

STEP: Vision, Status, Direction, and Public-private Partnerships

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Abstract–The Spherical Tokamak for Energy Production (STEP) is the UK government’s prototype fusion powerplant programme, the equivalent of DEMO for the UK. Building on the UK Atomic Energy Authority legacy of the Joint European Torus and the Mega Ampere Spherical Tokamak, STEP will take the next technological leap to continuous operation and power generation enabled by high-temperature superconducting (HTS) magnets. The ultimate goal of the programme is to demonstrate the provision of net electricity to the grid as well as to develop a commercial pathway to the economically viable deployment of fusion technology.

The present status of the programme will be outlined as it transitions from a four-year pre-concept design stage providing a baseline concept to detailed design and technology demonstration over the coming eight years. The direction of travel will be signposted with respect to the major activities underway and in planning for the development of the unprecedented-scale HTS magnets required by the reactor, and opportunities to interface with the programme in this critical technical area will be flagged.

The evolving nature of the programme as a public-private partnership will also be explored. From the establishment this year of a new delivery entity – UK Industrial Fusion Solutions Limited – to spearhead the programme, to the onboarding of whole plant partners in engineering and construction over the coming two years, to the appointment of specialist systems partners in areas such as magnets, while the direction and aims of the programme are determined at the public policy level, delivery is strongly delegated to private industry with a view to developing the supply chain required for future commercial deployment.

Keywords (Index Terms)–STEP, fusion, spherical tokamak, DEMO-class device, public-private partnership