers at the earliest opportunity in order to properly explore the parameters of the challenge and then frame it appropriately.

2. Pipeline of opportunity
Potential solutions-providers need to develop and maintain both their capability and capacity for innovation. This can be extremely resource-intensive. A future pipeline of opportunities, e.g. as part of the National Decommissioning & Waste Management Pipeline published in June 2019, would give potential solutions-providers the visibility of future funding and investment opportunities so as to de-risk their innovation and business development activities.

3. Simplified and centralised means for engagement
Potential innovators struggle with the myriad of platforms currently in use amongst licensees to communicate challenges/opportunities and their subsequent contracting systems. This unnecessary complexity also promotes the 'not invented here' issue, wherein potential solutions are not readily transplanted to across licensees and even across individual sites under the same licensee. A common challenge-sharing platform and consistent contracting system would make it easier for potential solutions-providers to engage.

4. Working with and learning from other sectors, etc
Whilst the nuclear sector does present many unique challenges this should not necessarily drive bespoke solutions. Often partial solutions have already been deployed and proven elsewhere (e.g. drones and autonomous mapping/visualisation) and could be adapted for use within nuclear. Therefore benchmarking with other sectors known for their innovation (e.g. space, aerospace, automotive, creative industries, life sciences, etc), as well as academia, national labs, national skills bodies, catapults is crucial.

5. National Nuclear Innovation Strategy
A portfolio approach to 'Nuclear UK' and the identification of a cascade of nuclear 'grand challenges' to 'problem-solving' would help to focus 'early-doors' innovation and the funding thereof on delivering maximum benefit to the portfolio and not just an isolated element therein (see graphic opposite).

6. Leadership
The nuclear sector suffers from the lack of a single authoritative voice which would drive delivery of a national strategy, pipeline of opportunity and common engagement and contracting systems. The NIC should step up and play its part in providing this voice and, in doing so, promoting innovation within the sector.

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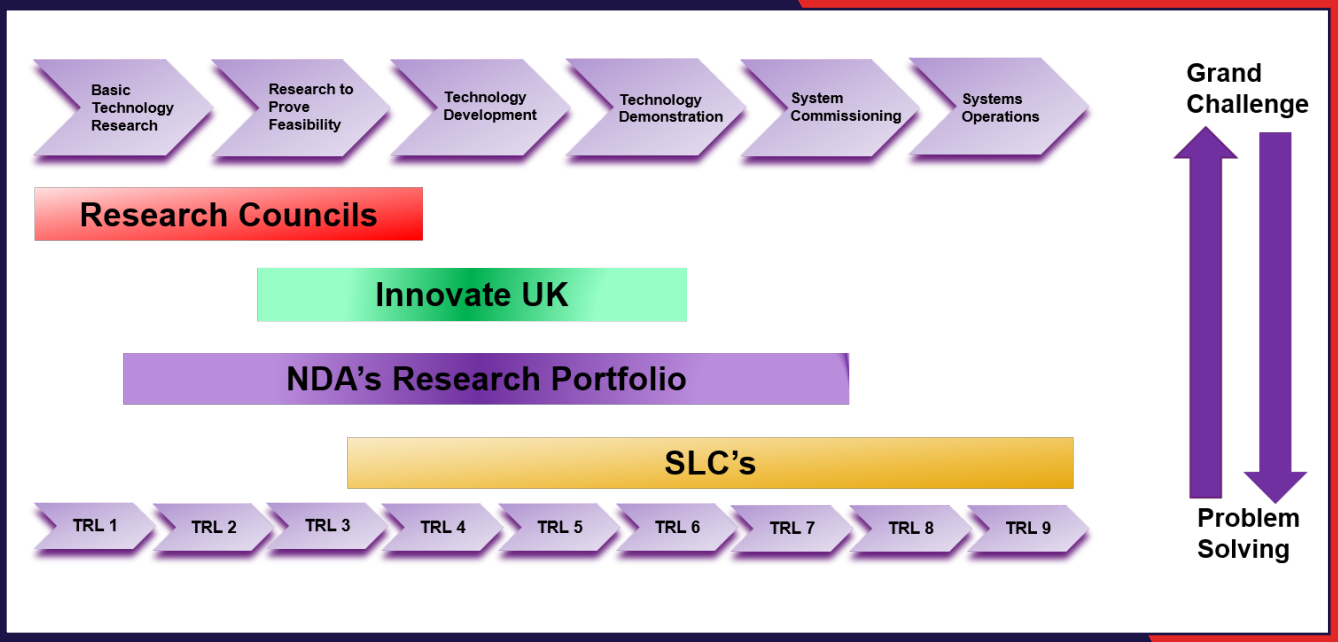
Legacy nuclear R&D within the UK



How do we procure for innovation?

The real questions here are "How do we currently procure, and does it bring about innovation?" and "How could we better procure innovation?", explored here in terms of routes to market, commercial incentives for innovation, procurement processes and people/culture.

Routes to market

Simply, in order to bring innovation to legacy cost reduction, innovators require transparent communication of the challenges, and then the opportunity to deploy that innovation in solving them.

Visibility of the opportunity pipeline is key to providing supply chain with the confidence to invest time and resource in this area. This requires communication and coordination between challenge owners, both site-wide for large complex sites such as Sellafield, UK-wide between nuclear sites and looking beyond the nuclear sector – this is being developed through the Decommissioning and Waste Management Pipeline.

There have been a range of funding models intended to invite supply chain innovation to nuclear sector challenges in Cumbria, which have raised the following questions:

- Is there sufficient commercial incentive for private sector supply chain to engage in funds that cover costs only?
- Bridging the technology readiness levels (TRL) "valley of death" - how to ensure that the outputs of successfully funded innovation projects are deployed?
- Are existing routes to market for lower tier suppliers via Tier 2 organisations accessible, inclusive and fair?

Commercial viability

Can we drive innovation by asking the supply chain to deliver more scope for less? Meeting the Legacy Cost Reduction commitment should not result in reduced margin for suppliers. So how can we align demand-side "pull" with supply side "push" to secure beneficial outcomes for challenge holders and supply chain alike?

The opportunity to innovate must be commercially viable for the supply chain, which leads to the following requirements:

- Challenge owner understanding of the desired outcome, not necessarily the desired solution
- Risk ownership models that incentivise innovation and accept potential for failure
- IP ownership sharing models similar to pain/gain mechanisms in engineering contracts
- Profit share mechanisms. Quantification of the value of innovation would require comparison to a "non-innovative" baseline, which may or may not exist.

Procurement process:

Existing procurement processes and systems are a critical blocker to innovation. The bureaucracy of the procurement process and the "hoops" to be jumped through to qualify to supply nuclear customers can also prevent engagement. The tendency to procure against prescriptive technical rather than functional specifications, limits the supply chain's ability to influence outcomes, and tightly defined deliverables reduce the scope for innovation.

Greater agility is required within challenge holder organisations, and in the processes through which innovation might be procured.

While commercial/procurement process skills are generic, challenge holders need to act as intelligent clients when procuring for innovation. Finding suitably qualified and experienced people ("SQEPness") for commercial personnel goes beyond purely commercial capability. Both commercial and delivery/operational personnel within client organisations must develop an awareness and understanding of the innovators who may hold solutions and how to access this resource, which requires them to be aware of the available procurement routes and what they are for. The development of procurement documentation must be a collaborative effort between commercial and delivery/operational personnel. A more collaborative effort throughout the procurement process between challenge owner and innovators from the supply chain, would provide access to technical not just commercial support, and result in well-defined challenge statements with agreed desired outcomes.

In order to facilitate a more agile environment, the procurement process must be proportional to the value and timescales of a given piece of

work. This should be considered throughout the entire route to market, including any onerous prequalification requirements for suppliers to "nuclearise", which may be unsupportable for small and micro-organisations, particularly for those outside of the sector. Equally, payment terms should reflect the nature of the task at hand and the supplier in question.

Culture and people:

Cultural challenges around siloed working, a tendency towards self-delivery, low appetite for change and perceptions of the "nuclear premium" abound. Physical siloing limits sharing of challenges, opportunities and best practice, while siloed management of budgets and resources limits the potential to identify economies of scale, cost savings and opportunities for prioritisation at organisational level.

Cultural change won't be organic and requires vision and direction, enabled by technology and streamlined processes and systems. Innovation can be invited from the supply chain by the measures suggested in this report, but this relies on behavioural change within challenge holder organisations. To facilitate the behavioural change required, there must be a golden thread from the Legacy Cost Reduction targets down through corporate strategy and embedded into team and individual performance objectives.

"Change costs", but the change that is the focus of this report will ultimately return a greater multiplier on every taxpayer pound spent in managing the UK's nuclear legacy, with a focus on where innovation can extract value from what is currently perceived as a cost.

Author:
Rob Ward, Nuclear Sector Development Manager of Copeland Borough Council (BECBC Shadow Board Member)

In conclusion

The Nuclear Sector Deal has created industry wide goals which present a unique opportunity for stakeholders to work together cooperatively where the outcomes create benefit for all. This first workshop has created a diverse community spanning those procuring, those creating and those facilitating innovation, including stakeholders from outside of the sector. The insights generated are of significant value to the industry and will be shared with its leadership in the Nuclear Industry Council and will be used to influence and shape activities being developed in the NSD Programme Management Office.

One message that came out of the session, loud and clear, is that the Nuclear Sector Deal needs to be owned by the sector and not be owned by the privileged few. We absolutely need to keep the deal real, maintain momentum and ensure that we are inclusive in our approach.

The challenges of the deal are big, but we can deliver them when we work together and place greater emphasis on the Place agenda. BECBC is proud to be part of the team seeking the best solutions for supply chain engagement.

Ivan Baldwin, Chair, Britain's Energy Coast Business Cluster (BECBC)

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