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Tender

3808/JN - Flue Gas/CO2 Scrubbing and Conditioning System (16 Lots)

UNIVERSITY OF SHEFFIELD

F02: Contract notice

Notice identifier: 2023/S 000-017997

Procurement identifier (OCID): ocds-h6vhtk-03dc2a

Published 23 June 2023, 3:53pm

Section I: Contracting authority

I.1) Name and addresses

UNIVERSITY OF SHEFFIELD

THE UNIVERSITY OF SHEFFIELD, WESTERN BANK

SHEFFIELD

S102TN

Contact

James Noble

Email

james.noble@sheffield.ac.uk

Country

United Kingdom

Region code

UKE32 - Sheffield

Companies House

RC000667

Internet address(es)

Main address

<https://in-tendhost.co.uk/sheffield>

I.3) Communication

The procurement documents are available for unrestricted and full direct access, free of charge, at

<https://in-tendhost.co.uk/sheffield>

Additional information can be obtained from the above-mentioned address

Tenders or requests to participate must be submitted electronically via

<https://in-tendhost.co.uk/sheffield>

I.4) Type of the contracting authority

Body governed by public law

I.5) Main activity

Education

Section II: Object

II.1) Scope of the procurement

II.1.1) Title

3808/JN - Flue Gas/CO2 Scrubbing and Conditioning System (16 Lots)

Reference number

3808/JN

II.1.2) Main CPV code

- 42000000 - Industrial machinery

II.1.3) Type of contract

Supplies

II.1.4) Short description

With co-funding from the European Regional Development Fund and BEIS, the University of Sheffield is establishing a national Translational Energy Research Centre (TERC) as an integrated multi-technology, pilotscale R&D platform for low-carbon technologies including hydrogen, bioenergy (BE), and Carbon Capture, Utilisation and Storage (CCUS). Site equipment includes a Molten Carbonate Fuel Cell (MCFC) which forms part of a Bioenergy with Carbon Capture and Storage/Utilisation (BECCS) system.

This tender covers the scrubbing and conditioning of biomass boiler flue gas (as well as synthetic/semi-synthetic flue gas) to meet stringent purity requirements of the MCFC. It also covers fuel feed to the Anode side of the MCFC. S-containing impurities as well as compounds containing halogens (e.g., HCl), As, Se and P must be scrubbed to low ppb levels to prevent poisoning of the plant catalyst.

II.1.5) Estimated total value

Value excluding VAT: £350,000

II.1.6) Information about lots

This contract is divided into lots: Yes

Tenders may be submitted for all lots

II.2) Description

II.2.1) Title

Flue gas probe, cathode inlet mixing valve, O2 feed in skid (a-c)

Lot No

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To monitor flue gas quality for excessive CO and low O₂ using an in-situ probe and to bleed in air to maintain required O₂ levels or to divert from flue gas supply to air in case of combustion problems, whereby the divertor valve or a combination of a divertor and bleed valve is/are sized for an air bleed of ~1-60Nm³/h) and full air bypass up to 264N/m³.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £8,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Flue gas filter

Lot No

2

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To remove particulates, from sampled flue gas from (primarily) biomass boiler from 40mg/m³ to

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £10,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Flue gas fan (a-c)

Lot No

3

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To sample 72-264Nm³/h of flue gas (on dry basis) primarily from biomass boiler through flue gas manifold pipework (~130m, 4" SS316 pipe) and filter, to the wet scrubber and demister, and downstream equipment to deliver 80-130-300 Nm³/h of humidified gas at 47±15mabr (max 137mbar) to the MCFC. Estimated pressure drops across the full gas train. (See also cathode gas skid regarding control)

Optionally this also includes flue gas flow meter for the corresponding range, for example: Vortex, averaging pitot tube, or other.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £8,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Wet scrubber and demister

Lot No

4

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To scrub:

- Bioenergy flue gas downstream of flue gas diverter, filter and VSD Blower or
- bulk CO₂ from site supply

to remove impurities to levels required by the MCFC; and with optional capacity to treat an additional 40Nm³/h of bulk CO₂ for FT plant.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £60,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

CO2 dryer

Lot No

5

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To dry up to 80m³/h of CO₂ from the Wet Scrubber + Demister down to at least -20°C

dew point for downstream metering.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £17,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Dry scrubber

Lot No

6

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To scrub bulk CO₂ from site supply to remove impurities (primarily S-containing compounds) to purity requirements of the MCFC; and with a total capacity of 80m³/h, to supply up to 40Nm³/h to the Anode and cathode gas skid + up to 40Nm³/h for FT plant.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £55,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Cathode gas mixing skid

Lot No

7

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To meter and mix component gases: CO₂, N₂, CA, to generate representative flue /process gas mixtures or to modulate real flue/process gases, whereby the CO₂ is fed from:

- the wet scrubber after demister and Dryer or
- the dry scrubber or
- bulk CO₂ from site supply for subsequent scrubbing the wet /dry scrubber, as a standalone gas or as part of the overall synthetic/real flue/process gas mixture

The skid (within its monitoring and control capability) would also meter flue gas/air flowrate and control the flue gas VSD fan as well as the inlet probe and diverter

Optionally the skid will also incorporate an additional line for O2 flow metering and control for direct injection into the flue gas where O2 levels are too low , where the O2 will likely be supplied from onsite electrolysis.

For emergency stop the skid should also have a separate fixed flow N2 supply (Flow setting TBC) from site services supply (7-8.5bar, 22mm, 10000L/min shared supply) for cathode supply train purge (covering Fuel cell module, cathode superheater, and recuperator).

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £45,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Cathode superheater

Lot No

8

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To accurately and controllably (ramp-rates of 5-10°C/hr, setpoint to 3 s.f.) heat-up and maintain setpoint temperatures of 80-130-300Nm³/h of humidified cathode gas (real/synthetic/modulated flue/process gas) downstream of the recuperator and humidifier, from ambient or elevated temperature when preheated by the

recuperator (to up to ~600°C), and to maintain the large cathode inlet temperature setpoint of 590 ± 25°C, which may require superheater exit temperatures of 640-700°C during hot standby.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £25,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Anode gas mixing skid

Lot No

9

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To meter and mix component gases: CO₂, N₂, NG, H₂, to generate representative fuel

gas mixtures whereby the CO₂ is fed from wet or dry scrubber.

Optional recycle loop from anode exhaust.

Water skid: controls equipment and instrumentation should be collocated with the anode skid due to special location of equipment

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £36,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Anode superheater

Lot No

10

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To accurately (to 3 significant figures) and controllably (ramp-rates of 5-10°C/h) heat 6-33Nm³/h fuel gas downstream of the anode humidifier, from ambient or elevated temperature (after 20kW anode humidifier to target operating temperatures of 580 ± 25°C or as high as 640-700 °C during startup or hot standby.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £20,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Ultra-pure water (UPW) supply loop

Lot No

11

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To provide a cat-5-type ultra-pure water supply loop system with an intermediate 1000L storage for 80 L/h at 2.8 bar (TBC) of deionised water produced from (2 off) onsite reverse osmosis plant (with conductivity of 0.1 μ S/cm) and provide an estimated 5.5 bar pressurised supply loop for UPW skid for the MCFC and minimum 3 other applications on site: 1) ACP; 2) Electrolyser 2; 3) HP heat exchanger test bed.

The MCFC supply shall also include an additional polishing stage for continuous operation

with standby capacity and quality monitoring to provide up to 45L/hr with conductivity of 0.05-0.06 μ S/cm. The polished UPW supply is required for the cathode steam generator or direct water injection into the recuperator and anode fuel humidifier. It is optional for filling the cathode and anode water seals.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £10,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Ultra-pure water (UPW) skid

Lot No

12

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To control the flow of ultra-pure water (UPW) from UPW supply loop to:

- a. cathode and anode water seals,.
- b. cathode steam generator for flue gas humidification with expected supply of 2-29kg/h
- c. cathode-anode heat exchanger, for flue gas humidification with expected supply of 2-29kg/h
- d. Anode humidifier for fuel gas humidification with expected supply of 1-14kg/h

Whereby a) and b) are controlled by level and c) and d) require accurate water metering.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £8,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Anode water seal

Lot No

13

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

To provide system overpressure protection to protect the MCFC module and incorporating a level adjusting tank for pressure balancing with Cathode exhaust stream.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £8,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

MCC

Lot No

14

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

Motor control centre to provide power management and switching for all relevant BOP plant components included above and in the overall process schematic outlined in Figure 1 (excluding the MCFC module), broadly:

By the MCFC

- (SCR) controlled power supply to Anode superheater
- (SCR) controlled power supply to Cathode superheater.
- (SCR) controlled power supply to Anode humidifier /vaporiser (18.2kW in 4 x 230V single phase heaters)
- (SCR) controlled power to Cathode steam generator.
- Natural gas compressor
- Equipment and instrumentation power across the system.
- Power management for the main supply (630A) and connection of 30kW regenerative load cell to the grid
- PLC power

Externally by FGD (potentially as a separate panel)

- FAN (VSD)

- Wet scrubber system
- Dry scrubber system (potentially booster)
- UPW circulation loop, and
- any equipment and instrumentation power associated with the above or the Cathode skid
- PLC power (if required for FGD)

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £30,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union

funds: European Regional Development Fund

II.2) Description

II.2.1) Title

MCFC module instrument PLC logger

Lot No

15

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

Optionally electrically isolated module controller to take voltage, temperature, and pressure readings from the MCFC to enable controls integration with gas supply system.

(Note BOP controller is excluded)

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £8,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

II.2) Description

II.2.1) Title

Controls manifold

Lot No

16

II.2.2) Additional CPV code(s)

- 31161200 - Gas cooling systems
- 38000000 - Laboratory, optical and precision equipments (excl. glasses)

II.2.3) Place of performance

NUTS codes

- UKE32 - Sheffield

II.2.4) Description of the procurement

Instrument air manifold block with in-build solenoids for control of air supply to instruments: pneumatic isolation, 3 way and control valves.

II.2.5) Award criteria

Price is not the only award criterion and all criteria are stated only in the procurement documents

II.2.6) Estimated value

Value excluding VAT: £2,000

II.2.7) Duration of the contract, framework agreement or dynamic purchasing system

Start date

30 August 2023

End date

31 August 2023

This contract is subject to renewal

No

II.2.10) Information about variants

Variants will be accepted: Yes

II.2.11) Information about options

Options: No

II.2.14) Additional information

This procurement is related to a project and/or programme financed by European Union funds: European Regional Development Fund

Section III. Legal, economic, financial and technical information

III.1) Conditions for participation

III.1.2) Economic and financial standing

Selection criteria as stated in the procurement documents

III.1.3) Technical and professional ability

Selection criteria as stated in the procurement documents

Section IV. Procedure

IV.1) Description

IV.1.1) Type of procedure

Open procedure

IV.1.8) Information about the Government Procurement Agreement (GPA)

The procurement is covered by the Government Procurement Agreement: Yes

IV.2) Administrative information

IV.2.2) Time limit for receipt of tenders or requests to participate

Date

25 July 2023

Local time

12:00pm

IV.2.4) Languages in which tenders or requests to participate may be submitted

English

IV.2.6) Minimum time frame during which the tenderer must maintain the tender

Duration in months: 4 (from the date stated for receipt of tender)

IV.2.7) Conditions for opening of tenders

Date

25 July 2023

Local time

12:01pm

Section VI. Complementary information

VI.1) Information about recurrence

This is a recurrent procurement: No

VI.2) Information about electronic workflows

Electronic ordering will be used

Electronic invoicing will be accepted

Electronic payment will be used

VI.4) Procedures for review

VI.4.1) Review body

The University of Sheffield

Sheffield

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Email

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Country

United Kingdom