



# **Fusion Industry Taskforce** **Policy Recommendations for** **Manufacturing and the Supply** **Chain in Fusion**

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**Fusion Industry**  
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# Policy objectives

The objectives of the Manufacturing and Supply Chain pillar is to identify areas of the supply chain that are critical to the success of the fusion industry in the UK, and to provide recommendations for Government to implement that will lead to the sustainable growth of skills, capabilities, and knowledge across the global fusion supply chain.



**Identify the supply chain “need”** – a strategic exercise should be undertaken to identify how the industrial supply chain needs to be mobilised for fusion energy, considering both UK programmes and export opportunities.



**Set a detailed timeline for UK manufacturing for fusion** – a technology timeline and set of objectives for the materials and manufacturing supply chain and scaling of the known technologies is required to provide near-term focus and long-term stability.



**Develop collaborative education activities** – a holistic plan to integrate fusion energy education with other STEM learning at all-levels from early years is required.



**Provide independent oversight for the development of the supply chain** – creation of an independent body to provide oversight of funding into the research and technology activities for fusion energy held within industry and the supply chain.



**Provide direct investment in the supply chain** – Government intervention is considered necessary for stimulating the supply chain for fusion energy, be it via the opportunity to develop and own intellectual property, or through funding high risk projects and programmes.



**Create a manufacturing hub** – funding for a forward-thinking hub with independence from the national programme

## FIT Recommendation #1

# Identify the supply chain “need”

An exercise to set the direction of the requirements of the supply chain is needed to inform the major fusion energy programmes of their expected timelines and where to apply effort in terms of UK/Rest of World supply chain development. This should consider: the how and when; UK supply and international export opportunities; and how the supply chain can be mobilised in a timely fashion for fusion. This activity should seek to establish clearly defined industry-led targets and is considered essential for a holistic supply chain approach. Significant design uncertainties within fusion, and opacity in the national programme currently impede the effective use of typical milestones, deliverables, and goals. The direction of travel should differentiate between immediate delivery needs and long-term R&D for future capabilities and cover a 25 year time span.

It is necessary for the UK to set a clear direction of travel, building on existing in-country strengths. Fusion has a high barrier to entry with many risks and significant challenges. This barrier is coupled with unique specialisations that are not directly addressed by other sectors, such as specialised materials and environmental considerations. This can lead to a lack of commercial incentivisation due to the unknown market potential. It is presently strategically difficult for private suppliers to invest into fusion with such large unknowns on return on investment, and timescales.

## FIT Recommendation #2

# Set a detailed timeline for UK manufacturing for fusion

Supply chain consensus is that manufacturing is not yet viewed as a priority by fusion device developers. The risk of a bottleneck to fusion commercialisation and, later, scaled deployment require a long-term view as the detailed activities required in manufacturing will likely impede the proposed timelines of power plant development and implementation as an energy supply.

A timeline should be tied to realisable technology development and identification of cross-sectoral knowledge transfer opportunities. Leveraging existing capabilities for fusion development from internationally renowned UK industries should be included. Specific industries with relevant specialisms include aerospace, motorsport, defence, and biotech. The timeline should account for potential competition for manufacturing resources – including personnel, funding, facilities – from other adjacent sectors, particularly those critical to defence and energy security. Consideration of the lead times on production scale-up is needed to ensure major programmes are recognised by the supply chain as realisable and thus present an investment opportunity. The timeline shall present the need for the UK to lead the standardisation of fusion manufacturing and materials.

A timeline will enable exploration of the means for UK-based companies to contribute to the fusion raw materials supply chain, based on existing resources within the country against an assessment of geopolitical sensitivity, critical materials supply, and supply chain security.

This timeline should cover both current and future supply chain development, with strategic prioritisation for demonstration fusion devices, and a commitment to specific future technologies within which the UK will build capability, leading to economic growth through, focus, stability, and export opportunity realisation.



### FIT Recommendation #3

## Develop collaborative education activities

Key areas for education and building a workforce with the necessary skills to deliver components for fusion power plants requires nurturing a wider talent pool that can cover the many advanced, large-scale technologies needed for future energy infrastructure. Fusion will be in competition for skills with other energy technologies and this should be addressed by building a deep, and interested, workforce through education from early years upwards. Fusion can help tackle the broader perception and stigma associated with engineering, and manufacturing as a career and should be exploited for its value in this regard.

Fusion needs a technically trained workforce across the developers and within the supply chain that can evaluate and understand the fusion-specific requirements. This requires addressing higher educational needs, which should include: advanced apprentice training in the skills and knowledge specialisms for manufacturing fusion components; fusion-focused undergraduate training considering the manufacturing perspective, getting engineering students to engage with manufacturing-related elements and the links across sectors; and, fusion-focused postgraduate training to prepare a highly skilled group of technical leads in manufacturing with academia-to-industry translation training.

A plan leading to the integration of fusion education activities at all levels with other key STEM learning is required directly within, and for, the supply chain.

### FIT Recommendation #4

## Provide independent oversight of the development of the supply chain

Independent oversight of the development of the supply chain is considered necessary to ensure that the supply chain is competitive at an international level leading to a broad UK plc opportunity. A body with independence of any government-led fusion activities should provide oversight of funding into the research and technology activities held within industry and the supply chain, allowing for the provision of the distribution of the supply chain need, and ensuring value for money to the taxpayer in delivery.

A formally appointed board containing broad industry expertise should be implemented with domain expertise in fusion energy, advanced manufacturing, and large-scale manufacturing. The model used by The Nuclear Innovation and Research Advisory Board (NIRAB) within the Nuclear Innovation and Research Office (NIRO) could be driven to form a "Fusion Industry Development Advisory Board (FIDAB)", separate to the UKRI Fusion Advisory Board, which should retain its fundamental fusion research focus.

### FIT Recommendation #5

## Provide direct investment in the supply chain

Government intervention is considered necessary for stimulation of the supply chain to make fusion an attractive proposition, and for private investment into the supply chain. Stimulation could be achieved by the formal identification of the necessary supply pipeline, direct investment into scaling of capabilities, and provision of intellectual property ownership opportunities or through funding high risk projects/programmes and allowing for failure in development to gain lessons learned for the wider national programme. Analysis of the capability requirements shall inform investment opportunity and identify strategic opportunity for innovation diffusion.

The UK retains world-leading capability and has a competitive advantage in fusion technologies. Supply chain and manufacturing development investment is a high priority as a small investment in pre-existing capabilities at an earlier stage will have a major impact, giving confidence to the whole sector.

Without direct incentives, early and immediate activities in fusion are not seen as sufficiently attractive for the effort required and the UK risks losing out on the supply chain development opportunity to other nations with a longer-term investment strategy and higher private capital risk appetite.

This timeline should cover both current and future supply chain development, with strategic prioritisation for demonstration fusion devices, and a commitment to specific future technologies within which the UK will build capability, leading to economic growth through, focus, stability, and export opportunity realisation.

## FIT Recommendation #6

# Create a manufacturing hub

FIT recommends that funding is provided for a forward-thinking fusion manufacturing hub with independence from the national programme that provides a central point for supply chain engagement across fusion in the UK, thereby reducing duplication of effort in individual businesses and enabling rapid productivity increase.

The hub should provide a means of assessment for the benefit of the UK, recognising and addressing the nascent stage of nuclear fusion technology. Through signposting and alignment with existing academic, research and technology organisations, industrial partners, and their capabilities, the hub should place an emphasis on fostering support and collaboration within the UK supply chain. The hub should provide the support structure to prevent the mass migration of supply chain expertise to competing fusion programmes and companies outside the UK. The hub should be enabled to address export control challenges, to upskill on regulations, and to facilitate international supply chain collaboration and enable realisation of export opportunity where appropriate.





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