NIA Fusion Business Group

Wednesday 14 October 2026

The Guildhall, York

WIFI
Name: UoY-Fi Guest

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We will be using SLIDO throughout today's meeting, please join using the code below

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Nuclear Industry Association

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Which item on the agenda are you most looking forward to today?

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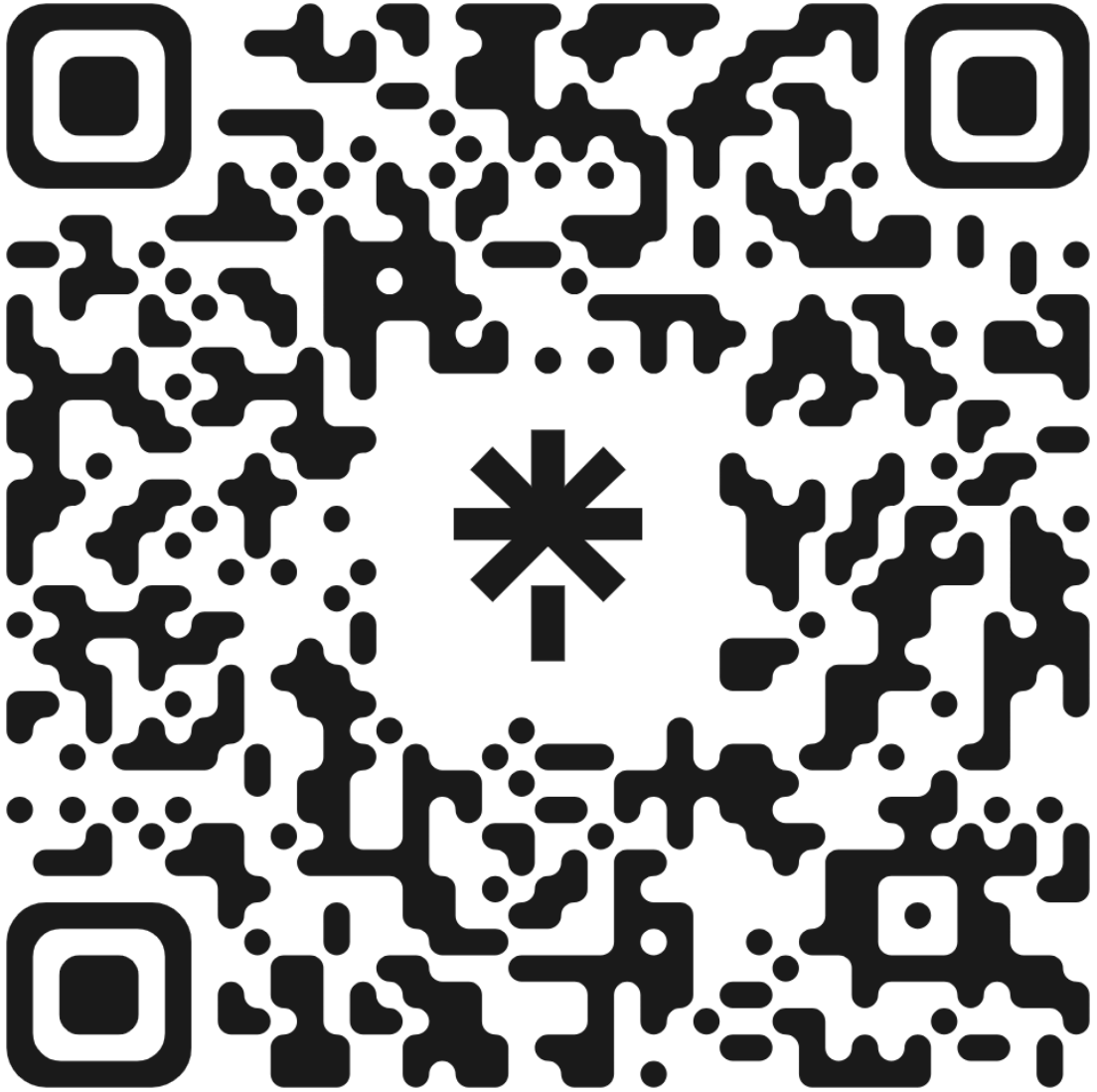
slido

Upcoming NIA events

- Decommissioning & Waste Management Group Meeting
- Glasgow | 4 November
- Legal & Financial Business Group Meeting 2026
  London | 18 November
- Nuclear 2026
  London | 2-3 December
- Annual Dinner 2026 – **SOLD OUT!**
  London | 3 December
- Nuclear Week in Parliament – **SOLD OUT!**
  London | 25–27 January



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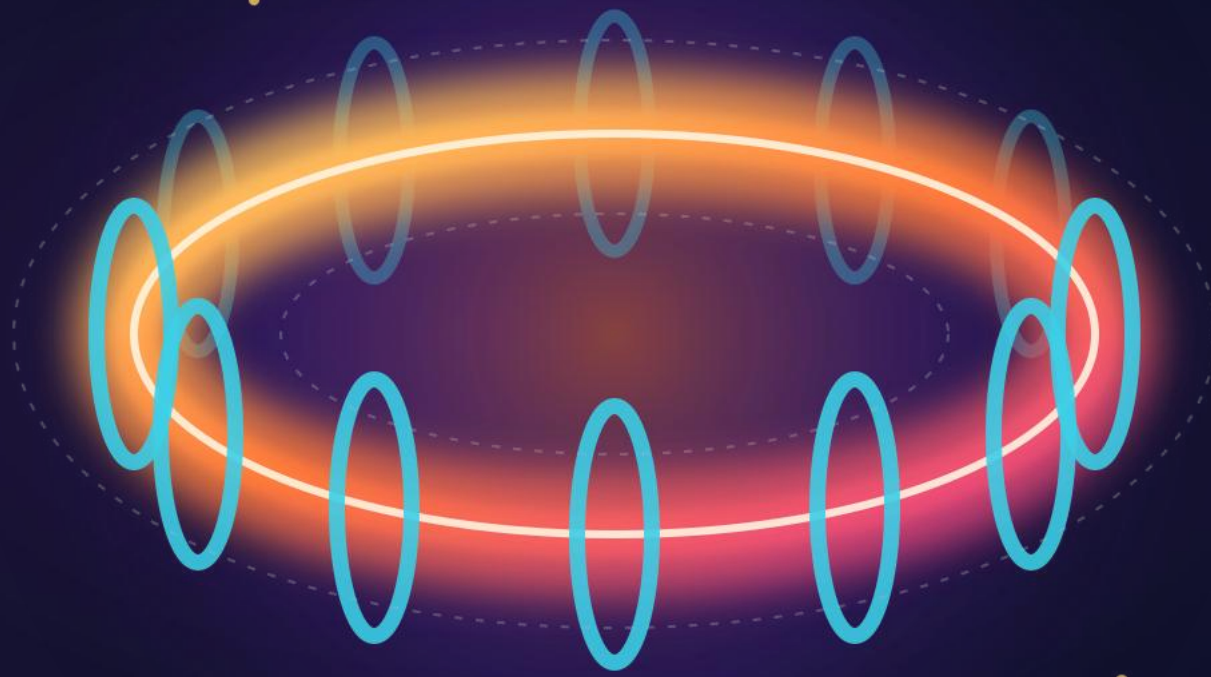


Nuclear Industry Association

FUSION BUSINESS GROUP · 14 OCTOBER 2026

Fusion sector update

Money, machines and momentum: An overview of where the fusion sector stands in Autumn 2026



Steve Lawler · Chair of the NIA Fusion Group · UK Director, Helixos

AGENDA

Contents

01	Global snapshot	Funding, companies, people, technologies
02	UK focus	Strategy, STEP, T1E, the supply chain
03	US focus	FOAK plants and policy
04	Rest of the world	Europe, China, Japan, Korea, Canada
05	Latest news	The past eight weeks
06	The next six months	What to watch to April 2027
07	Summary	Four takeaways



The global picture in numbers

$4.48bn

raised in the 12 months to July 2026, a record and 69% up on the previous year

$14.24bn

total private funding reported since the FIA survey began in 2021

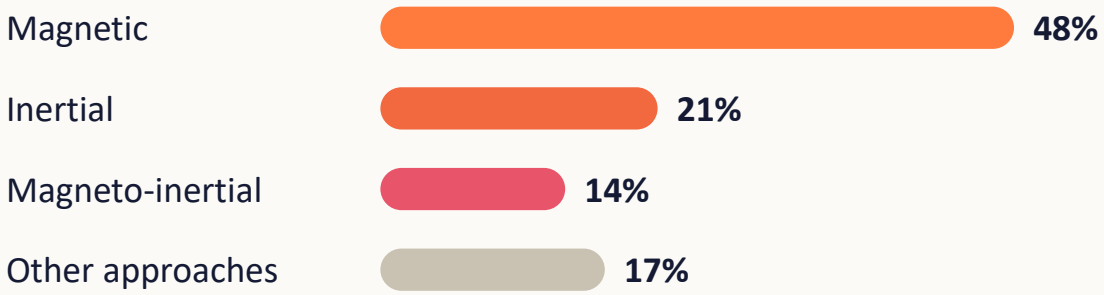
56

fusion companies surveyed, up from 23 in 2021

16,000+

people now employed by private fusion companies

Technology mix across companies



71%

of companies expect the first fusion plant to sell electricity in the 2030s

Data from FIA, The Global Fusion Industry in 2026 (July 2026)

A funded strategy … moving into delivery

£2.5bn over five years

Fusion Strategy published 16 March 2026. Fusion is a frontier industry, with 10,000+ UK jobs targeted by 2030.

STEP at West Burton

UK Fusion Energy has £1.3bn for the next phase.
ILIOS is construction partner; Tokamak Energy leads magnets (£70m).

Supply chain engaged

854 suppliers since 2019, around 84% UK based.
£103m spent with UK firms and 500+ SMEs involved.

New leaders, new alliances

Dennis Whyte now leads UKAEA.
UKAEA and Eni formed Rh3ova.
The UK Infinity consortium launched in May 2026.



STEP prototype plant, West Burton. First land parcel transferred March 2026, 3 ½ years early. First operations targeted early 2040's.

Key themes from UK fusion week

1 From science to engineering

F**ocused Energy** has grown from 60 to 240 staff, **Helion's** first plant is in build and **CFS's SPARC** magnets are nearly complete.

2 Build the market before you need it

Lord McNicol's lesson from fission.

Suppliers will only invest once they see a clear demand signal.

3 Build, scale, repeat

CFS, Helion and ENI all pointed to aerospace, with standardised products and common parts.

4 Customers are signing

Helion has deals with **Microsoft** and **Nucor**.
TVA is co-developing with **Type One**
RWE has signed at Biblis.

5 Regulation as an advantage

The UK's dedicated framework is a competitive edge. Next steps are proportionate, harmonised rules distinct from fission.

6 Competition and uncertainty

China is building its own supply chain ($6.5bn invested).
Demo timelines range from five years to "I don't know".

What was announced and what it means

£3-12tn
estimated global fusion market (DESNZ prospectus)

£2.5bn
UK five-year fusion investment commitment

10,000+
UK fusion jobs targeted by 2030

2,700
companies mapped by F4E against 421 technology codes

Global Fusion Policy Summit

- Joint UK-US statement on proportionate regulation, with fusion standards distinct from fission
- UK-Tennessee Letter of Intent on R&D, skills, regulation and supply chains
- UKAEA-PPPL AI partnership linking SUNRISE and STELLAR-AI
- Regulation Landscape document and EA/HSE Early Engagement Process to follow

FIA UK Fusion Forum

- DESNZ message that “the UK is open for fusion business”
- UKAEA now focusing on discrete enabling technologies such as the fuel cycle, STEP and H3AT
- European developers want funding, regulatory predictability and an EU fusion strategy
- HSE fusion web pages are live and EN-8 is close to issue

Implications for the supply chain

- Demand signals should strengthen as PPAs and FOAK deals firm up
- Standardised, repeatable products will be favoured over bespoke work
- Early engagement with developers and regulators is now expected
- International markets are opening, but China will stay largely closed

Private capital racing to first-of-a-kind plants

2027

CFS SPARC, MA

First plasma and a Q>1 attempt. Full cryogenic system ran at 8 K in September.

2028

Helion Orion, WA

50 MW for Microsoft. Polaris was the first private machine to show D-T fusion, at 150 million °C.

2031

TAE Da Vinci, site TBC

50 MWe plant planned. $6bn Trump Media merger now targeting a Q4 2026 close.

Early 2030s

CFS ARC, VI

Google 200 MW offtake. CFS raised a further $1bn in July, about $4bn in total.

$10bn fusion bill

Bipartisan American Leadership in Fusion Act tabled in September. Unlikely to pass this Congress.

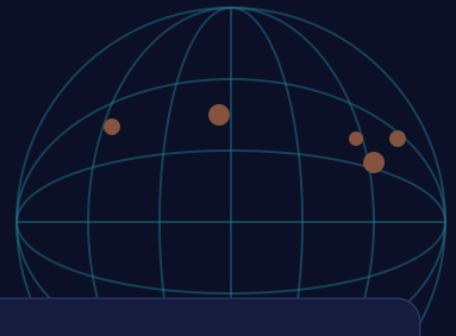
States set the rules

Tennessee fusion rules live in June, first licence to Type One. California SB 925 now signed.

Mixed federal signals

ARPA-E committed $135m in April, yet the FY27 request trims fusion science by 6%.

A genuinely global race



Europe

€2bn+ German Fusion Action Plan

Aims for the first fusion power plant in Germany by 2040. Proxima raised $518m for its stellarator path. Euratom set €330m for 2026 to 2027. The EU Fusion Strategy is still awaited.

China

$6.5bn to $13bn since 2023

US commission estimate of state backing. The BEST tokamak in Hefei is over half assembled, with power demonstration aimed at around 2030. A record 582 tonne coil passed full testing.

Japan and Korea

Power demos in the 2030s

Japan's private FAST project completed its conceptual design and moves to engineering design to 2028. Korea named fusion one of seven strategic technologies in August.

Canada and ITER

First fusion company

General Fusion began trading on Nasdaq in July, and its LM26 machine reached about 8.4 million °C. ITER reports a summer of substantial assembly progress.

It’s been a busy few weeks…

14 September

UK and US align on fusion

Joint statement at the Global Fusion Policy Summit, Mansion House. UK

investment prospectus launched.

September

Dennis Whyte at UKAEA

CFS co-founder and former MIT fusion centre director now leads the 2,600-strong UKAEA Group.

16 September

SPARC reaches 8 Kelvin

Full cryogenic system at operating temperature. CFS then placed a record HTS tape order with Fujikura.

September

$10bn US fusion bill tabled

$3.8bn for materials and fuel cycle test facilities.

Would codify a DOE Office of Fusion.

September to October

US states move first

Tennessee licenses Type One Energy at Bull Run.
California signs its SB 925 fusion strategy law.

October

China's BEST passes halfway

Hefei machine targets usable electricity around 2030.

ENN reports an EXL-50U milestone.

What to watch: now through to April 2027

UK

- STEP System Partner and supply chain packages reaching the market
- Dennis Whyte's first priorities for UKAEA
- Rh3ova's first services and investment off the back of the prospectus
- Strategy delivery milestones on skills and regulation

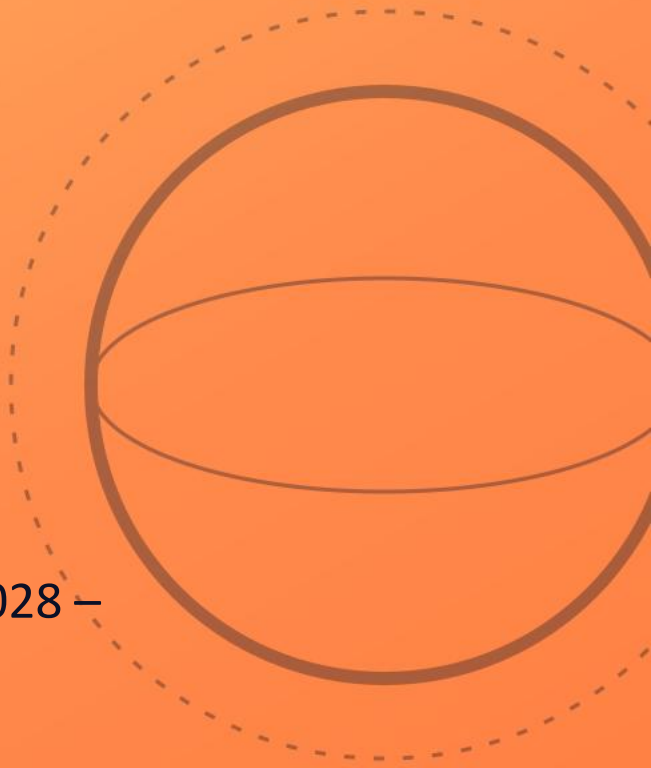
USA

- SPARC integrated commissioning ahead of 2027 first plasma
- TAE merger close and Da Vinci site choice
- Helion's Orion build and the Polaris electricity attempt
- Fusion bill groundwork for the new Congress

REST OF WORLD

- The EU Fusion Strategy and public-private partnership
- BEST assembly in China and Proxima's Alpha siting
- Japan's FAST funding and site selection
- More large rounds and stock market listings

Four takeaways



1 **Capital at increasing scale:** A record $4.48bn in a year, and the first fusion company (GF) is now publicly .

2 **Proof points are closer than ever:** CFS's SPARC in 2027; Helion's Orion in 2028 – putting the commercial case to the test.

3 **The UK has a funded plan and a live programme:** £2.5bn, STEP in delivery, numerous key partners appointed, with new partnering tenders imminent for release.

4 **Supply chain is both bottleneck and opportunity.** HTS tape, magnets, fuel cycle and materials are where demand is building.

UK Government

October 2026

Energy Security – Fusion in Government

Speaker: Chris Russo, Head of International Fusion (Bilateral), DESNZ

UK Government

Objective and Strategy

UK fusion objective

The challenge has shifted from research excellence to industrial leadership. We are shifting the focus on **preparing for deployment**, to ensure the UK is placed to capture the near- and long-term economic benefits of fusion commercialisation.

Accelerate growth of the UK fusion industry to capture the economic and strategic benefits of fusion through a globally competitive supply chain; UK based power plant design, subsystems and systems integration capabilities; and demonstrating commercial viability through STEP.

UK Government

A New Energy Revolution – The UK's Plan for Delivering Fusion Energy

- On 16th March 2026 the Department for Energy Security and Net Zero published ***A New Energy Revolution – The UK's Plan for Delivering Fusion Energy***. This strategy looks to accelerate growth of the UK fusion industry to capture the economic and strategic benefits of fusion and builds on the government's record investment of **over £2.5 billion over five years** in fusion research and development.
- This includes progressing **STEP** (Spherical Tokamak for Energy Production) - the UK's programme to design and build a prototype power plant by 2040. This will demonstrate commercial viability of fusion and address remaining scientific issues.



UK Government

Global Fusion Policy Summit – September 2026

UK Government

Global Fusion Policy Summit

- On Monday 14 September, the Global Fusion Policy Summit took place at Mansion House in London.

- This joint UK-US event co-hosted by **Minister Shanks** and **Under Secretary Dr. Darío Gil** opened UK Fusion Week.



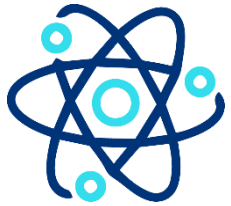
UK Government

What next?

UK Government

The UK's plan for commercial fusion deployment

We will achieve our vision through:



Accelerating R&D

Investing in the underpinning research and technology needed to solve remaining technical challenges, including the world-leading capabilities of UKAEA Group and partnerships with UK industry.



Growing investment, supply chains and skills

Using public investment, including through STEP, to unlock private sector investment and stimulate a rich ecosystem of companies working in fusion, from SMEs to multinationals, supported by a pipeline of skills, making the UK a top global destination for private developers, suppliers and investment.



Policy Innovation

Creating a forward-leaning environment for the fusion sector to thrive, further developing the UK's pro-innovation regulatory regime, streamlined planning, and developing the world's first market framework for fusion energy.

UK Government

Thank you

Fusion Energy Partners Ltd

Unique Expert Advice on Fusion Energy

Brian Lloyd

brian.lloyd@fusionenergypartners.com

The fusion energy landscape

- Huge future demand for clean electricity, partly driven by data centres and AI
- Now >50 private fusion companies worldwide
- Wide range of approaches - Tokamaks, Stellarators, Mirrors, RFC, Z-pinch, Laser ICF, Magnetized Target Fusion, Levitated Dipole …….
- Burgeoning fusion supply-chain
- Private & public investment > $14Bn to date. $4.5Bn in 2025/26 (FIA 2026 report)
- In 2022, NIF achieved scientific breakeven with Q_{sci} >1, in 2025, 8.6MJ for 2.08MJ input (Q_{sci} >4)
- Non-fission regulatory frameworks being pursued in UK, USA and Japan
- UK fusion energy strategy and US fusion energy roadmap published
- Significant change of stance in Germany regarding nuclear – now actively supporting fusion

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- Spin-out from UKAEA end 2024 from a nucleus of ‘semi-retired’ experts in broad aspects of fusion energy. Started trading at the beginning of 2025.
- Since then, more consultants from a range of backgrounds, have joined the team bringing additional specialist expertise.
- *Unique Expert Advice on Fusion Energy* - as a group we have strength in breadth and depth
- Technical opinion and advice for: Investors, device and system developers, supply-chain, Government ….
- Say it as we see it, but always professional. We have opinion but are not opinionated
- Multiple projects with several repeat customers

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Areas of engagement include:

- Technical due diligence to inform investment decisions
- Strategic fusion landscape assessment and continuous monitoring
- Design evaluation and review
- Trouble-shooting and problem resolution
- Briefing and mentoring for senior technical leaders involved in fusion energy

FEP provides a comprehensive technical resource for organisations seeking strategic advice on fusion technologies or navigating fusion-related challenges

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Type of work undertaken – so far

- Client types: VC's, Industrial Investors, Sovereign Wealth Funds, Device Developers, Gov't Labs
- Full due-diligence (DD), scoped DD, design review, general technical advice on a topic, fundamental technical review, landscaping
- Scale of contract duration 2 days – 6+ weeks
- Client location: Worldwide
- DD work– typically looking for evidence of:
  - Sound scientific, technical and engineering underpinning?
  - Is there a credible (albeit challenging) development path?
  - Planning to do the right things, in the right order?
  - The right team and processes in place that can make things happen, at pace?
  - Is the technology scalable?

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Lessons Learned

- Confidentiality is key (even if we know clients talk to each other). Within FEP only those consultants engaged on a project have access to the relevant technical information (the other consultants are usually not even aware of the existence of the contract).
- Don’t underestimate the level of technical understanding – some very impressive individuals working for clients. Potential investors often have their own embedded technical experts.
- Investors are cognisant of the challenging claims (timescale) made by private fusion companies
- Investment risk appetites vary – from conservative to real long-shots. High technical risk doesn’t necessarily mean no investment – balanced against potential gain, including possibilities for an early return on investment.
- Contracts generally have a short lead-in and a challenging delivery timescale

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The future?

- Having established a positive reputation, particularly for in-depth technical due diligence, we are expecting demand for our services to continue to grow
- Need for sound technical support in fusion will continue but will evolve as the industry matures
- Investigate adjacent sectors
- Continue to expand pool of consultants to increase capacity and scope

FEP is passionate about getting commercially viable fusion energy across the line

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contact@fusionenergypartners.com

For more information, please visit

www.fusionenergypartners.com

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NIA FUSION GROUP MEETING

Fusion CEO Activity

What do fusion developers need from industry over the next 10 years?

60-minute workshop · Participant instructions

Workshop objective

By the end of this session we will have agreed the **Top 3 priorities** for industry to focus on over the next 10 years

Those priorities will help enable

- **Investment**
- **Capability development**
- **Supply chain readiness**
- **Successful fusion commercialisation**

Running order

Time	Activity	Format
09:55	Introduction	Whole room
10:00	Q1 · Temperature check	Individual on Slido
10:10	Q2 · Engaging the supply chain	Table activity
10:25	Q3 · Lessons from other industries	Table activity
10:40	Q4 · Delivering FOAK by 2035 to 2040	Table activity
10:55	Vote, summary and close	Everyone on Slido

Why your input matters

Today's output will shape the fusion panel at Nuclear26

Who

Steve will represent the NIA Fusion Group and Helixos on the panel.

What he takes with him

The Top 3 industry priorities this room agrees in the final vote.

The central question

Imagine you're a Fusion Power Plant Developer CEO. What do you need from industry over the next 10 years to deliver your FOAK plant successfully?

FOAK means first-of-a-kind. Keep this CEO mindset for every question that follows.

Prompts to get you thinking

Could industry help you to

1. Invest in capability
2. Build new supply chains
3. Develop specialist skills
4. Create manufacturing capacity
5. Support technology demonstration

And consider

1. What to build
2. When it will be needed
3. How certain the requirements are
4. Where to invest

Question 1

INDIVIDUAL · SLIDO WORD CLOUD · 10:00 · 10 MINS

What is the single most important thing fusion technology developers need from industry and the supply chain?

A temperature check for the room

1

Join the Slido at #35187312



2

Enter your answer as a word or short phrase

3

Watch the word cloud build on screen

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What is the single most important thing fusion technology developers need from industry and the supply chain?

ⓘ The Slido app must be installed on every computer you're presenting from

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Question 2

TABLE ACTIVITY · 10:10 · 15 MINS

If you were a Fusion CEO, what is the one thing you would do to engage the existing and potential supply chain more effectively?

Be creative and ignore the budget

1. Think on your own about your answer
2. Share your pitch with the table
3. Choose the table's favourite idea
4. Present it when time is up

Question 3

TABLE ACTIVITY · 10:25 · 15 MINS

What good practice and lessons learnt would you bring in from other industries to achieve your goal?

Draw on your table's experience of

Rail **Fission** **Maritime** **Medical** **Automotive** **Aerospace** **Oil & Gas**

Think about what worked well, what went wrong, and what fusion could adopt.

Question 4

TABLE ACTIVITY · SINGLE OUTPUT · 10:40 · 15 MINS

Considering your answers so far, what does your company need to do to achieve its FOAK plant by current timelines of 2035 to 2040?

One output per table

1. Look back at your answers to Questions 1 to 3
2. Agree ONE statement as a table
3. Submit it to go forward to the vote

Vote for the Top 3

EVERYONE ON SLIDO · 10:55

Vote on the table statements to reveal the Top 3 priorities

1

Each table's Question 4 statement appears on Slido

2

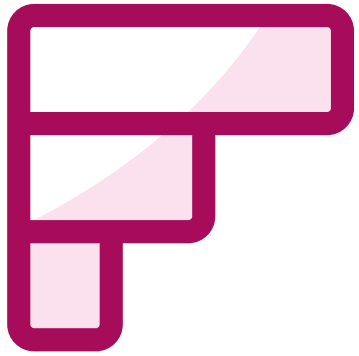
Everyone votes individually at #35187312



3

The three highest-ranked statements become our priorities

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Vote for the TOP 3 Priorities

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Our Top 3 priorities for industry

1. Engage early with the right partners to deliver from a whole plant perspective
2. Collaborate with suppliers in adjacent sectors who are willing to invest and develop a delivery model that incentivises partners. Seek out good practice such as the advanced nuclear framework.
3. Political support - regionally and nationally

These go forward to the fusion panel at Nuclear26. Thank you for taking part.

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Which agenda item did you most enjoy this morning?

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NIA Fusion Business Group

Break – 30 mins



Nuclear Industry Association Fusion Business Group

Some thoughts on effective fusion skills development

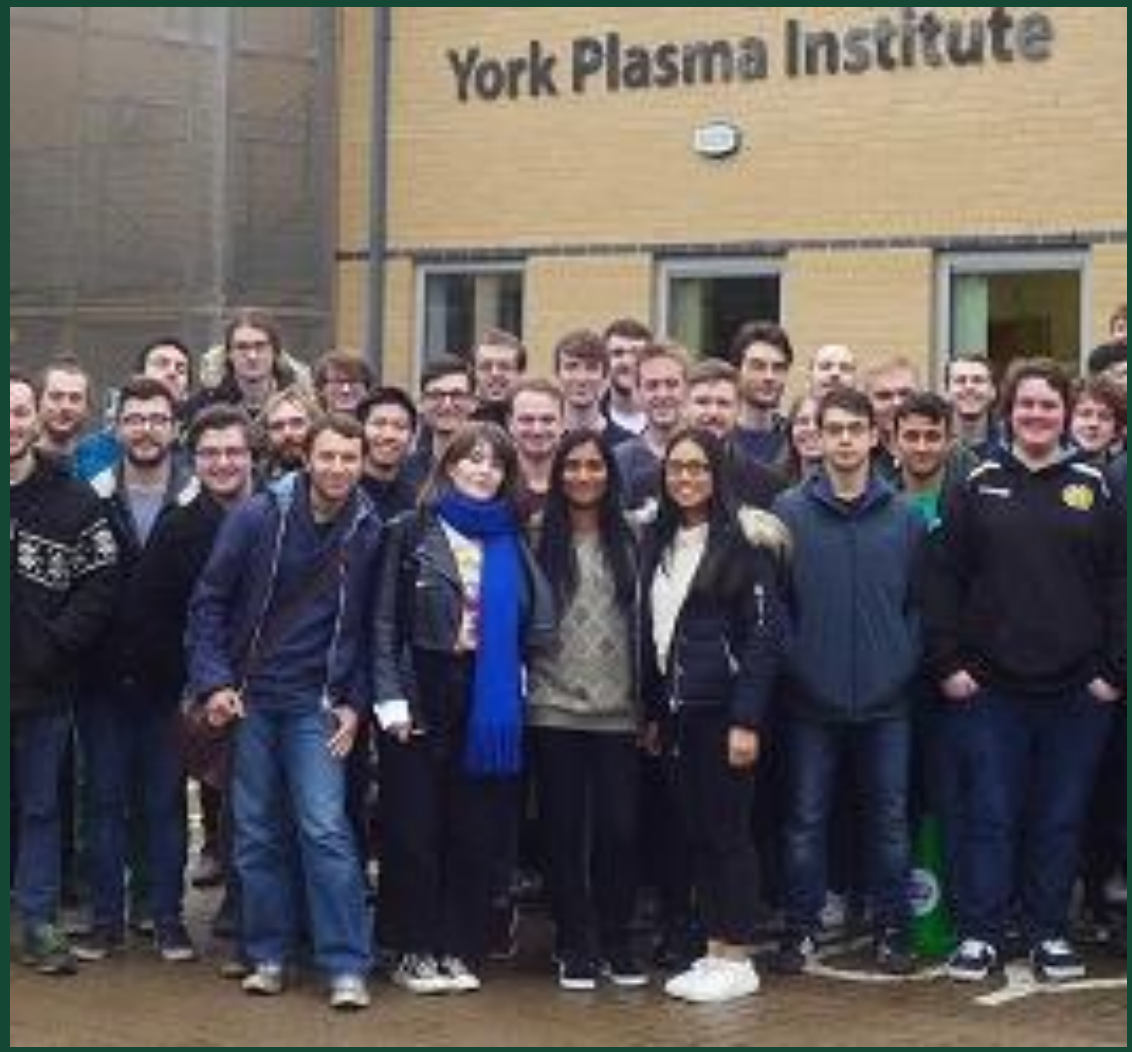
Roddy Vann

York Plasma Institute, School of Physics, Engineering and Technology, University of York, Heslington, York UK

York Plasma Institute

Three research “strands”:

- Magnetic Confinement Fusion
- Laser plasma physics
  (“Matter at the extremes”)
  including Inertial Fusion Energy
- Low-temperature plasmas
  e.g. for technological applications such as space thrusters, semiconductors or medicine



Magnetic Confinement Fusion strand

Largest magnetic fusion plasma group in UK:

- Istvan Cziegler (turbulence; diagnostics)
- David Dickinson (core turbulence; gyrokinetics)
- Kieran Gibson (divertor physics & diagnostics)
- Jon Graves (MHD & fast particles)
- Roddy Vann (microwaves)
- Alessandro Geraldini (plasma-wall interaction)
- Koki Imada (L-H transition physics)
- Juan Ruiz (turbulence physics & diagnostics)

Plus:

- Peter Hill (Research Software; PlasmaFAIR)
- Chris Ridgers (non-local transport; BOUT++)
- Andrew Gibson (divertor plasma chemistry)













Roddy is a career fusioneer (now ~25 years)

- Director of Centre for Doctoral Training in Fusion Power
- Director Fusion Industry School
  - see Naomi & booth
- Skills Pillar Lead, UK Fusion Industry Taskforce
  - https://fusionindustrytaskforce.co.uk/fusion-industry-taskforce-policy-recommendations-for-the-development-of-skills-in-uk-fusion/
- Supervisor of 9 PhD students (currently)
- Ex-Chair of Board of Governors of FuseNet (2019-2026)
- (ex) Lecturer of 2nd year electromagnetism at U of York
- (ex) Chair of Governors at Stamford Bridge Primary School



Roddy many years ago

Fusion is technically difficult, but our greatest challenge is the supply of suitably-trained people.

=> People are our most valuable commodity.
We need to treat them this way.

“We need X more skilled people.” ⇔ “We have the opportunity to provide X people with well-paid jobs.”

Roddy is a career fusioneer (now ~25 years)

- Director of Centre for Doctoral Training in Fusion Power
  - see Katy Welford poster
  - see Aneeqa Khan poster



y many years ago

- As fusion grows and commercialises, more people will be in fusion for less of their career.
- Non-fusion experts will be making strategic decisions on behalf of all of us.
- Targeted / bespoke training will be necessary to equip these people with the knowledge they need.
- (Example: “fusion is now only an engineering problem”)

- Chair of Governors at Stamford Bridge Primary (Elementary) School

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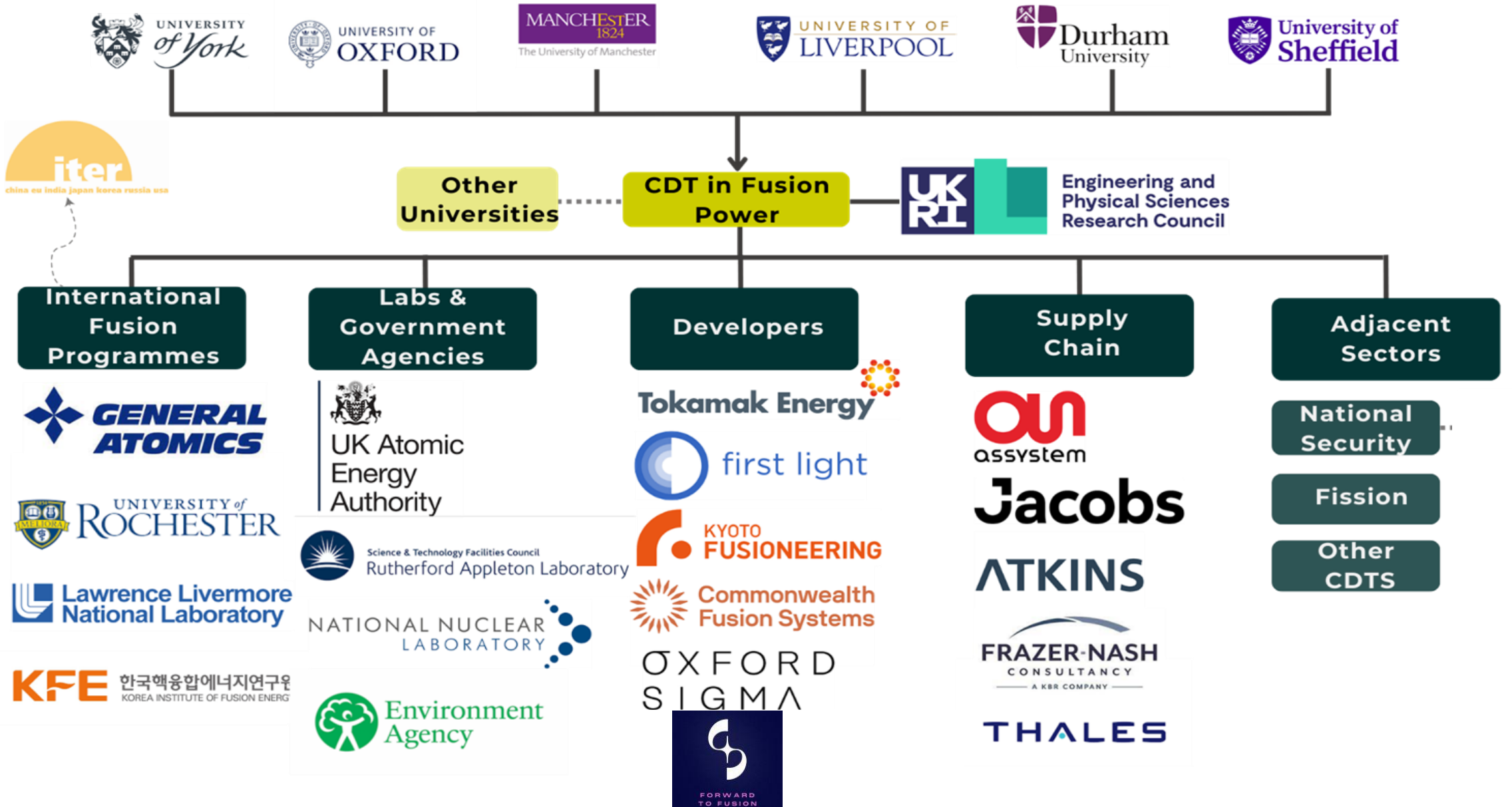
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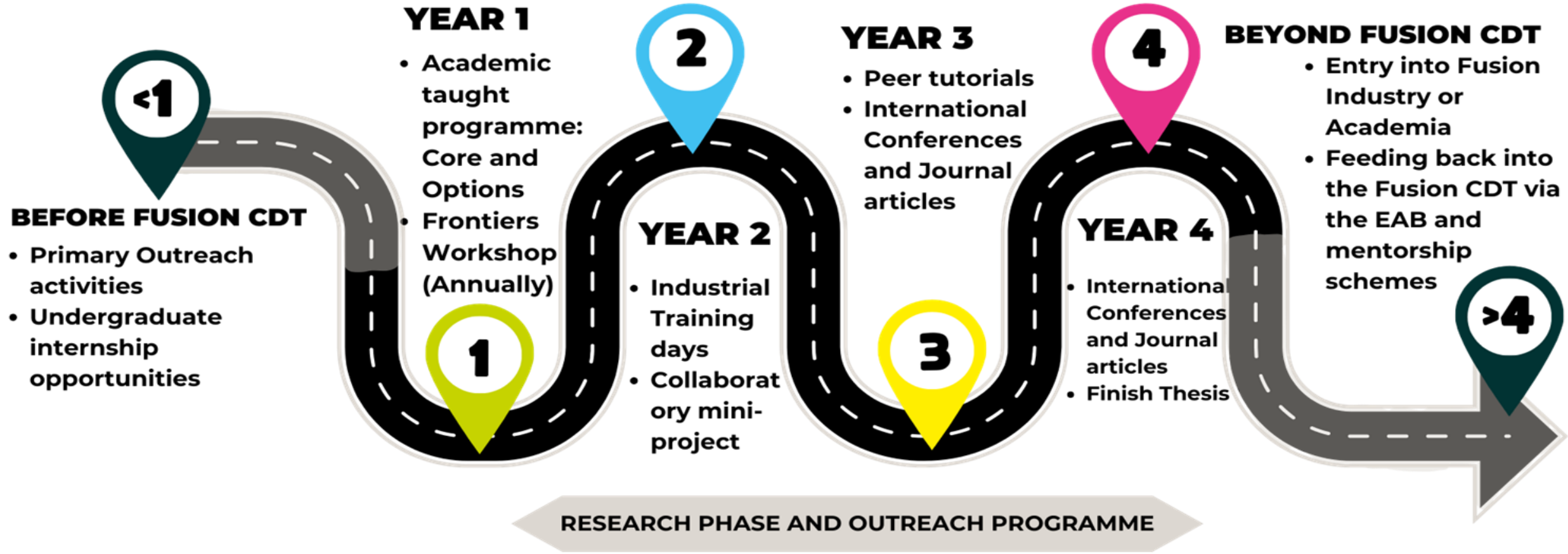
Roddy many years ago

EPSRC Centre for Doctoral Training in Fusion Power: academia, (inter)national labs and private industry

FUSION CDT



Fusion Power CDT student journey



Updates for NIA Fusion Business Group

FUSION CDT

- Scope: materials science & plasma physics for fusion power
- Third cohort of ~25 students starts later this month of which 10 are “community studentships” – students who are registered at universities other than the original six partners
- Inaugural IAEA Technical Meeting on Developing the Fusion Workforce (Vienna)
- Fusion Academy Summer School, run by PhD students for 13-16 yr olds
- We welcome proposals for joint training activities.
- We would be delighted if you would like to design, co-fund & co-supervise PhD projects (~£70k half cost)





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Roddy many years ago

Fusion Industry School

- https://fusion-cdt.ac.uk/fusion-industry-school/
- Now in its fifth year; managed by the Fusion CDT & UKAEA
- Interactive programme of lectures & panel sessions with experts in fusion, aimed at providing an overview of the current progress and challenges to industry professionals
- Original format delivered over two weeks: in York (22-25 June) & Oxford (21-24 September)
- Crash course for Managers & Senior Leaders: 1st & 2nd December 2026 in Retford
- You do not need to have prior knowledge of fusion science or engineering.





FIS Crash Course: Tuesday 1st & Wednesday 2nd December 2026

FUSION CDT

- **Provisional programme**
- **Location: West Retford Hotel (near West Burton)**
- Day 1: Tuesday 1st December (registration 10am)
  - Fusion Science (fundamentals; fuel cycle; plasma physics)
  - Materials for Fusion: tritium; superconductors; plasma-facing & structural materials (Panel)
  - UK & International Landscape
  - Conference Dinner
- Day 2: Wednesday 2nd December (finish 3pm)
  - The Fusion Community: Regional, National, International (Panel)
  - Socio-economics and Financing Fusion
  - Engineering opportunities and connecting to the grid





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- (ex) Chair of Governors at Stamford Bridge Primary (Elementary) School



Roddy many years ago

Fusion Industry Taskforce: workforce recommendations

Paper published in December 2025.

Primary recommendations:

- Build an inclusive and diverse fusion workforce
- Inspire early and sustain interest in science and engineering
- Enable flexible career pathways
- Coordinate national and regional skills infrastructure
- Align skills development with industry growth and innovation



Fusion Industry TASKFORCE

Fusion Industry Taskforce: consequences for us

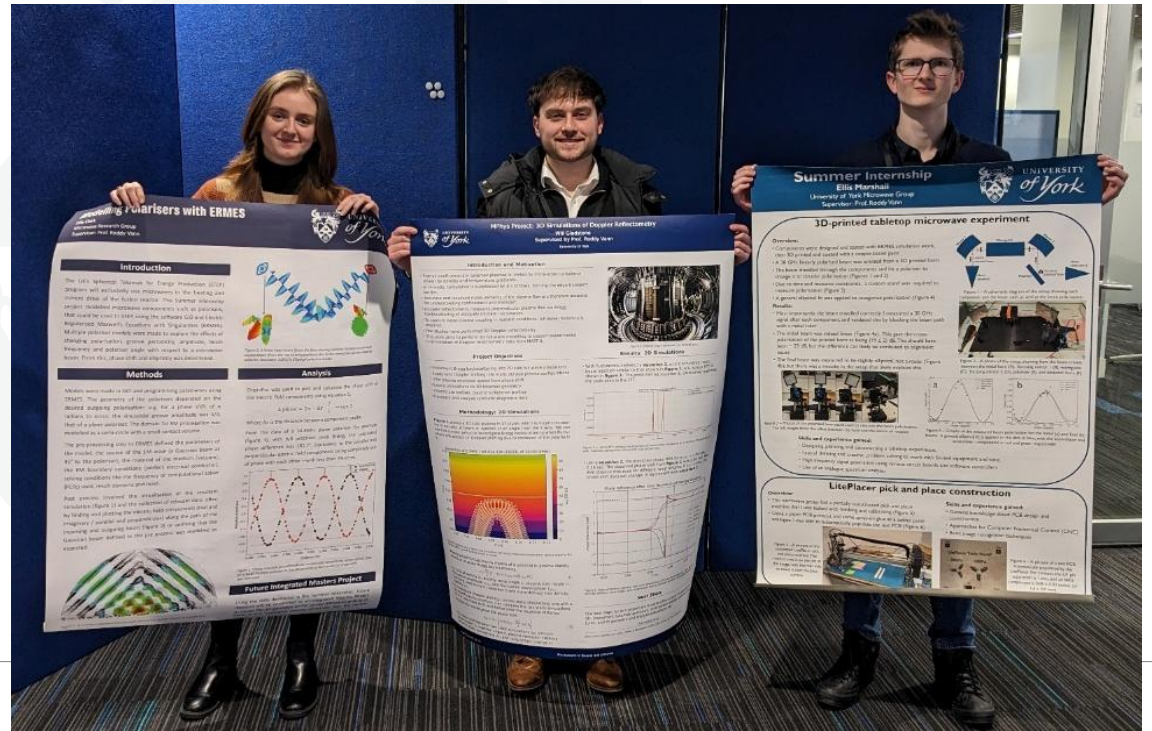
- There are only 168 hours in the week. It turns out that this is fixed.
- Conclusion: no single individual can do everything
- The pipeline is leaky at every stage: from primary schools to senior managers; consequently there is no “silver bullet”.
- My experience is that discrete interventions that have positive impacts for individuals have greater benefit than strategy documents. [Ouch!]



Fusion Industry
TASKFORCE

Summer internships are great!

- In 2022 & 2023, Fusion Industry School supported summer internship bursaries for students from lower socio-economic backgrounds.
- UKIFS & University of York supported 6 microwaves in fusion internships in 2025; we would like to expand the scheme in future years. (This year we ran an advanced summer school.)
- A great way to provide talented undergraduates with the opportunity to experience research.
- [Don't underestimate supervision efforts & running costs]



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Back

UKAEA Fusion Internship Scheme

The UKAEA Fusion Internship scheme provides financial support for UK universities or industry to host undergraduate students for a full-time, 8-week paid UK based summer internship in fusion and related disciplines. This can be through a hybrid or in-person working model. Internships must take place between June and August 2026. Latest start date is 7 July 2026. Each award provides £4,500 stipend per intern, enabling students to gain hands-on experience and develop skills for future careers. This opportunity has scope for 40 awards.

Opening date: 5 January 2026, 9:00am

Closing date: 24 February 2026, 4:00pm

Start new application

Summary

- Why work in fusion?
  - Help the climate; give people a decent standard of living; generate growth; travel the world; be intellectually stimulated
- Diversity is key to success: whether or not you agree with me that it is morally and ethically right, fusion will succeed only if access to careers in fusion is independent of gender, socio-economic background or inherited characteristics.
- Interdisciplinarity is exciting, valuable & risky; we need more lawyers, economists, …
- Can we get more fusion content into university taught programmes?
  (My 2nd yr EM module has homework problems starting “An alpha particle in JET…”)
- If you are invited to give a talk at a primary school, cancel all your meetings and give the talk.
- We need to ensure training is what you need.



Be more like Professor D …

The welfare of the learner is paramount.

The Co-Lab Journey

START

2022 Co-Lab is born

co-lab



Clyne

Phase 1

Engineering Academy



Nishant

Phase 2

Consultancy Business



Diana



Sevi

SCRUB MARINE



Rohith



Elizaveta

Pneu monitor

DIAGNOSING THE PEN, NOT THE CALF



Isaac



Sarah



Sophie

Phase 3

Planning

Strategy

Performance




13D
TO LET
2,217 SQ FT
INSTANT VAN HIRE
AVAILABLE NOW


UK
100258
303804
Pneu
monitor

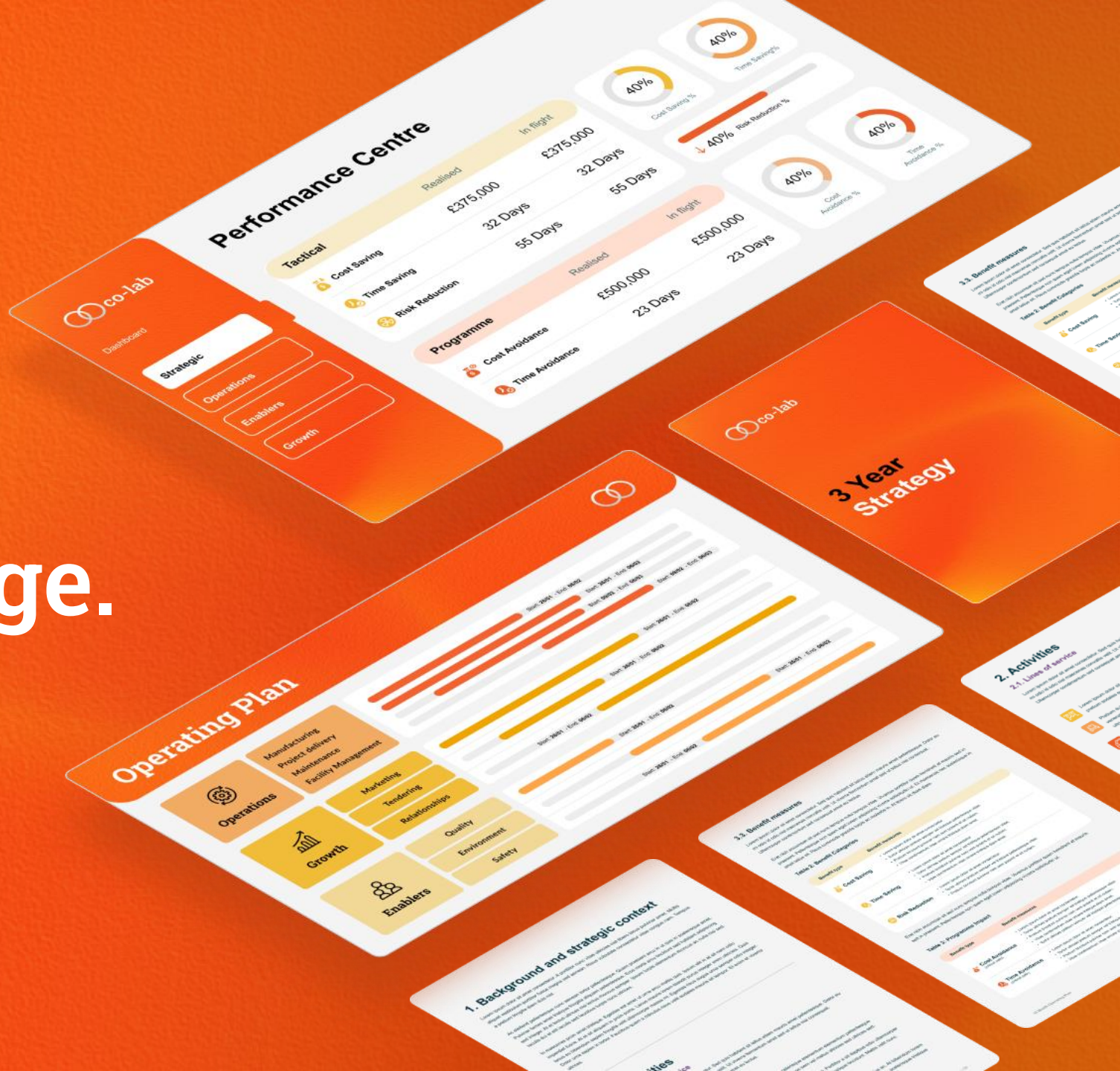
co-lab

We get organisations on the same page.

Strategy, Planning & Performance

Agree priorities, turn them into practical plans and measure whether it's working.

Progress Made Clear



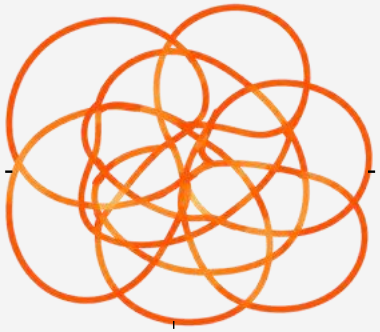
THE PROBLEM

When strategy, planning and performance do not connect

Many organisations have all three, but they are often developed, managed and reviewed separately.
This creates confusion between direction, delivery and visibility.

Strategy

Priorities are set



Planning

Actions are defined

Disconnected in practice

Performance

Data is collected

Cause

- Priorities are not translated clearly
- Ownership and timing are inconsistent
- Performance information sits apart from delivery

Effect

- Teams pull in different directions
- Delivery becomes reactive
- Progress, risk and accountability are harder to see

The result is more activity, less clarity and weaker accountability.

WHAT WE DO

We connect strategy, planning and performance

Our approach can be applied across an entire organisation, business, project or programme.

Strategy

Agree the direction, strategic choices, priorities and measures of success.



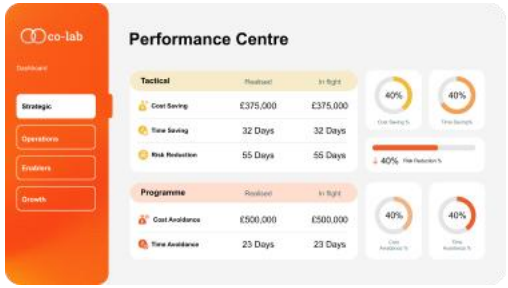
Planning

Turn agreed priorities into an Operating Plan with actions, owners and milestones, at the agreed level of detail.



Performance Measurement

Build branded Power BI dashboards around agreed measures, data sources and refresh frequency.



CASE STUDY

Turning Strategy into Accountability

Challenge

iSH needed a clearer way to connect its long-term ambition with day-to-day delivery. Strategy, quarterly priorities and performance measures needed to work together in a format that was easy for teams to understand, use and communicate.

Solution / Our Approach

Co-Lab developed iSH's organisational strategy, operating and delivery plans, and impact measures. We connected purpose and strategic priorities to day-to-day activity, with clear ownership and practical tools to measure progress and communicate performance.



Strategy on a Page

Creating a shared direction

We developed the organisational strategy and a visual summary bringing iSH's vision, principles, clusters, priorities and intended outcomes together, giving teams a shared direction.



Operating Plan

Connecting strategy to delivery

A single operating plan mapping responsibilities and quarterly priorities across clusters and enabling programmes, helping teams understand what matters, when it happens and who is accountable.



Performance Dashboard

Making performance visible

A concise quarterly dashboard bringing key impact, outcome and narrative measures into one view, giving iSH a clearer picture of progress across its Robotics, Manufacturing and Digital clusters.

Realising Tangible Benefits for UK Nuclear organisations

UK Atomic Energy Authority

RAICo ROBOTICS AND AI COLLABORATION

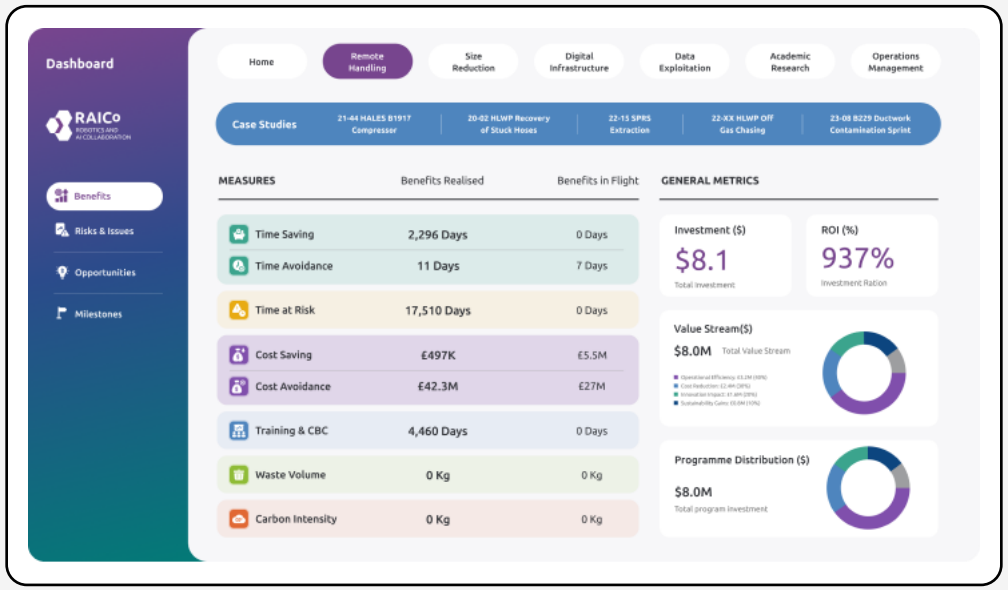
Sellafield Ltd — Manufactured Products Organisation

Challenge

UK Government departments must clearly demonstrate taxpayer value, ensuring transparency and accountability in project performance.

Solution

Our Benefit Management System tracks Return on Investment across projects, linking performance and sustainability metrics to strategic goals.



Benefits

High ROI

9:1 Return on Investment, proving measurable value.

Scalability

A flexible tool for real-time benefit tracking.

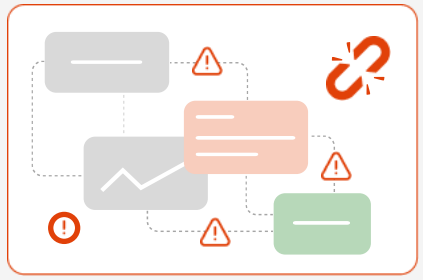
Transparency

100% visibility across 300+ stakeholders.

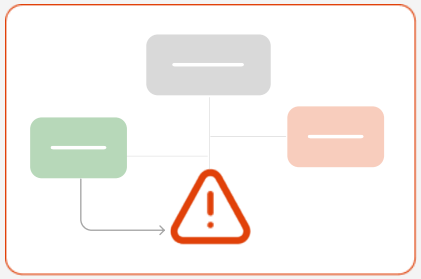
THE CHALLENGE

Reporting was ready to be streamlined and scaled

As reporting needs grew, the opportunity was to create clearer metrics, better-connected data, and stronger visibility of impact.



Create consistent KPIs



Connect data sources

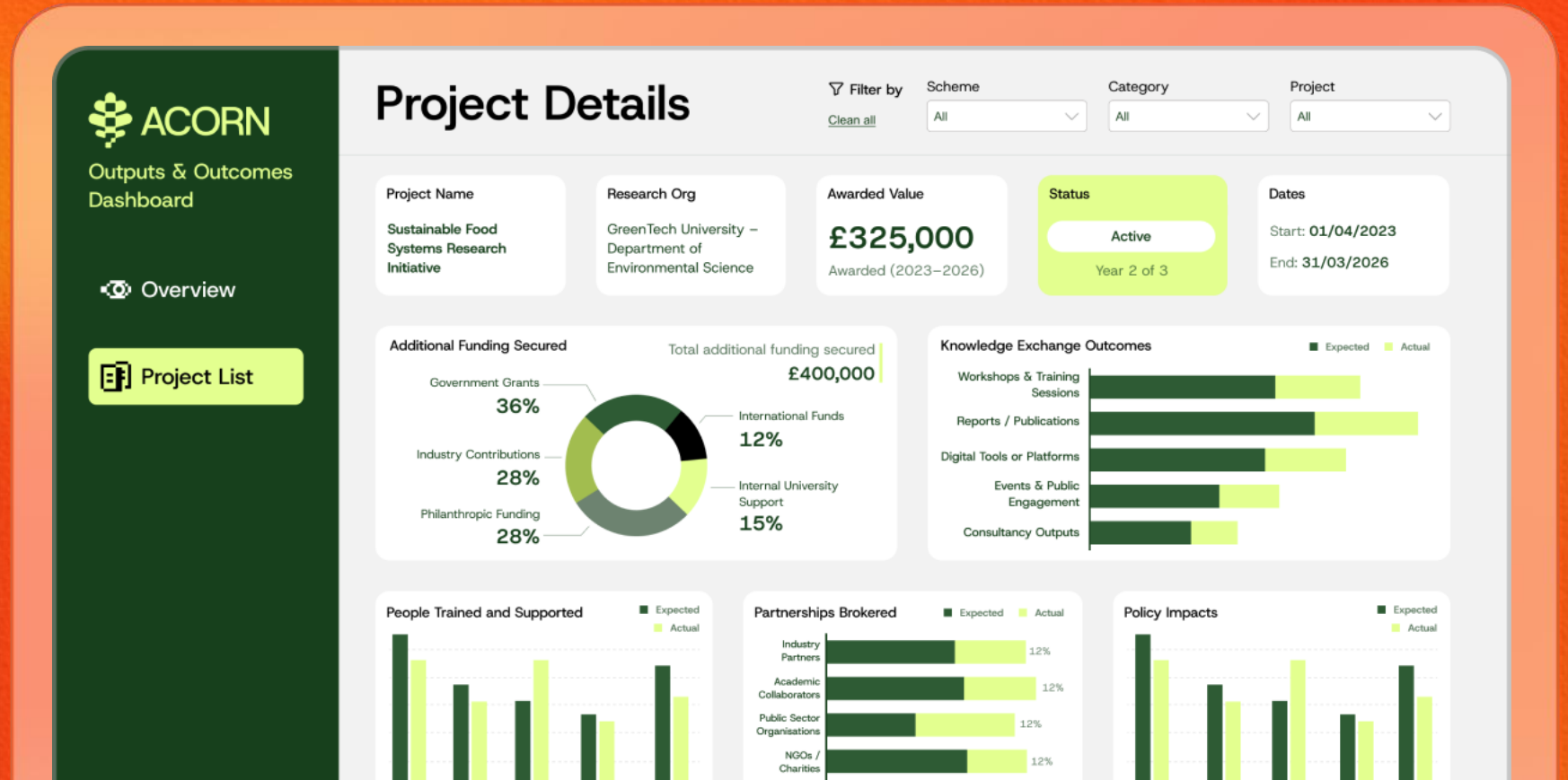


Improve impact visibility

THE SOLUTION

A centralised BI reporting solution

Bringing all programme data into one place



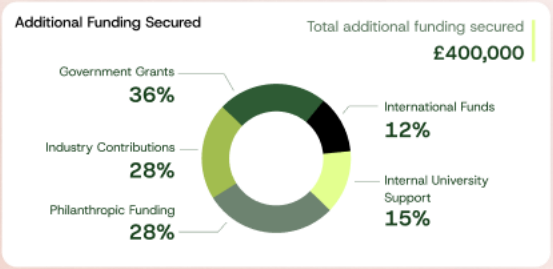
KEY OUTCOMES

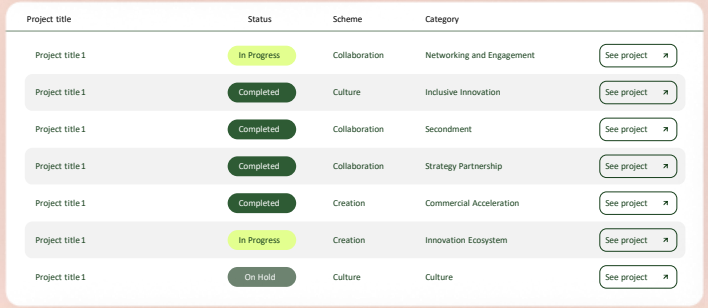
What Changed

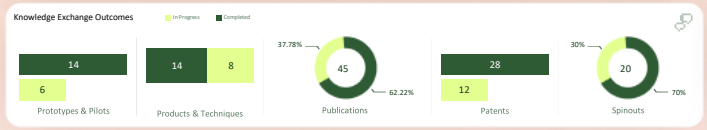
- One source of truth
- Reduced manual effort
- Consistent reporting
- Clearer insight into impact

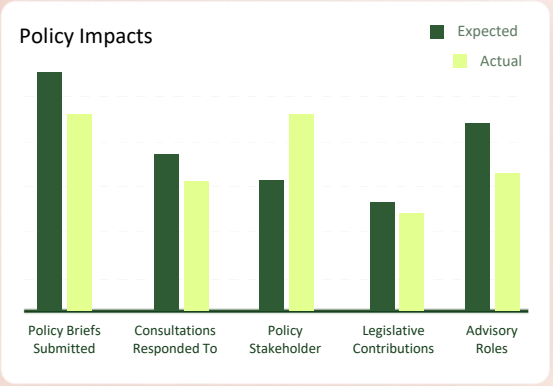












Let’s look at what needs to change.

Our free two-hour Discovery Workshop helps us understand what’s working, what’s getting in the way and where we could help.

co-lab

Email: info@co-lab.solutions

Website: www.co-lab.solutions

Address: Stop 4, The Bus Station, Bransty Row, Whitehaven, CUMBRIA, CA287XE

Thank you

Progress Made Clear

UK Fusion Regulation

Environment Agency (EA) and Health and Safety Executive (HSE)

NIA, Fusion Business Group, York 14th October 2026

Greg Black (EA)

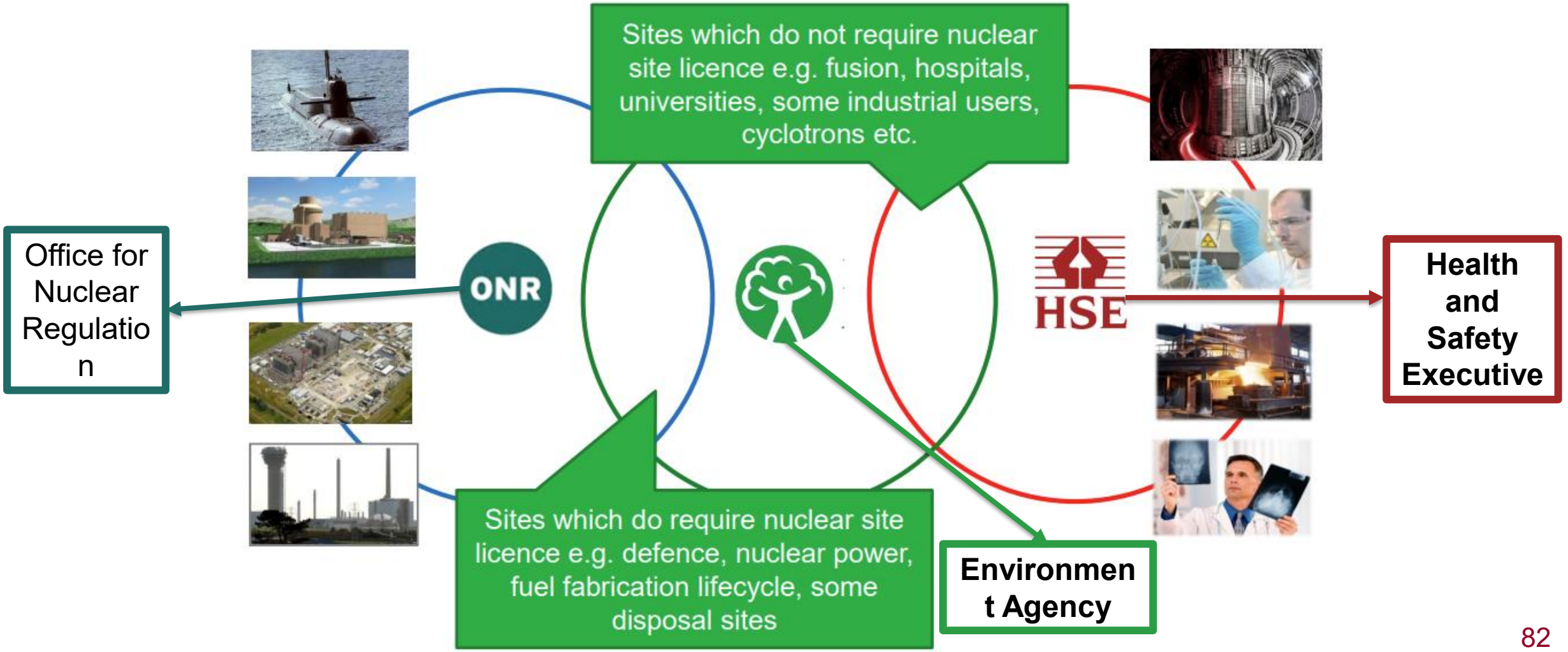
Manager, Advanced Technologies & Fusion Strategy

greg.black@enviornment-agency.gov.uk

Environment Agency

PROTECTING PEOPLE AND PLACES HSE

UK Regulatory Framework



UK Government and Fusion Regulation

- Following the UK government's 2021 Fusion consultation, the Energy Act 2023 confirmed that fusion would not be regulated under the Nuclear Installations Act due to its lower risk profile compared with fission. **HSE and EA jointly regulate fusion powerplants**.

- Key factors informed the government decision, including:
  - fusion's inherently safer profile
  - the risk of disproportionate regulation under fission frameworks
  - the need for a holistic hazard approach
  - avoiding public association with nuclear regulation

- A UKAEA technology report supported this decision by showing **lower offsite radiological risks from fusion designs**, though operators are still required to complete an appropriate risk assessment to determine emergency planning needs.

- HSE and EA will develop fusion regulation from first principles while engaging with the Office for Nuclear Regulation (ONR) as needed. ONR will continue to regulate radioactive material transport and Safeguards, while HSE and EA draw on their extensive experience regulating a broad range of industries, and scales, including complex facilities such as JET

The Environment Agency

- Lead regulator for environmental protection in England
  - Environmental protection is a devolved matter in the UK

- Principle duties:
  - protect (pollution control) or enhance the environment
  - make a contribution towards achieving sustainable development

- Three long-term goals:
  - healthy air, land and water supporting nature's recovery
  - sustainable growth
  - a nation resilient to climate change

- Regulate major industry and waste
- Water quality and resources
- Regulate treatment of contaminated land
- Flood risk and emergency response
- Fisheries and river navigation
- Conservation and ecological impacts

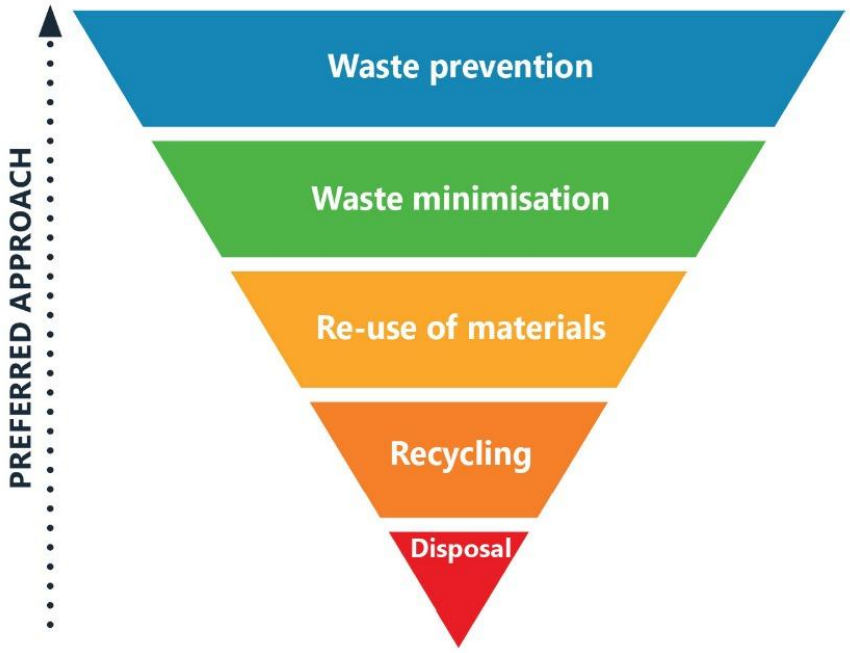
Environment Agency

PROTECTING PEOPLE AND PLACES HSE

Environment Agency regulation of radioactive substances

Permitting for:

1. Keeping and use of sealed and unsealed sources
    - Includes physical security
2. Accumulation (storage) and disposal of radioactive waste
    - Apply the waste hierarchy
    - Must be demonstrably As Low As Reasonably Achievable (ALARA)
        - Goal-setting approach applying Best Available Techniques (BAT)
    - Public dose limit = 1 mSv/year
    - Dose constraints:
        - 0.5 mSv/year from a site
        - 0.3 mSv/year from a single source

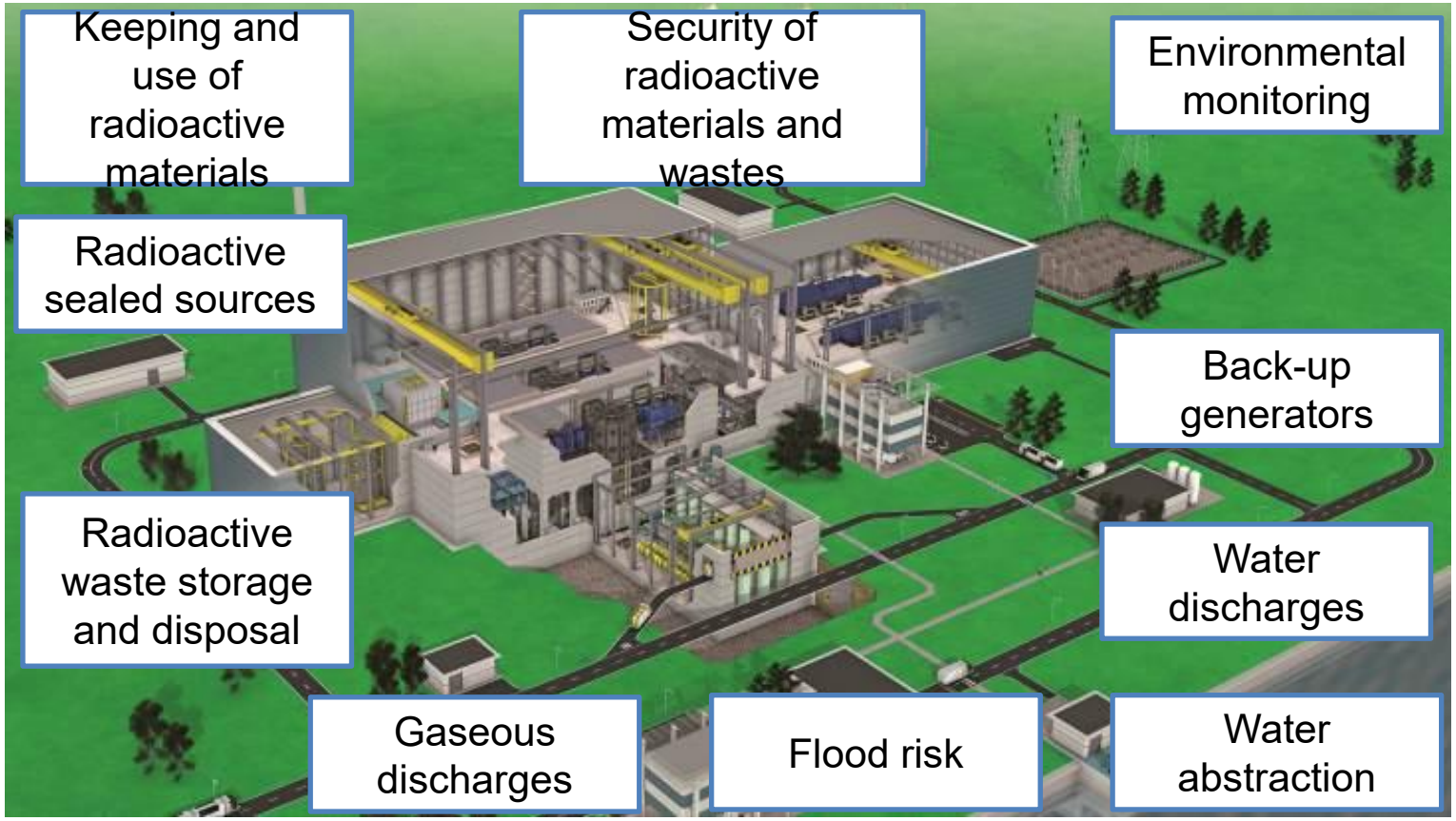


Environment Agency

PROTECTING PEOPLE AND PLACES HSE

The role of the Environment Agency in regulating fusion sites

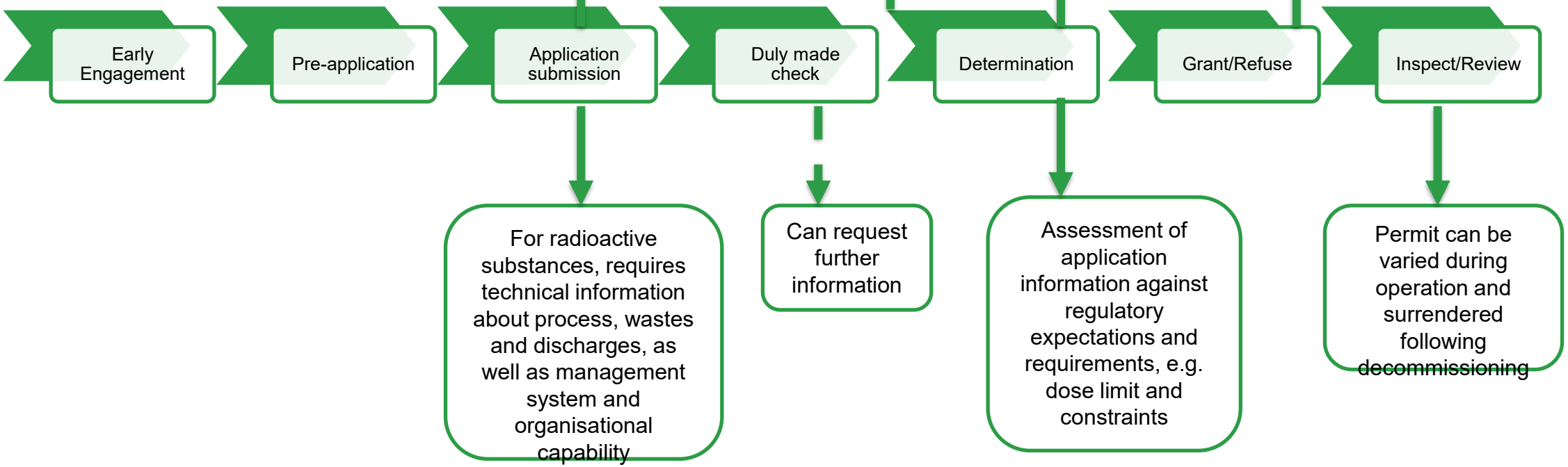
- Lifecycle approach
- Conventional as well as radiological hazards
- Goal-setting regulation of radiation based on ICRP pillars and OSPAR
  - ALARA
  - Best Available Techniques (BAT)
- Regulation of other pollutants often standards based



Environmental protection of the public and wildlife

Environment Agency Permitting Process (general)

Generic process for all types of environmental permit – for radioactive substances activities and other, non-radiological, permits

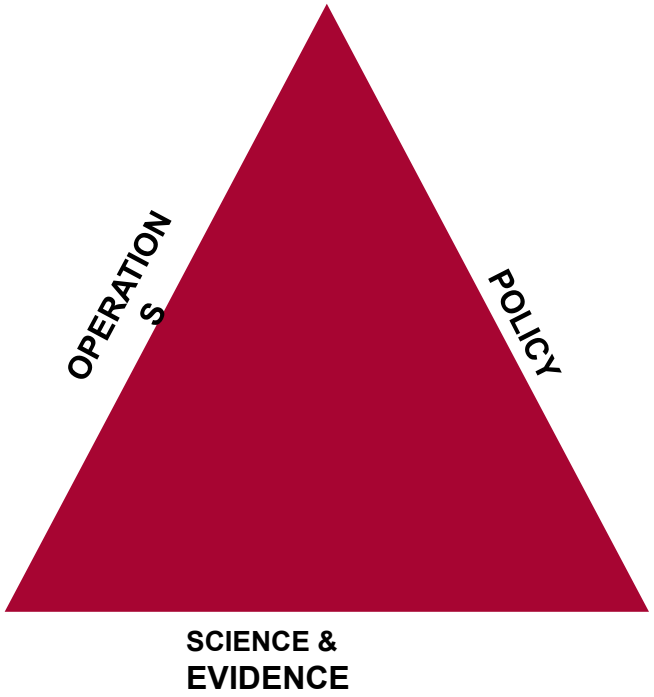


Environment Agency

PROTECTING PEOPLE AND PLACES HSE

The Health and Safety Executive (HSE)

- UK Government policy lead for occupational health and safety
- The regulator in Great Britain (GB) for the risks arising from work to workers and others
- HSE is unique as a regulator. It has three equal and complementary functions:
  - Policy
  - Operations – inspection and enforcement
  - Science and technical



Health and Safety Legislation Applicable to Fusion

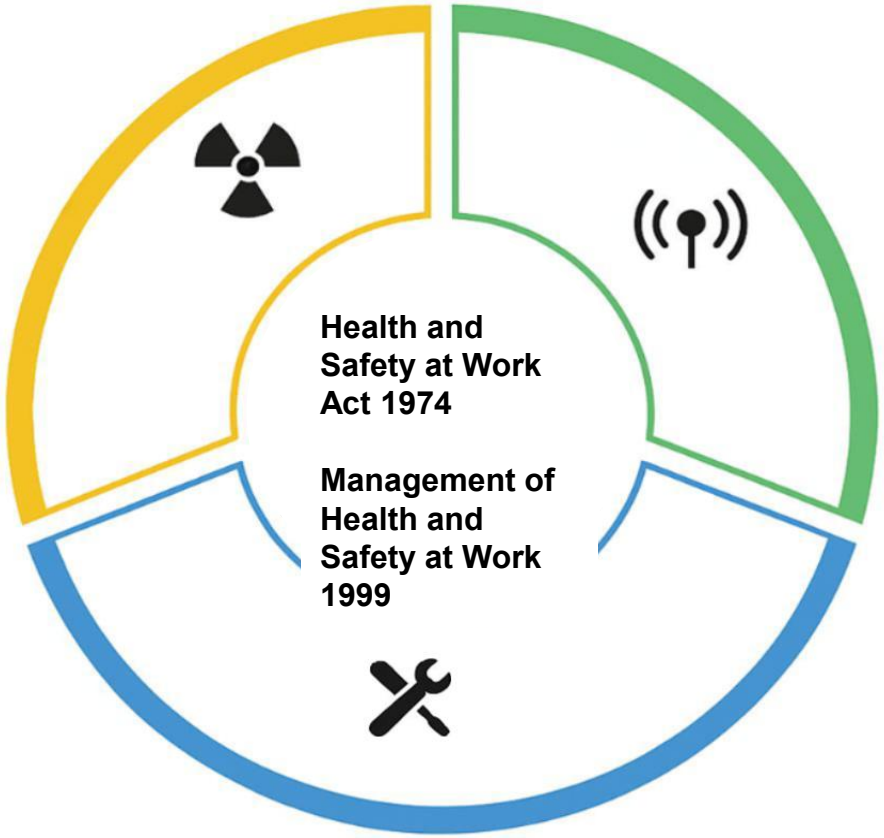
(Non-exhaustive)

PROTECTING PEOPLE AND PLACES HSE

Ionising Radiation

Ionising Radiation Regulations 2017 [**IRR**]

Radiation (Emergency Preparedness and Public Information) Regulations 2019 [**REPPIR**]



Non-Ionising Radiation

Control of Electromagnetic Fields at Work Regulations 2016

Control of Artificial Optical Radiation Regulations 2010

Conventional Health and Safety

Construction (Design and Management) Regulations 2015

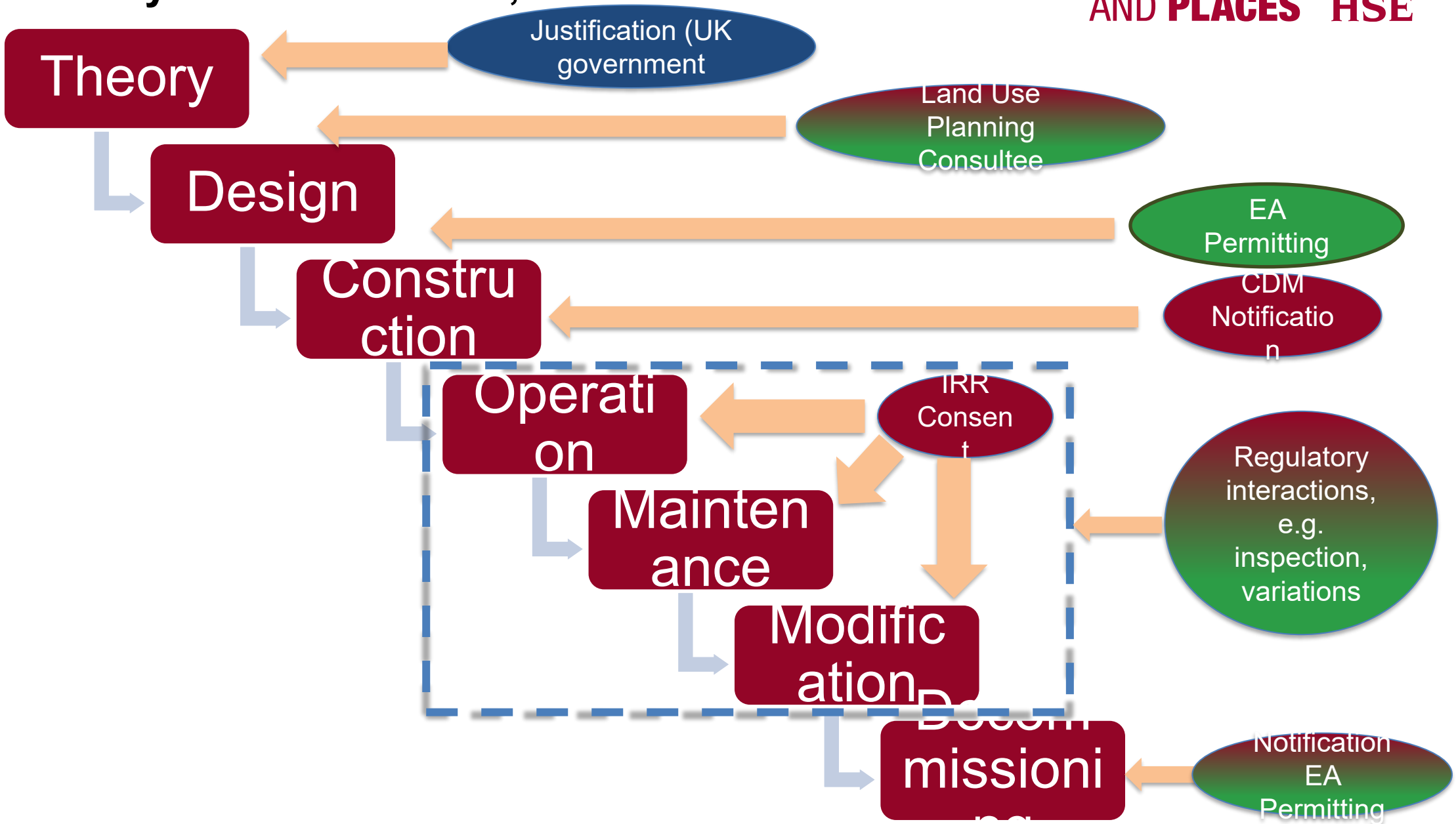
Control of Substances Hazardous to Health Regulations 2002

Dangerous Substances and Explosive Atmospheres Regulations 2002

Electricity at Work Regulations 1989

Fusion Plant Lifecycle – Notifications, Permits and Consents

PROTECTING PEOPLE AND PLACES HSE



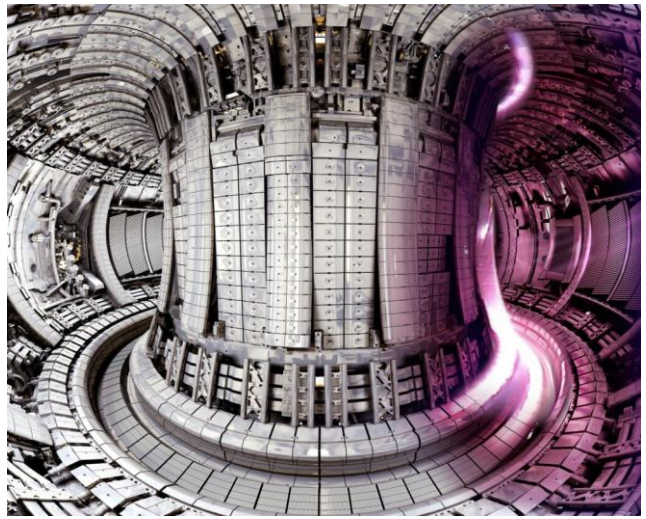
Environment Agency

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Regulatory experience of fusion activities

- Main experience from regulating UKAEA Culham Centre for Fusion Energy
  - Joint European Torus (JET), started operations in 1983 and ceased in 2023
  - Permitted as a “non-nuclear” operator
- Other fusion operators, e.g. First Light Fusion, Tokamak Energy
- Early engagement with UK Fusion Energy’s Spherical Tokamak for Energy Production (STEP)





<u>Key Learning</u>

- Goal-setting regulation allows flexibility
  - Important for a research and development site where changes may be rapid
  - Conduct operations within a “safe” regulatory envelope
- Early engagement is needed for changes requiring regulatory permission
  - Understanding improves application of a graded approach

Early Engagement process



GOV·UK

Home > Business and industry > Business and the environment

Guidance

Fusion energy developers: engage early with regulators

How fusion energy developers can engage early with the Environment Agency and Health and Safety Executive to get regulatory advice before applying for permits and other approvals.

From: Environment Agency and Health and Safety Executive

Published: 14 September 2026

[Fusion energy developers: engage early with regulators - GOV.UK]

Environment Agency

PROTECTING PEOPLE AND PLACES HSE

Points and Views to note:

Any individual site and design would be assessed on its own merits.

Under a first principles approach, increased understanding as industry develops should define approach

The UK will engage with IAEA as global understanding

TRENT
SUPERCLUSTER



West Burton

Edward Wright

A Partnership

Trent Supercluster
A Partnership

TRENT SUPERCLUSTER

Our Strategic Collaboration Group:

East Midlands Combined County Authority

Nottinghamshire County Council

Bassetlaw DISTRICT COUNCIL — North Nottinghamshire —

SOUTH YORKSHIRE SYMCA MAYORAL COMBINED AUTHORITY

STEP FUSION

Department for Energy Security & Net Zero

UK Atomic Energy Authority

Greater Lincolnshire Combined County Authority

Lincolnshire COUNTY COUNCIL *Working for a better future*

West Lindsey DISTRICT COUNCIL

Our wider collaborators include:

Ministry of Housing, Communities & Local Government

FUSIONSKILLS COLLABORATION PARTNERSHIP

FUSION CDT

UNIVERSITY OF LINCOLN

UNIVERSITY of York

University of Nottingham UK | CHINA | MALAYSIA

UNIVERSITY OF BIRMINGHAM

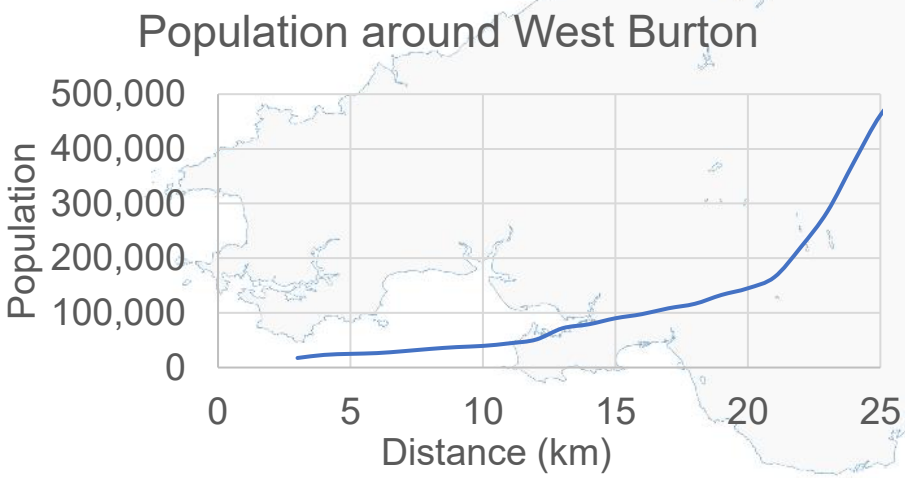
Fusion Industry SCHOOL

Midlands Connect Transport | Investment | Growth

…and others!

Trent Supercluster
A Partnership

Along the River Trent - the boundary between two UK regions: The **East Midlands** and **Greater Lincolnshire**



England Combined Authorities Map.png, Wikimedia Commons, licensed under CC BY-SA 4.0. Available at: https://commons.wikimedia.org/wiki/File:England_Combined_Authorities_Map.png

Trent Supercluster What Is It?

- Regional vision along the River Trent
- Delivering a supporting ecosystem
- Unlocking opportunities around three major sites
- Driving regeneration and investment
- Playing our part in growing the wider UK sector



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Six priority workstreams for 2026

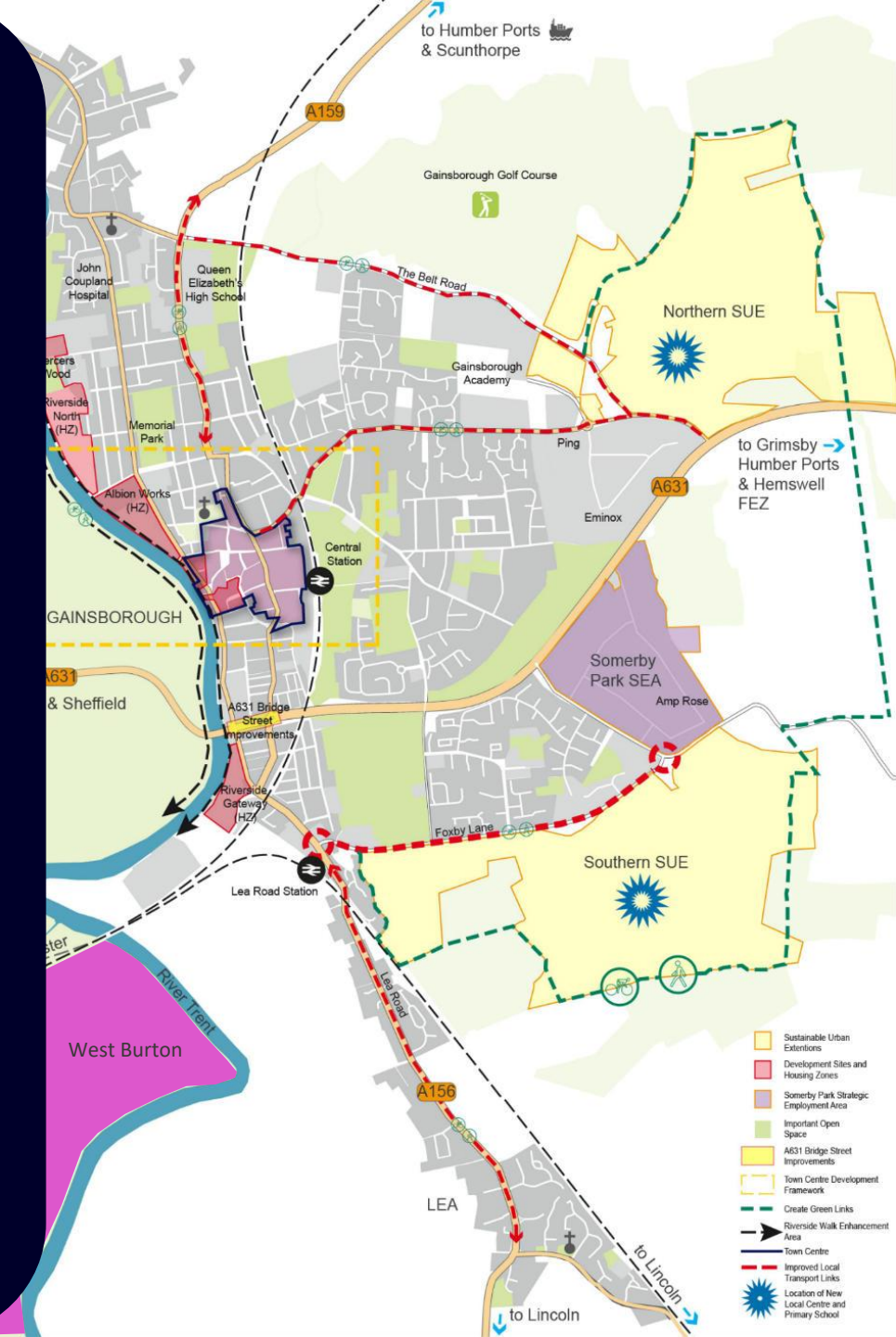
- Spatial Development
- Skills & Employment
- Supply Chain, Business & Industry
- Research & Innovation
- Communications & Engagement
- Discovery Centre

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OFFICIAL-SENSITIVE

Spatial Development

- A unified Supercluster approach to spatial planning that enables and protects long-term investment.
- Coordinated infrastructure planning across transport, grid, housing, and business parks, etc
- A major regional programme to prepare the land, utilities, and sites needed for future industrial growth.



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Skills and Employment

- Enhance the attractiveness of the Supercluster sites to investors, given the critical need for a skilled workforce to deliver large-scale build and support ongoing operations
- Ensure that the benefits of Supercluster developments accrue to people in the region by giving local people the skills they need to access high-quality, higher-paid roles
- Aligning education partners around an overall Supercluster skills strategy and approach
- Defining requirements and mobilising resources to provide the skills requirements for Supercluster



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Supply Chain, Business, & Industry

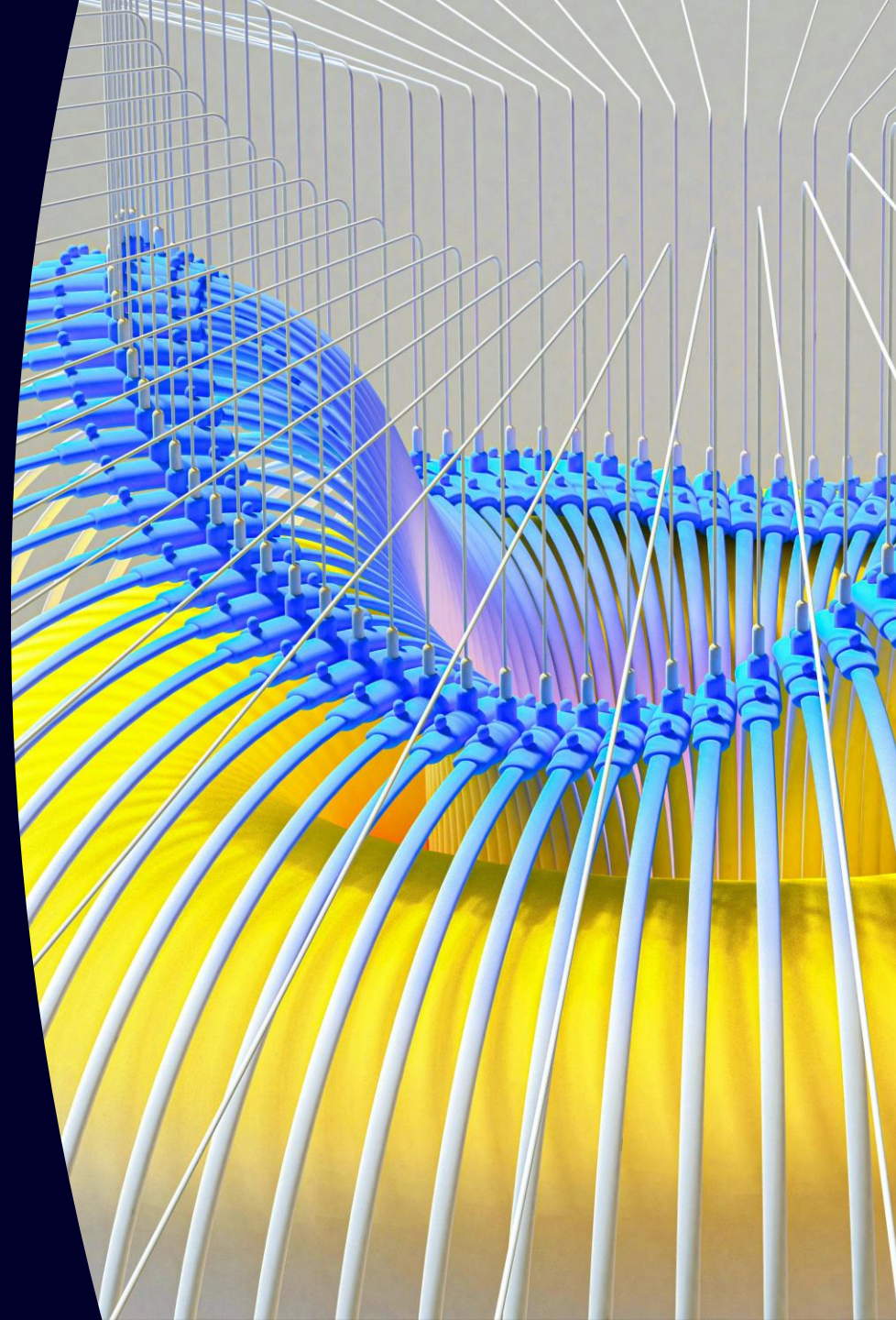
- **Build a world-class cluster** aligned to the STEP programme and wider energy developments.
- **Prepare the regional supply chain** to pivot, diversify, and grow into fusion and adjacent sectors.
- **Support international investors**, through the support programme and infrastructure investment.
- **Maximise social value**, creating efficient pathways for local people and inclusive growth.



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Research and Innovation

- Provide collaborative regional innovation ecosystem to support STEP Fusion and the wider Supercluster.
- Leverage wider UK capabilities to support the Supercluster.
- Development of supporting facilities.
- Co-located with managed workspace, conferencing, skills facilities, etc.



OFFICIAL-SE

Comms & Engagement

- Developing a brand for the Trent Supercluster
- Engagement across all stakeholders; government, investors, public, etc
- Community engagement, to foster and maintain support, and to help inform the programme of work



OFFICIAL-SE

Discovery Centre

- Shaping the vision for a world-class discovery centre
- Engaging with stakeholders across the partnership to gather ideas and views
- Producing an initial scope, defining the purpose, potential experiences, and design ambition to guide future approach to development



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What the Supercluster can deliver

'Leadership, Strategy, Influence'	*'Intelligence, Awareness, Insight'*	*'Growth, Innovation, Transformation'*	*'Investment, Promotion, Development'*	*'Community, Opportunity, Inclusion'*
Cluster Formation and Strategic Coordination	**Supply Chain Mapping and Development**	**Business Innovation and Growth**	**Inward Investment and Place Promotion**	**Social Value, Skills, and Inclusive Growth**
Establish Business Cluster	Supply Chain Mapping and Analysis	Fit4Fusion+ Programme	Supercluster Investment Proposition	Social Value Framework
Policy and Strategy Engagement	Requirements Forecasting	Business Support and Diversification	Site Development and Marketing	Skills and Workforce Development
Adjacent Sector Coordination	Supplier/Opportunities Database and Capability Profiles	Demonstrator Projects and Pilots	International Promotion and Trade Missions	Informed and Engaged Community
Strategic + Global Collaboration and Engagement	Strategic Risk and Resilience Analysis	Convening Innovation Support	Spatial Development	Social license
Communications and Engagement			Business & Science Park Facilities	Placemaking

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Capability Mapping

1. Beryllium	4. Construction support	7. Customized vacuum components	10. Deuterium, Tritium, or other gaseous fusion fuels	13. Lithium-6, Tritium	16. Power electronics	19. Specialized metals	20. Vacuum pumps/chambers	21. Engineering, Procurement and Construction
2. Common metals e.g. nickel, copper	5. Cryogenic capable welding	8. First wall materials	11. Laser beams (crystals, customer-specific optics, refractory metals)	14. Magnets	17. Rare earth metals	22. Heat management technologies	24. High temperature heat exchangers and structural materials	25. Tritium extraction systems
3. Control Software	6. Cryogenic devices	9. High-temperature superconductors wire	12. Laser components (gratings and diodes)	15. Outsourced precision engineering	18. Radio-frequency heating	23. High temperature breeding blankets (Sic/Sic)	26. Liquid metal and molten salt loops	27. Plasma diagnostics	28. Other - legal services, recruitment, industry insights, consultancy, 3D design software, insulation,

The Fusion Energy supply Chain, 2024, FIA

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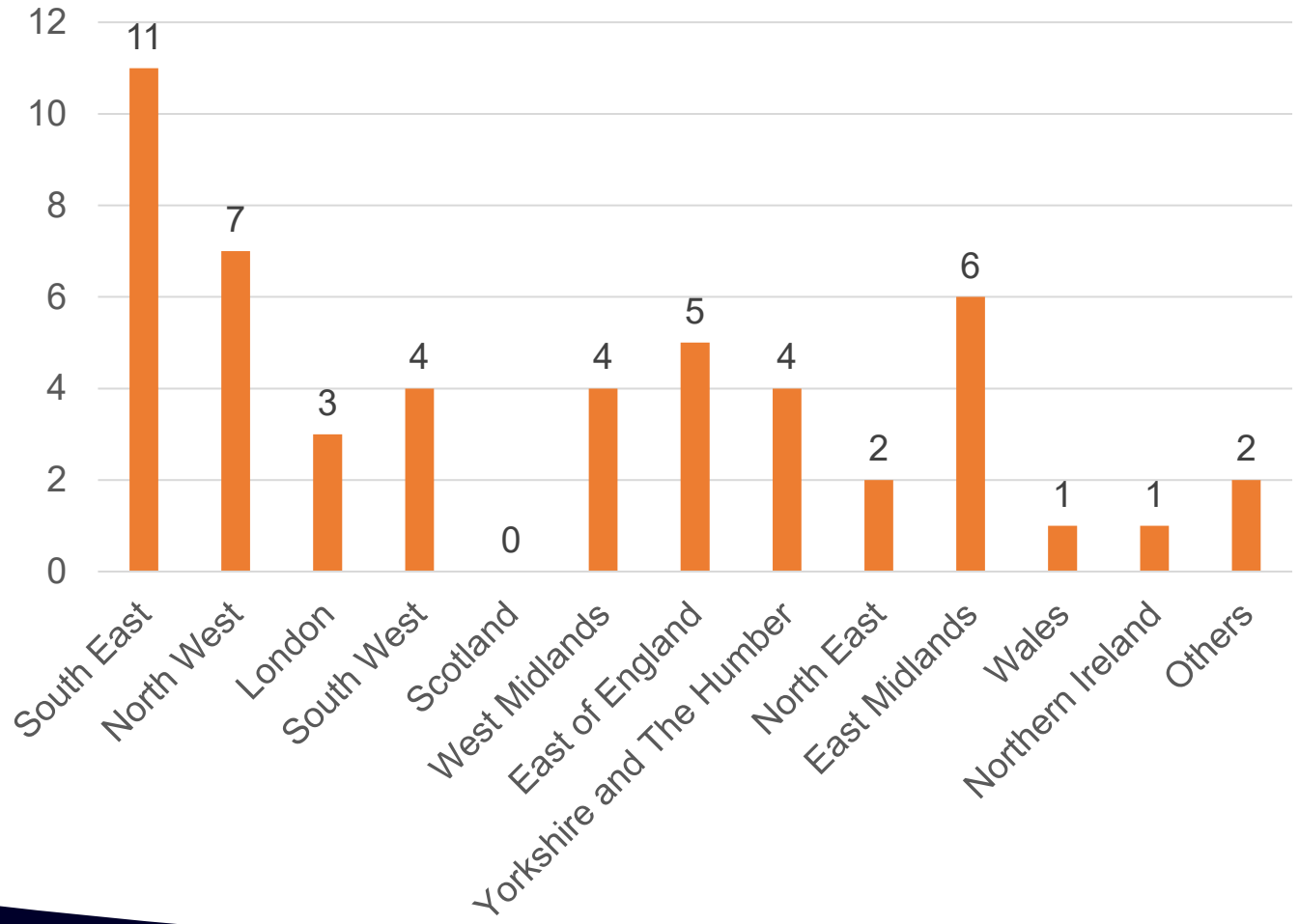
Capability Mapping

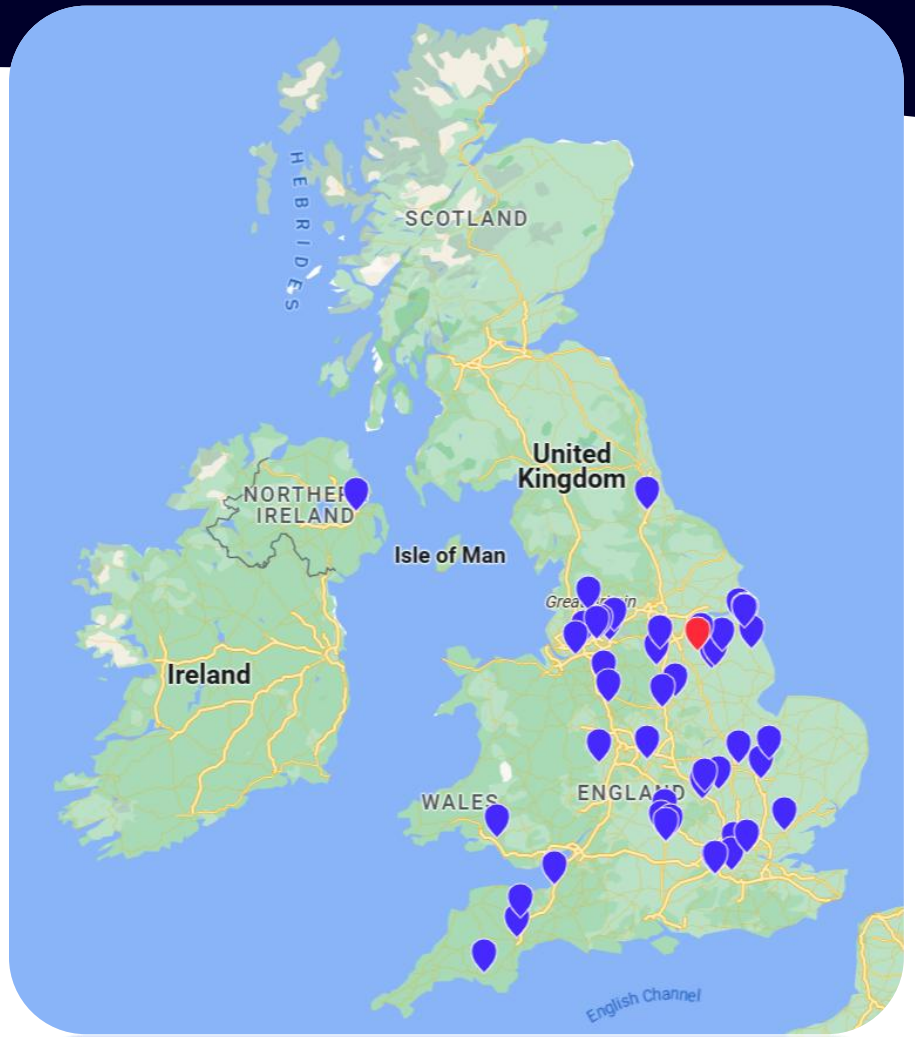


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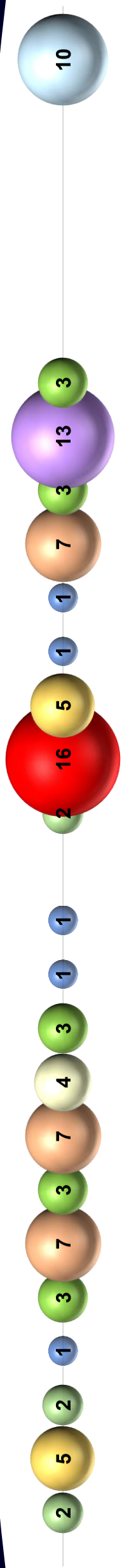
Capability Mapping





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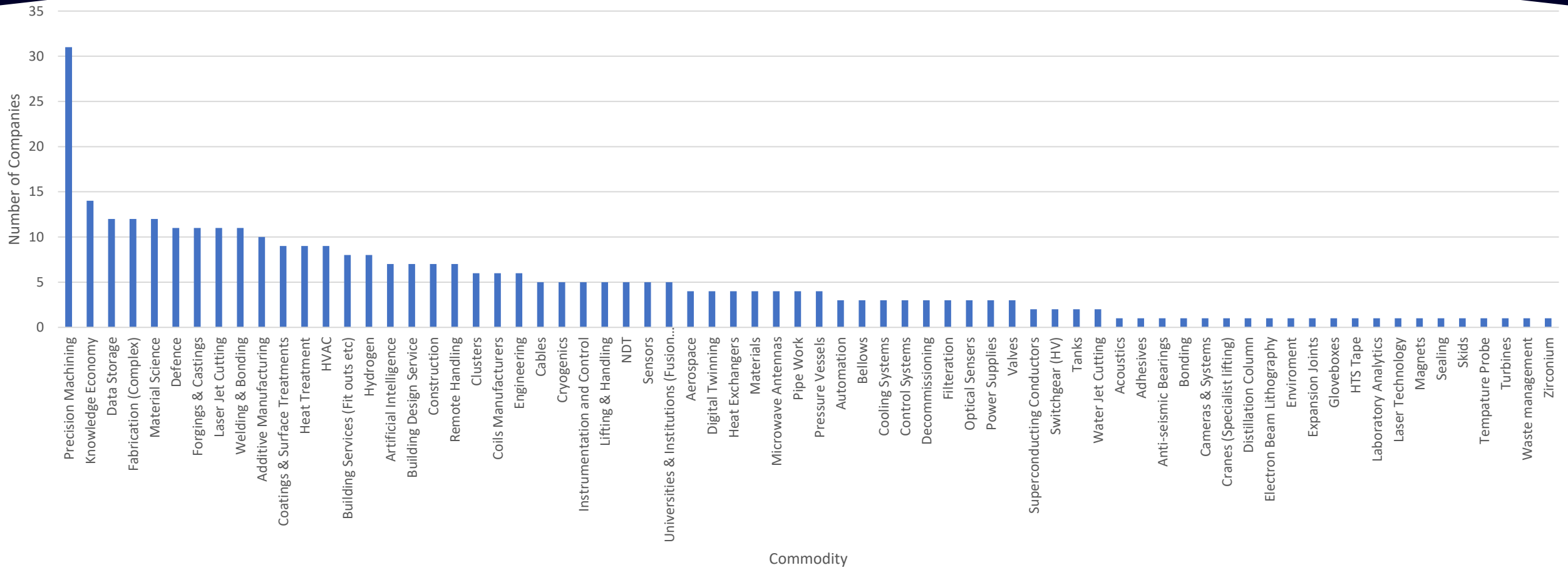
Capability Mapping



28. Other
27. Plasma diagnostics
26. Liquid metal and molten salt loops
25. Tritium extraction systems
24. High temperature heat exchangers and structural materials
23. High temperature breeding blankets (Sic/Sic)
22. Heat management technologies
21. Engineering, Procurement and Construction
20. Vacuum pumps/chambers
19. Specialized metals
18. RF heating
17. Rare earth metals
16. Power electronics
15. Outsourced precision engineering
14. Magnets
13. Lithium-6, Tritium
12. Laser components
11. Laser beams
10. Deuterium, Tritium, or other gaseous fusion fuels
9. HTS wire
8. First wall materials
7. Customized vacuum components
6. Cryogenic devices
5. Cryogenic capable welding
4. Construction support
3. Control Software
2. Common metals
1. Beryllium

OFFICIAL-SENSITIVE
OFFICIAL-SENSITIVE

Capability Mapping – 2025 Update



Capability Mapping – 2025 Update

Insulator (Magnets)	Clean & Hazardous Waste	Electrochemical Machining (PECM)	Heavy Water	Mechanical Handling Membranes (Palladium Silver Seperation)	Plasma	Steady State Electrical Network	Tritium Removal
SMRs	Co2 (Super Critical: sCO2)	Electron Bernstein Wave	Helium Refrigerators	Methane Burner	Plasma Control	Steel Mills	Tritium Sourcing
Vacuum Systems	Compressors	Electron Cyclotron Heating	High Voltage Power	Microwave Heating	Plasma Modeling	Stellarator	Tungsten
Waveguides	Control Centres	Engineering Simulation	HIP	Modeling	Plugs, Sockets, Contacts & connectors	Surveys	UHV - Systems
Active Charcoal Beds	Cooling (incl Heat Sink)	EPCM	Hot Cell	Molybdenum	Polishing	Systems Intergration	Uranium Beds
Analysis	Cooling Towers	Equilbrators	Hydroforming	Motion Systems	Polyimide Seperation Membranes	Testing, Inspection & Certification	UV Spectrophotometers
Anti-Vibration	Core	Erbium Doped Waveguide Amplifiers	Hydrogen Electrolysers	Neutron Fission chambers	Power	Thermal Cycle Systems	Vacuum Transmitters
Architect Engineering	Cryogenic Distillation (Hyd Isotopes)	Erbium / Erbia	Hydrogen Polyamide Membranes	Neutron Reactors	Pulse Height Analyzer (PHA)	Thermal Power Transfer systems	Vacuum Variable Capacitors
Aux Start up power generation	Cryogenic Molecular Sieve	Exhaust processing	I.T Solutions	Neutron Shielding	Pulse Modulator	Thomson Scattering	Vacuum Vessel
AXUV Te	Cryogenic Oxygen Plants	Fibre optics	Infrastucture	Neutron Spectrometer	Pumps & Circulating Systems	Thyratrons	Vacuum Vessel Support Structure
B - Probe	CuCrZr	First wall Panels	Insulation	New Technology	Radiation Hardened Sensors	Thyristor-controlled Valve	Vanadium
Beam & Beam Lines	Cyber Security	First Wall Machining	Interferometer / Polarimeter (CO2)	Niobium	Radiographhic Testing (RT)	Tin	Vessel Flexure Support
Bearing & Linear slides	Data Acquisition Systems	Flood defence systems	Interferometer / Polarimeter (FIR)	Nuclear Waste Characterisation	Radiological Protection	Tokamak Heat Removal Coolants	Vibration Measurement
Beryllium	Designers	Fuel Cycle	Ion Cyclotron Transmission Line	ODS Steel	RAFM Steel	Transformers	Virtual Reality
Blanket	Diagnostic & Testing	Fusion power plants / Start ups etc	Ion Doppler (Visible)	Optical Analyzer	Ramon Spectroscopy Probe	Tritium Analysis	Visible Spectroscopy (Survey)
Bolometer	Digital Intergration	Gallium	Lead	Optomechanics	Research Services	Tritium Breeder Pebbles	Wall Diagnostics (Droplet Detection)
Buildings (MMC)	Digital transformation	Geotechnical Services	Legal & Commercial	Particle Accelrator	RF Amplifiers	Tritium Confinement Systems	Wall Diagnostics (LIDAR)
Calorimeters	Digitizers	Getter Beds	Limiters	Pellet Injector	Robotic Welding	Tritium Delivery Systems	Waste (Clean & Hazardous)
Catalytic Recombiner (Low Tempature)	Diverter	Gyrotrons	Lithium Lanthanum Zirconium Oxide (LLZO)	Permitting & Regulatory Compliance	Siesmic Analysis	Tritium Extraction Systems	Waste Containers
Ceramic Membranes	Electric Motors	Halo Rogowski Coils	Lithium & Lithium 6	Planning, Cost & Risk Services	Simulation	Tritium Plant	Water Detritiation System
			Lithium Batteries	Plant & Equipment Removal			Waveguides (Double Seal)
			Logistics	Plant Operations			Waveguides (Straight)

TRENT SUPERCLUSTER



Gainsborough

edward.wright@eastmidlands-cca.gov.uk



first light

First Light Fusion - FLARE

Powering a world worth inheriting

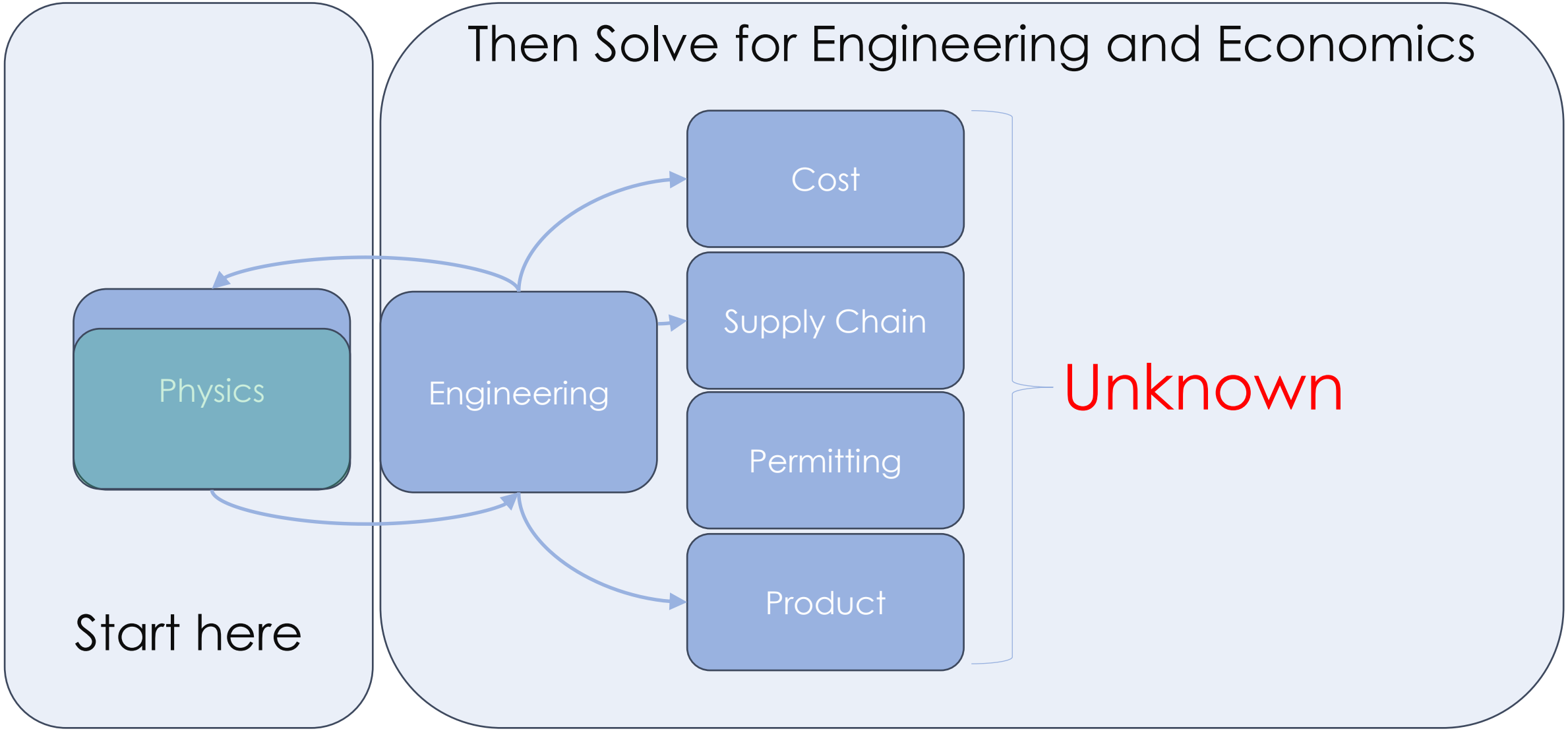
David Bryon

Core Philosophy

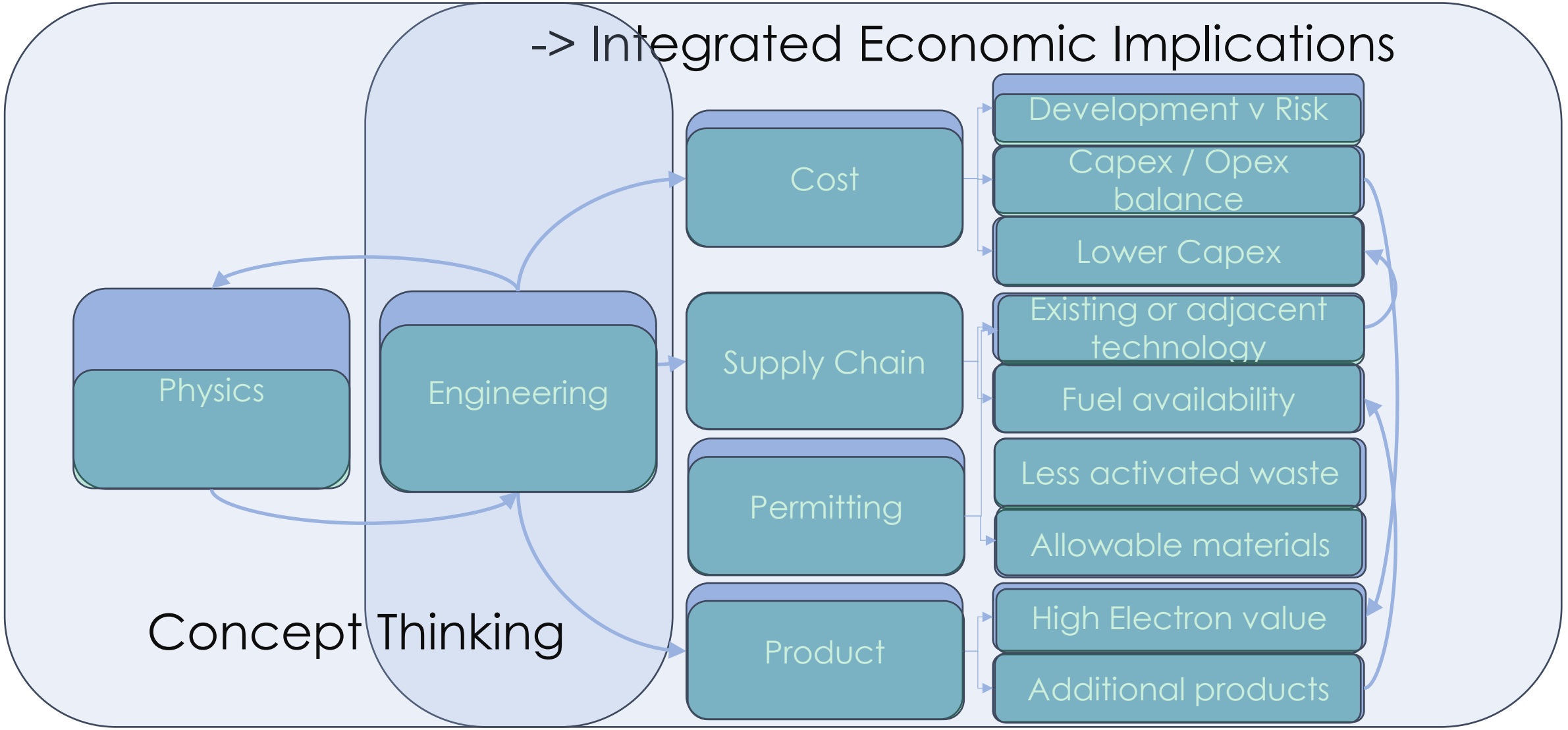
"We build functionality into the fuel system, reducing requirements on the machines and plant"

- The FLARE fuel system enables economic, deployable fusion
  - Robust, simpler plant using existing materials and technology
  - A viable, economic energy solution for modern grids
  - Supports fusion deployment and fuel cycles

To deliver fusion energy, carefully pick your starting point

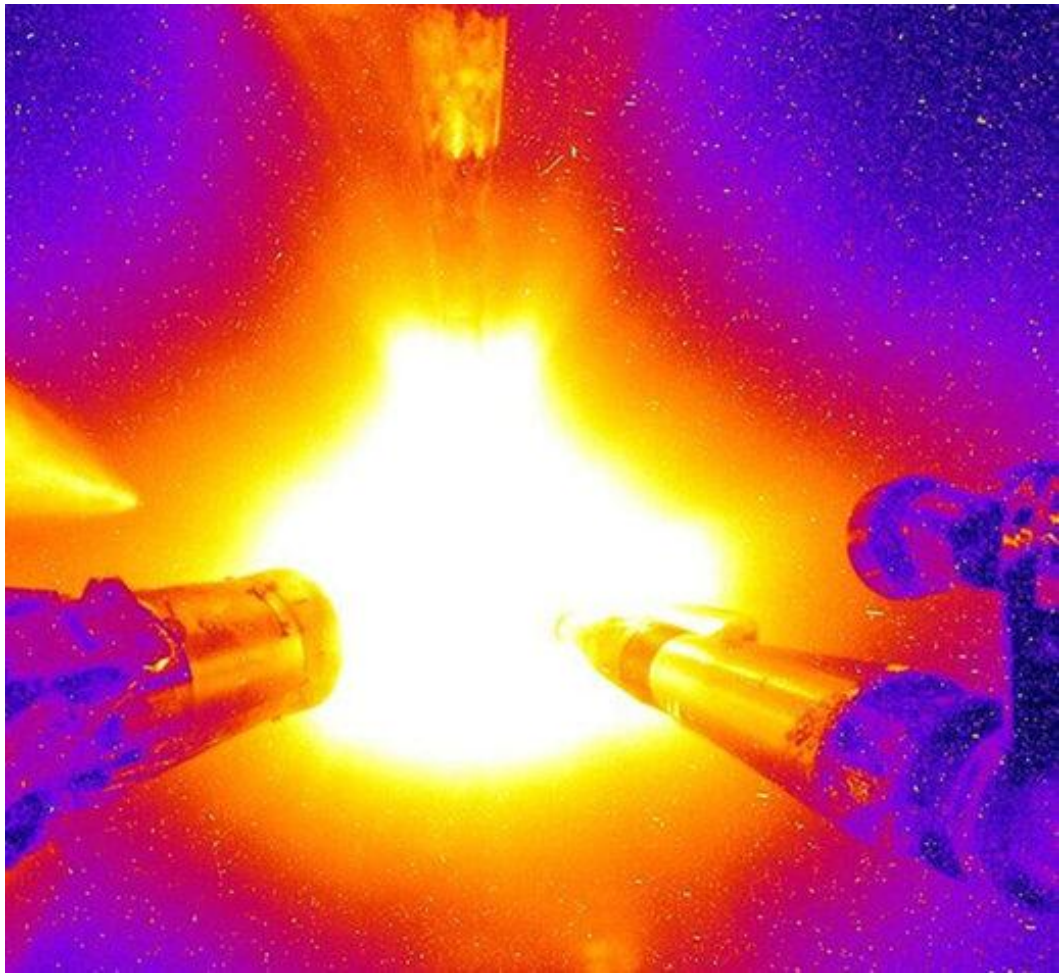


To deliver fusion energy, carefully pick your starting point



The physics challenge of Inertial Fusion





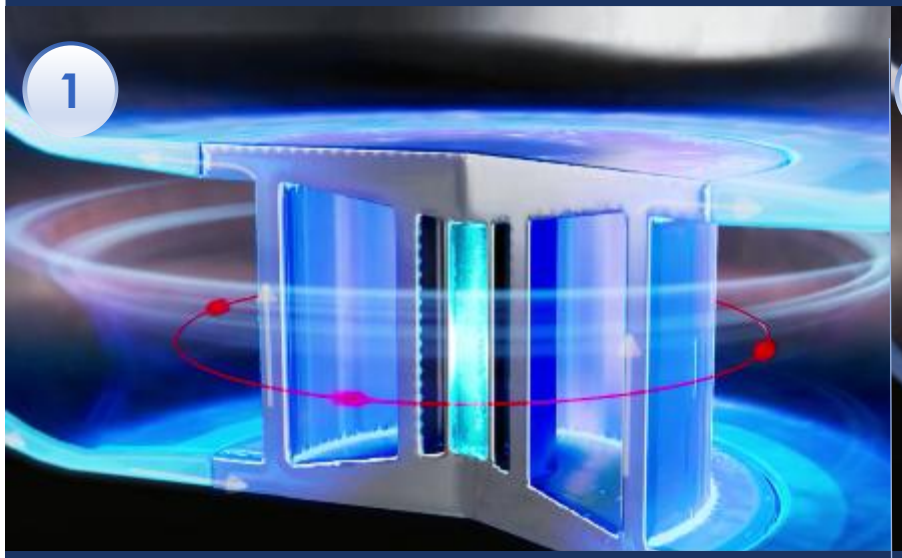
2 mm fuel capsule, central DT gas, frozen DT solid layer, outer ablator. LLNL (1999)

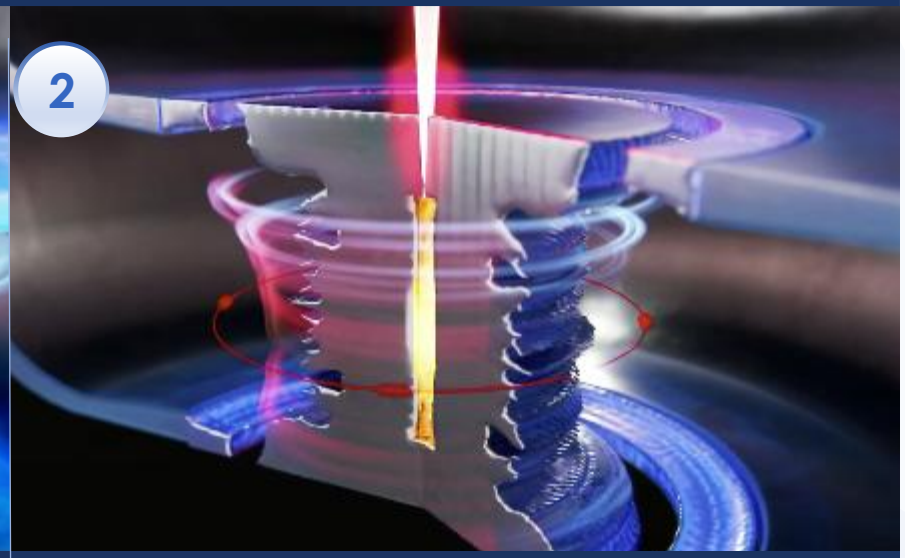
FLARE: compress first, ignite second. High gain, low repetition rate

A target-led fast-ignition architecture that separates compression and ignition

first light

FLARE





COMPRESS

Build a high-density fuel assembly

Efficient pulsed-power compression

IGNITE

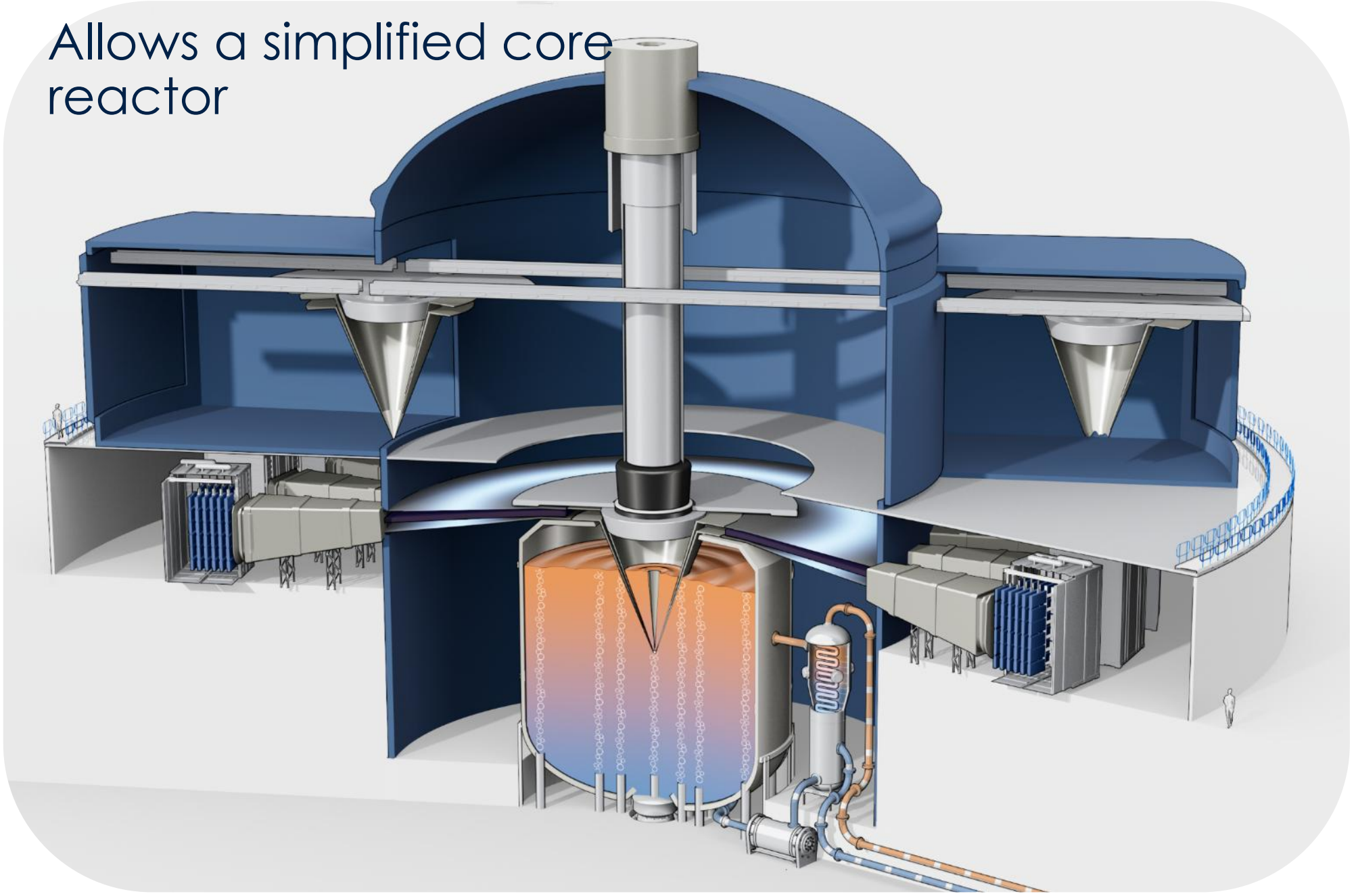
Rapidly excite pre-compressed fuel

Independent ignition

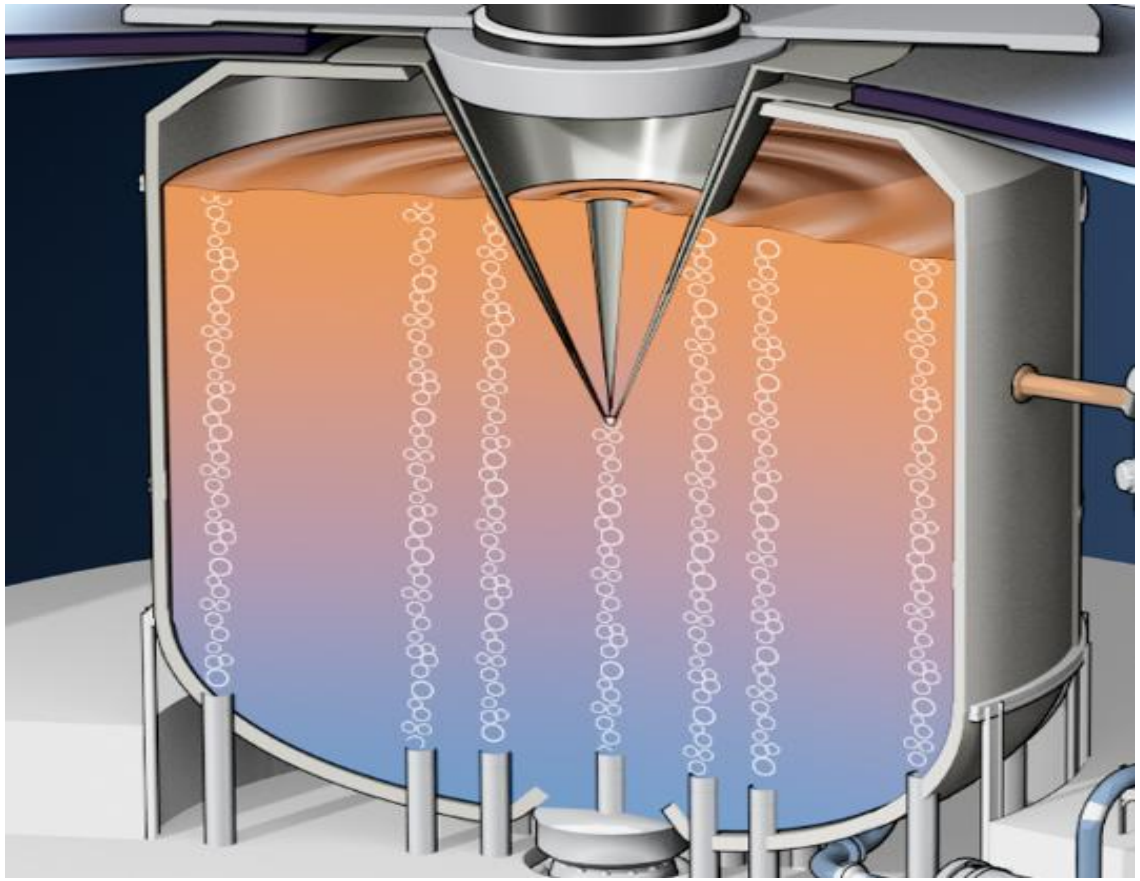
HIGHER GAIN | SIMPLER MACHINE | LOWER CAPEX

Functionality in the fuel | Simplicity in the machine

Allows a simplified core reactor



Balanced isotope Li system solving multiple challenges



- First wall, Heat exchange, Breeder blanket
  - 60+ years chamber life: operating at ~300C, low corrosion rate, low tritium permeability; continuously renewed, lowering maintenance and increasing availability.
  - Addresses environmental and H&S challenges, facilitating permitting: no lead; no beryllium. Lithium requires additional fire safety.
  - Efficient: neutron capture 99.9%; lower pumping requirement
  - Natural balance Li7 + Li6; Existing supply chain, reasonable % of global supply
  - **TBR of 1.8**

Key points

- Low development cost
- Low capital cost – cheaper machines, available materials
- Decreased machine power, liquid first wall, recyling and low repetition rate = lower opex
- Low capex and pulse flexibility -> load following potential
    - Higher value electrons
- High TBR allows lean tritium start-up and creates second product: surplus tritium *
- All suggest FOAK could provide useful electrons and meaningful quantities of tritium, lower funding risk

Future Plans

FLARE Demonstration (2027-2029)



Demonstrate the complete FLARE architecture

✓ Integrated compression + ignition experiment

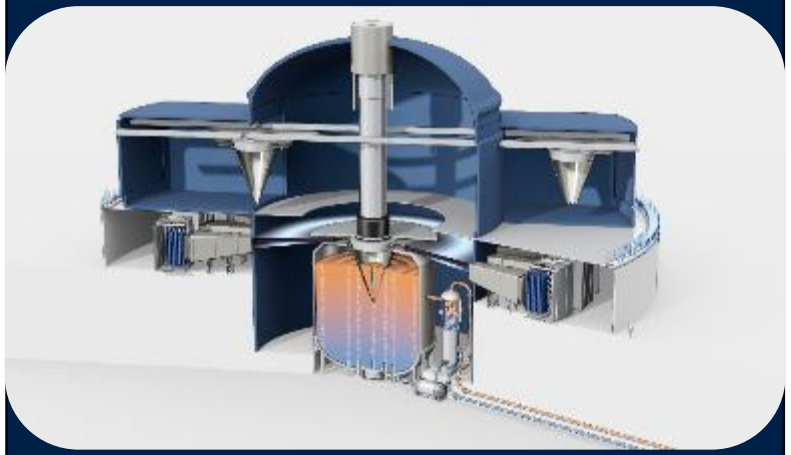
High Gain Demonstrator (Early 2030s)



Prove commercially relevant fusion performance

✓ High gain achieved
✓ Scalability validated

Commercial Power Plant (Late 2030s)



Deploy first FLARE-based power plant

Reactor development with partners

Final thought

- Tritium will be the dominant constraint on global fusion deployment
  - 25kg civilian stock available globally. Production is likely to decrease as reactors age.
  - New fission reactors breeders unlikely to be built: >$10Bs, inefficient
  - Requires a huge neutron source to create meaningful quantities
- Each new D-T reactor (except FLARE based) will require 5-15kg to start. Fuel cycles will be difficult to close.
- If Fusion Industry prediction is accurate, demand >100kg for start up alone
- At $30k to $100k per gram



Introducing Helixos

NIA Fusion Business Group, 14th October 2026

Steve Lawler, UK Director

from breakthrough to business

About Helixos

At Helixos, we drive cleantech commercialisation through **strategy**, **communications**, and **technical advisory**, focusing on **nuclear energy** and **fusion.**

We support the entire journey of technology development and deployment, **from ideas to impact**, and optimise the relationship between people, technology, and nature.

Over the last 6 years, Helixos has delivered **over 100 projects** to our clients **around the world**.

We are an agile, global business delivering cleantech commercialisation solutions across the **nuclear energy** and **fusion energy** sectors.

Helixos has branches in the **United States**, **Australia**, and the **United Kingdom**, and we work with technology developers, research organisations, governments, investors, and end users, across the globe.



Our Services

Cleantech Commercialisation

Partnering with you on the technology commercialisation and implementation journey through:

- Product and business strategy
- Market research
- Market entry
- Business cases and plans
- Business development



Technical Advisory

We are engineers with a strategic mindset providing:

- Technology evaluation
- Operations strategy
- Supply chain assessment
- Technoeconomic modelling
- Regulatory strategy and planning

Strategic Communications

We provide the full suite of marketing and communications services to bring your ideas to life, including:

- Communications and marketing strategy
- Branding, website, social media, and PR
- Content development
- Stakeholder engagement
- Science communication training

What we do in fusion energy

1 National strategy and roadmaps

Lead author and editor of national fusion roadmaps, including a major player in the development of the **US DOE** *fusion science and technology roadmap* through stakeholder workshops.

2 Market and technoeconomic modelling

Fusion deployment models to 2100 covering economic value, jobs and carbon, plus the **FusionX** market analysis sizing a $2.1 trillion electricity opportunity.

3 Supply chain and ecosystem mapping

A global fusion supply chain analysis for a high profile US client, mapping what developers need, when they need it and how it will be secured. ***Fusion Ready*** pilot underway today!

4 Technology due diligence

Assessment of **18 leading fusion developers** for an energy provider and investor, covering performance, readiness, IP, partners and funding.

5 Fuel cycle and tritium markets

Tritium **supply and demand mapping** across fusion and non-fusion markets for a utility, including regulatory, storage and transport requirements.

6 Strategic communications

Communications partner to the **Fusion Industry Association**, brand launch for a fusion developer, and science communication training for 200+ people.

Some of our public sector clients

ANSTO

UK Atomic Energy Authority

UK Fusion Energy

United Kingdom National Nuclear Laboratory

INL Idaho National Laboratory

Pacific Northwest NATIONAL LABORATORY

SRNL SAVANNAH RIVER NATIONAL LABORATORY

U.S. DEPARTMENT of ENERGY

Japan Fusion Energy Council

UNSW SYDNEY

Canadian Nuclear Laboratories / Laboratoires Nucléaires Canadiens

AECL EACL

FusionX

Australian Nuclear Association

from breakthrough to business

Supporting the ecosystem

Suppliers entering fusion

- **Market intelligence** on what fusion developers will need, and when
- **Supply chain** readiness and capability assessment
- **Business cases**, **market entry** and international **routes to market**

Fusion developers

- **Commercialisation and business strategy**
- **Technoeconomic** modelling and **technology evaluation**
- **Communications**, **brand** and **stakeholder engagement**
- Advanced Manufacturing awareness and support.

Public and industry bodies

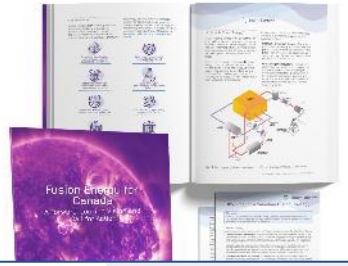
- **Roadmapping**, ecosystem mapping and gap analysis
- **Policy** and **market model analysis**
- Science **communication** and **media training**
- **Understanding fission and fusion.**

Teams in the UK, US and Australia, pairing commercial insight with hands-on nuclear engineering experience

Case studies

National Fusion Strategy and Roadmap

- Helixos served as the lead editor and author for Canada's strategic national roadmap for fusion energy development in partnership with a national laboratory.
- This involved a market analysis on the international public and private fusion landscapes, benchmarking national fusion strategies and activities in other countries, and understanding the fusion capabilities within Canada to find where it could best bring value to the international fusion sector.
- Finalizing the roadmap involved synthesizing input from multiple stakeholders, managing revisions, and graphic design.
- The roadmap [illegible] and other sta[illegible] implementati[illegible]
- The report ca[illegible] Roadmap



SMR and Advanced Nuclear Technology Evaluation

- Helixos evaluated and compared all near-term small modular reactor (SMR) and advanced reactor designs from multiple countries in North America, Europe, and Asia based on the following factors:
  - Design maturity
  - Energy output and intended uses/markets
  - Regulatory strategy and licensing status
  - Safety
  - Fuel
  - Operating experience
  - Cost
  - Private and government funding
  - Business model
  - Marketing strategy
  - Commercial agreements
  - Supply chain complexity and partnerships



US Market Entry

- Helixos supports technology developers in entering or enhancing their presence in the US market through market strategy, government relations, and communications, including, but not limited to:
- Government Grants
  - Commercialization assistance and TABA services for innovators receiving SBIR/STTR grant funding through DOE and other agencies, including preparing applications
- Federal Incentives
  - Strategy for obtaining federal incentives, such as through the Inflation Reduction Act or CHIPS Act
  - Recommendations for specialized US firms providing assistance in obtaining federal incentives
- Siting and State/Local Incentives
  - Partnering with a specialty siting firm, identify ideal sites for facilities in jurisdictions with favourable state and local incentives, infrastructure, and workforce

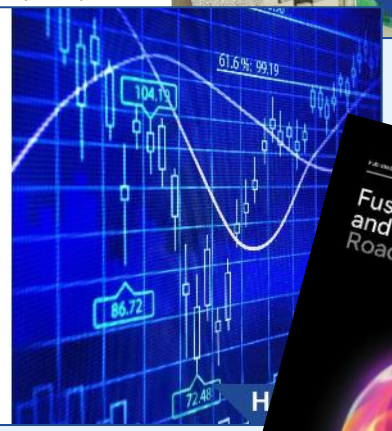


Fusion Energy Techno-economic Model

- Helixos developed a techno-economic model which analyzed the economic and decarbonization opportunity for the deployment of fusion power plants.
- This involved the evaluation of international market growth trajectories, and the development of multiple [illegible]ment scenarios.

[illegible]mulative economic benefits and carbon [illegible]on potential from a fusion industry, through to [illegible]was aligned to different levels of policy [illegible]ntion, mobilization of private capital, and the [illegible]f penetration into existing energy markets.

[illegible]cial benefits were quantified to provide values [illegible]full-time equivalent jobs from domestic [illegible]ment and export opportunities from a fusion [illegible]y.





Bringing Advanced Fission and Fusion to Market

- Helixos has supported the commercialization of small modular reactors through market-driven approaches and strategic communications.
- We researched and outlined strategies for key markets, such as coal repurposing, clean hydrogen production, and steelmaking, and new products, such as an educational reactor simulator.
- Helixos also supported all aspects of strategic communications and stakeholder management for a fusion energy startup, including helping develop a new brand, website, marketing materials, social media, launching out of stealth mode, and community engagement for a new facility.
- In addition, we provided insights on the energy market and other niche markets and advice on business strategy and growth for these startups.



[illegible]tional Market Assessment [illegible]anced Reactor Design

[illegible]ndertook an international market analysis to [illegible]xport market opportunities for an emerging high [illegible]ture reactor design to provide electricity and heat.

[illegible]matic methodology was undertaken to determine the [illegible]y value proposition, competitor landscape, and market [illegible]y based on nuclear maturity, stable governance, [illegible]evitized nuclear programs, and industrial energy [illegible]ance.

[illegible]global markets were identified as potentially attractive for [illegible]porting the reactor with the key levers for success [illegible]ducing:

- The country's attitude towards nuclear energy for decarbonization
- The market saturation with other reactor vendors, especially similar designs
- The maturity of strategic partnerships and nuclear cooperation agreements between the two nations
- Development of industrial heat or hydrogen strategies

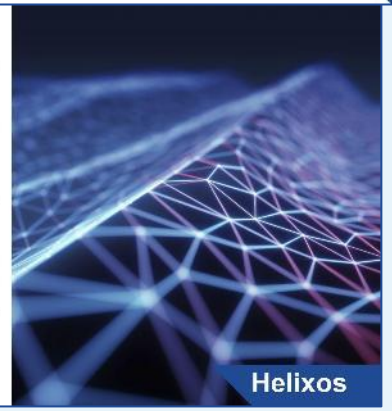


Commercialization Support

Helixos has provided commercialization assistance by developing business plans and go-to market strategies for many different technologies, including those listed below.

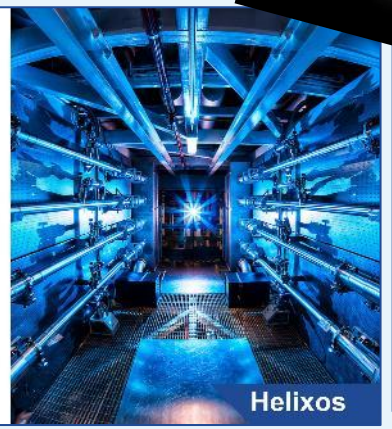
Helixos also collaborates with the United States Department of Energy to support grant recipient cleantech start-ups in their growth and commercialization journey.

- Carbon capture technology
- Solar cyber security and operational technology product
- High penetration wireless technology for power plants
- Electrodes for molten salt thermal power plants
- Novel membranes for solar photoelectrochemical cells
- Hydrokinetic tidal power system
- Anti-corrosive coating for industry
- Modular ammonia production unit
- 2D/3D imaging vision platform
- Membrane manufacturing process
- Press for the bioenergy industry
- Geothermal to green hydrogen process
- Additive manufacturing process for metallic structures
- Next-generation radiation detector
- Tunnel diode for photocathode characterization
- Multi-use data board for energy project development
- Neutron absorbers for microreactors



National Roadmap for Fusion Energy

- Helixos is developing a national fusion science and technology roadmap that enables prioritization to chart and accelerate the path towards the commercialization of fusion energy.
- Helixos conducting a series of strategy workshops to engage key stakeholders in shaping a national fusion science and technology roadmap. These workshops facilitate discussions on prioritizing key technical challenges and defining actionable steps toward the commercialization of fusion energy.
- A key outcome is a strategic roadmap that enables stakeholders to prioritize technical gap areas, align actions with long-term objectives, and define clear milestones and success metrics. This roadmap serves as a decision-making tool, allowing the fusion program to assess progress, adjust strategies proactively, and allocate resources effectively.



[illegible]ications [illegible]tup

- Helixos advised on all [illegible]s of strategic communications and stakeholder engagement for a fusion energy startup, including supporting re-branding efforts to launch the company out of stealth mode.
- Helixos supported the development of annual strategic communications plans with objectives tied to company goals, quantitative KPIs, tactics, schedules, risks, budget, and resources.
- Helixos also designed presentations, web copy, social media posts, infographics, and other communications and marketing assets.
- Supporting work included external relations with local and federal government, elected officials, regulatory agencies, NGOs, media, influencers, workforce, tribes, and local communities.
- Helixos also developed community engagement plans for new manufacturing and demonstration facilities.



Thank you

Steve Lawler

07476 440 985

Steve@Helixos.co



Arcadis at a glance

FOUNDED IN

1888

in the Netherlands

OUR PEOPLE

34,000+

across 30+ countries



ABOUT ARCADIS

Arcadis is the world's leading company delivering sustainable design, engineering, digital and consultancy solutions for natural and built assets.

We are more than 34,000 architects, data analysts, designers, engineers, project planners, cost managers, water management and sustainability experts, all driven by our passion for improving quality of life.

35,000+
projects delivered annually

€4.9bn
in gross revenue in 2025

>80%
of revenue is related to SDGs

Top 2%
for ESG performance (Sustainalytics) 2024

We exist to find solutions to today's most pressing challenges, from the impact of climate change to increasing urbanisation and digital transformation – all with the goal of improving quality of life for people around the world. You can see this in the work we do for our clients, the opportunities we create for our people, and in our efforts to enhance the communities in which we live and work. We bring together world-class resources and the latest innovative technologies to help define the cities and experiences of tomorrow.

***updated as of April 2026*

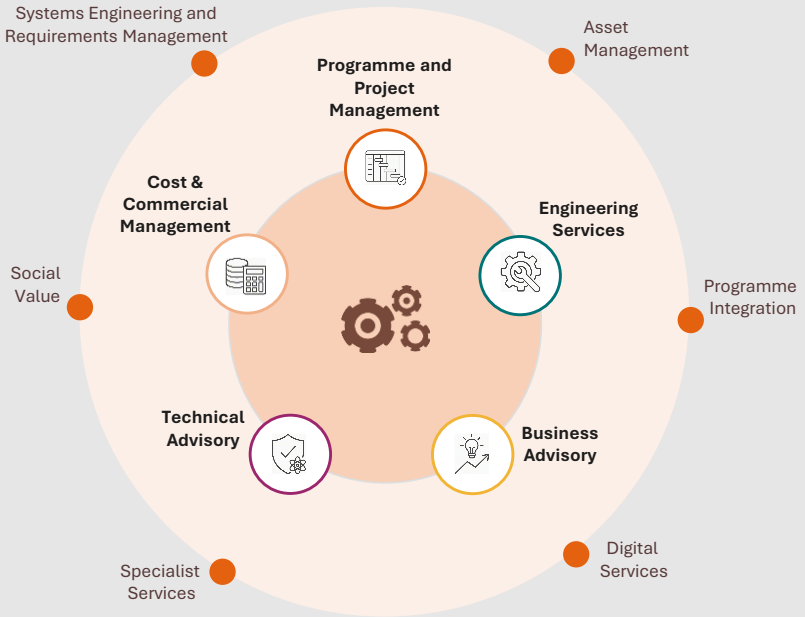
Arcadis in fusion

Supporting UK fusion since 2019

- Working as one team with UKAEA and UKFE
- More than 30 people with hands-on fusion experience
- Programme, project, controls and commercial management alongside technical advisory



Cross-disciplinary integration, multi-sector insights



Selected delivery experience

- ✓ **STEP** – Programme controls and risk management
- ✓ **LIBRTI** – Programme management, business case and construction support
- ✓ **UKAEA PfMO** – Portfolio-level planning, critical resource prioritisation and delivery confidence assessment
- ✓ **FOSTER** – Programme management supporting fusion skills development
- ✓ **Fusion Foundations Programme** – Programme and benefits management supporting the Fusion Cluster
- ✓ **Fusion Futures – Industry Capability** – Programme, commercial and business case support
- ✓ **Independent safety case peer review** – STEP, MAST-U, JET, H3AT and AGHS

Helping fusion programmes move from strategy through to delivery

Join the Fusion Special Interest Group!

A hub for developing skills, networks and careers within Fusion.

Follow us on LinkedIn!

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- Create account: https://www.nuclearinst.com/myni





SIGs FUSION

fusionsig@nuclearinst.com

Scan the QR Code to complete our survey

TURN INTEREST INTO PARTICIPATION

01

BUILD CAPABILITY

Share knowledge, skills and practical experience

02

CONNECT THE SYSTEM

Link industry, academia, government and talent

03

SPIN UP A NETWORK

Turn conversations into a network through events

Fusion needs a connected capability, visible pathways and an active professional community.

WHAT IS NEXT

SIGs FUSION

26 NOV 2026: LONDON

BUILDING THE UK FUSION ECOSYSTEM

Senior stakeholder panel with Madano

5 MAR 2027: BIRMINGHAM

ANNUAL FUSION SIG CONFERENCE

The wider community, together in one room

SPRING 2027: CULHAM

FUSION CDT & ALUMNI EVENT

Showcasing career pathways for Fusion PhDs

SUMMER 2027: TBC

LITHIUM ROUNDTABLE

A technical SME discussion for Li6 and Li7.

JOIN THE CONVERSATION **linkedin.com/company/ni-fusion-sig**

Nuclear Institute → SIGs→ Fusion

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- Create account: https://www.nuclearinst.com/myni





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How to change the design



Which agenda item did you most enjoy in this session?

ⓘ The Slido app must be installed on every computer you're presenting from

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NIA Fusion Business Group

Lunch – 60 mins



Nuclear Industry Association

Parliamentarian Engagement Fusion Group



Joseph Ridding
Senior Public Affairs Executive
October 2026

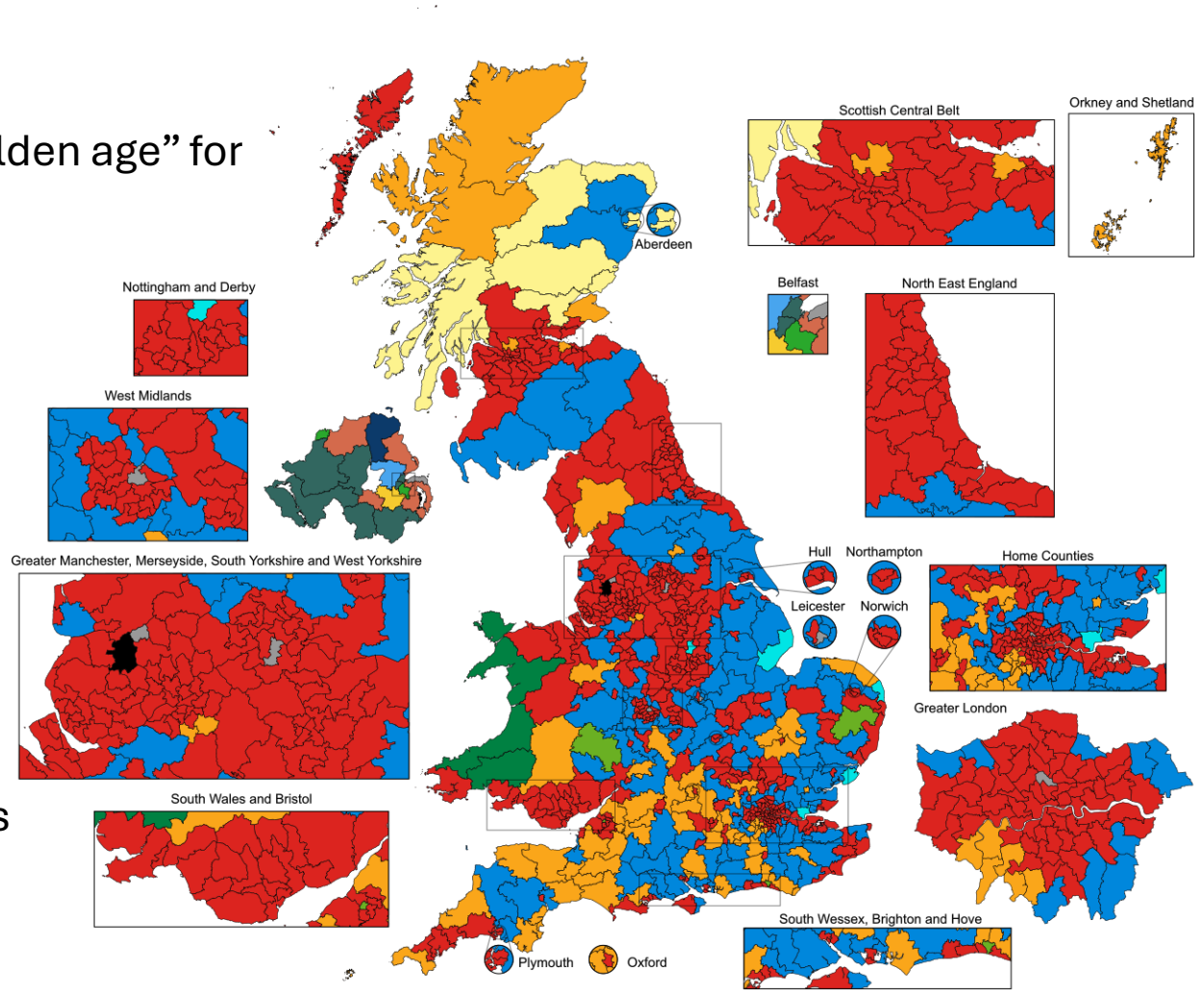
Political Landscape

Since 2024:

- Big wins for nuclear under Labour government with “golden age” for nuclear & momentum must continue
  - Sizewell C FID
  - Rolls Royce SMR at Wylfa
  - Advanced Nuclear Framework
  - Fingleton Review

Under Burnham:

- New Energy Secretary: Miatta Fahnbulleh MP
- Energy Minister Michael Shanks MP overseeing civil nuclear policy
- New focus on affordability and jobs
- Major decisions locked in under Starmer, with focus now on the Energy Independence Bill and Nuclear Regulation Bill



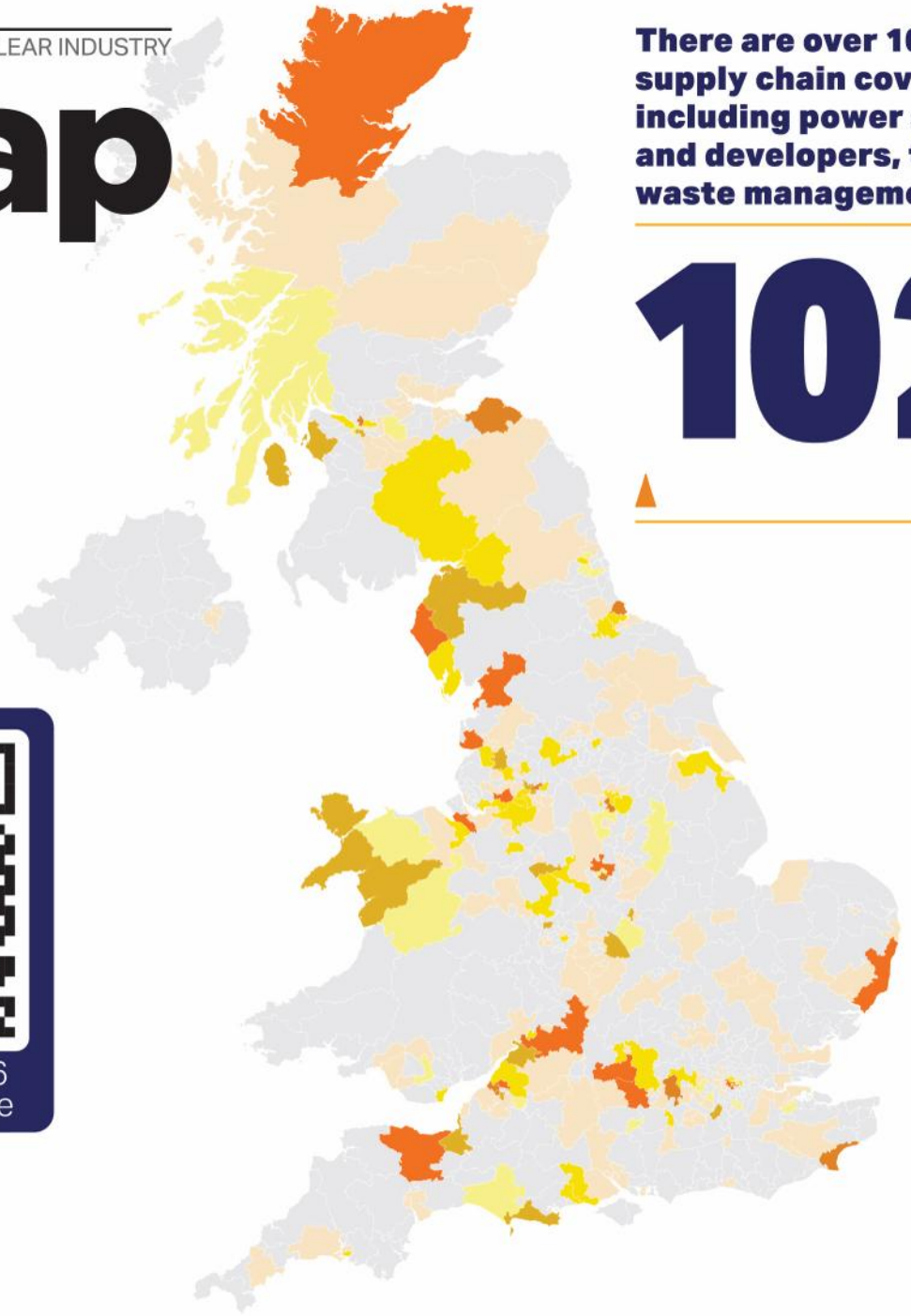


Busy time for industry…

- Fingleton Nuclear Regulatory Taskforce Report published – November 2025
- Wylfa announced as RR SMR site – November 2025
- GBE-N large scale siting study commissioned – December 2025
- Government response to Fingleton Review ‘Building our Nuclear Nation’ - March 2026
- Advanced Nuclear Framework – March 2026
- GBE-N and Rolls Royce SMR Contract signed for Project Gwyndod – April 2026
- Nuclear Regulation Bill announced in King’s Speech – May 2026
- GBE-N large-scale Scottish siting published – June 2026
- Nuclear Regulation Bill entering Parliament – 2027?

AUTUMN / 2026 WORKFORCE OF THE UK CIVIL NUCLEAR INDUSTRY

jobs map



There are over 102,000 jobs across the UK civil nuclear supply chain covering a wide variety of expertise including power station operators, new build vendors and developers, those engaged in decommissioning, waste management, and the nuclear fuel cycle.

102,606

Jobs throughout NIA membership in 2026

Read the 2026 Jobs Map here

Regional totals

East Midlands	6,667
East of England	4,731
London	5,872
North East	1,651
North West	30,478
Northern Ireland	4
Scotland	5,583
South East	8,111
South West	34,109
Wales	1,160
West Midlands	1,331
Yorkshire and the Humber	1,886
Various site and home based workers	1,023
Total	**102,606**

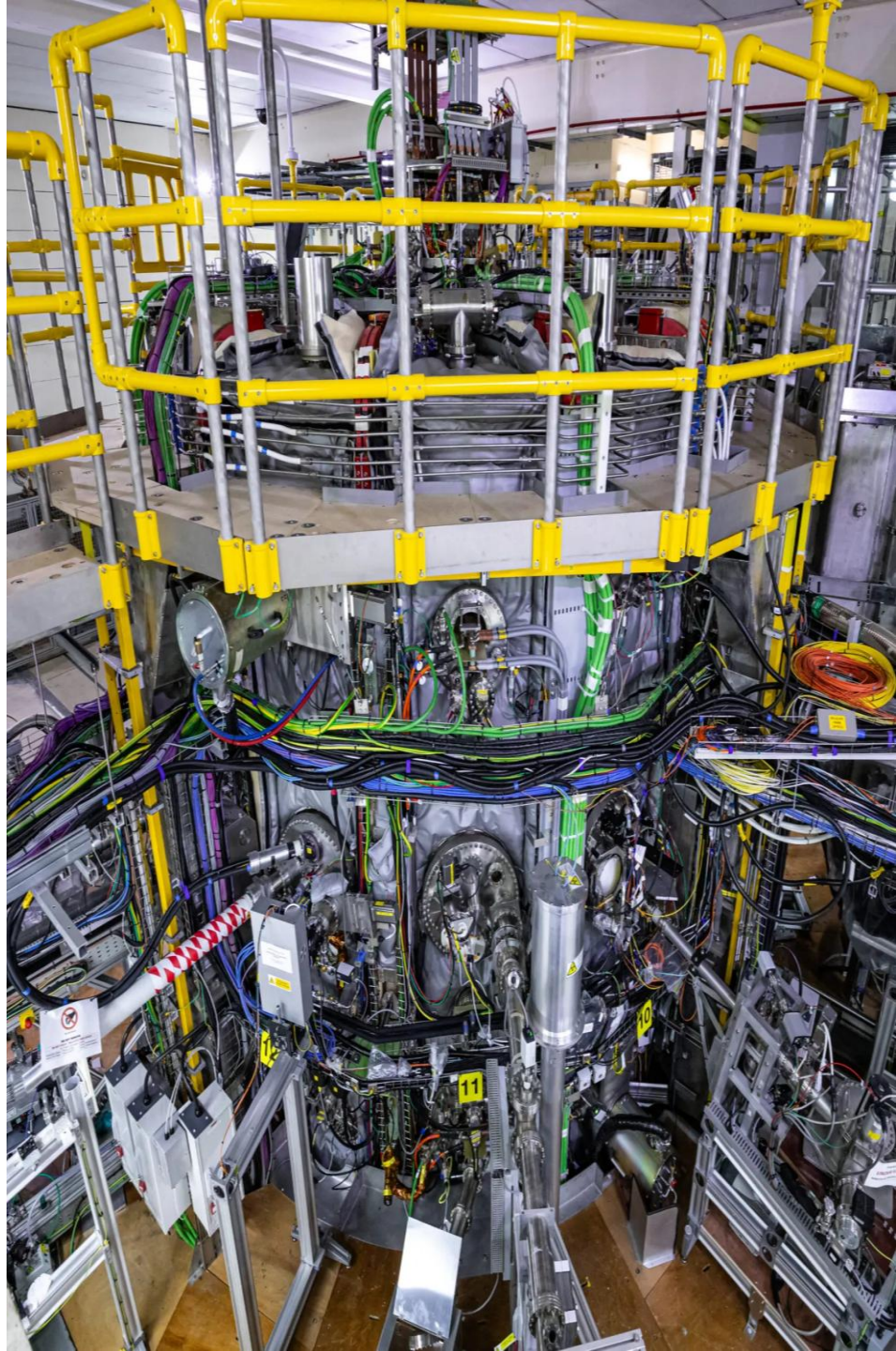
▲ Jobs Map figures are generated from participating NIA members

UK Fusion Strategy

- Published in **March 2026.**
- Focuses on capturing the **“economic and strategic benefits of fusion”** by:
  - Building a globally competitive fusion supply chain
  - Developing UK-based power plant design, subsystem and systems integration capabilities
  - Demonstrating commercial viability through STEP
- The global fusion market could be worth £3tn–£12tn, and the UK wants to position itself to benefit from this emerging industry.

Minister Shanks on fusion:

- September, ESNZ Committee: Said the UK is “closer than we have ever been” to commercial fusion deployment.
- IAEA Conference: Highlighted the UK’s “innovation-enabling framework” and early engagement process
- 15 September: Said fusion could support more than 10,000 jobs across the UK by 2030.





MP Engagement and why it matters

- The last year is a testament to MP engagement – political will of MPs within the governing Party goes a long way
- Majority of site MPs want (and indeed campaigned on) new nuclear in their site once current nuclear retires – championing local causes
- Nuclear is in the spotlight – MPs want to understand it
- Labour need big wins now
- Conservatives looking to protect their legacy and claim some of the wins
- Reform backing nuclear

NIA MP & Government Engagement

- All Party Parliamentary Group on Nuclear Energy
- Nuclear Week in Parliament 2027
- Senedd Cross Party Group on Civil Nuclear
- Party Conferences
- MP Letters to government
- Written Parliamentary Questions/Oral Parliamentary Questions
- 1:1s with MPs





Opportunities for fusion

- Minister for Energy: Michael Shanks MP
  - Supportive of the fusion sector
  - Fusion new to his brief
- All Party Parliamentary Group on Fusion
  - Secretariat: UKAEA
  - Over 20 members

How to approach your MP

- Find their email: https://members.parliament.uk/FindYourMP
- Email them
- Say who you are and why they should care (e.g. a local business doing interesting work, an expert on an issue they care about)
- Say why you need their attention now
- Say what you want and how they can help
- (If applicable) offer a visit: MPs love an action shot
- Leave contact details and offer more information
- Be nice to staff!



We are here to help

- Joseph.Ridding@niauk.org
- Millie.Beaver@niauk.org
- Ask us your questions!
  - MP staffer contacts
  - Who to approach

STEP FUSION

UKFE & STEP's System of Systems

NIA Fusion Group Workshop

14th October 2026



Ezzat Nasr

Head of Whole Plant Performance, UK Fusion Energy

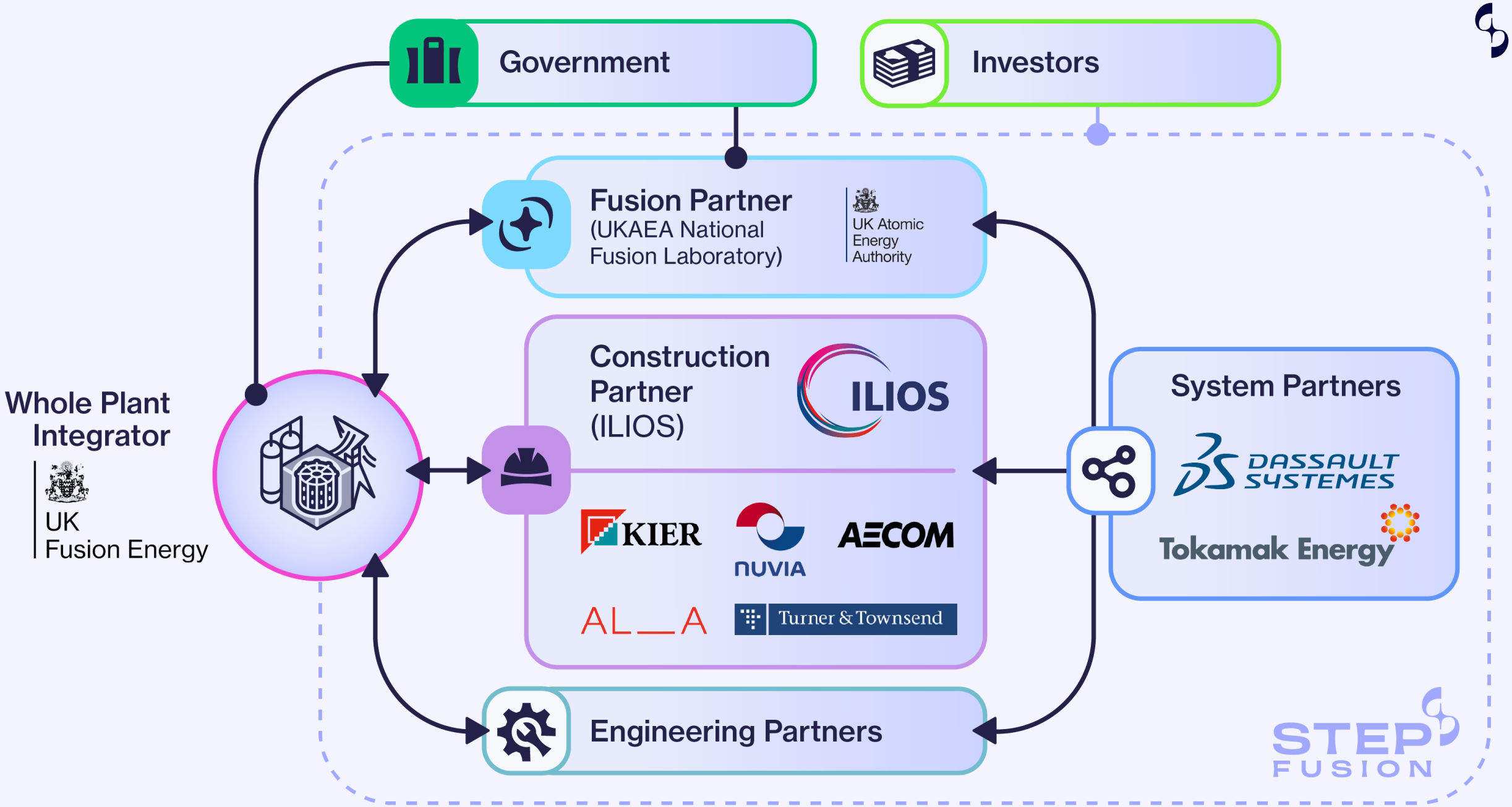
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STEP FUSION MISSION

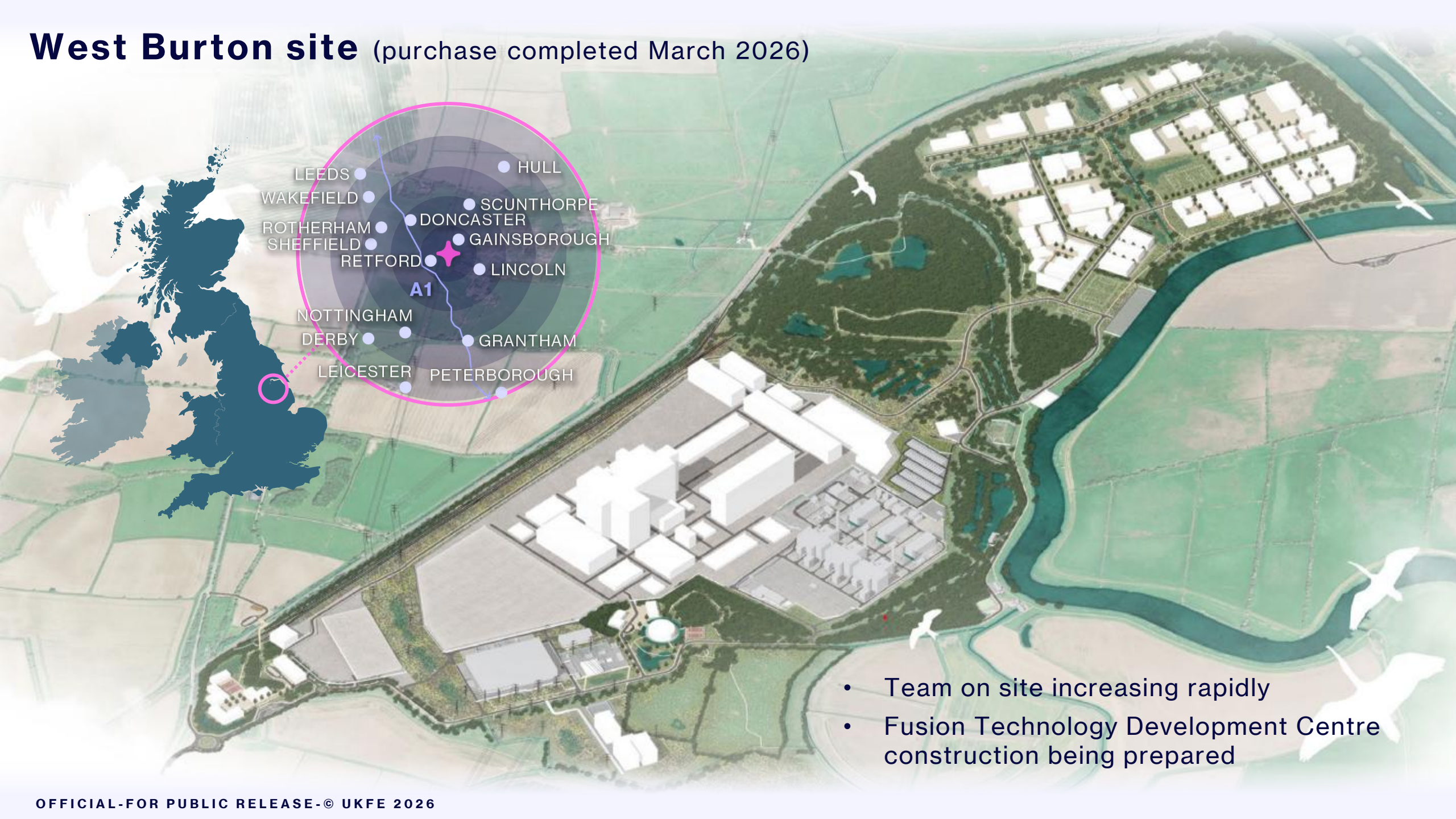
DELIVER A UK PROTOTYPE FUSION ENERGY PLANT, TARGETING 2040,
AND A PATH TO COMMERCIAL VIABILITY OF FUSION.

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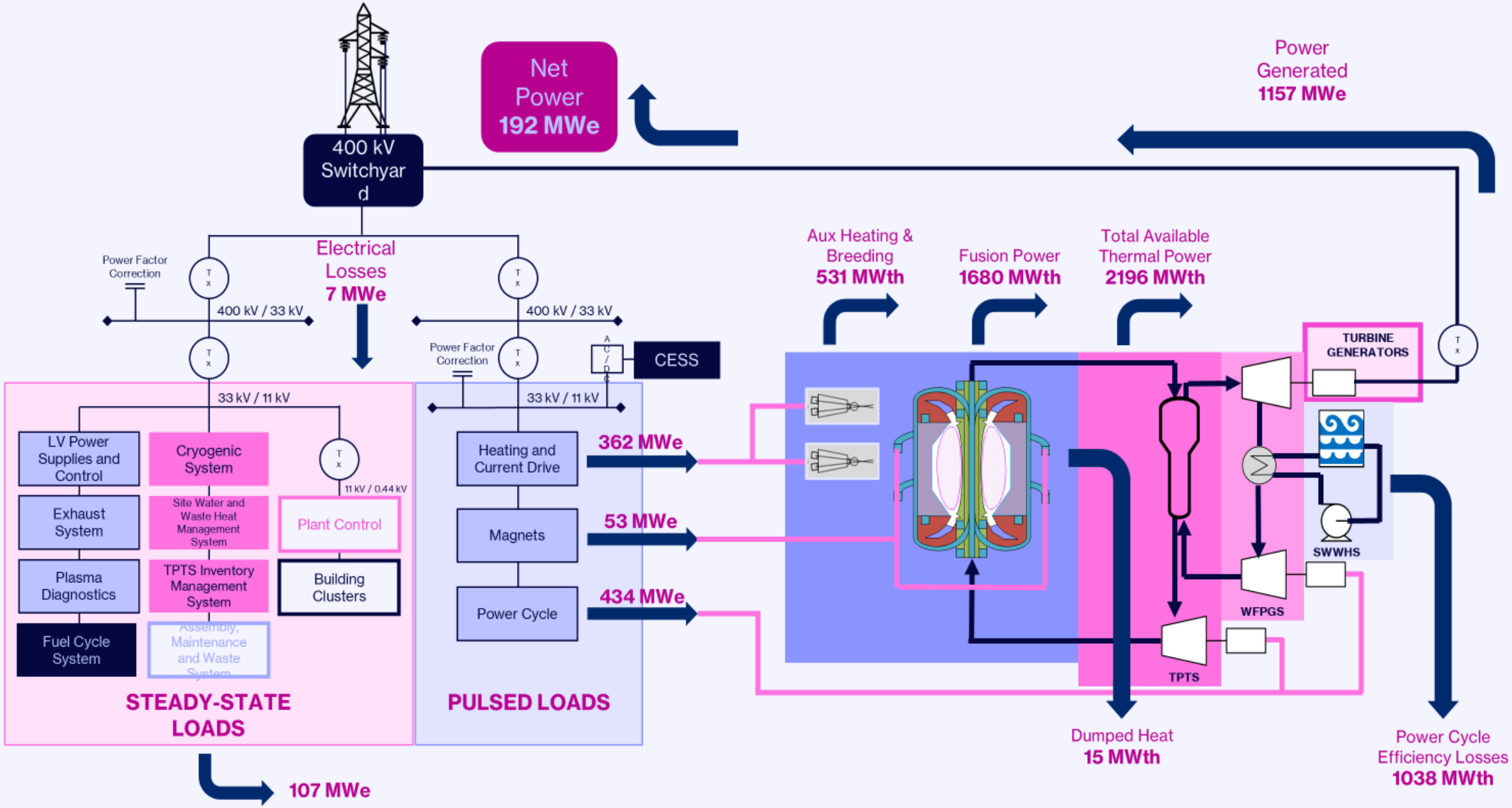
West Burton site (purchase completed March 2026)



- Team on site increasing rapidly
- Fusion Technology Development Centre construction being prepared

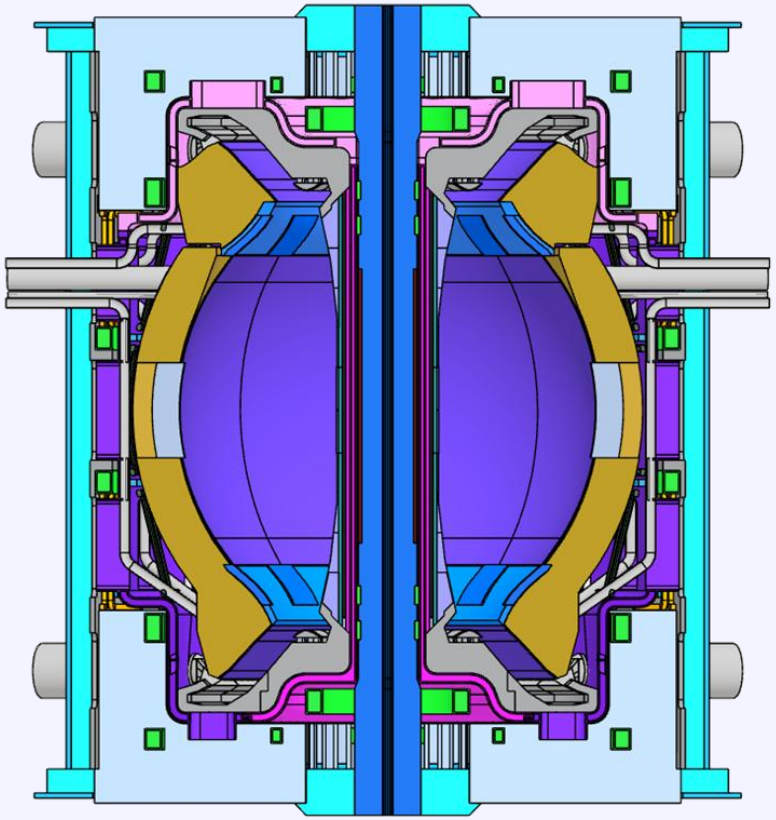
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STEP Fusion Prototype Power Plant

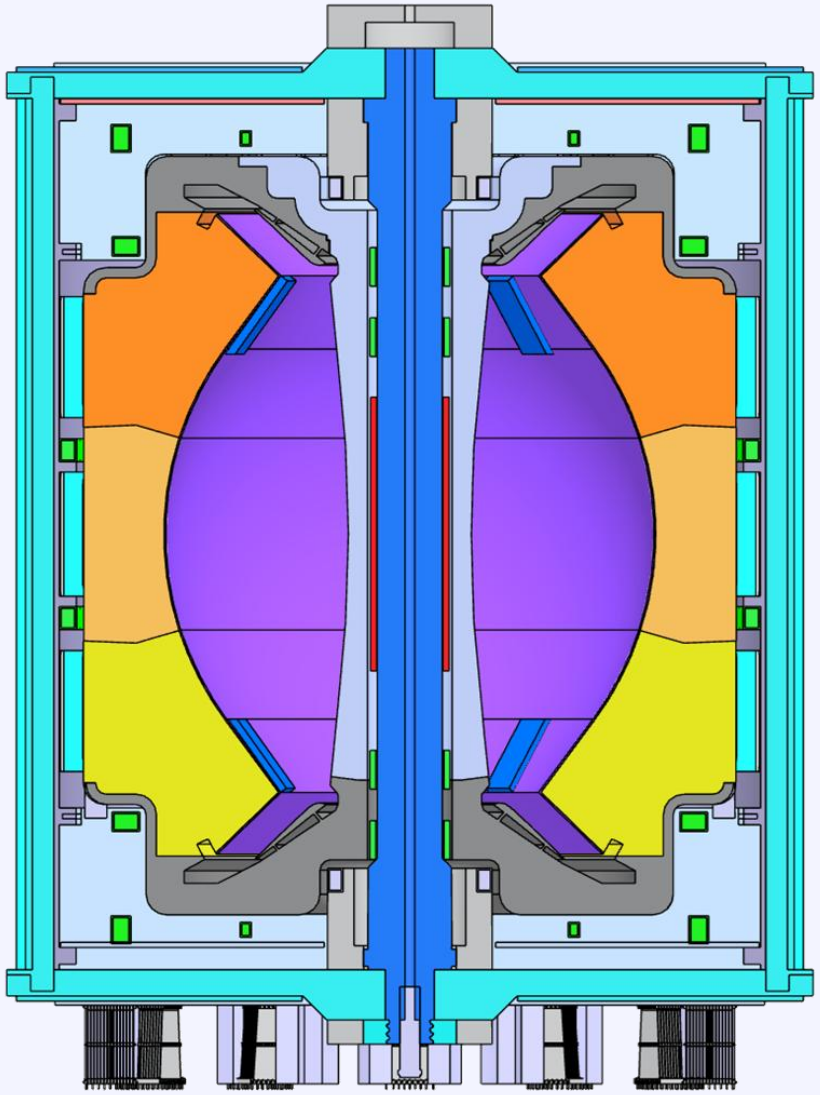


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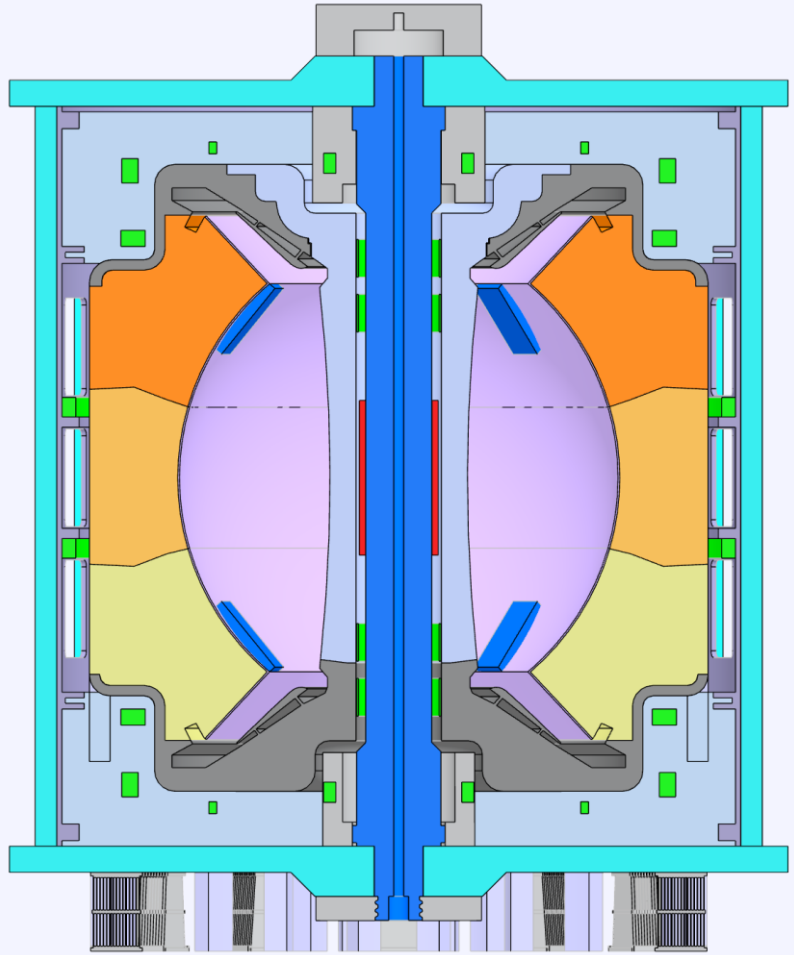
STEP Fusion Plant Evolution



SPP 1 (2024)



SPP 2 (2025)

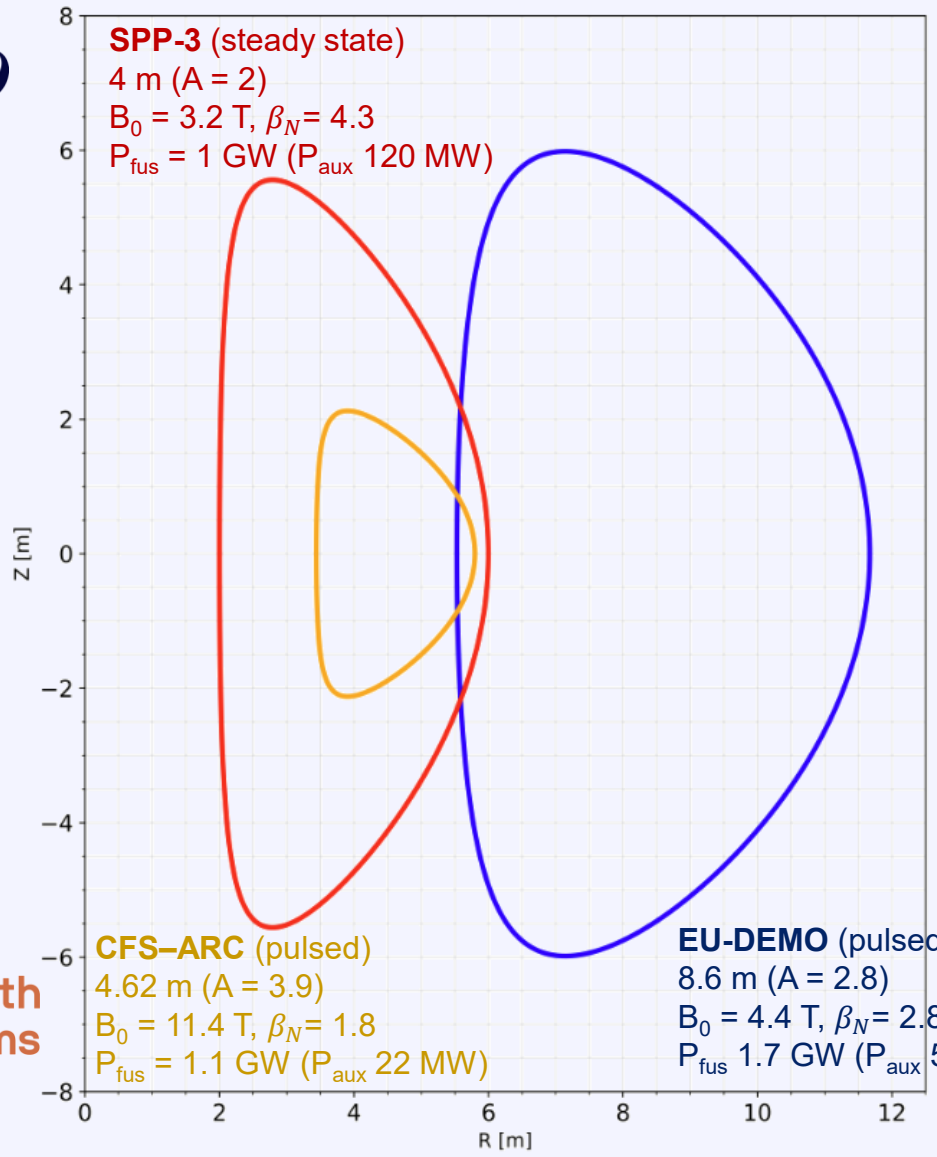


SPP 3 (2026)

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Other Tokamak Approaches

STEP FUSION



$$P_{fus} \propto \frac{\kappa^5 \beta_N^4}{A^3} B_t^4 R_0^3$$

Commonwealth Fusion Systems

EUROfusion

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Feeback from April – By System

1. **Magnets & Remountable TF System**
   - Immature technology
   - Limited supply chain / uncertainty
   - Limited HTS tape capacity / QA
2. **Maintenance System**
   - Inspection strategy, outage frequency & disassembly/replacement
   - Fast access for emergent failures
   - Dose management, concrete and public perception
3. **Heating & Current Drive System**
   - Typical prototype to production gap
   - Balance innovation with standardisation
   - Design of manufacture, operations/monitoring & maintenance (not just a physics problem!)
4. **Fuelling & Fuel Breeding System**
   - Fuel sovereignty, including lithium sourcing and enrichment
   - No supply chain!
   - Early engagement with Regulator

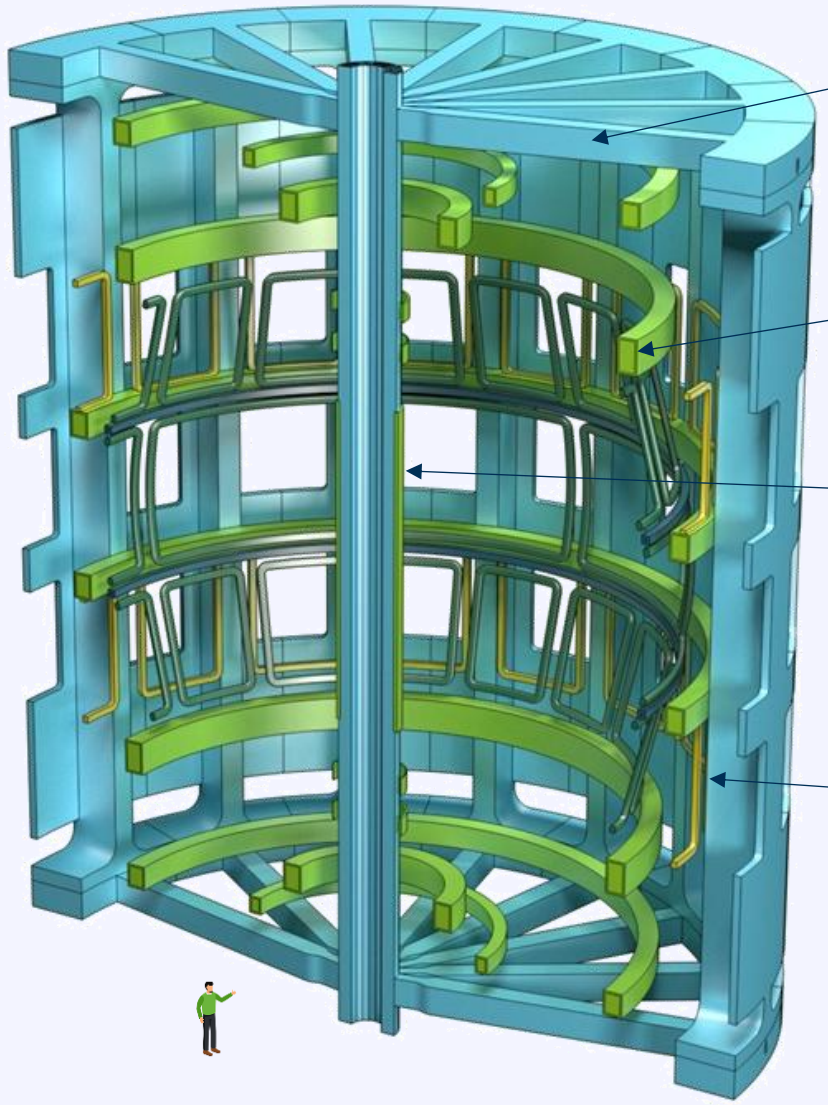
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Feeback from April – Common Themes

- Supply chain immaturity: STEP cannot wait for markets to develop – it needs to create credible demand and incentives
- Systemic skills shortages: “where will the suitably qualified people come from?” – investment in fusion skills is UK government policy
- Limited test facilities and expensive iteration: strong test-and-learn approach is needed
- Design for manufacture, assembly, operation/monitoring, maintenance & decommissioning
- “Technical Readiness” alone won’t be enough: licensing/environmental readiness and regional acceptance are part of the critical path.

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Magnets System



REBCO Toroidal Field Magnets:
Confine the plasma

REBCO Poloidal Field Magnets:
Position & Shape the plasma

Resistive Central Solenoid:
Initiates & Ramps-up the plasma

Control Coils:
‘Stabilise’ the plasma

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HTS Technology Transfer

- **Medical:** Magnetic Resonance Imaging (MRI)
  - high field, reduced scan times and enhanced image quality – more efficient, portable
- **Power grid:** superconducting transmission lines & sub-stations
  - Connecting micro grids for renewables
  - Data centres
  - Market expected to be >$500bn by 2035
- **Windfarms:** superconducting turbines
  - Upto 5% of wind farm turbines may be superconducting by 2035
  - Market expected to be >$300bn by 2035
- **Science:** accelerators, Nuclear Magnetic Resonance (NMR)
- **Transport:** MAGLEV, aviation

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Magnets Technology Challenges

- **Quench** management (quench resilience / quench mitigation).
  - 26 GJ stored energy = 6 tonnes TNT in the heart of the reactor.
    - Simulation.
    - Detection.
    - Protection.

> "Quench in large-scale REBCO magnets remains the most significant technical challenge."
> USDOE R&D Needs for a US Fusion Magnet Base Program (2024)

- **Manufacturing** of unprecedented scale magnets (2× ITER).
- High current density **cables** in high magnetic fields.
  - Lorentz force (**J × B**) = 1500 kN/m on the HTS stack *cf.* VIPER 400 kN/m.
- Magnet **jointing**.
  - Remotely remountable (including high-voltage 'Paschen tight' joints).
  - 'Fixed' magnet joints.
- HTS tape
  - Improved **irradiation** lifetime.
  - High-throughput **quality control** at fusion relevant conditions
- Fusion magnet scale **test facilities**.
- Global shortage of skilled **workforce**.

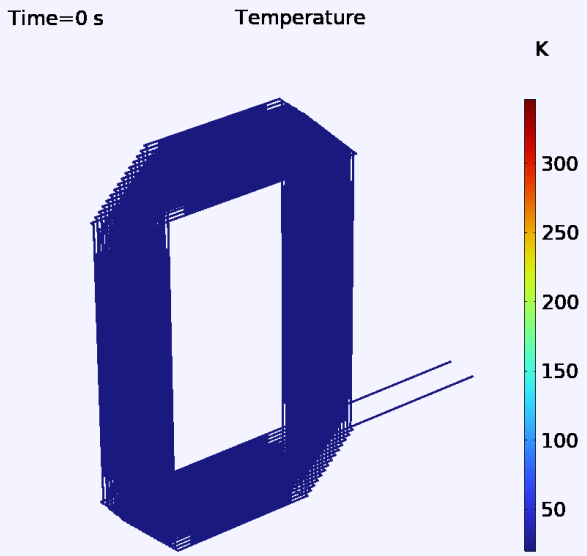
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Quench Simulation

*"Our community is **still struggling with fundamental issues like an accurate estimation of the critical current of a given HTS cable** or magnet and an understanding of the spatial and temporal behaviours of currents, both **under nominal operation** and on quench, especially in the fully soldered partial (or no) insulation schemes favoured by the leading fusion companies."*

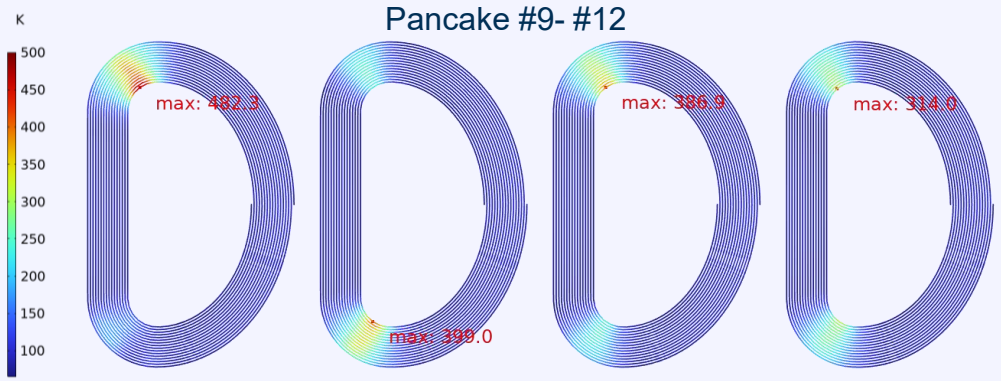
Executive Summary of 2nd Fusion Magnet Community Workshop (1/21-23, 2025)

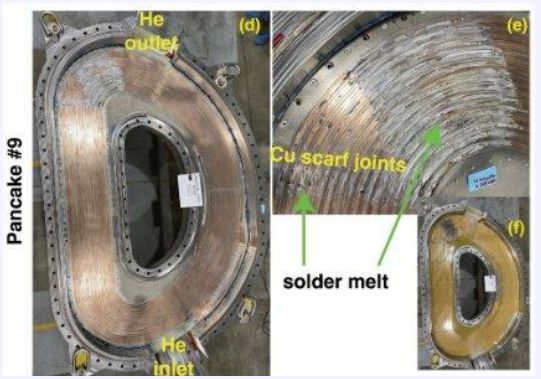
- Non-linear behaviour of HTS tapes near critical current.
- Manufacturing variability in HTS tape performance.
- Limited materials data at cryogenic temperatures (e.g. HTS tape, solders, insulators).
- Coupling electromagnetic, thermal and mechanical models.
- Large multi-physics models are computationally intensive.
- Wide array of digital tools.



3D EM-thermal model of the STEP TF 'model coil' using QUANSCIENT which uses a highly efficient H-ϕ formulation and offers a flexible HPC cloud platform.

3D EM-thermal model of the MIT TF 'model coil' using COMSOL. Simplified cable into '1D line' taking 1 day processing time on a standard desktop (MIT's simulation took a month)





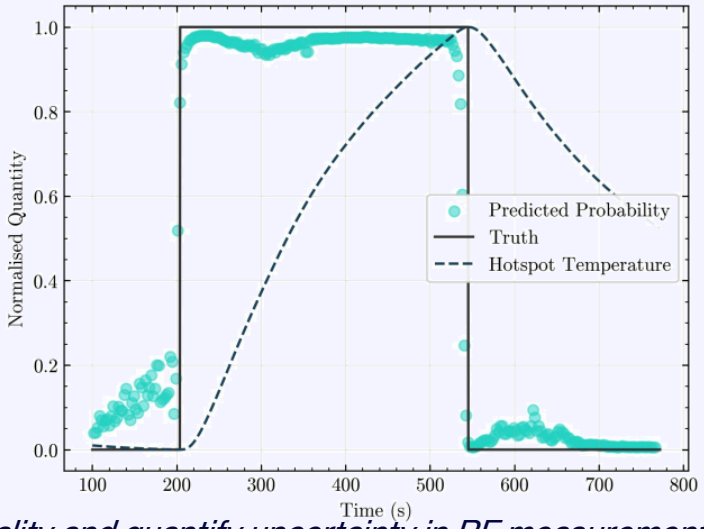
Experimental Assessment and Model Validation of the SPARC Toroidal Field Model Coil

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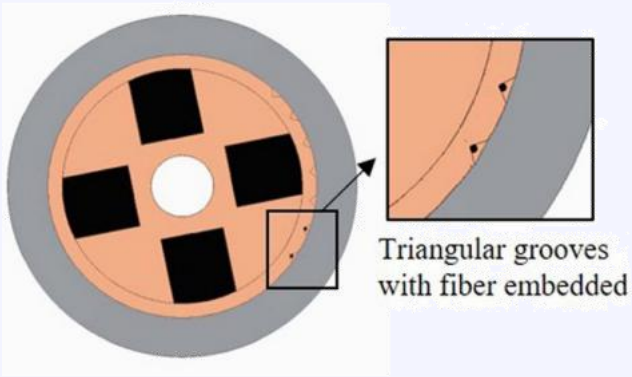
Quench Detection

- 10s of kms of cable with hot-spot length scales in the order of mm!
- Challenging environment (neutron radiation, electrically noisy) for localised sensors, such as voltage taps.
- Localised sensors also require too many channels to be viable.
- Distributed measurement methods required. Optical fibres most developed. Ultrasonics and RF methods under development.
- Distributed methods will generate a vast amount of data that requires innovative fast processing techniques to achieve sub-second detection.

digiLab



Machine learning to reduce dimensionality and quantify uncertainty in RF measurements



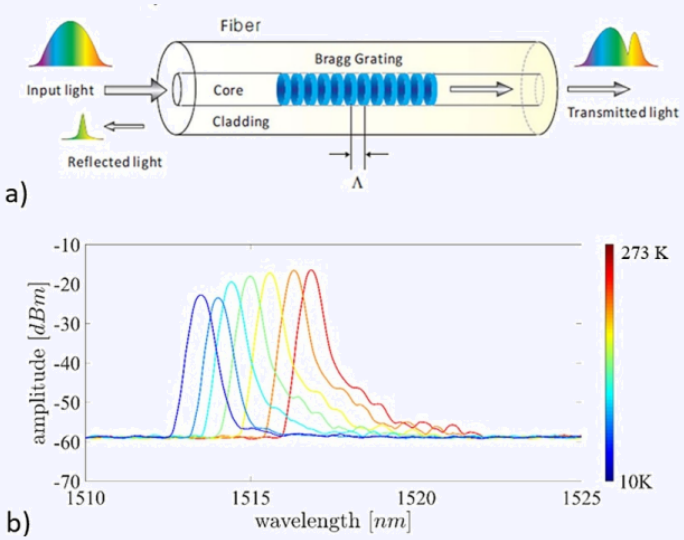


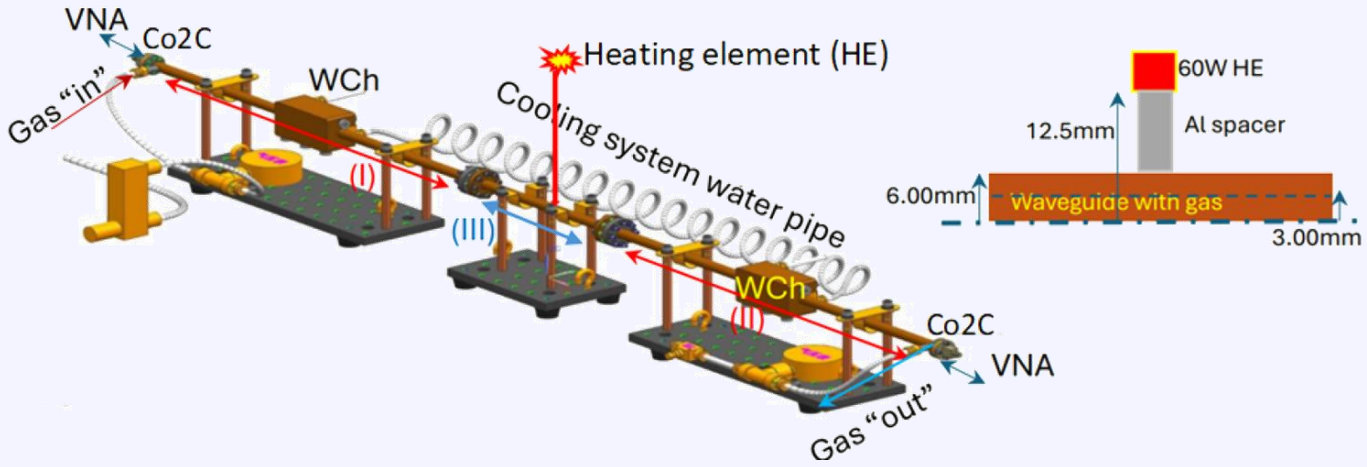
Figure 1. (a) Conceptualization of FBG technology (b) FBG wavelength shift with temperature. This figure shows how the wavelength peaks decreases as the temperature drops.

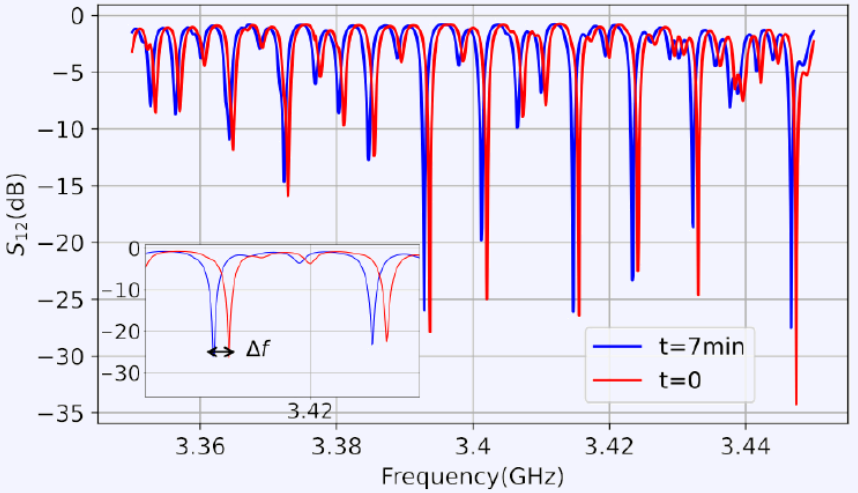
E E Salazar et al, Supercond. Sci. Technol. 34 (2021) 035027

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Quench Detection

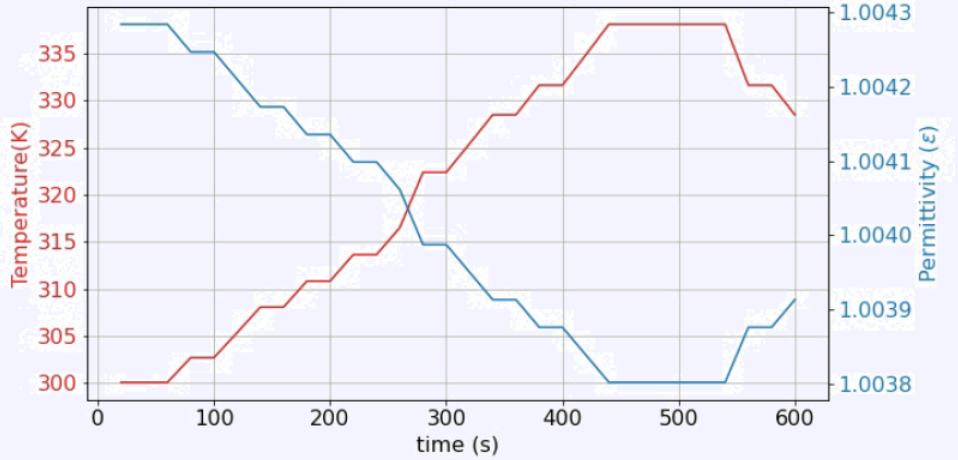
Proof-of-Principle







Oriol Fernandez Serracanta



STEP is developing a non-invasive RF frequency and time domain reflectometry method to measure coolant temperature excursions.

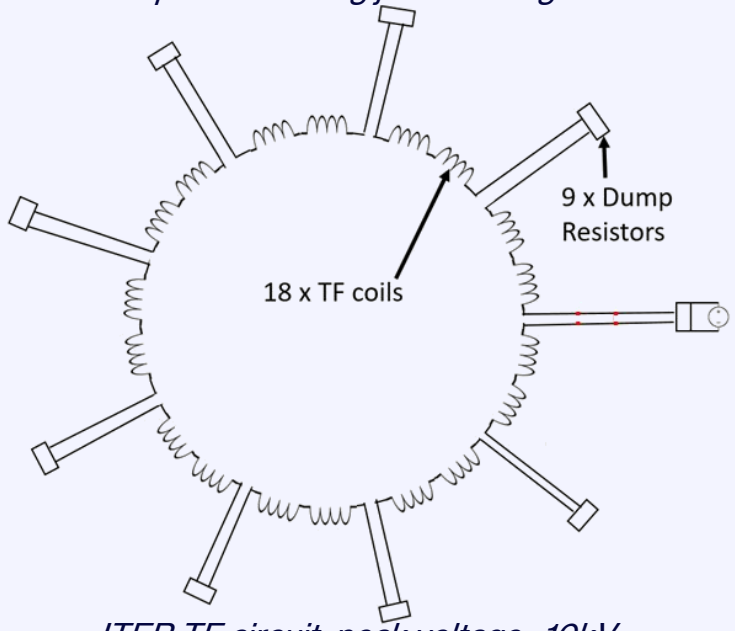
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Quench Protection

- ITER and JT-60SA highlight risk of Paschen breakdown – achieving ‘Paschen tightness’ remains a major risk for ITER TF coils.
- Achieving reliable Paschen tightness on remotely remountable joints considered impractical.
- Current strategy is therefore to pursue a quench protection philosophy that has a peak voltage below the Paschen minimum.
- This rules out external dump resistors for STEP TF coils.
- Low voltage, ‘self-dump’ solutions are being developed.



JT60-SA: major electrical arc dumped 60 kJ of energy, melting holes into superconducting joints during commissioning

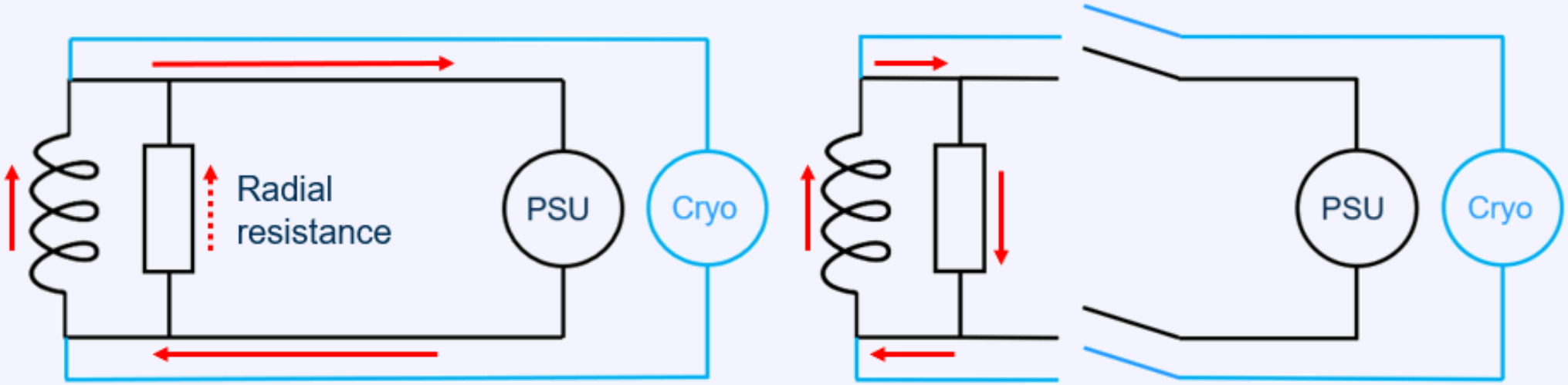


ITER TF circuit: peak voltage ~10kV.

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Quench Protection

"Open-Circuit Discharge"



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STEP TF Model Coil Programme

2025
Small Test Coils
(<1 kJ, <300 A)

2026
Sub-Scale Model Coil
(15 kJ, 10 kA)

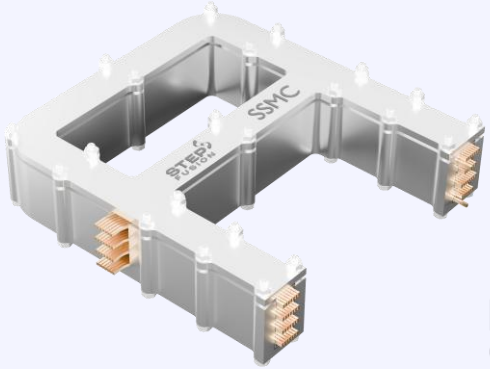
2027

2028
TF Model Coil
(50 MJ, 90 kA)

2029+
TF Production
(~1 GJ, 90 kA)

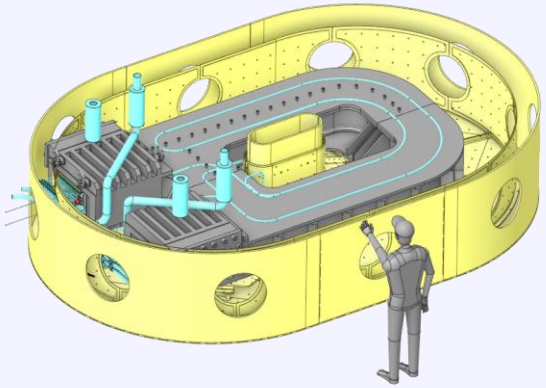


University of Strathclyde Glasgow

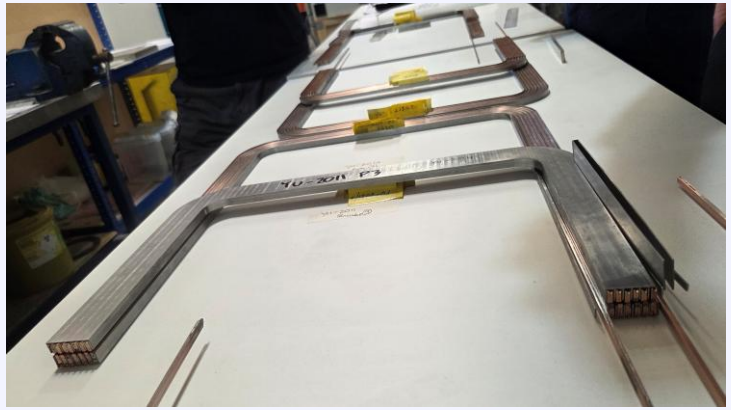


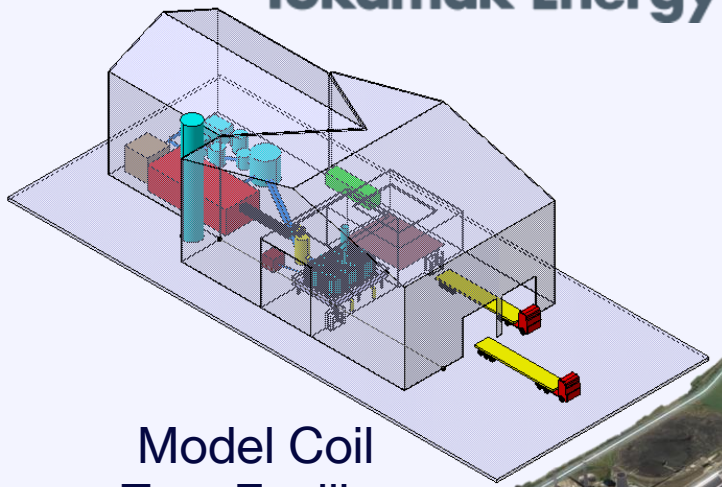
OXFORD SIGMA

ROCKWOOD COMPOSITES

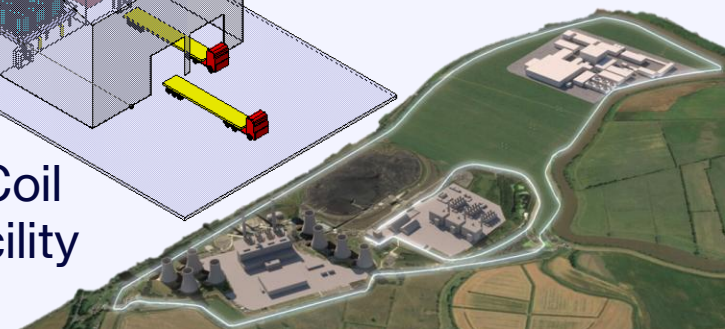


Tokamak Energy





Model Coil
Test Facility

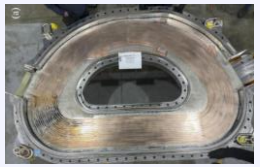


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Unprecedented Scale

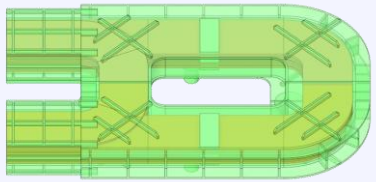
HTS technology unproven at fusion power plant scale

Commonwealth Fusion Systems



SPARC TFMC
2.9 × 1.9 m

STEP



STEP TFMC
3.6 × 2.0 m

Tokamak Energy



DEMO4 TF
0.7 × 0.5 m

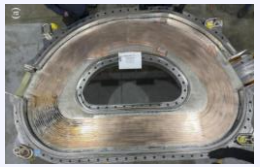


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Unprecedented Scale

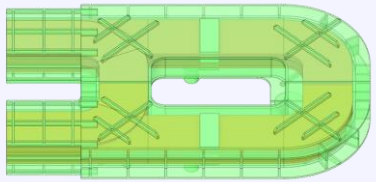
HTS technology unproven at fusion power plant scale

Commonwealth Fusion Systems



SPARC TFMC
2.9 × 1.9 m

STEP

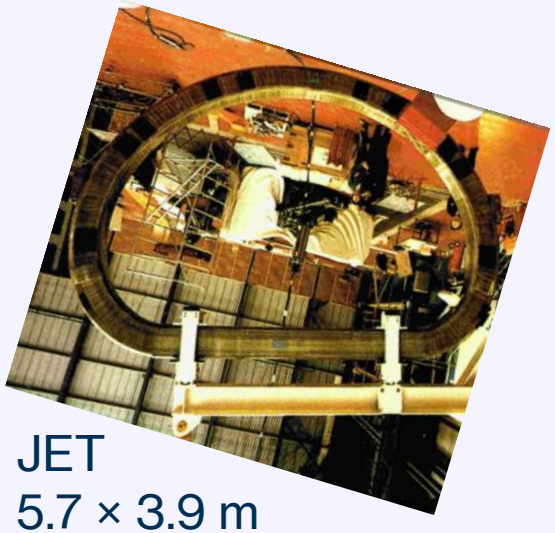


STEP TFMC
3.6 × 2.0 m

Tokamak Energy



DEMO4 TF
0.7 × 0.5 m

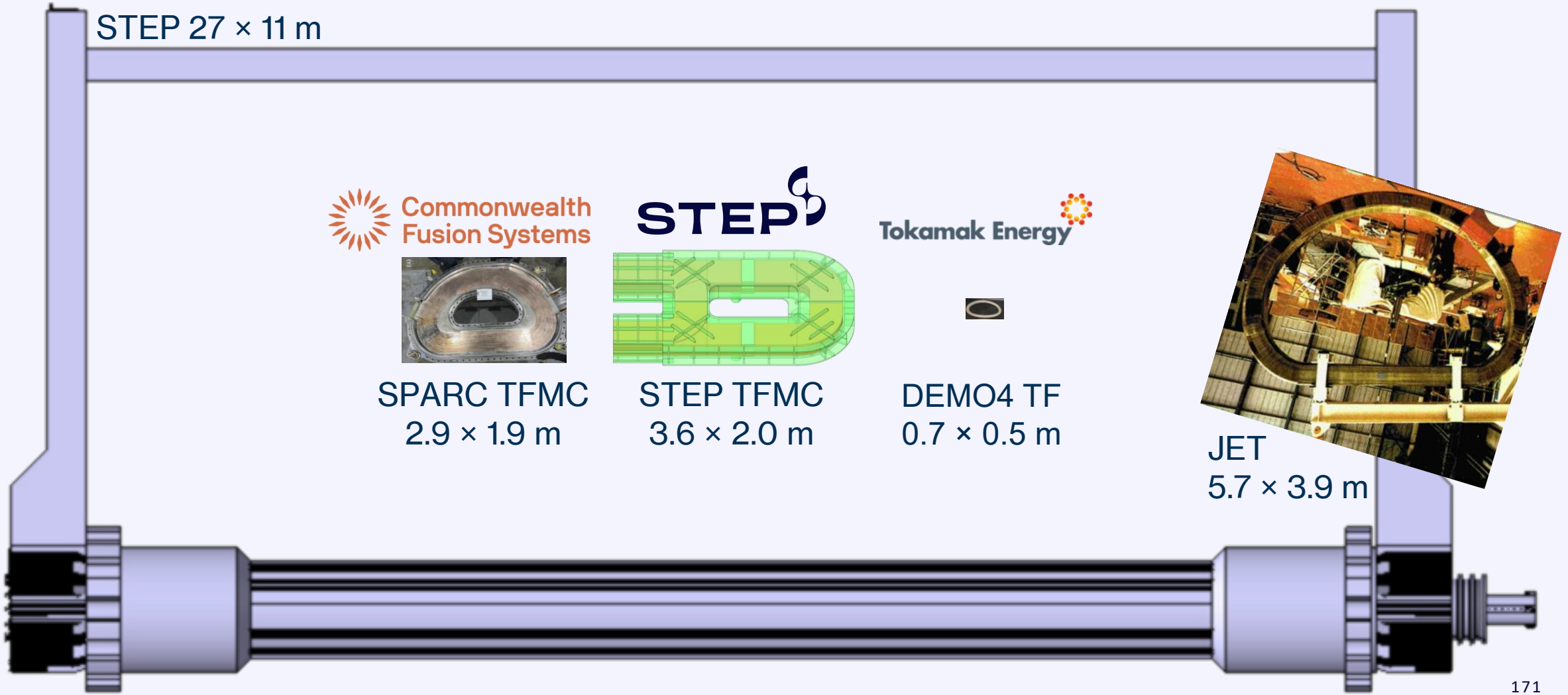


JET
5.7 × 3.9 m



Unprecedented Scale

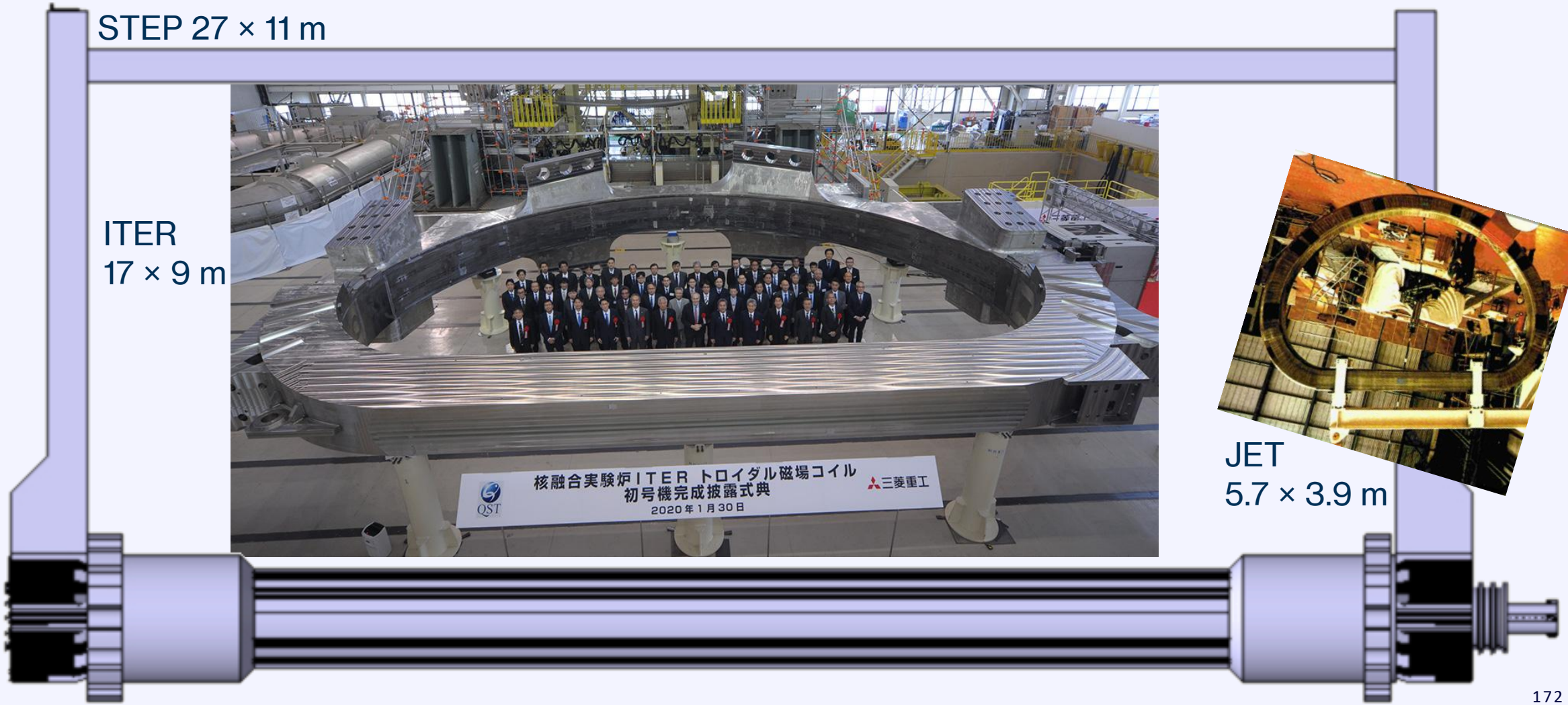
HTS technology unproven at fusion power plant scale



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Unprecedented Scale

HTS technology unproven at fusion power plant scale



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ITER Experience



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https://www.youtube.com/watch?v=_OQMJE6U1EA

ITER Europe

















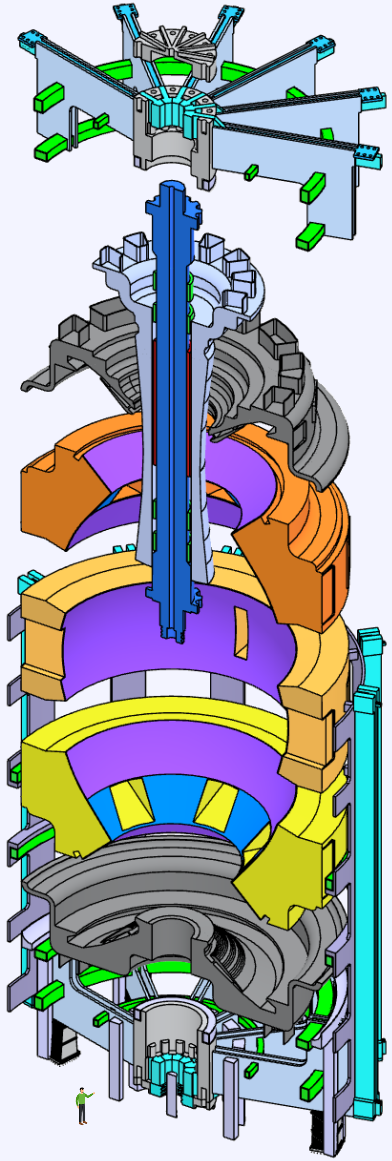




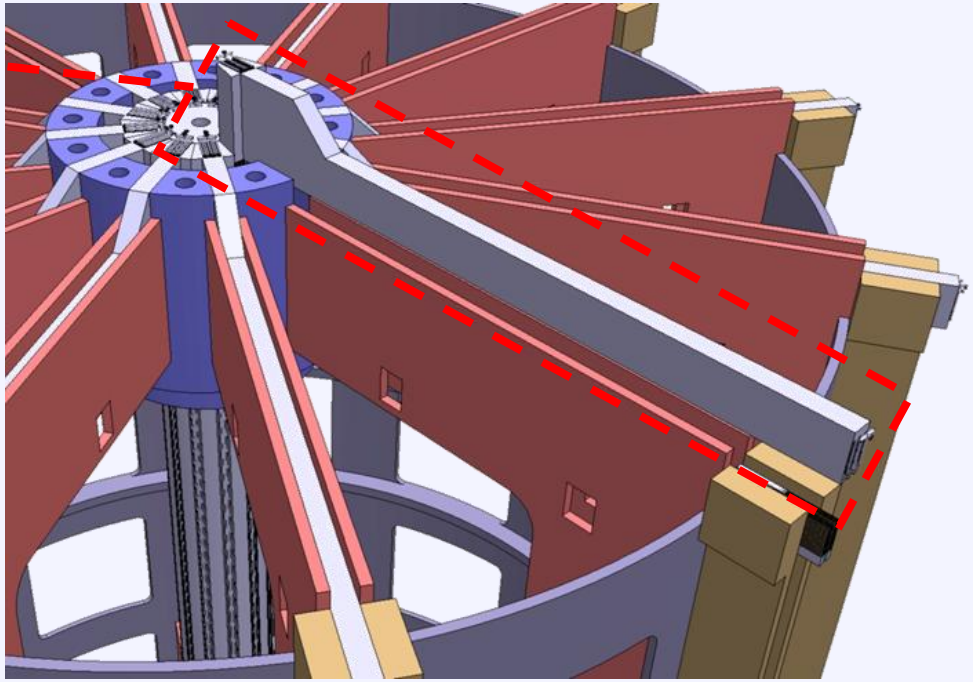


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Magnet Remountable Joints

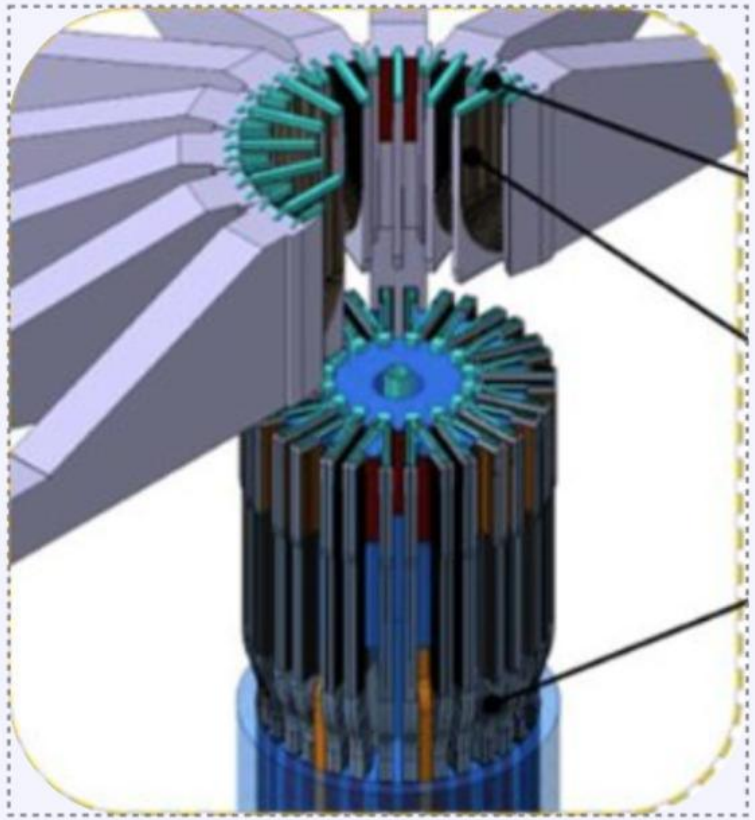






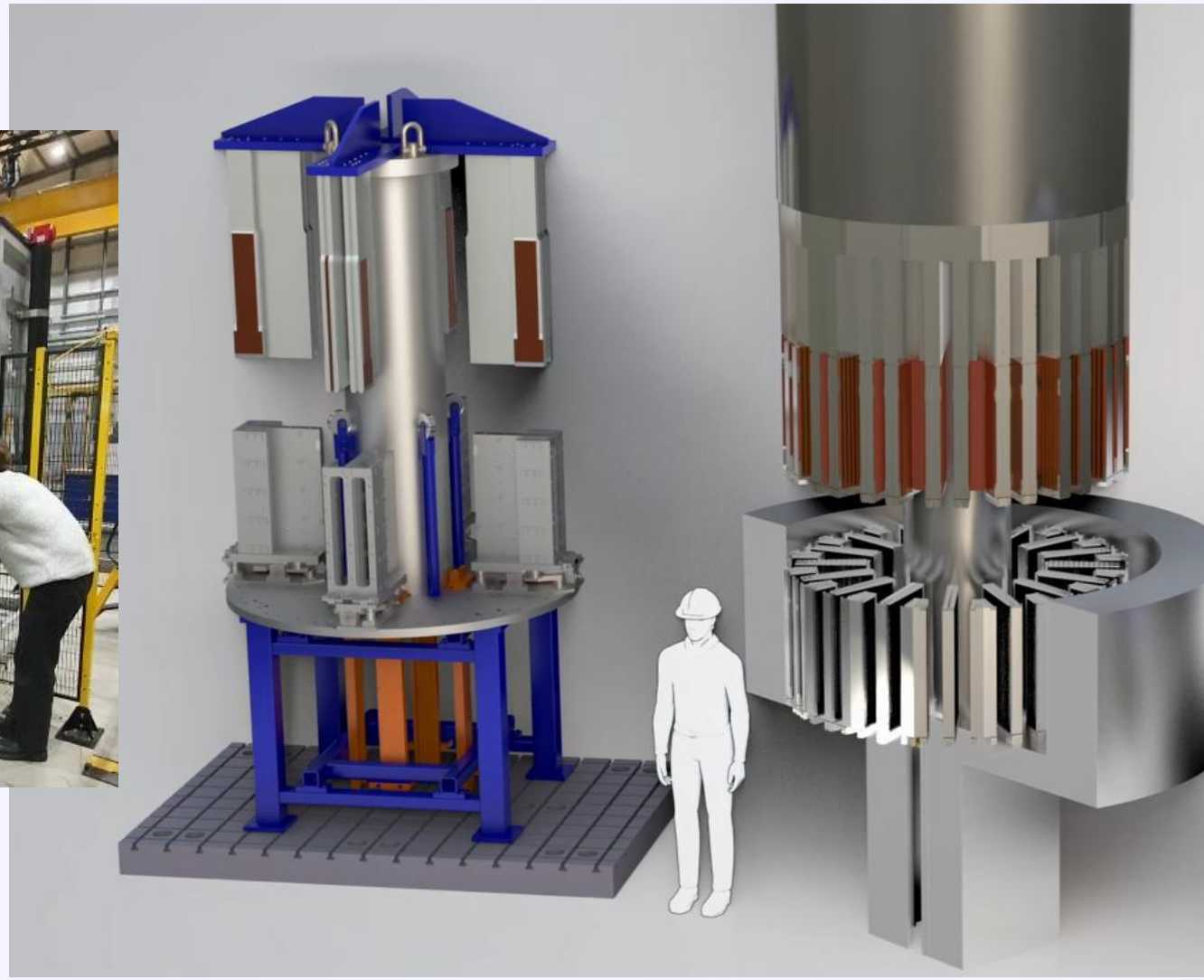
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Manufacturing Tolerances



60 turns carrying 90 kA in each of 12 limbs

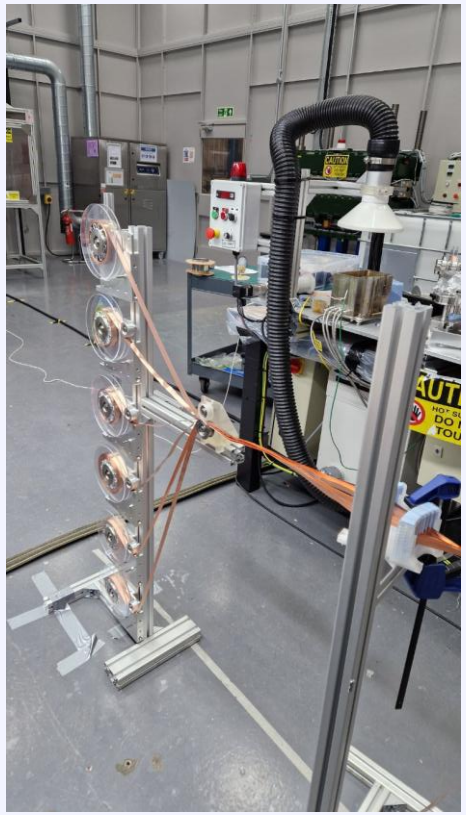


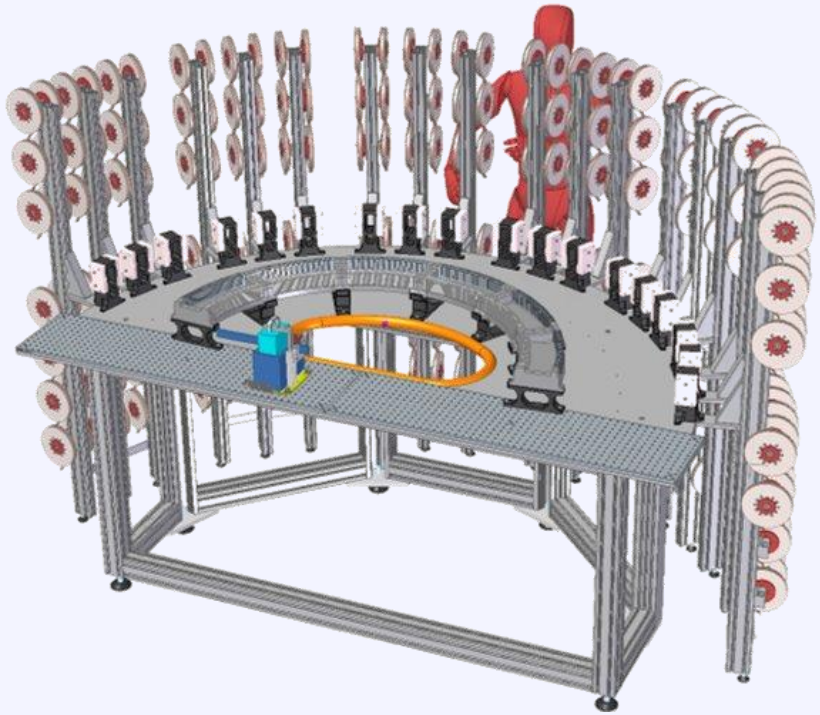


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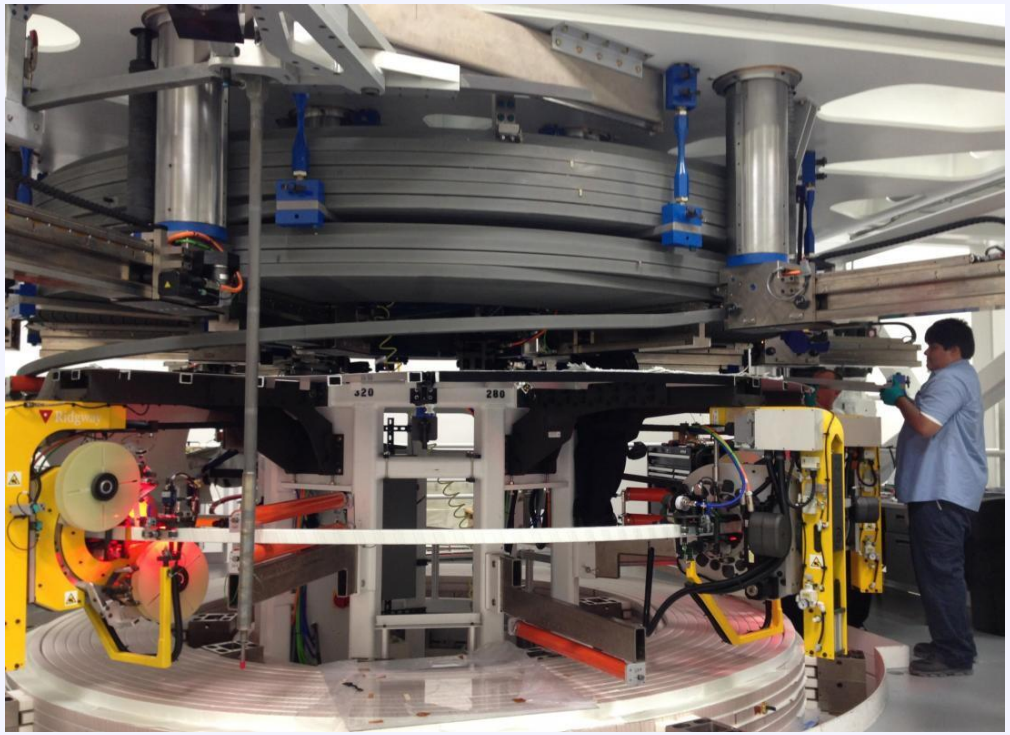
Manufacturing with HTS Tape

Tokamak Energy Ridgway GENERAL ATOMICS





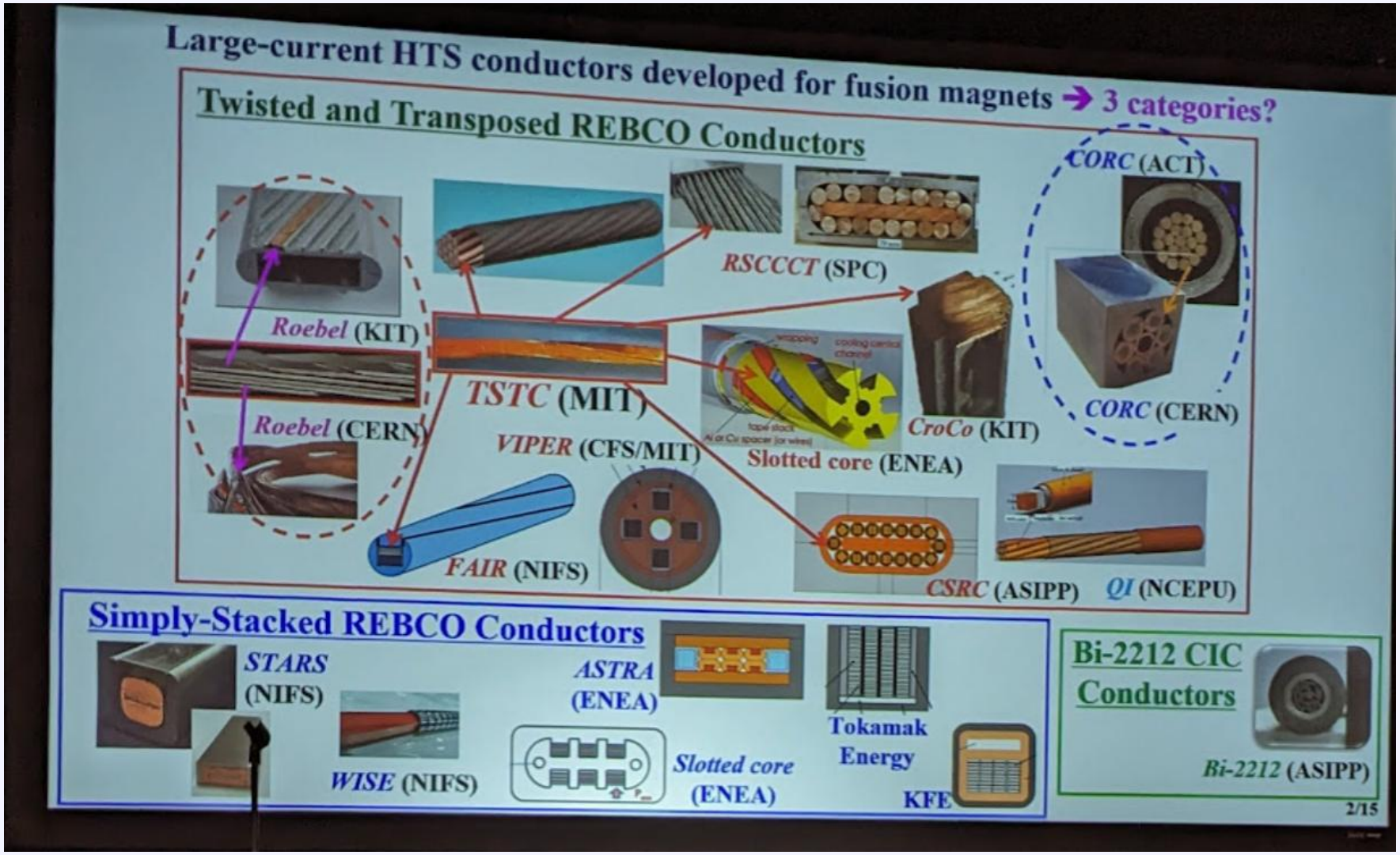
300-tape laying machine design and feed head prototype



ITER CSMC coil is prized apart for turn insulation machines (supplied by Ridgeway) to apply layers of Kapton and glass tape

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Cables Manufacturing



Credit: Dr Nagato Yanagi, National Institute for Fusion Science Japan, MT29 2025

[MIT/Commonwealth Fusion Systems VIPER HTS Cable - 2022]

[The Institute of Plasma Physics Chinese Academy of Sciences (ASIPP) 'CORC-CICC' HTS Cable - 2024]

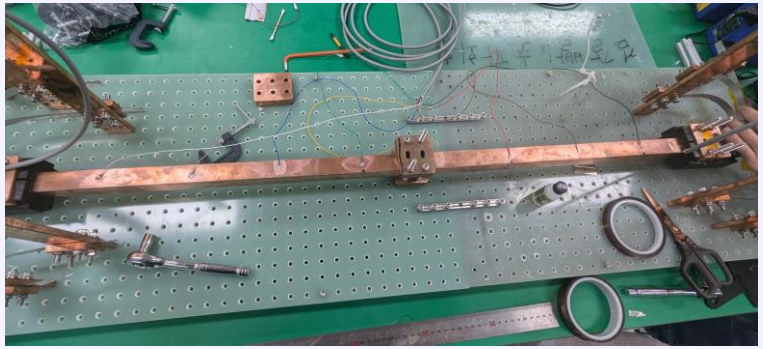
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Cables Development

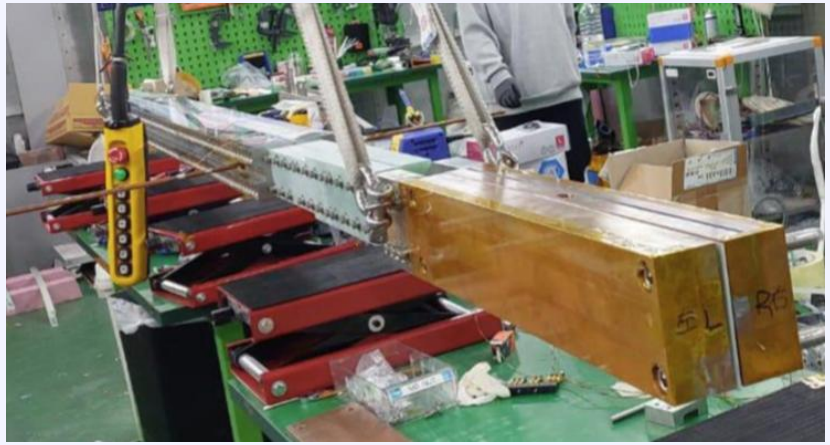




Small Lengths



Intermediate Lengths



SULTAN Test Piece

Tokamak Energy

서 울 대 학 교
SEOUL NATIONAL UNIVERSITY

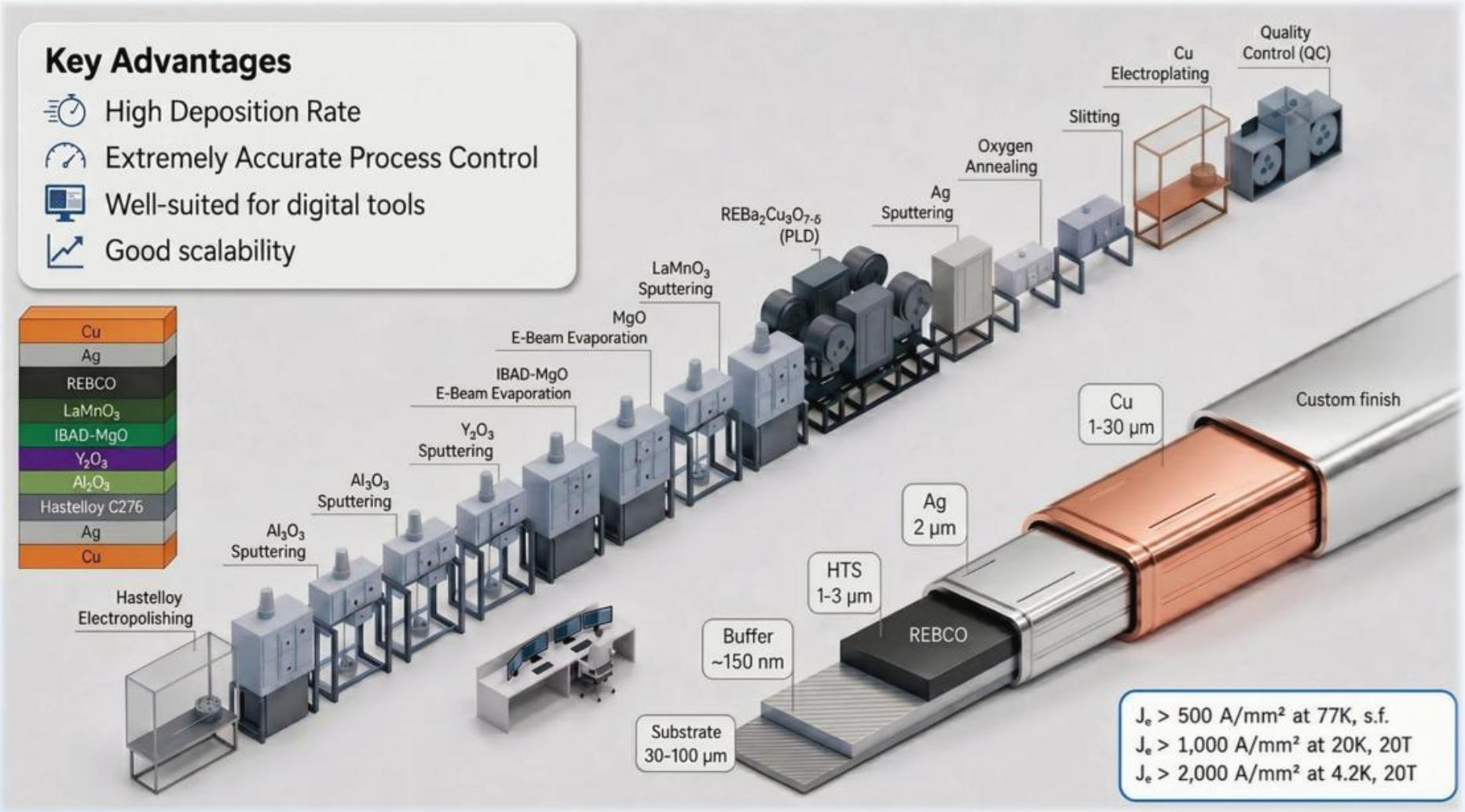
Power Quality System Leading Company
PowerNix Co., Ltd.

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HTS Tape Supply

Production Platform: IBAD-PLD Manufacturing Flow

FARADAY FACTORY JAPAN

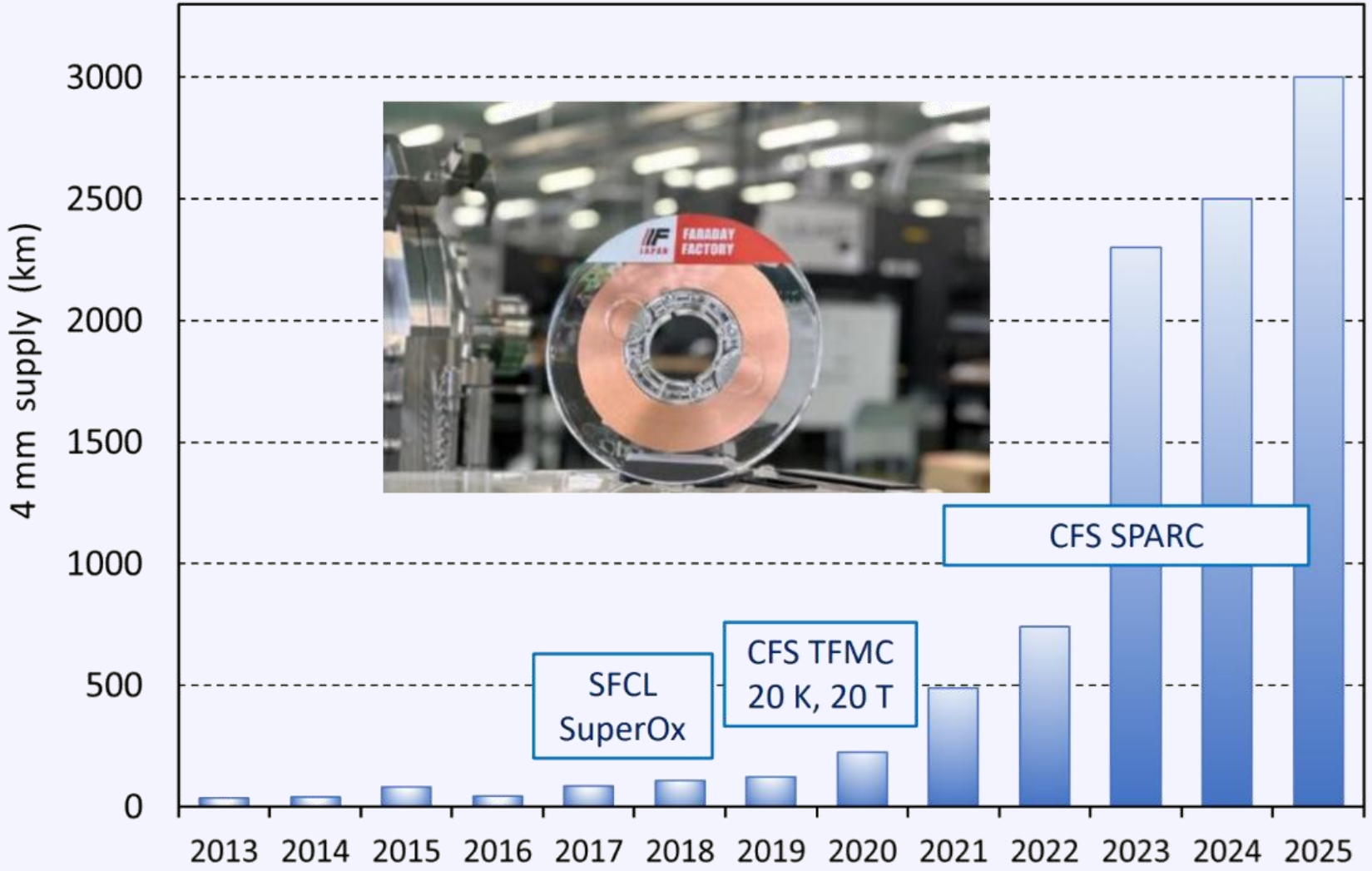


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Credit: Faraday Factory Japan ICEC30/ICMC2026

HTS Tape Supply

Fusion hatches the egg for HTS: 10,000+ km delivered



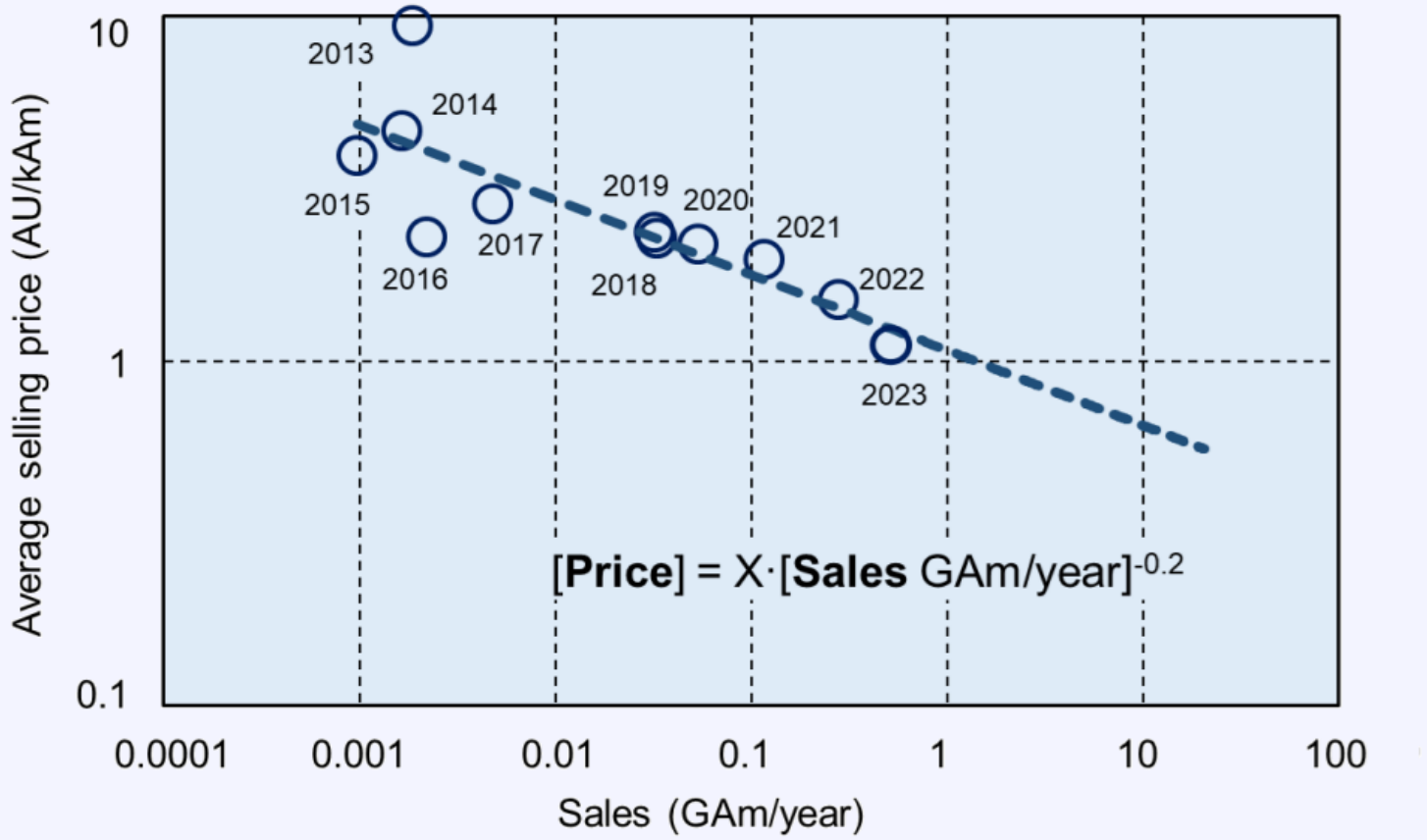
At 100% capacity and profitable since 2017

Credit: Faraday Factory Japan

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HTS Tape Supply

Actual price learning curve

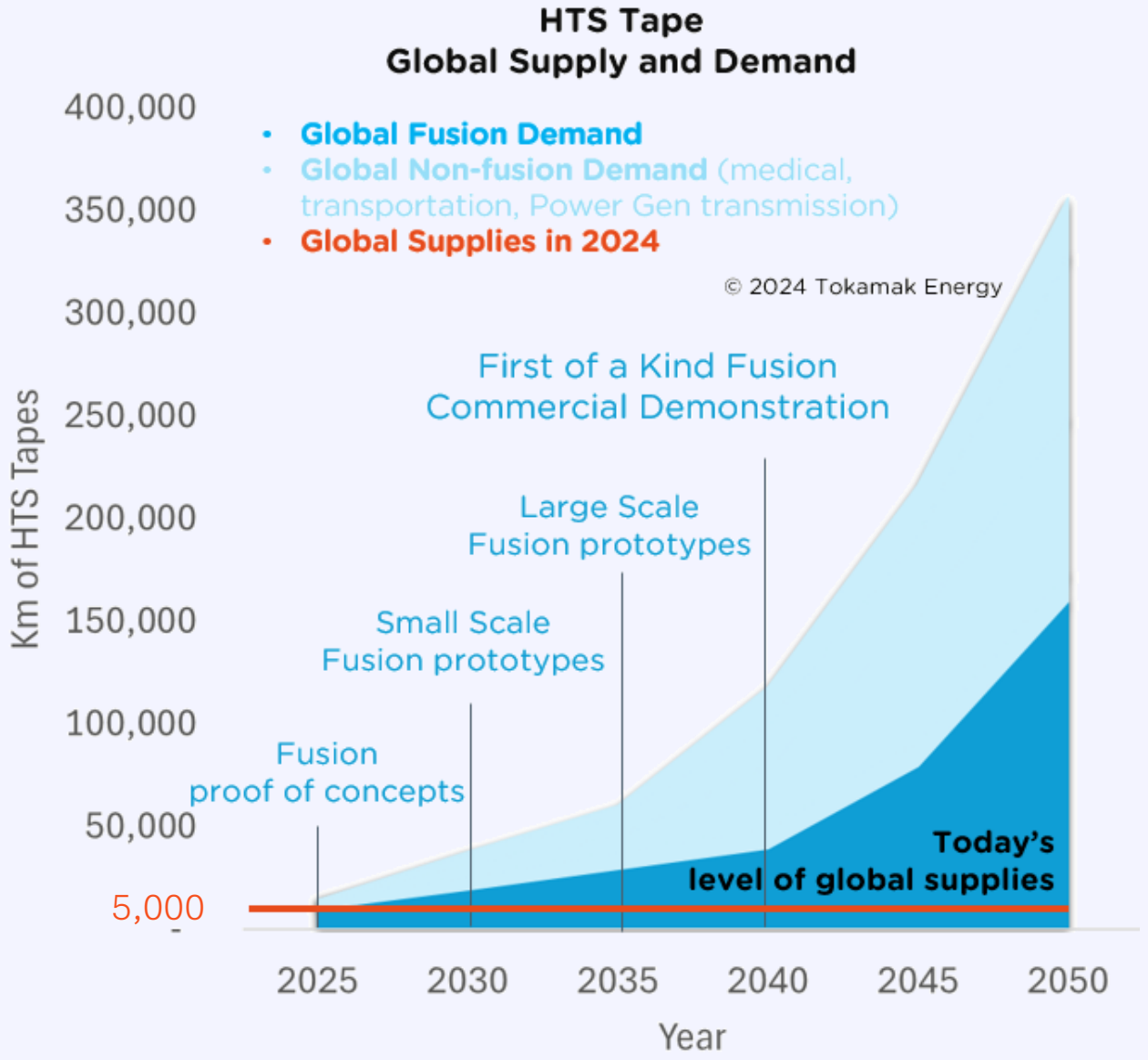


- Fusion creates demand, promotes capacity; large volume drives the cost down
- HTS price halves with every 10-fold volume increase
- Other applications will benefit

Faraday Factory Japan: ICMC Geneva July 2024

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HTS Tape Supply



Credit: Tokamak Energy

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HTS Tape Supply



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HTS Tape Supply



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HTS Tape Supply



Proxima Fusion

Technology Our Programs

News | 09.09.2026

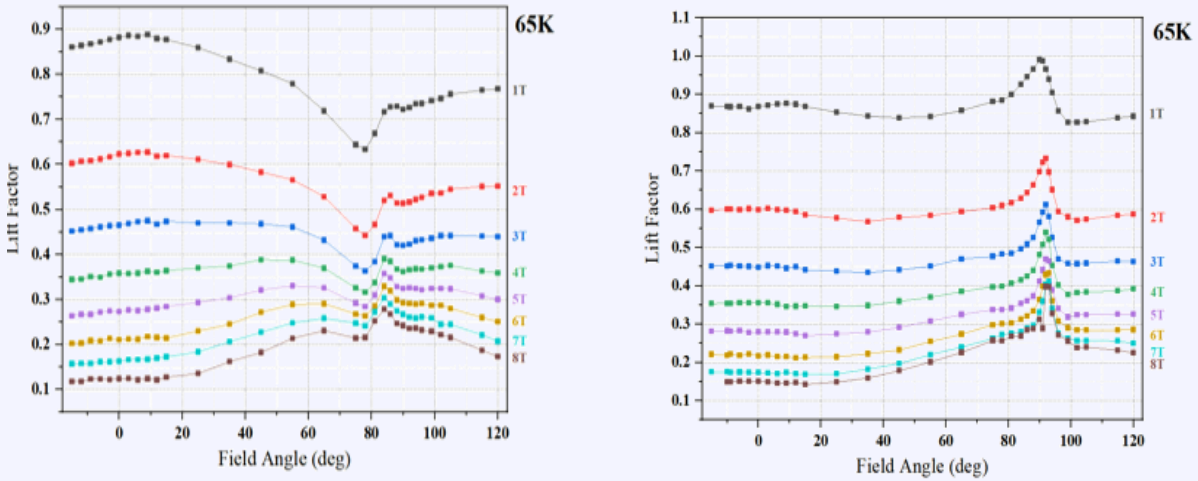
Proxima Fusion and Lower Saxony sign MoU to build Europe's first large-scale fusion-grade HTS tape facility

https://www.proximafusion.com/press-news/lower-saxony-sign-mou-first-large-scale-fusion-grade-hts-tape-facility

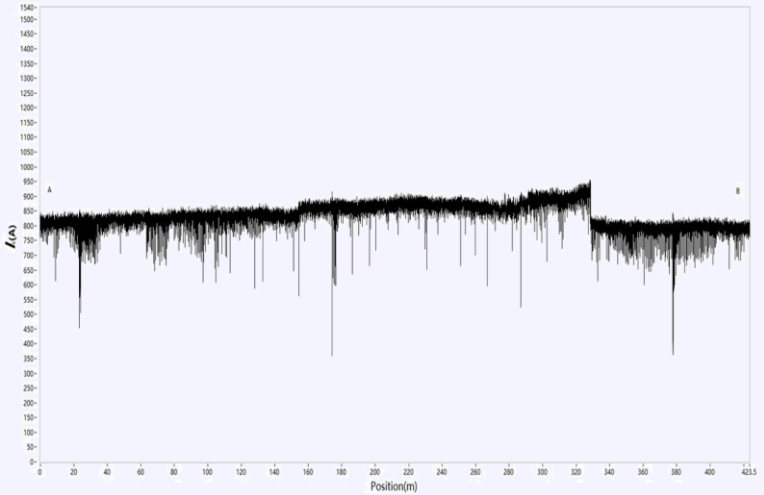
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HTS Tape QA

- The challenge: tens of thousands of kilometres of HTS tape with highly variable performance requiring to be characterised along its length.
- Compounding the challenge: while this can be done at 77 K (liquid nitrogen bath) – see figure, fusion requirements are at 20 K, 20 T. There is no reliable correlation between these two test points.
- Facilities to do this are few and far between (globally), and require slow and destructive testing of short samples.
- Not just the magnetic field, but also the field orientation is critical.



Variation in performance of two nominally identical tape pieces under different magnetic fields.



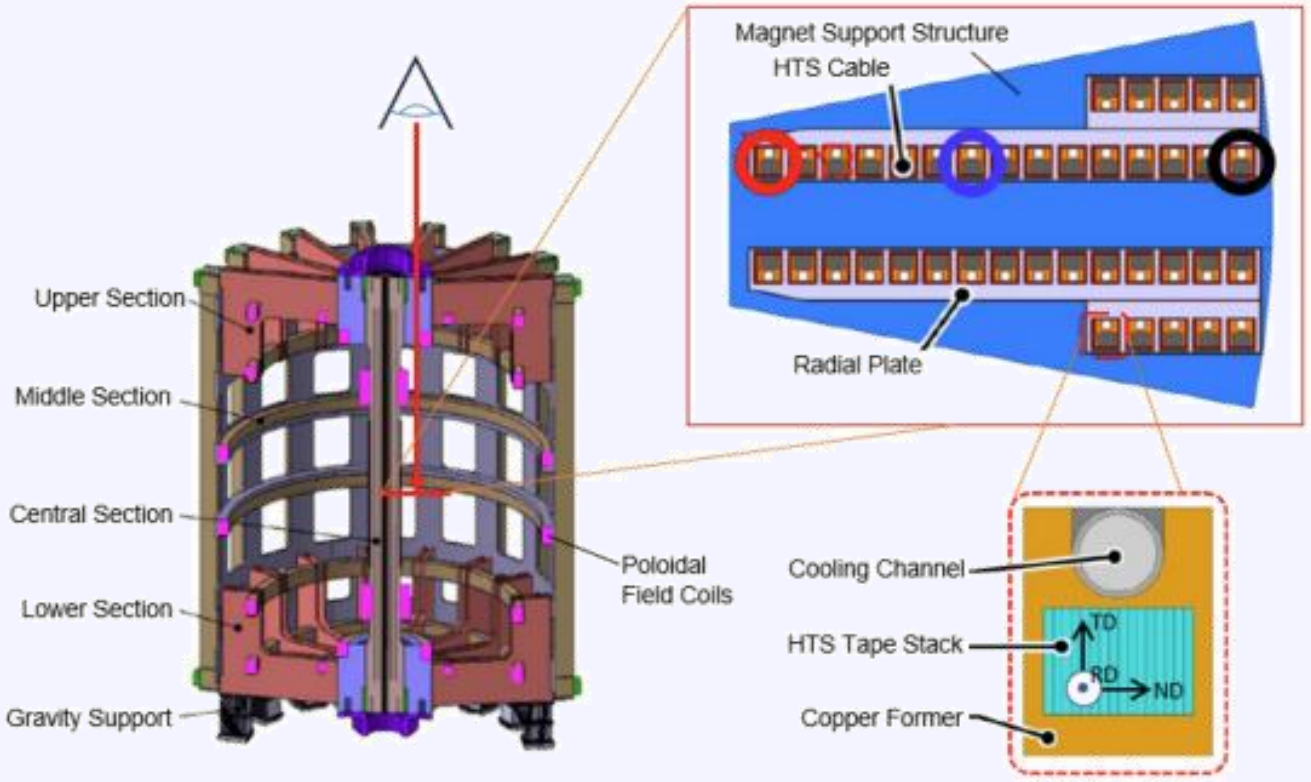
Typical HTS tape performance along the length (77 K, no magnetic field).

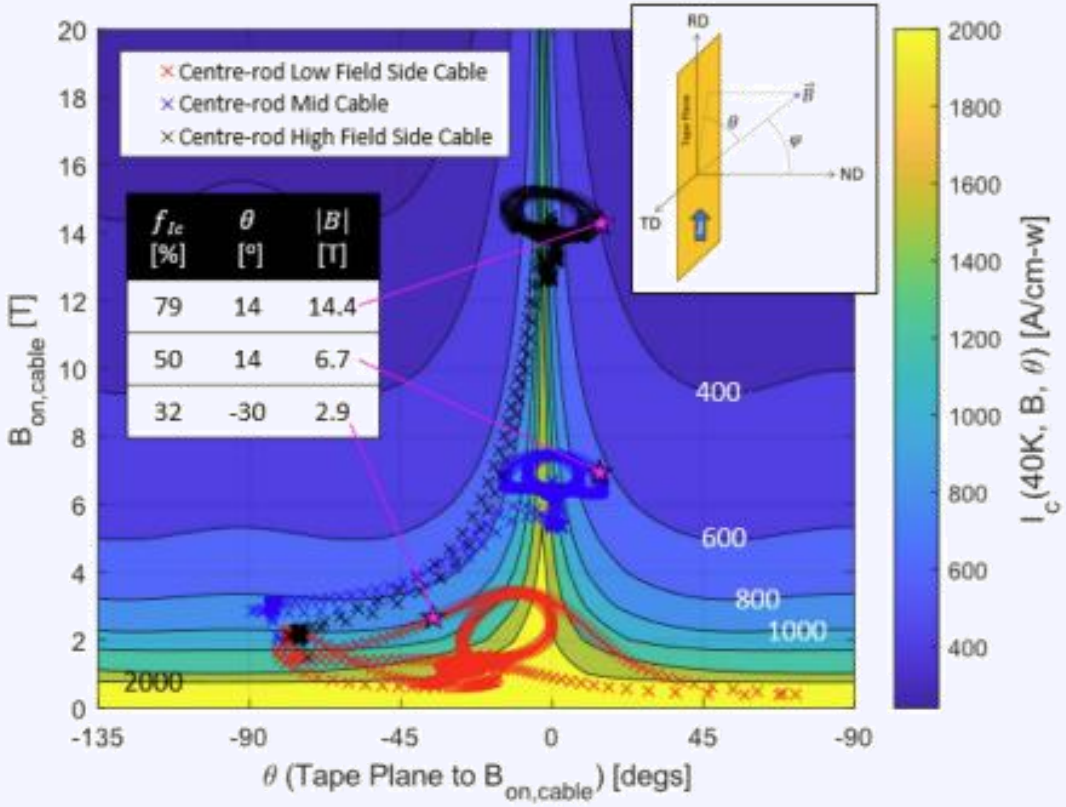


THEVA TAPESTAR™

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STEP Magnet QA



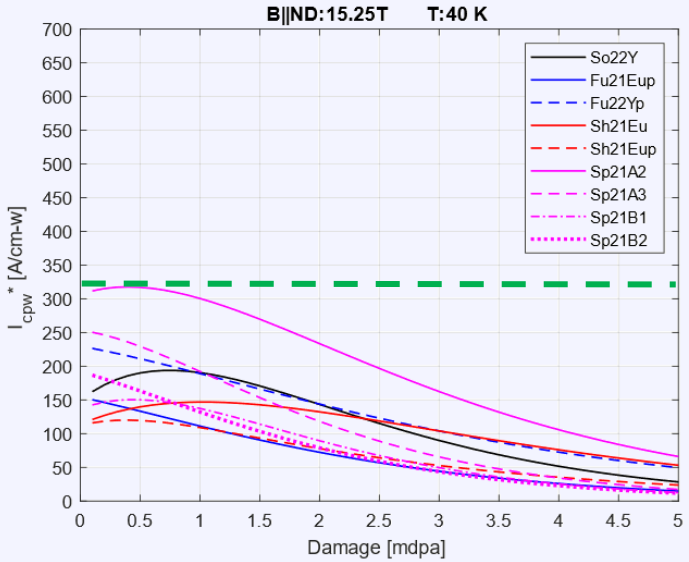


W. Iliffe et al., "Progress in the STEP Programme Toward Understanding REBCO Coated Conductors in the Fusion Environment," IEEE Trans. Appl. Supercond., vol. 35, no. 5, article no. 6602105, Aug. 2025, doi: 10.1109/TASC.2024.3523248

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Radiation

- STEP assumes ~3 × 10^{24} n/m^2 fluence limit for the HTS tape which drives shielding required and ultimately overall size of the machine.
- Commercial fusion powerplants are likely to need fluence limits at least 10 times that.
- Uncertainty remains regarding neutron flux effects on superconductivity.
- Test facilities to irradiate tape with fusion relevant spectra of neutrons are limited.
- These facilities would ideally irradiate tape ‘in situ’, i.e. with supercurrent flowing in the tapes.
- Don’t forget insulation! ITER qualified epoxy cyanate ester blends for 1 x 10^{22} n/m^2 (>75% initial interlaminar shear strength)



STEP has been using ion irradiation experiments, as proxies for neutrons, to assess critical current degradation of various HTS tapes.

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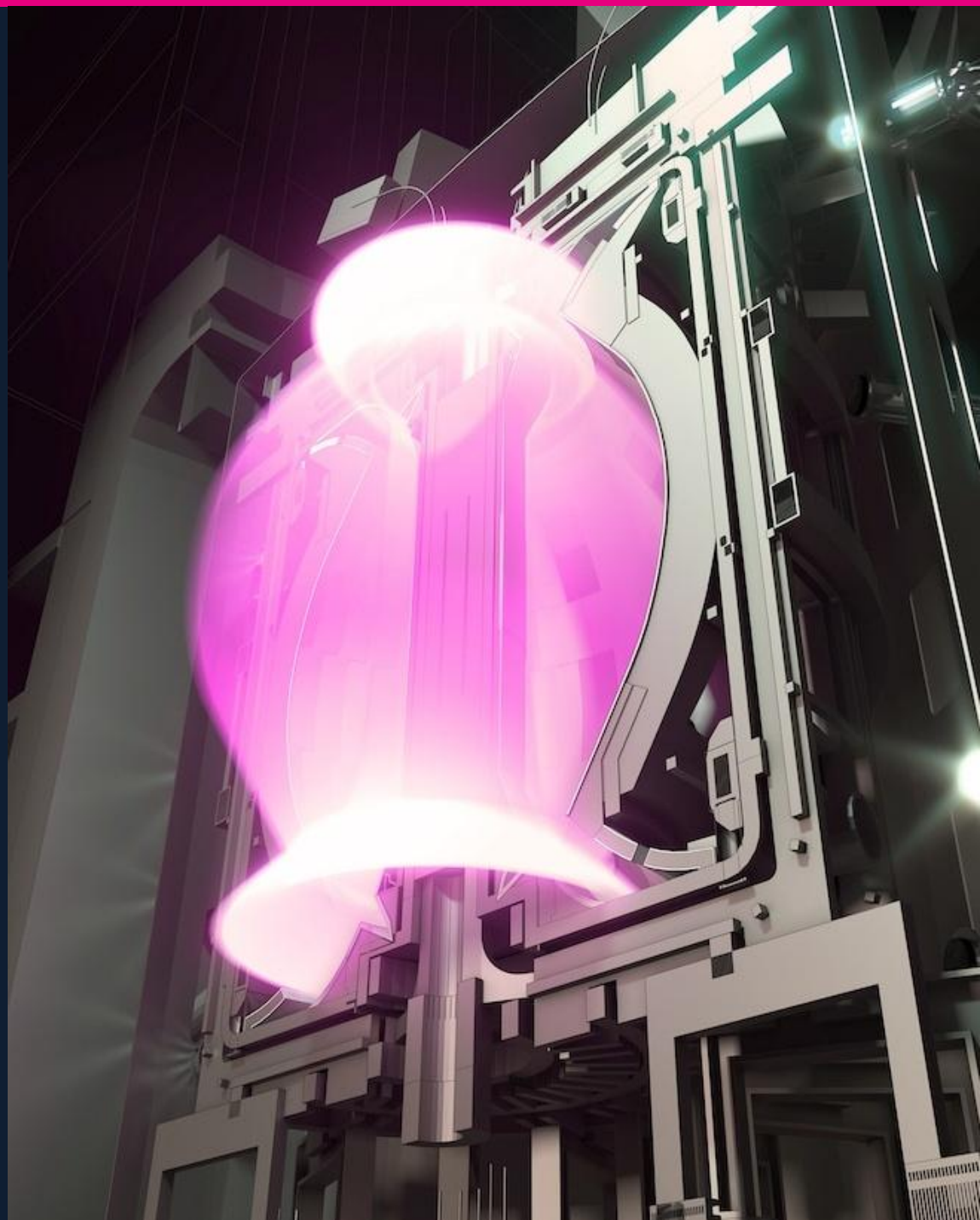
STEP FUSION

ILIOS

NIA Fusion Business Group

Introduction to ILIOS

Simon Matthews
ILIOS Programme Director



Introducing ILIOS

KIER

NUVIA

AECOM

AL_A

Turner & Townsend

Tier 1 UK contractor with proven capability in delivering complex, safety-critical and regulated infrastructure, bringing strong design integration, constructability, and sustainable construction expertise across a range of sectors.

Specialist engineering capability focused on enabling safe, efficient delivery, with strong engineering management experience supporting complex assets through design assurance, construction support, commissioning and transition into operation.

Globally recognised engineering, design and programme management capability, with deep experience in complex transport, nuclear, energy and science infrastructure, across concept, design integration, environmental consenting and delivery assurance.

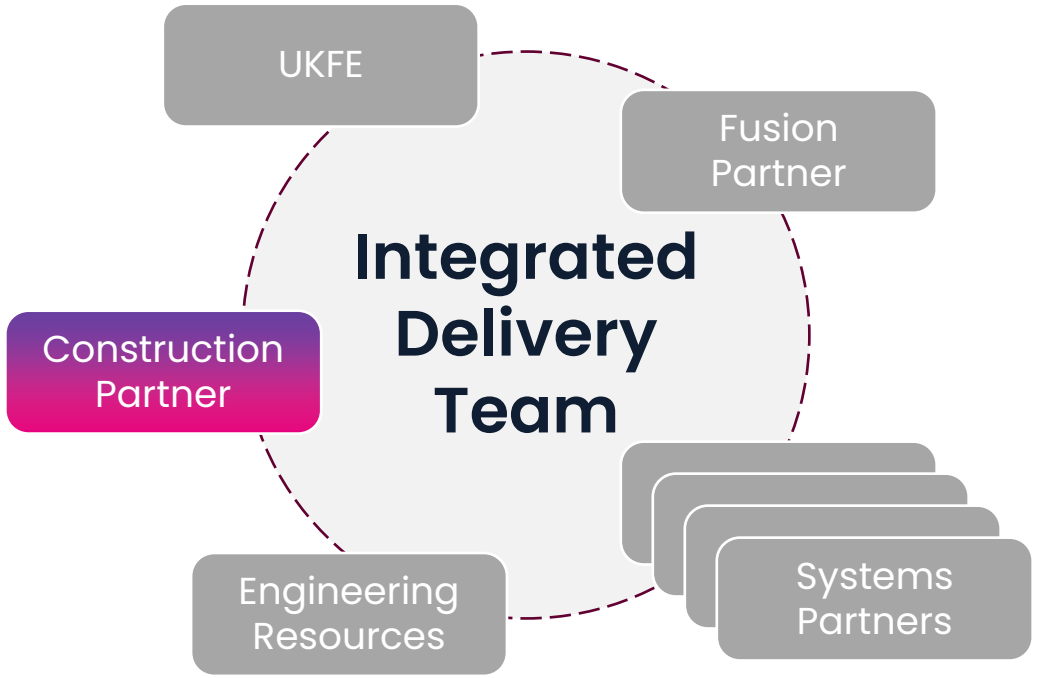
Internationally recognised UK architects delivering transformational architecture for ambitious organisations and cities around the world. Innovative thinkers who challenge the status quo to deliver sustainable, functional design for complex science, cultural & commercial programmes.

Specialist global programme, cost and commercial management organisation operating across major energy, infrastructure and built-environment projects, providing controls, assurance and governance across the full programme lifecycle.

STEP is delivered through an Integrated Delivery Team

Whole Plant Partners bring capability into programme and project layers under UKFE leadership

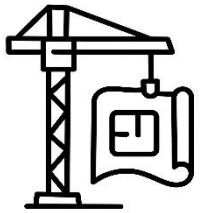
Corporate	Governance, assurance and enterprise decisions
Programme	Programme integration, whole plant design, engineering management and controls
Project	Integrated Project Teams delivering defined scopes with partner capability



Our role as Construction Partner



Site Management
Manage and develop the works at West Burton covering H&S, environment, security, maintenance, and facilities management



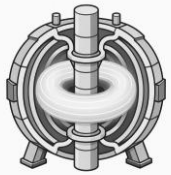
Site Layout & Coordination
Development and management of the STEP site and coordination during construction



Design & Execution of Works
Design and execution of buildings, infrastructure, and facilities at STEP site and associated infrastructure



Progress Measurement
Provide appropriate progress measurement, data collection and analysis on construction activities



Integrated Design
Work with the STEP Partners to ensure an integrated design of key facilities to support overall operations of the SPP



Construction Programme
Provide overall integrated construction programme planning and scheduling to meet programme objectives



Construction Supply Chain
Manage and contract the construction supply chain, taking direct responsibility for some sourcing decisions and supporting UKFE in other significant procurements



Constructability Assurance
Assurance of constructability within designs proposed by all Partners

ILIOS MISSION | VISION | VALUES

OUR PURPOSE. OUR FUTURE. OUR WAY.

WE CHAMPION SAFETY

Responsible delivery: safety, security, environment, quality and constructability are designed in, not inspected in

WE ALL MATTER

People-focused delivery: respect, inclusion, wellbeing and psychological safety are performance enablers

WE ACT AS ONE

Badge-less One STEP team: act for the programme before parent-company preference

WE ARE PIONEERING

Constructive challenge and innovation: bring industry capability to make fusion deliverable

WE DELIVER

Pace, value and accountability: deliver outcomes, not activity

WE EMBRACE CHANGE

Dynamic flexibility: adapt fast as learning develops

MISSION

To integrate and enable the construction, programme and supply chain capability needed to help deliver STEP safely, at pace, and Best for Programme – creating the foundations for commercial fusion and lasting UK value.

VISION

Building Britain's Fusion Future

- A prototype plant at West Burton
- A repeatable pathway to commercial fusion
- Lasting economic, social and industrial value for the UK



OUR OPERATING BEHAVIOURS – WHAT LEADERS REINFORCE

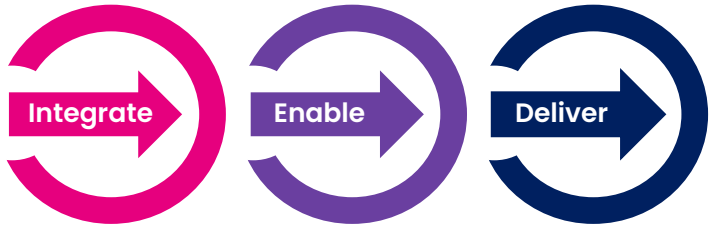
Best for Programme decisions	Badge-less collaboration	Cost and value conscious	Pace with discipline	Accountability and transparency	Psychological safety and learning
We do what's best for STEP	One team, one rhythm, one plan	We design and deliver for value	Focus on the work that matters	Own it, share it, improve it	Speak up, listen, learn and adapt

INTEGRATED CAPABILITY DELIVERING LASTING IMPACT

OUR PROOF POINTS – WHAT PEOPLE WILL SEE

Integrated packages	Clear priorities	Better data	Safer mobilisation	Supply chain development	Regional value and visible progress
Seamless systems, fewer interfaces	One plan, clear focus	Right information, better decisions	Safe starts, zero compromise	Stronger UK capability	Real benefits, real results

MAKING STEP THE LAUNCHPAD FOR A WORLD-LEADING UK FUSION DELIVERY CAPABILITY | SAFELY. AT PACE. COST-CONSCIOUSLY. BEST FOR PROGRAMME.



UKFE
Client and programme integrator

PURPOSE

Connect the whole delivery system so plant, site, safety, programme and supply chain decisions are made once, made early and made together

SYSTEMS PARTNERS

Specialist plant systems capability integrated through clear interfaces, sequencing and assurance.

- **Tokamak & fuel cycle systems**
  Plant systems, interfaces, requirements
- **Power, utilities & infrastructure**
  Grid, distribution, buildings and services
- **Controls, digital & data**
  Plant Control, monitoring, protection and cyber
- **Installation & commissioning suppliers**
  Package delivery, testing and handover

FUSION PARTNER
Tokamak performance integration

ENGINEERING RESOURCES
Plant design and assurance

Integrated Governance & Decision Making
Risk Management & Assurance
Safety, quality and sustainability
Shared data and digital integration

ILIOS

CONSTRUCTION PARTNER

Delivery integrator and Constructability leader

Single integrated view of scope, interfaces, programme, risk, assurance and site delivery

INTEGRATED PROJECT TEAMS

1 2 3 4 5 Cross-functional teams align design, delivery, commercial, assurance and operational readiness

- **Design integration**
  Interfaces, standards, configuration
- **Commercial & contracts**
  Procurement, incentives, change control
- **Construction delivery**
  Site execution, logistics, sequencing
- **Assurance & readiness**
  Safety, quality, commissioning transition

OUR ENABLERS

- Integrated ways of working
- Connected data environment
- Transparent communication
- Aligned incentives and KPIs
- Best for Programme Decisions

SUPPLY CHAIN & INDUSTRY

Working in partnership to build UK capability and deliver enduring social and economic value

Manufacturers | Logistics | Subcontractors | Innovation & R&D | UK capability

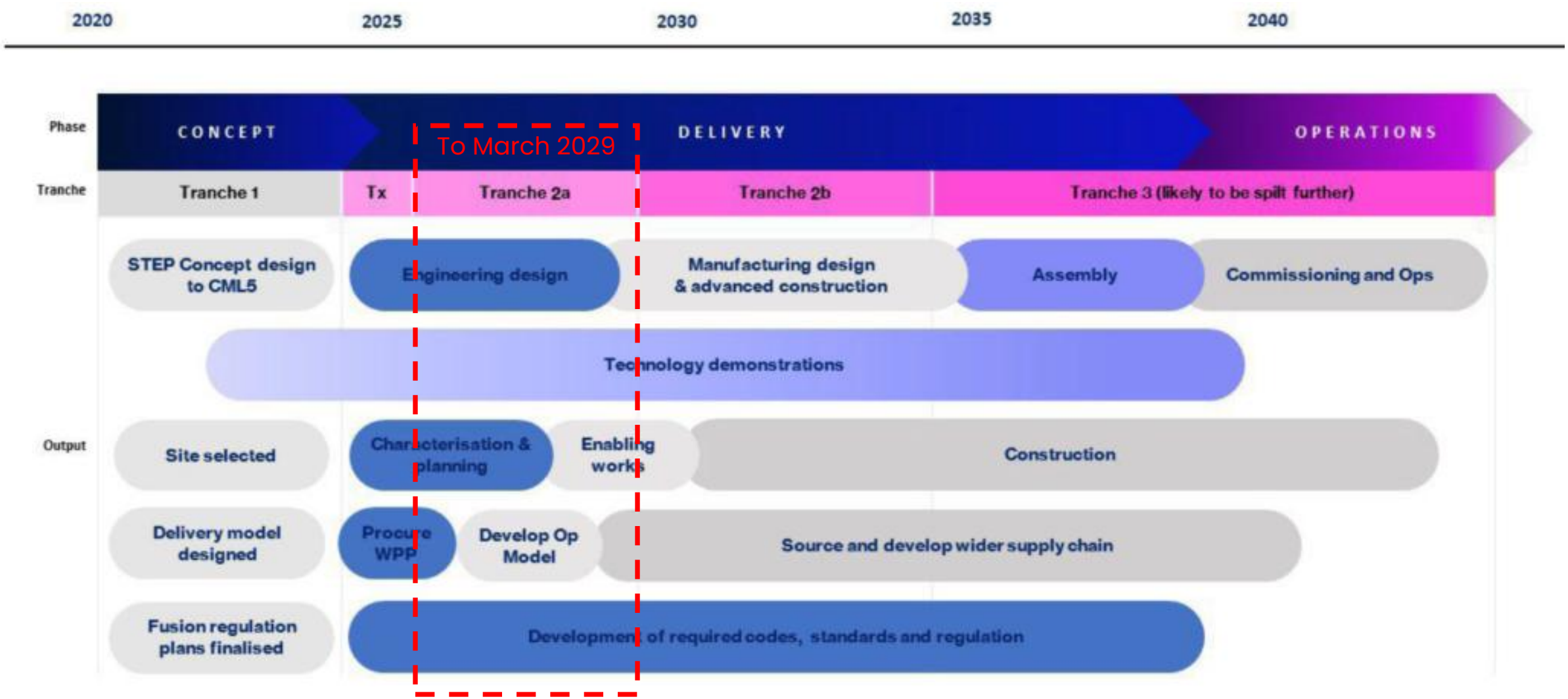
BENEFITS

For Systems Partners
Clear routes into integrated planning, interface management and site delivery

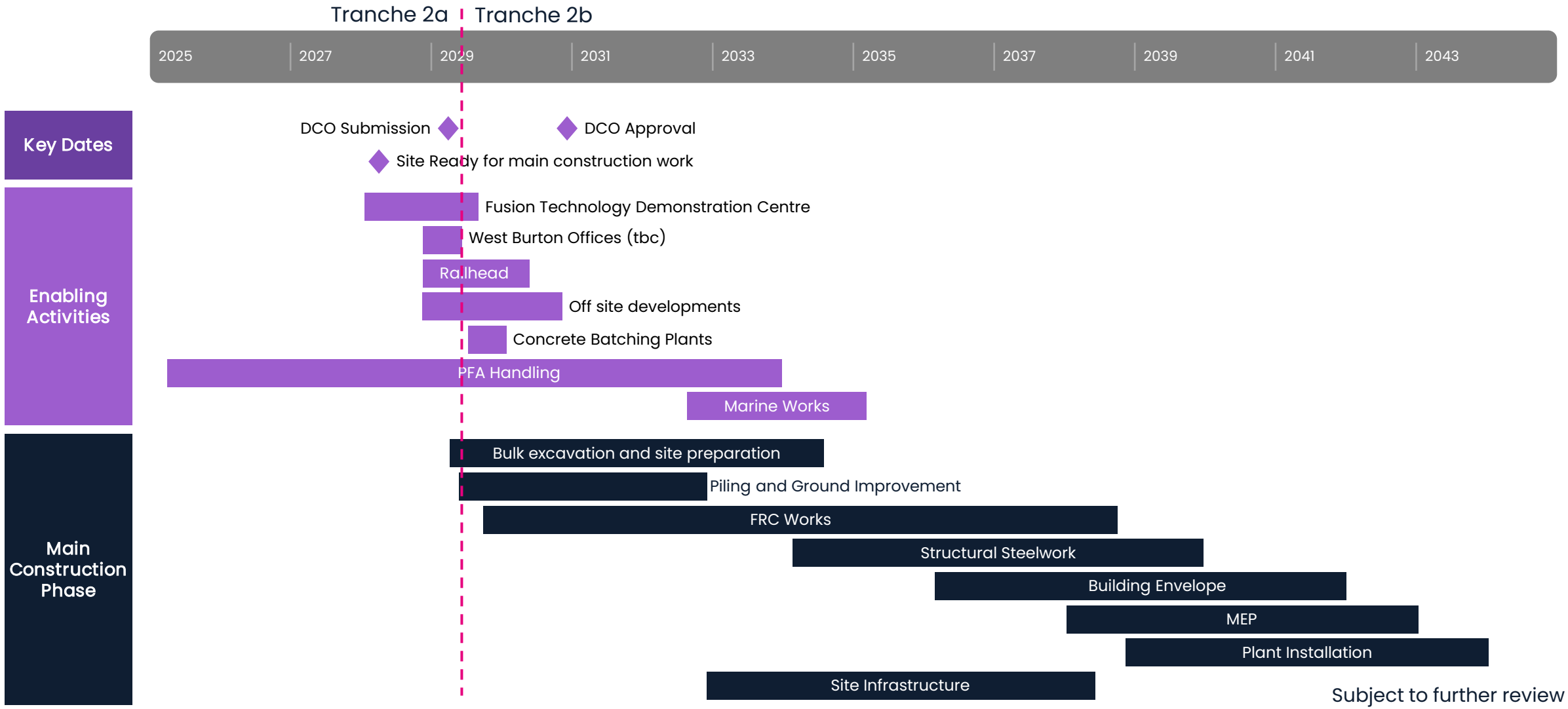
For the Programme
Better decisions, fewer hand-offs and stronger delivery confidence

STEP FUSION ILIOS

Summary Level Programme



Indicative Construction Schedule



Subject to further review

Strategic traceability: STEP objectives to ILIOS delivery outcomes

The nine delivery outcomes link to approved Tranche 2a objectives and the STEP Whole Programme Objectives

WHOLE PROGRAMME OBJECTIVES

- **WPO 1** Demonstrate power plant characteristics
- **WPO 2** Create an information baseline
- **WPO 3** Develop a fusion supply chain
- **WPO 4** Deliver UK economic value
- **WPO 5** Deliver UK social value
- **WPO 6** Deliver safely
- **WPO 7** Schedule
- **WPO 8** Cost

TRANCHE 2a OBJECTIVES

T2a 1
Mature STEP Prototype Plant design

T2a 2
Increase confidence through physical and digital demonstration

T2a 3
Establish the team, toolset and strategic supply chain

T2a 4
Demonstrate direct UK economic and social value

T2a 5
Mobilise the STEP site, delivery structures and commence site development

FINALISED DELIVERY OUTCOMES

1 Establish an Integrated Programme Environment
T2a 3 | WPO 2, 3, 7, 8

2 Develop and Secure the Full Business Case
T2a 3, 4, 5 | WPO 4, 5, 7, 8

3 Establish the Digital Delivery Environment
T2a 3 | WPO 2, 3

4 Establish the Masterplan
T2a 5 | WPO 6, 7, 8

5 Progress Critical Design Elements Including Partner Integration
T2a 1, 3 | WPO 1, 2, 3, 6

6 Manage and Secure the West Burton Site
T2a 5 | WPO 6, 7, 8

7 Secure Development Consent
T2a 5 | WPO 6, 7

8 Deliver Enabling Infrastructure
T2a 5 | WPO 6, 7, 8

9 Deliver On-Site Test Facilities
T2a 2 | WPO 1, 2, 3

Approx. 70 Work Packages

How to read the map Each outcome card records its direct Tranche 2a and Whole Programme Objective references. The hierarchy then continues into Activities, Work Packages and RADIO controls.

Golden thread: Whole Programme Objective → Tranche 2a Objective → Delivery Outcome → Activity → Work Package → RADIO item

Breadth of T2a Workbank

The programme moves from delivery foundations, through definition and permissioning, into tangible site and facility delivery.

1. ESTABLISH THE DELIVERY ENTERPRISE

1. Integrated programme environment
2. Full Business Case
3. Digital delivery environment

Organisational, commercial and digital foundations

2. DEFINE THE FUTURE ASSET

4. Masterplan
5. Critical design and partner integration

Defines what is to be built and how it will be delivered

3. PREPARE SITE & SECURE PERMISSIONS

6. Manage and secure West Burton
7. Development consent

Creates legal, environmental and site-readiness conditions

4. DELIVER EARLY PHYSICAL ASSETS

8. Enabling infrastructure
9. On-site test facilities

Delivers first significant assets and enabling scope

T2a Workbank

The workbank is not a construction-only pipeline. It combines enterprise mobilisation, technical definition, consent, controls and delivery.

PROGRAMME & COMMERCIAL

Operating model • governance • FBC • cost/value case • workforce and supply chain

DIGITAL & INFORMATION

Trusted information baseline • CCDE • integrated scope, cost and schedule • digital handover

DESIGN & INTEGRATION

Masterplan • Tokamak and auxiliary plant design • power • supporting buildings • constructability

CONSENT & ENVIRONMENT

DCO strategy • environmental assessments • land and stakeholder engagement • submission

SITE & ENABLING

Security • surveys • asset transition • ash • water/flood • access • logistics • temporary infrastructure

FACILITIES & HANDOVER

FTDC requirements • design and planning • utilities • construction • fit-out • commissioning and handover

ILIOS is planning simultaneously across the programme system, the future asset, the West Burton site and the first physical facilities. Delivery confidence depends on these capabilities progressing as one integrated plan.

STEP FUSION

DASSAULT SYSTEMES

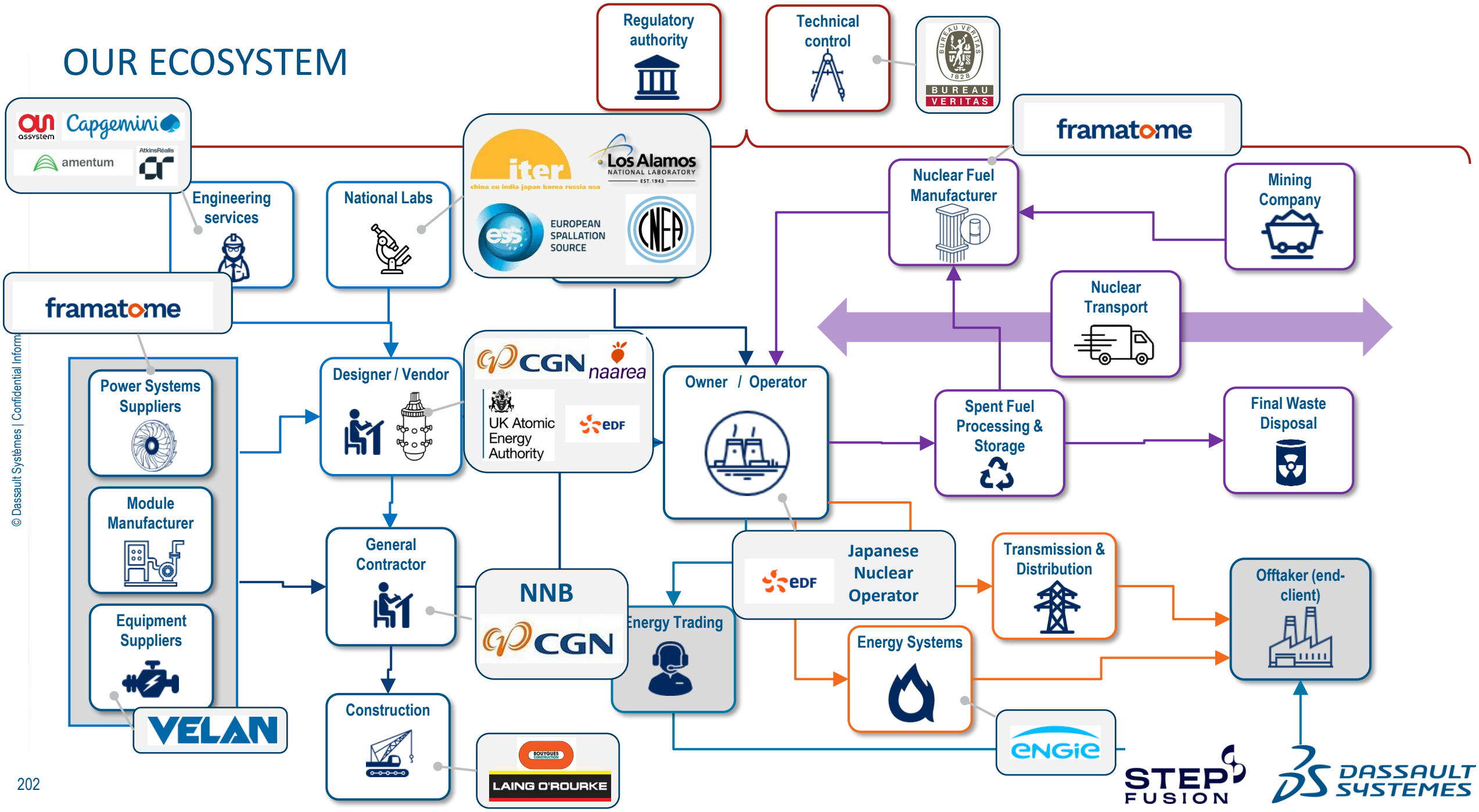
DASSAULT SYSTÈMES
UK FUSION ENERGY STRATEGIC PARTNER

Aston Smith – Nuclear Client Executive



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OUR ECOSYSTEM



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WE HAVE BEEN SUPPORTING FUSION FOR A LONG TIME















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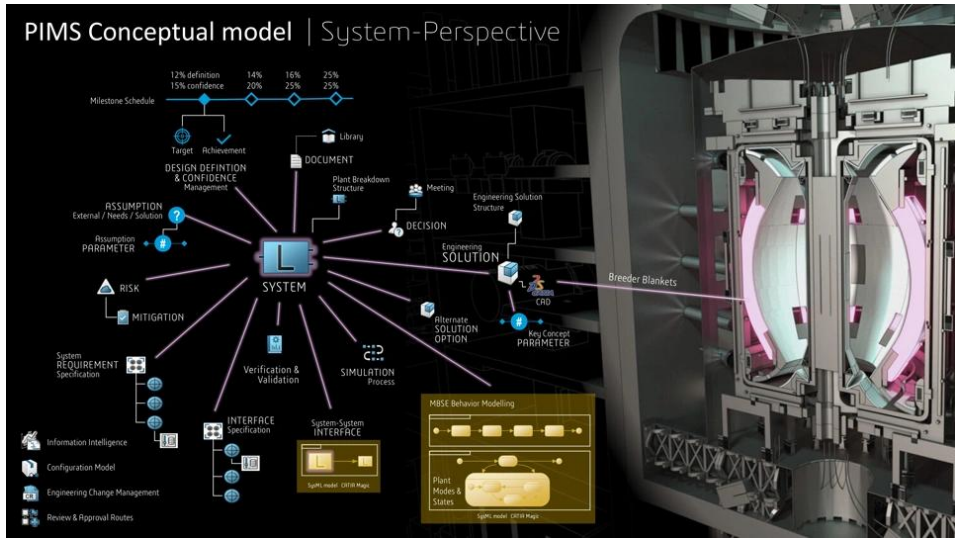
STEP FUSION DASSAULT SYSTEMES

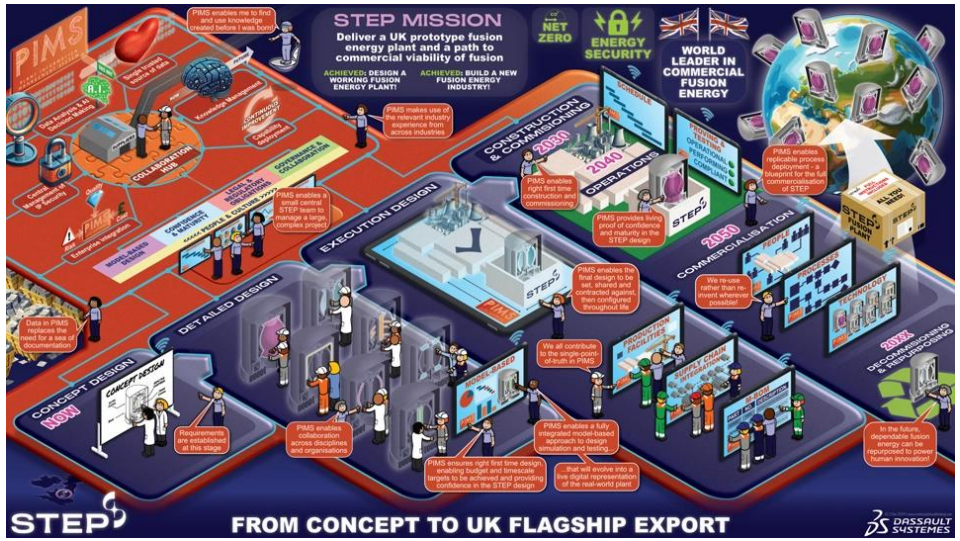
OUR HISTORY WITH STEP

2.2 The system shall facilitate the Tranche 1 objectives of the STEP Programme lifecycle, to produce a concept design by 2024. It shall be scalable to meet the functional needs of future phases of the STEP lifecycle.

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OUR HISTORY WITH STEP





PIMS

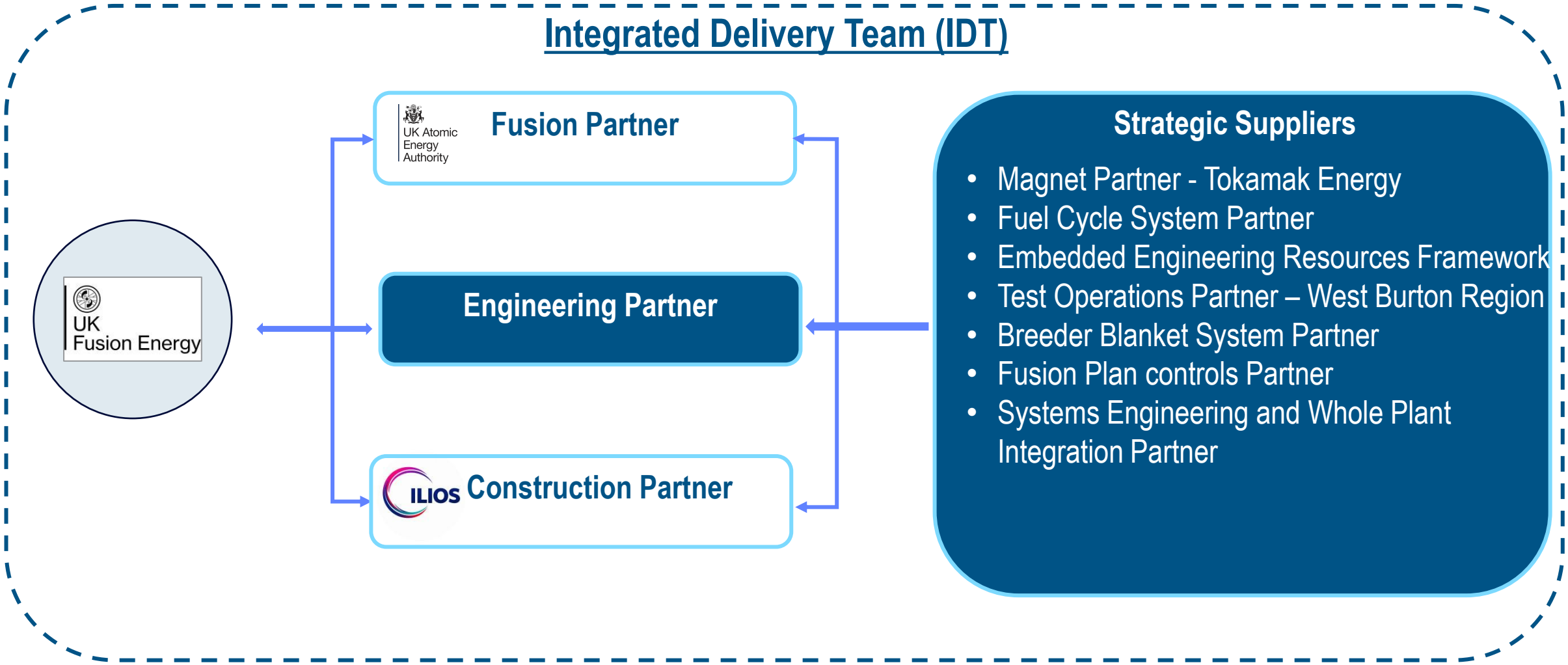


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STEP FUSION

DASSAULT SYSTEMES

KEY NEXT STEPS



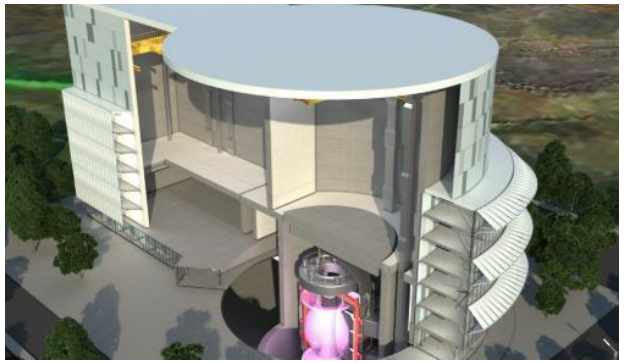
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STEP FUSION DASSAULT SYSTEMES

TARGET STATE

Creating a repeatable process for new plant delivery

UK Fusion Energy



The challenge

- To deliver a **first of a kind** fusion power plant which will demonstrate net energy to the grid by 2040
- A system that will manage the **whole lifecycle** from concept to operations
- Rigorous engineering delivery while creating a **blueprint for repeatable project delivery** for future plants

Solution

- 3DEXPERIENCE provides the model digital backbone to manage all plant related data for STEP
- All key industrial partners including Construction, Engineering, Technology and Strategic System Partners collaborate in 3DEXPERIENCE
- The project includes data science and AI capability to constantly learn, improve, and mitigate risk

Results

- Across all levels of the organization, access to connected, relevant information to make decisions quickly
- Traceability throughout the lifecycle, ensuring what is designed is what will be built, and ability to demonstrate adherence to regulatory requirements
- A single, integrated delivery team executing in a collaborative environment

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STEP FUSION DASSAULT SYSTEMES

DISCOVER MORE ON 3DS.COM

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Do not edit
How to change the design



What did you most enjoy about today's meeting? (you're not allow to put lunch!)

The Slido app must be installed on every computer you're presenting from

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Thank you

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