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Planning

Large Scale Non-Battery based Electrical Energy Storage Systems

United Kingdom Industrial Fusion Solutions

UK2: Preliminary market engagement notice - Procurement Act 2023 - [view information about notice types](#)

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Scope

Reference

PP-UKIFS-528

Description

The following summary is not intended as a complete or definitive specification of the requirement. A purpose of this engagement is to seek information from the market to help refine our understanding and aid the development of a future specification.

STEP is currently in its Concept Design phase, which is expected to be completed by 2026.

The electrical infrastructure of STEP will resemble that of large conventional thermal power stations; however, its design presents unique challenges:

Fusion power stations like STEP have exceptionally large parasitic (auxiliary/house) loads required to initiate and sustain fusion reactions—significantly higher than those in

conventional power plants.

These parasitic loads must be supplied by external sources during plant start-up, before the power generation cycle begins producing electricity.

The highly dynamic nature of these loads could make compliance with grid code requirements challenging.

For more information, please refer to: Staying positive: producing net power | Philosophical Transactions of the Royal Society A | The Royal Society

UKIFS is seeking experts to support the technology selection of a Central Energy Storage System (CESS) that is part of the STEP Electrical infrastructure. Due to the power dynamics of operating the STEP power plant and the operating parameters set by the National Energy System Operator (NESO), an energy storage system is required to provide a mechanism to ensure that we remain within the NESO operating parameters.

Rather than a continuous output, STEP will operate on a pulsed basis. The power dynamics of the fusion pulses are typically different to a conventional power plant. The CESS has been identified as a critical system to the design as it provides a mechanism to compensate for the changing load dynamics throughout the pulse. This will ensure STEP remains within the NESO defined operating parameters at the point of grid connection.

The scope of the CESS cannot be fully defined due to knowledge gaps in CESS behaviour and limitations. Once these are understood, a technology will be selected, and limitations will be incorporated into the electrical infrastructure design. This PME is looking to address the knowledge gaps.

The proposed technical and operations of the CESS are

- 2 operational cycles per day
- Pulse length will be over 1 hour (continuous)
- Power range larger than 300MW
- Energy capacity 100-300MWh
- Response in the millisecond range
- Similar charge and discharge rates.
- Fast response time during power swings (full charge to discharge)

- High round trip efficiency: 80%

In conjunction the CESS will be required to be operated and maintained for the 20-year life of the STEP machine.

Due to the requirements, we are attempting to ascertain if this could be accomplished or partly accomplished by a non-battery-based system (Flywheel, Super-conducting magnetic storage (SMES), Capacitor, Super Capacitor, Fuel Cells or other)

For more information about this opportunity, please visit the Delta eSourcing portal at:

<https://www.delta-esourcing.com/tenders/UK-UK-Culham:-Engineering-design-services./W8UFJUNW28>

To respond to this opportunity, please click here:

<https://www.delta-esourcing.com/respond/W8UFJUNW28>

Total value (estimated)

- £0 including VAT

Above the relevant threshold

Contract dates (estimated)

- 1 April 2029 to 31 March 2033
- 4 years

Main procurement category

Services

CPV classifications

- 71320000 - Engineering design services
- 71323100 - Electrical power systems design services
- 71323200 - Plant engineering design services

Contract locations

- UK - United Kingdom

Engagement

Engagement deadline

24 March 2026

Engagement process description

To participate in this exercise, please complete and submit Appendix 1: Questionnaire and return any documents via the Delta portal. We are conscious of your time (and grateful to you for taking the time to complete the questionnaire), therefore we suggest you limit your responses to a maximum of 5 pages. If there are any areas you would like to expand on, please add a note to the relevant section for future discussion.

If you experience any difficulties with the portal, please contact the portal helpdesk helpdesk@delta-esourcing.com cc operationalprocurement.step@ukifs.uk

Information obtained from responses to Appendix 1: Questionnaire will help UKIFS understand current market capabilities and may shape the scope, direction, and design of the future procurement activities.

If you have any questions about this Preliminary Market Engagement, please contact UKIFS through the Delta portal. We are keen to engage with suppliers to assist with the questionnaire if needed, to ensure quality responses enabling us to shape the future requirement and procurement.

Following the submission and review of questionnaires, UKIFS intends to run an online conference call meeting/seminar/Q&A. The closing date for the pre-market engagement is Monday 23rd March 2026, 1 pm.

Contracting authority

United Kingdom Industrial Fusion Solutions

- Public Procurement Organisation Number: PCRM-7973-DCBL

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Organisation type: Public undertaking (commercial organisation subject to public authority oversight)