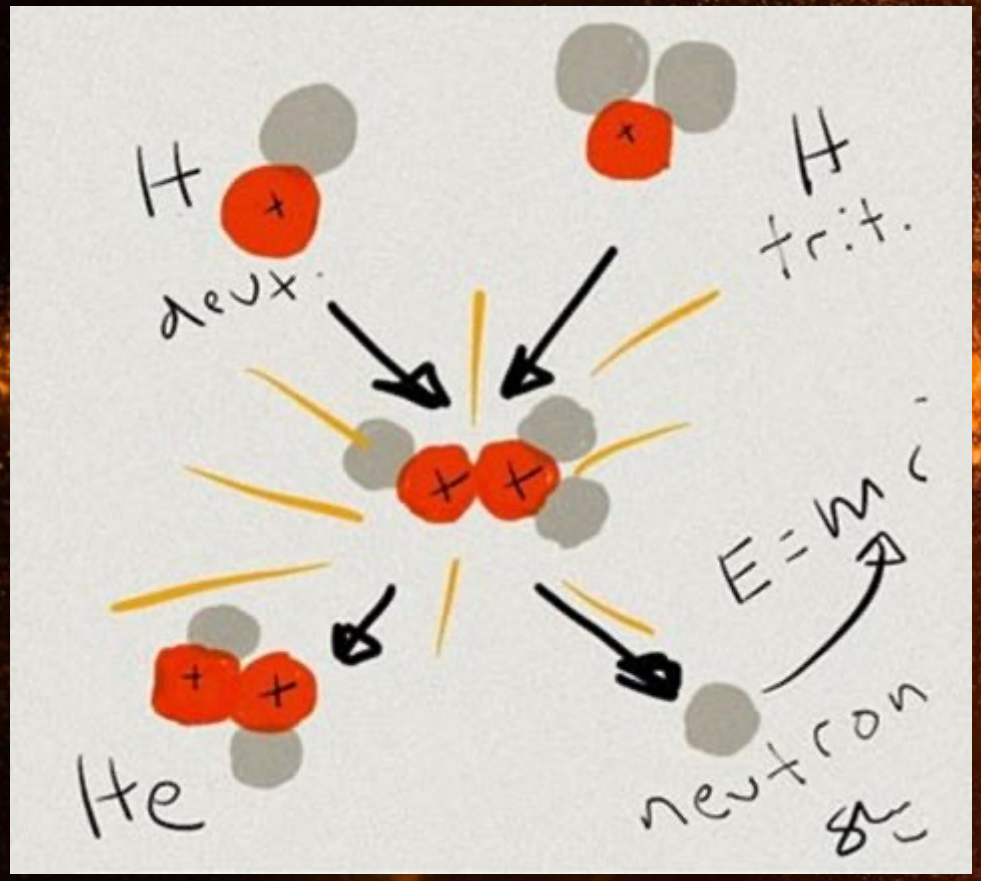
UK Atomic Energy Authority

STEP
Spherical Tokamak for Energy Production

Paul Methven

November 2022

Physics recap...



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Benefits of fusion

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1. **LOW CARBON**
   Fusion is low carbon, with low land usage

2. **SAFE**
   The fusion process is readily and safely controllable

3. **RELIABLE**
   Fusion energy will be baseload and does not depend on seasonal variation, the sun, or the wind

4. **SUSTAINABLE**
   Fusion fuel is potentially abundant in our seas and the Earth's crust

5. **ENERGY EFFICIENCY**
   Fusion provides the most power-dense process available on Earth

The need

The opportunity - Economic value

Department for Business, Energy & Industrial Strategy

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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”

Towards Fusion Energy

The UK Government’s Fusion Strategy

October 2021

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Deliver a UK prototype fusion energy plant, targeting 2040, and a path to commercial viability of fusion.

STEP mission

Spherical Tokamak for Energy Production

Commercially driven design basis:

- Predictable net electricity production
- Fuel self-sufficiency
- Credible maintenance solution

Spherical tokamak design – potentially lower capital cost

A major infrastructure programme

A major manufacturing programme

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Becoming a major programme

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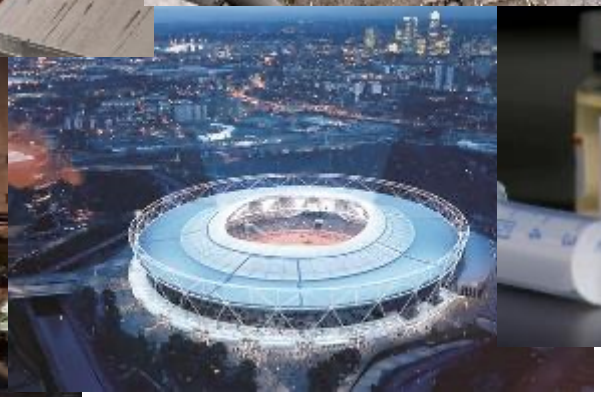

STEP high-level schedule

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Concept (till 3/24)

- Concept / Reference Plant Design
- Programme Development
- Site selection
- Transition to Target Operating Model

Detailed Design and Mobilisation

- Engineering Design
- Long lead procurement
- Early Manufacture
- Site development

Main Construction

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

Commissioning and Operations

- Non-active and active commissioning
- Prototype ops

STEP site – From fossil to fusion

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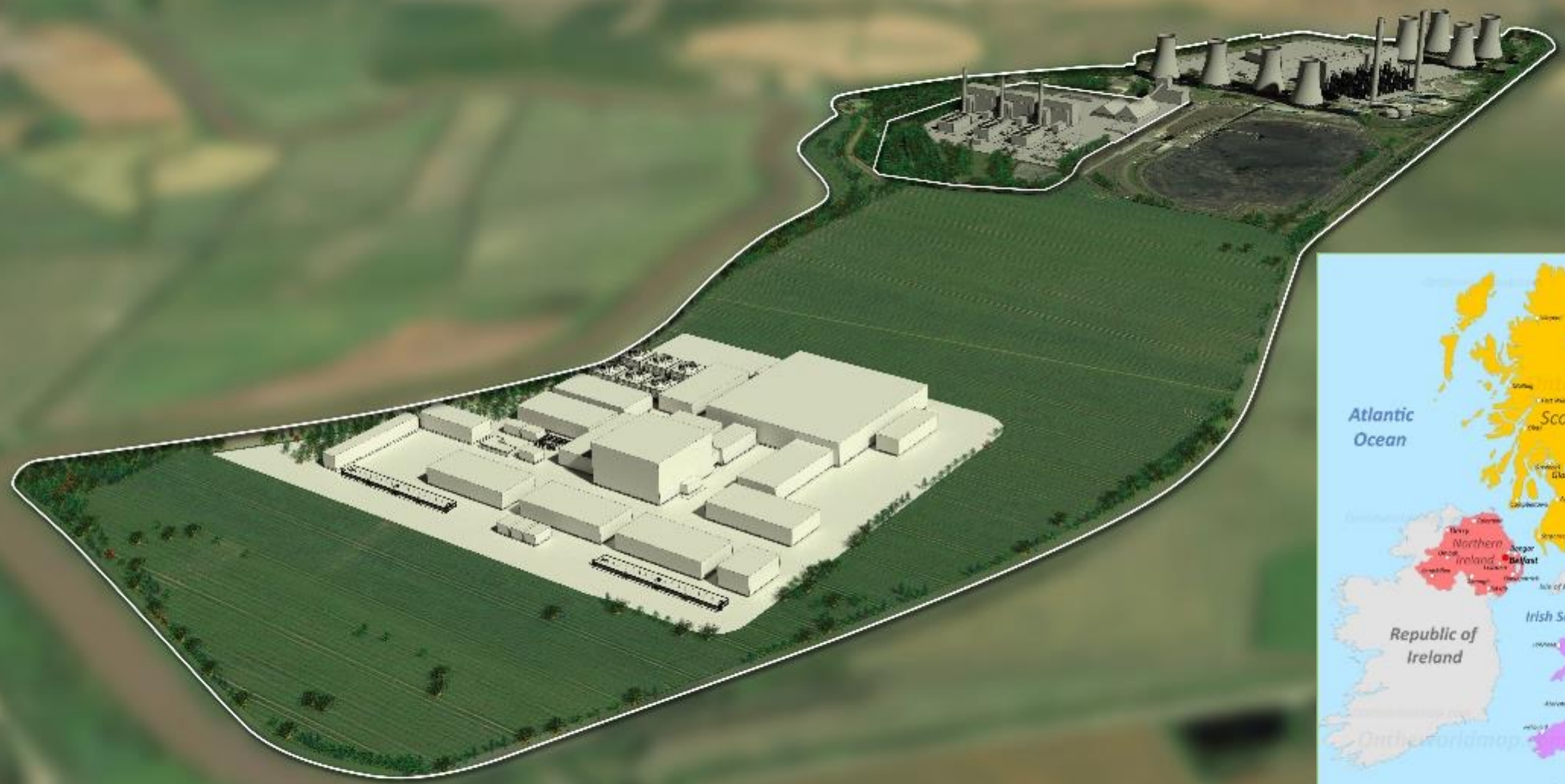

This is an indicative image of how the STEP prototype plant may look

STEP's potential regional footprint

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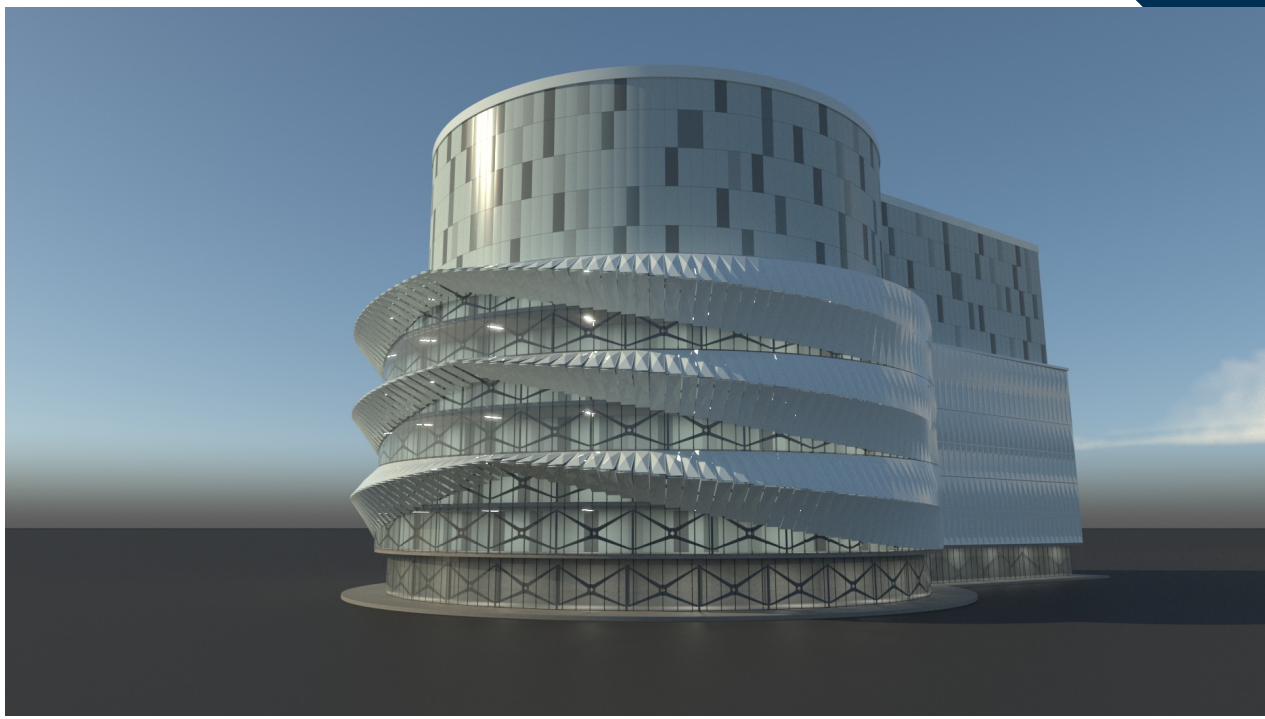
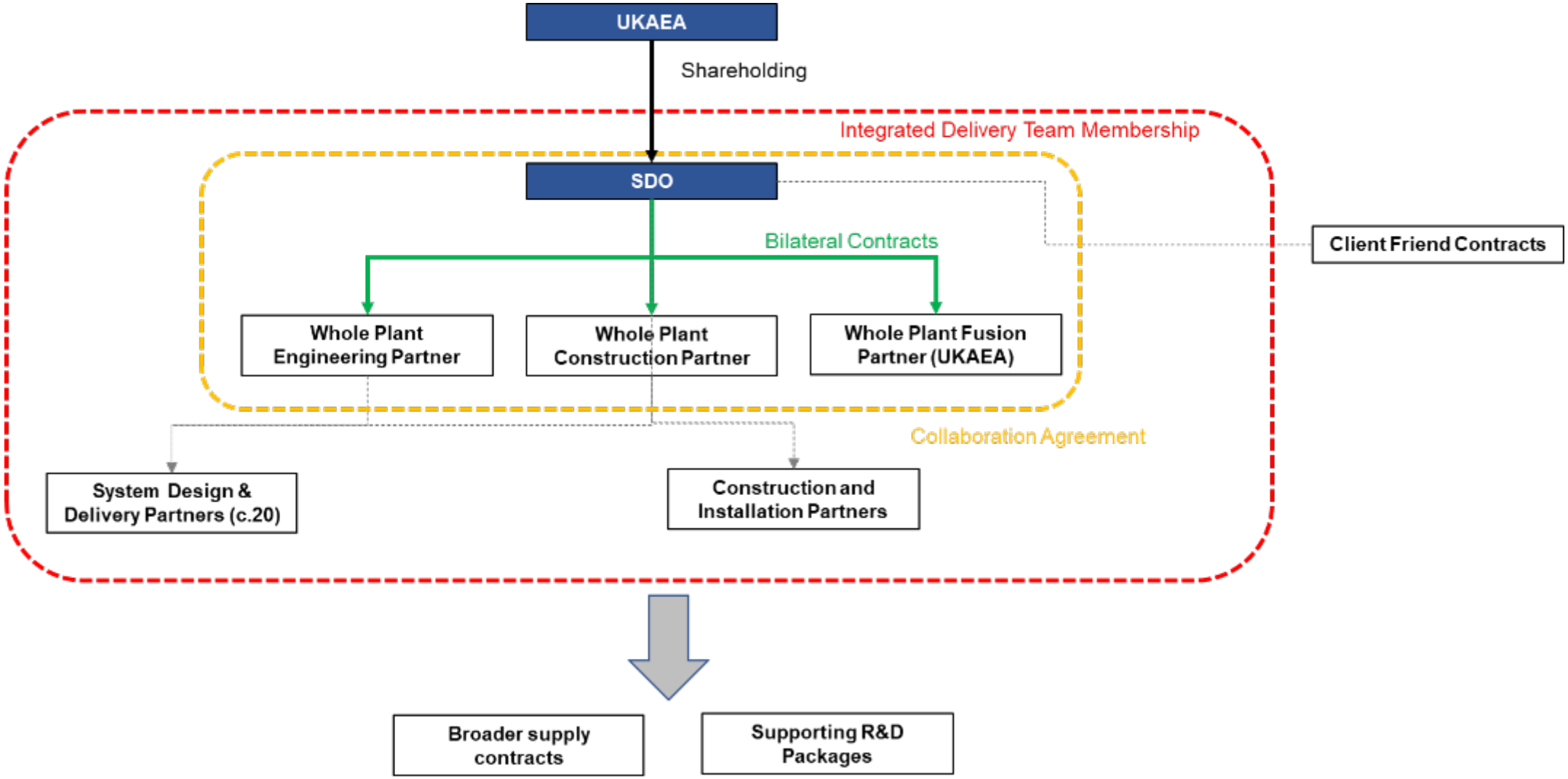
- Employment
- Skills development
- Regional industry
- Regional infrastructure
- Partnership with universities



Openness, consultation and structured collaboration from the beginning

A collaborative approach (subject to approvals)



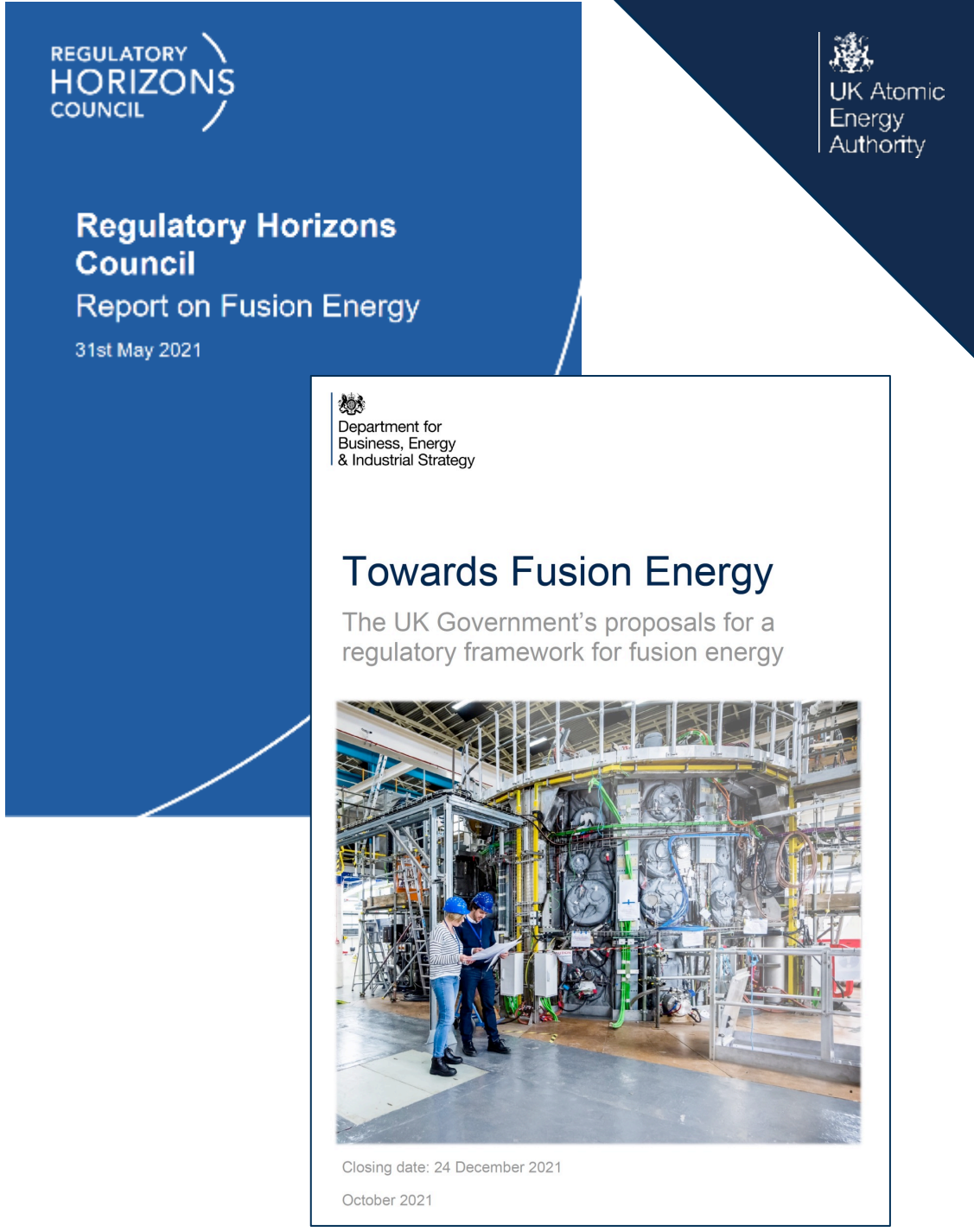
UK Fusion regulation

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]"

Energy Security Bill:

"Creating a new pro-innovation regulatory environment for fusion energy"



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Q: What world-changing idea, small or big, would you like to see implemented by humanity?

A: This is easy. I would like to see the development of fusion power to give an unlimited supply of clean energy

Stephen Hawking

'Brief Answers to the Big Questions', 2018