UK Atomic Energy Authority

UK fusion strategy

Lee Packer, 11th June 2025

IAEA 9th DEMO Workshop, Aomori Japan

Reasons to be interested in fusion energy

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- Low-carbon baseload and/or industrial process heat
- Energy security
- Economic opportunity
- Power for data/compute (or other niche applications)

Objectives for UK fusion

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(previous Government)

1. For the UK to demonstrate the commercial viability of fusion by building a prototype fusion power plant in the UK that delivers net energy

2. For the UK to build a world-leading fusion industry that supports different fusion technologies and is capable of exporting fusion technology in subsequent decades

UK Programme has unique breadth

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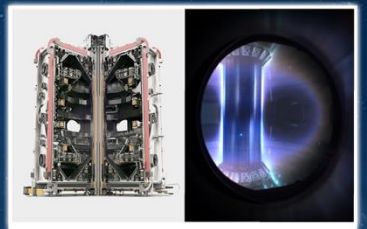
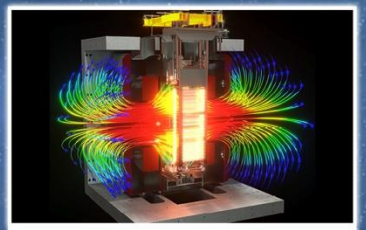
HIGH PERFORMANCE FUSION



SPHERICAL TOKAMAKS

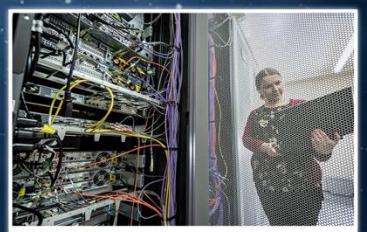
MATERIALS RESEARCH



FUSION TECHNOLOGY

ROBOTICS

TRITIUM



ADVANCED DIGITAL COMPUTING

POWERPLANT DESIGN

INDUSTRY DEVELOPMENT

SKILLS DEVELOPMENT

TECHNOLOGY TRANSFER

UKAEA sites

UK Atomic Energy Authority

UK Atomic Energy Authority

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ROBOTICS

B24

JET

OXFORDSHIRE ADVANCED SKILLS

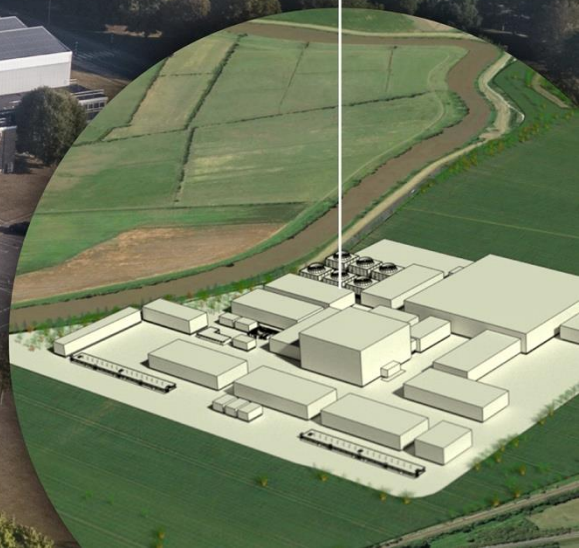
MAST UPGRADE

MATERIALS

FTF SOUTH YORKSHIRE

WEST BURTON

RAICo



New Tritium Breeding Programme - LIBRTI

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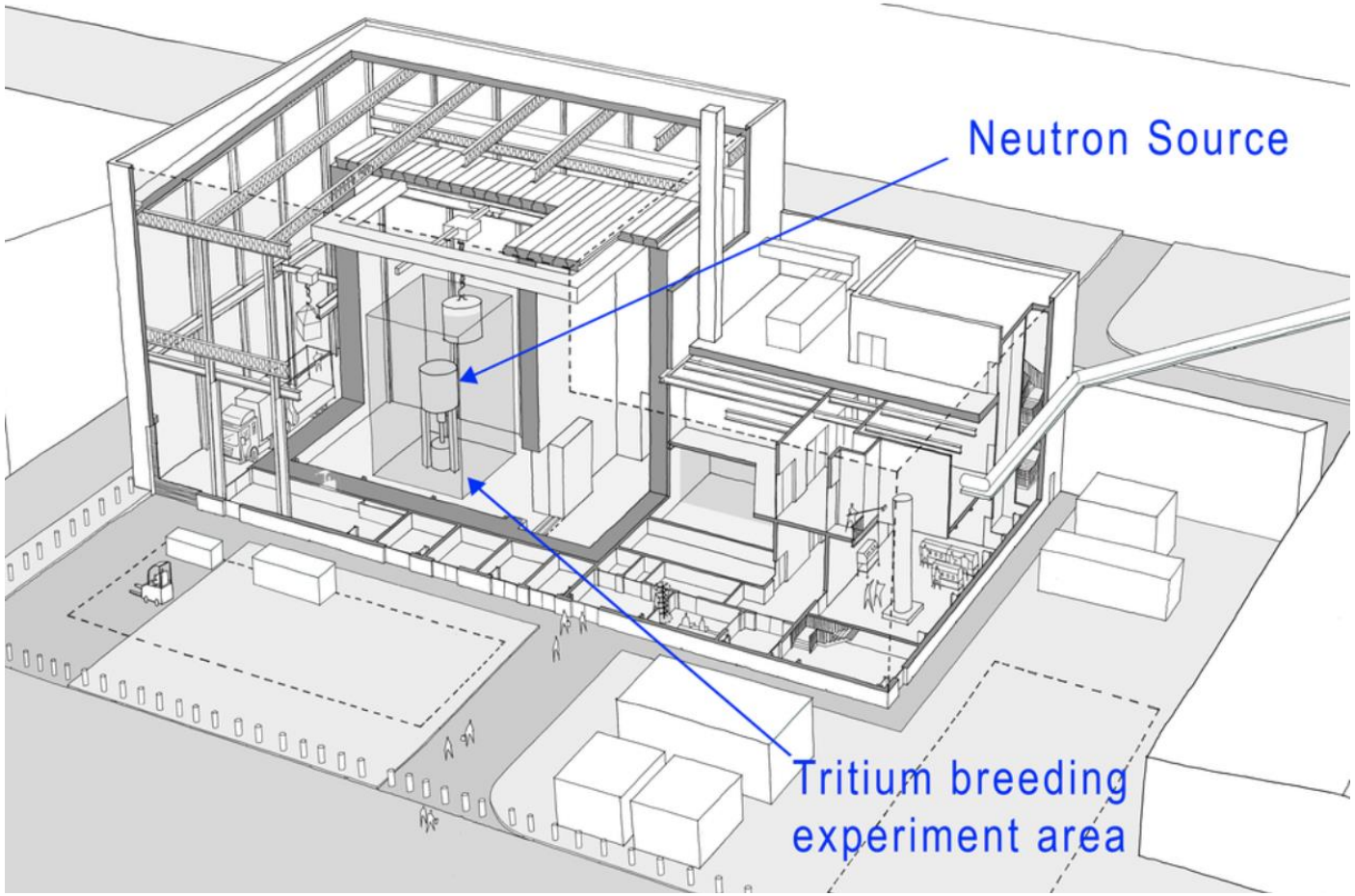
UKAEA's £200 million Lithium Breeding Tritium Innovation (LIBRTI) programme has announced a series of significant steps to advance fusion energy development.

SHINE Technologies, USA, is expected to deliver a 14 mega electron volt (MeV) deuterium-tritium fusion system to provide the LIBRTI neutron source in 2027

12 small-scale experiments. The organisations involved include: Amentum Clean Energy Limited, Astral Neutronics Ltd, Bangor University, IDOM UK Limited, Kyoto Fusioneering, Lancaster University, University of Manchester, a US university, Oxford Sigma, Tokamak Energy, the University of Birmingham, and the University of Edinburgh + several other organisations

SHINE



https://www.gov.uk/government/news/multi-million-pound-investment-to-advance-fusion-fuel-development

What does UKAEA do?

UK Atomic Energy Authority

- We lead the delivery of sustainable fusion power and maximise scientific and economic benefits
- We deliver high-impact research, partnering with companies and the international research community
- We own UK Industrial Fusion Solutions on behalf of UK government

RESEARCH
building the knowledge base of fusion

- Generate and curate knowledge from our technical centres of excellence
- Solve challenges across the full lifecycle of fusion
- Integration of technologies for fusion
- Operate world-leading facilities
- Analyse what is needed for the widespread use of fusion

DELIVER
fusion powerplants

- Use our skills, facilities and expertise to help partners deliver fusion powerplants
- Work with major industrial partners in a national programme to deliver the STEP prototype fusion powerplant

ENABLE
the fusion community

- Grow a fusion cluster
- Support a fusion industry
- Develop skilled people #fusiongeneration
- Support the regulation of fusion
- Seek out growth opportunities for fusion technology
- Communicate the opportunities

Build Public-Private Partnership

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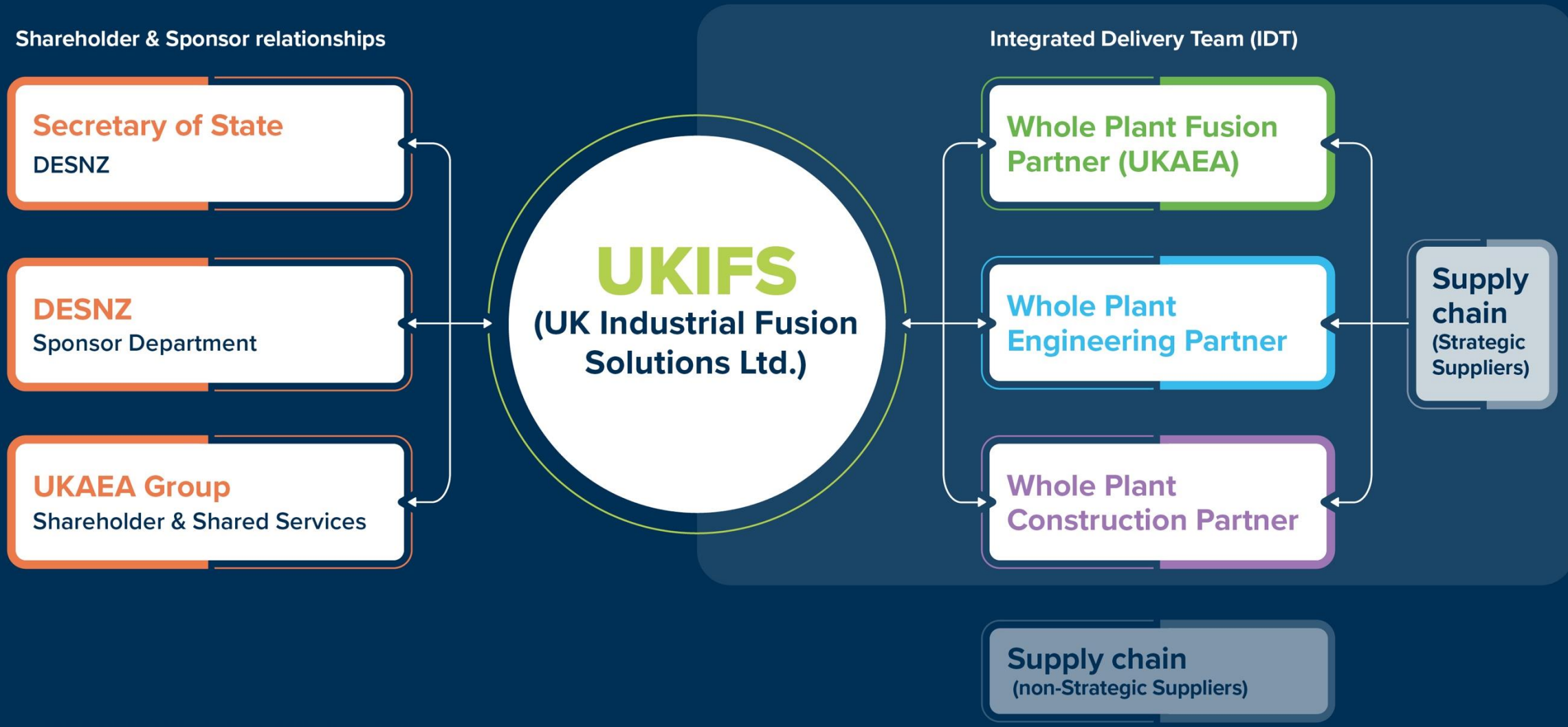

Ingredients of fusion strategy

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Powerplant demonstration programme

- Absolute government commitment
- Product integrators
- Siting process clarity

Specialist technology suppliers

- Technology development
- Innovation programme
- Access to start-up investment
- Access to follow-on investment

(Sub)systems supply chain

- Spillover / borrowing from adjacent sectors
- Strong private sector investment in supply chains

Enabling environment

- Enabling regulation
- Vibrant research base
- Skills development programme
- General public engagement
- International collaboration

Principles of a fusion strategy

1. Have clarity of purpose and know what your key stakeholders want
2. Deliver for your investors consistently
3. An integrated design drives the specification of components
4. Governance arrangements need to enable ‘integrators’ to build powerplants
5. Create mechanisms to expand industrial supply base in fusion
6. Support innovation in specialist technology suppliers
7. Locate powerplant programme in a site and a community

Record investment in Fusion…

UK Atomic Energy Authority

10th June 2025

"The government is also making a record investment in R&D for fusion energy, investing over £2.5 billion over 5 years. This includes progressing the STEP programme (Spherical Tokamak for Energy Production), the world-leading fusion plant in Nottinghamshire, creating thousands of new jobs and with the potential to unlock limitless clean power.

This builds on the UK's global leadership to turbocharge economic growth in the Oxford-Cambridge corridor, while helping deliver the UK's flagship programme to design and build a prototype fusion power station on the site of a former coal-fired plant."

Source: https://www.gov.uk/government/news/thousands-of-jobs-to-be-created-as-government-announces-multi-billion-pound-investment-to-build-sizewell-c#:~:text=The%20government%20is%20also%20making,2.5%20billion%20over%205%20years.