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HTS Magnets Development for the UK's STEP Programme

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The Spherical Tokamak for Energy Production (STEP) is an ambitious public programme to deliver a UK prototype fusion power plant alongside a pathway to commercial deployment. One of the primary technical challenges facing the programme is the development of the unprecedented scale high temperature superconducting (HTS) magnets required by the reactor concept design.

This presentation outlines the key design features of these magnets following the latest iteration of the STEP concept. These include the remountable toroidal field (TF) coils, which enable the power plant's vertical maintenance strategy, and the replaceable 'central magnet unit', which comprises the inner limbs of the TF coils, the inner divertor shaping coils, and the central solenoid. The significant design integration, technology, and manufacturing challenges are summarised.

To address these challenges, The STEP Magnets Technology Development Programme planned for the period 2025 −2029 is presented, culminating in the delivery of a sub-scale toroidal field model coil demonstrating the key technologies required and providing confidence in the scale-up to production. Developing HTS capability, from modelling to large-scale manufacturing and testing, is central to successful delivery of STEP and eventual commercialisation. This presentation outlines the public-private partnership model UK Industrial Fusion Solutions Ltd (UKIFS) is implementing to realise this ambitious programme.

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Country or International Organisation

United Kingdom of Great Britain and Northern Ireland

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