Topics

• Overview

• Major Programme Delivery

• Design
Government is backing fusion development

“The UK Government’s strategy to move from a fusion science superpower to a fusion industry superpower. With this plan, the UK hopes to lead the world on the commercialisation and deployment of this potentially world-changing technology.”

Overarching goals of the fusion strategy
1. For the UK to demonstrate the commercial viability of fusion by building a prototype fusion power plant in the UK that puts energy on the grid
2. For the UK to build a world-leading fusion industry which can export fusion technology around the world in subsequent decades”
Deliver a UK prototype fusion energy plant, targeting 2040, and a path to commercial viability of fusion.
This is a Major Programme...but has to be “1950s agile”

Scale, Complexity & Learning Lessons
Some major programme theory
Measures of Effectiveness
Site
Ways of Working
Operating Model
High Level Schedule
Enabling Regulation
A major infrastructure & re-generation programme
A major manufacturing programme
Becoming a major programme
Organisation & Capability

- **Project IS Organisation**
- **Capability = Competence + Capacity + Culture**
- **Competence**
  - Integration of Science, Engineering, Programmatic, Commercial, Financial, Supply Chain, People, Legal….
  - To address some very challenging technical issues and uncertainties, with credibility
- **Capacity (client) – goldilocks zone**
- **Culture**
  - Ambition plus Pragmatism
  - Delegation and empowerment
  - Pace and grip
- **Develop capability ahead of demand**
Programme Measures of Effectiveness

Safety & Environment
- Confidence that risks can be demonstrated as ALARP
- Delivering with minimum impact

Cost
- Total Programme Cost, and confidence in the estimate
- Inferred cost of commercial plant and LCOE (to be developed later)

Schedule
- Total Programme Schedule, and confidence in the estimate

Power
- Confidence in delivering 100MWe net power

Fuel
- Confidence in delivering tritium self-sufficiency

Maintainability
- Estimated operating cycle including outage durations, and confidence in those estimates

Development Flexibility
- Ability to capture data
- Ability to support developments for subsequent commercial plant
Site

- Shortlist of 5, from 15 nominations
- Make recommendation – Easter 22
- Approval for lease or purchase
- Announcement – by end 22
- Establish local presence
- Site characterisation
- Consents and permissions
- Clearing & construction
STEP Programme Charter
It’s in our DNA

WAYS OF WORKING

- Learn from others
- Be empowered to take measured risks

- Be decisive
- Be creative and innovative

- Be focussed
- Be honest and realistic

- Be collaborative and supportive
- Be agile

- Communicate clearly and effectively
- Operate at pace

INCLUSIVE  TRANSPARENT  KIND AND COMPASSIONATE  AMBITIOUS, TENACIOUS AND PIONEERING  AGILE AND PRAGMATIC
Operating Model - Pivoting to industrial delivery

Tranche 1: 2020 - 2024
- Full Engineering Design
- Supply Chain Established
- Construction Approvals

UKAEA Programme
- Concept Design
- Site Selection
- Operating Model Design

Tranche 2
- Manufacture
- Construction
- Installation

Industrial Delivery Capability

Tranche 3

Programme Team

UKAEA & Academia

Strategy Partners

Broader Industry

STEP Prototype Fusion Energy Plant

Commercial Applications

Commercial Opportunities
# Operating Model – High Level Arrangements

## STEP Delivery Organisation

Subject to approval:
- Special Purpose Vehicle, company limited by shares

<table>
<thead>
<tr>
<th>Technology &amp; Engineering Partner</th>
<th>Facility Construction Partner</th>
<th>Fusion Partner</th>
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<tbody>
<tr>
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<td>UKAEA</td>
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Industrial Base – Multiple SMEs delivering packages

Focussed organisation leading STEP delivery
Operating in a collaborative model with 3 Strategic Partners
Leading and developing an extended industrial base
STEP high-level schedule

2021

Concept (till 3/24)
- Concept / Reference Plant Design
- Programme Development
- Site selection
- Transition to Target Operating Model

2025

Detailed Design and Mobilisation
- Engineering Design
- Long lead procurement
- Early Manufacture
- Site development

2030

Main Construction
- Full plant manufacture and assembly
- Full site development
- Equipment and system testing

2035

Commissioning and Operations
- Non-active and active commissioning
- Prototype ops

2040
Fusion regulation

“The RHC recommends that the UK champions the way for a non-fission approach, by setting out and consulting on a bold, forward-looking vision of how HSE and EA could lead and evolve the regulatory approach for STEP”

Green Paper: “We want to trailblaze a proportionate and pro-innovation approach and collaborate internationally to maximise fusion’s long-term global potential. With this plan, the UK hopes to lead the world on fusion regulation and enable the safe and rapid development of [fusion]”
Concept Design – It’s all hard, but integration is the killer...

Methodology
Outline of Preferred Concept
Next steps
Prioritised Post-CML-3 Activities:

- S1 concepts
- S2 concept
- Product Area Studies
- Cross-product Area studies
- Parameter scans

CML3 Concepts Freeze

CML3.5 Preferred Concept Selection (Single Design Family)

Integrated Plan

Decision Strategy

Bounding Trade Space

Identify objective variant concepts
Align with Programme Measures of Effectives

Whole plant comparison of outline concepts
Preferred concept for development in 2022

Identify outstanding gaps or uncertainties with concepts
Review and agree an integrated set of decisions

Concept Maturity Level (CML) Journey
Preferred concept

<table>
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<th>Parameter</th>
<th>Value</th>
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<td>Fusion Power (capability)</td>
<td>1500 – 1800 MW</td>
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<td>Parasitic load</td>
<td>400 – 600 MW</td>
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<td>Major Radius</td>
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This definition reflects the outcome of the CML3.5 review: STEP Preferred Concept Memo CD-STEP-01791
Questions