

## Sizewell C Project

# Expression of Interest – Sizewell C Hydrogen Demonstrator Project

Invitation to interested parties to express interest in respect of the following aspects of a hydrogen Demonstrator Project (as defined below):

- 1) Installation of the hydrogen electrolyser and associated infrastructure;
- 2) Provision of hydrogen-fuelled vehicles and other plant for the construction phase of SZC and other proposed uses of hydrogen from the Demonstrator Project; and
- 3) Project management services for the Demonstrator Project.

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## 1 PURPOSE

The purpose of this Sizewell C Hydrogen Demonstrator Project Expression of Interest (“EOI”) is to identify suitable parties interested in supporting NNB GenCo (SZC) in the preparation, procurement and installation of a suitable hydrogen electrolyser including the potential provision of hydrogen fuelled vehicles and other plant for the construction of Sizewell C (“SZC”), consumption from the project and all associated project management services in its delivery.

SZC welcomes proposals from suitable organisations interested in supporting SZC with the development and delivery of this project in accordance with the scope in Section 5.

## 2 DEFINITIONS

ALARP	As low as reasonably practicable
BAT	Best available Techniques
COMAH	Control of Major Accident Hazards
COSHH	Control of Substances Hazardous to Health
COTS	Commercial off the Shelf
DBO	Design, Build, Operate
DSEAR	Dangerous Substances and Explosive Atmosphere Regulations
EOI	Expression of Interest
EPC	Engineer, Procure, Construct
EPR	European Pressurised Water Reactor
HSE	Health and Safety Executive
LC	Licence Condition
NNB	Nuclear New Build
ONR	Office for Nuclear Regulation
RC	Reinforced Concrete
SCADA	Supervisory Control and Data Acquisition
SZB	Sizewell B Power Station
SZC	Sizewell C Power Station
UPS	Uninterruptable Power Supply

## 3 BACKGROUND

NNB GenCo (SZC) proposes to construct a twin station UK EPR at the SZC site near Leiston, Suffolk. When constructed, SZC will provide clean low carbon heat as well as electricity, and intends to make some of this heat available for heat assisted electrolysis to make low-carbon hydrogen at scale. SZC’s low carbon ambition has resulted in a study into possible methods and techniques to reduce use of diesel during construction of the station.

## 4 SYSTEM DESCRIPTION

Based on our assessment of the likely early hydrogen requirements, SZC is considering a demonstration project (potentially supplied with electricity by the adjoining operational station, Sizewell B (SZB) nuclear power station). This project is called the “**Demonstrator Project**”.

The detailed specification of the hydrogen electrolyser to meet the requirements of the Demonstrator Project is yet to be fully established and as such SZC would welcome suggestions and examples of previous similar projects undertaken. The following assumptions have however been made:

- it will take the form of a smaller-scale electrolyser (less than 2MW). The size will vary depending on the full demand assessment (including in particular, scale of vehicles / plant expected to be hydrogen-fuelled during construction of SZC); and
- additionally, the hydrogen produced from the Demonstrator Project could be potentially used to serve a number of other markets, such as shipping and port activities.

SZC are currently targeting completion of the Demonstrator Project in the first half of 2022. SZC are willing to discuss scaling-up of the electrolyser with interested parties (in due course) should it provide additional value.

The longer-term hydrogen strategy (after the Demonstrator Project) at SZC is still under consideration and SZC are looking at options to utilise a steam-assisted electrolyser which could use steam tapped off from an operational SZC station, adding efficiency to the hydrogen generation process.

## 5 SCOPE

### 5.1 LOT 1 - Installation of the electrolyser, associated infrastructure and life cycle operation

Annex 1 sets out a schematic of a sample hydrogen production and delivery system including its associated equipment. Consideration should be made to a solution which is commercial off-the-shelf (COTS) in order to reduce cost where possible, however SZC will consider all value engineered proposals to determine the best solution that meets the need of the Demonstrator Project.

A number of other infrastructure items should be considered including but not limited to the MV substation, package transformer and switchgear, SCADA including UPS, electrical cabling, communication links, fire detectors, fire detection panel, security panel, lightning protection, welfare facility, foundation and fencing.

The SZB and SZC sites are unsuitable for the siting of the Demonstrator Project and other areas around the site may also prove to be unsuitable. The supplier is invited to propose an indicative site location and SZC will discuss siting and the provision of suitable supply of electrical power and water including other logistics such as road access. For the Demonstrator Project, SZC envisage provision of electricity via private wire from SZB (subject to further discussions).

#### 5.1.1 Infrastructure Required

The primary piece of infrastructure required to deliver the Demonstrator Project is the hydrogen electrolyser. At present, the assumption is that this will be an electrolyser of capacity around or less than 2MW (we base this on the understanding that a 2MW electrolyser will be able to produce around 800Kg of hydrogen per day). Although SZC has assumed this capacity, if different factors suggest that a different size of electrolyser is more suitable this assumption can be adjusted. The specialist involved in supporting SZC should demonstrate the feasibility of any proposals and advise on the most appropriate and cost effective solution. We have also assumed a minimum operational life of around 10 years for the hydrogen electrolyser however opportunity and upgrades to extend this operational life would be welcomed and be considered as part of any proposal made.

Another consideration is the modular nature and scalability of the proposed solution. SZC welcomes the specialist to provide guidance on the scalability of their proposal including the physical impact in undertaking this.



### 5.1.2 Associated Infrastructure

A number of associated infrastructure considerations must also be addressed. These include the following:

- Electrical connection sufficient to run the electrolysis operations
  - An electrolytic hydrogen production plant will typically require a medium voltage (3.3kV or 11kV) power supply, a transformer to lower the voltage to 400 volts and rectifiers to generate a continuous voltage and current to feed the electrolyser in the range of 200-300 volts DC.
  - A low voltage 3 phase cable backup power supply is also required for use during maintenance or failure, to run the auxiliaries of the plant.
- Water supply
  - Electrolysers typically consume 400L/h of potable mains water (20 L/kg of hydrogen generated) at a minimum pressure of 4 bars.
  - If the water is already demineralised, then 200L/h is required.
- Capability for bottling and storing the hydrogen and oxygen produced (so that it can be passed onto the end-user, for example to a port).
- Any refuelling infrastructure required (for example, for the hydrogen-powered buses or construction equipment which will be end-users).
  - The hydrogen refuelling facilities would in particular service the hydrogen-powered buses and other construction vehicles to be used on the SZC project and we wish to discuss refuelling facilities for on-site purposes.
  - We will also be interested in exploring the practicality and cost of separate off-site refuelling facilities which could be used by non-SZC users (such as local authorities and stakeholders) for their hydrogen-powered buses and equipment, or provision of other hydrogen based capabilities

### 5.1.3 Operation and Maintenance

SZC are also interested in organisations with the specialist capability to operate and maintain the hydrogen electrolyser once constructed. Although the strategy for this is yet to be determined, proposals from an operations and maintenance perspective would be welcomed to allow SZC to understand the requirements and any value that could be gained from a Design, Build and Operate (DBO) type contract arrangement. We are particularly interested in understanding the maintenance requirements for this equipment and the skills required to operate the system.

### 5.1.4 Decommissioning

In order for SZC to evaluate the through-life costs for the hydrogen electrolyser we wish to understand the decommissioning requirements for the proposed hydrogen electrolyser. SZC request that indicative costing and methodology for decommissioning are included within the return to assist in the development of the business case for the project.

**Interested parties for LOT 1 are invited to submit their proposals for a small-scale hydrogen project, accompanied by details on the following:**

- (i) required land area



- (ii) indicative site location around SZC site area
- (iii) plans regarding electricity and water supply
- (iv) purity and other parameters of hydrogen produced
- (v) indicative costs for this scope which principally includes:
  - a. costs of the electrolyser and associated infrastructure;
  - b. costs of on-site refuelling infrastructure (at a location to be discussed with the SZC team) and
  - c. costs to install off-site refuelling infrastructure (optional and subject to further discussion on costs and practicality)
- (vi) operation and maintenance requirements including projected costs
- (vii) indicative scope and associated costs for decommissioning

SZC also request that examples of similar projects in terms of size and scale to that proposed for the Demonstrator Project are provided as part of the return, to demonstrate the experience of the specialist.

## 5.2 LOT 2 - Consumption of Hydrogen

SZC are seeking interested parties who can support in developing an assessment of consumption for hydrogen produced from the Demonstrator Project. From our understanding, a 2 MW electrolyser, such as that proposed could produce around 800 kg of Hydrogen per day

The assessment of consumption is to consider the following:

### 5.2.1 Consumption at SZC

There are opportunities at SZC to ‘green’ the construction of SZC and its associated developments through procurement of hydrogen-powered vehicles and other construction equipment. This could include but not be limited to forklifts, excavators and other heavy plant. Other examples for consideration are hydrogen-powered buses and site equipment such as hydrogen generator sets. SZC are looking for the specialist selected within this LOT 2 to work integrated within the SZC delivery team to advise on, and be involved in, the provision of hydrogen-powered vehicles and equipment such that the selection of construction vehicles is influenced to utilise the capacity of the Demonstrator Project.

The interested party is requested to submit a proposal for what (and how many) hydrogen-fuelled vehicles and equipment it expects to be able to provide over the ten-year construction period of SZC, which could be powered by the hydrogen electrolyser referred to at LOT 1 above. SZC will look for the interested party to work alongside the delivery team to advise on, and provide, hydrogen-powered vehicles and equipment which will form part of a larger fleet consisting of a mix of hydrogen, electric and diesel powered vehicles and equipment.

The SZC team is also involved in a project called Hy4Fleets (with funding from Innovate UK) assessing the transition from fossil fuel to hydrogen-powered fleets. We would welcome the interested party to provide assistance and collaborate with SZC in respect of the Hy4Fleets project alongside this Demonstrator Project.

**Interested parties are invited to submit proposals for consumption of hydrogen from the Demonstrator Project, outlining:**

- (i) **what (and how many) hydrogen-fuelled vehicles and equipment it expects to be able to provide over the ten-year construction period of SZC**

**(ii) indicative level of hydrogen consumption arising from such vehicles and equipment**

**5.2.2 Non-SZC related Consumers**

The interested party is requested to submit its proposal for how much hydrogen (and for what purposes) it may be looking to purchase from SZC when the Demonstrator Project is operational (for its uses which are not related to SZC). SZC has already had some positive initial discussions with local councils and organisations, to use low-carbon hydrogen to meet their green objectives:

Current considerations for non-SZC consumers could include:

- supply of hydrogen to nearby ports, to green their own activities, the shipping industry, and to decarbonise the offshore wind industry (by decarbonising the vessels which build, operate and maintain offshore wind farms);
- supply of hydrogen to bus refuelling stations (and a number of pilot projects in the UK are already using hydrogen buses – a single refill of a bus is understood to typically require 30 - 50 kg of hydrogen);
- supply of hydrogen for rail pilot projects, which are ongoing to prove the viability of ‘hyrail’ (both Ipswich station and Norwich station, close to Sizewell, are train hubs with routes well suited to the conversion to hydrogen); and
- industrial use of hydrogen, which is an established global market for hydrogen (Sizewell is well situated with surrounding agriculture to provide hydrogen for the production of ammonia for fertilisers).

**Interested parties are invited to submit proposals for consumption of hydrogen from the Demonstrator Project, outlining:**

- (i) proposed usage for non-SZC consumption**
- (ii) geographical location of non-SZC consumption**
- (iii) volumes of hydrogen required to meet demands (along with a profile of changing requirements over time)**
- (iv) proposed mode of transportation for hydrogen (where relevant)**

**5.3 LOT 3 - Project Management Services**

In order to successfully deliver the Demonstrator Project and manage its development and continuing operation, SZC are looking to engage a party to provide project management services. The role of the interested parties will include, but not be limited to managing the following:

- obtaining and complying with relevant permits and consents (including planning requirements);
- site preparation including removal of debris and vegetation, excavation and levelling;
- construction of the facility reinforced concrete (RC) ground bearing slab;
- site drainage;
- site enclosure, fencing and access provisions (design and specification excluded from this document);
- enabling works; and
- coordinating with the hydrogen solutions supplier and EPC contractor.



Interested parties are invited to submit proposals for project management services in respect of the Demonstrator Project, outlining:

- (i) prior relevant experience in hydrogen-based projects of similar size and scale to that of the Demonstrator Project at SZC
- (ii) indicative costs for this scope with details of the rates charged including all associated costs. It is currently not forecast that the resource would need to be based on site full time however provisions need to be included to be present when required to manage the works appropriately
- (iii) indicative project management structure for the Demonstrator Project
- (iv) example CVs for those included within the management structure

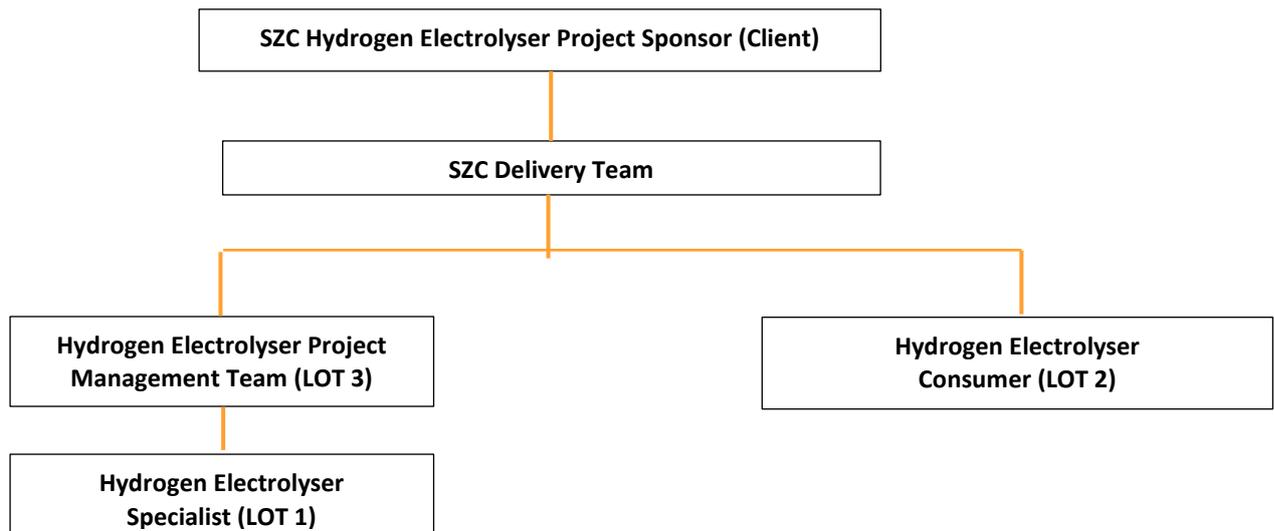
## 6 OBJECTIVE

The objective of this EOI is to identify suitable organisations that wish to work with SZC to complete the required deliverable based tasks. A return can provide for individual or combined LOTS as detailed in Section 5, by no later than 17:00 BST on 8 January 2021 (the “Closing Date”) by email to [hydrogen@sizewellc.com](mailto:hydrogen@sizewellc.com) (and clearly identifying in the subject, the LOT(s) being applied for). Any questions or requests for clarification may be directed to the same email address.

SZC will review each of the proposals received to ensure compliance against the requirements. Organisations may be deemed more favourable, where: (i) it can complete all of the LOTs within this EOI (other than those responding just to LOT 2), compared to those who can only complete individual elements; and / or (ii) activities and content in relation to relevant LOT(s) are UK-based.

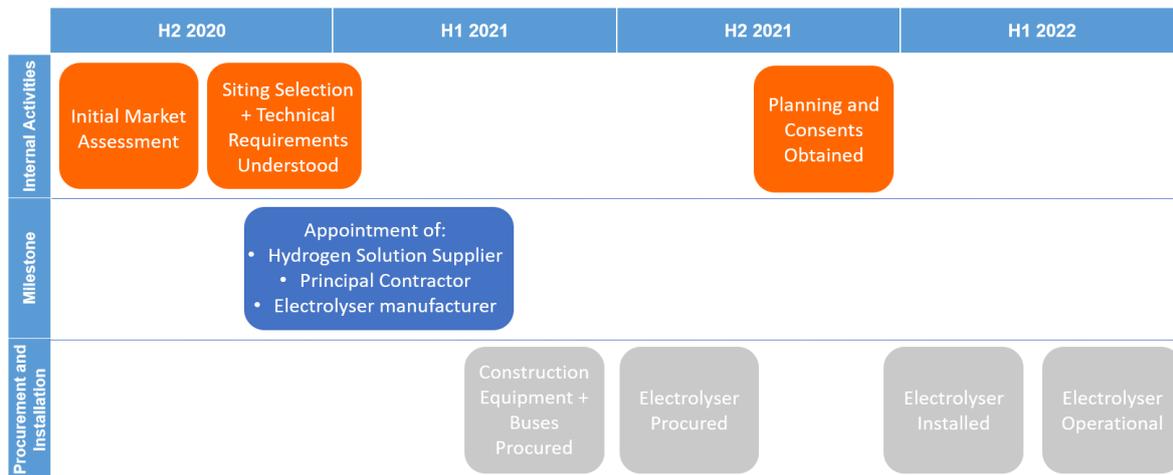
## 7 WORKING ARRANGEMENTS

The current proposed organisational chart for the Demonstrator Project is shown below. This is indicative and could be subject to change. We would encourage specialists reviewing the scope to also propose where they would fit within this structure or advise on any alternative arrangement which would make the structure more suitable for the project.



## 8 CONTRACT DURATION & TIMESCALES

Below is an indicative timeline for the development of the Demonstrator Project. We do however wish to accelerate this programme where possible and therefore would welcome schedules which can demonstrate efficiencies in this programme. Please note that the project is still subject to SZC board approval and funding therefore these timescales provide only an indication of the currently understood timescales to develop the Demonstrator Project.



This EOI will form the basis for a route to contract to deliver the Demonstrator Project. The following steps will provide a guideline on the route to contract for each of the LOTS detailed within Section 5:

- (i) EOI published
- (ii) responses received
- (iii) short-listing (and proposal presentations)
- (iv) short-listing of preferred specialist contractors
- (v) issue of formal tender request
- (vi) response to tender
- (vii) contract award

## 9 RESPONSIBILITIES

SZC will nominate a representative SZC Project Sponsor who will be accountable for all matters relating to the execution of this Demonstrator Project. In addition to this, SZC will have a hydrogen electrolyser Delivery Team who are responsible for all aspects associated with the delivery of the project. SZC is also responsible for providing the specialist undertaking the work within the LOTS with appropriate access to its document management system and all required information.

The specialist shall nominate a representative who is responsible for all the matters relating to this contract. They will be responsible for building a suitable and qualified team and performing the tasks as described in this EOI, providing results to SZC in the requested time deadline. The specialist shall ensure that all personnel forming part of the core team shall be suitably qualified and experienced (SQEP) to perform their work.

Due to the specialist nature of the project, it may be necessary to work with other organisations as part of the project structure. SZC therefore expected that the organisations involved in this project will work collaboratively with each other and SZC to successfully achieve the project objectives.

## 10 WORK MONITORING / MEETING SCHEDULE

Provision should be made within returns to this EOI for a follow-on video conference to further explain proposals returned to SZC. We would expect this to be undertaken within 2 weeks of the return date.

Due to the collaborative nature of the work in this project, the specialist will be required to attend regular telephone or video conference calls with SZC to present proposals, progress and other information requested as part of the project development. The frequency of these may vary as the project progresses however, and we would look for the specialist to advise on this.

## 11 REQUIRED SKILLS AND EXPERIENCE

The specialist shall develop a team of personnel with the required experience and skills (SQEP) in order to undertake the tasks described in Section 5. Due to the specialist nature of the work proposed, SZC will utilise the skills and experience of the contractors however we would still seek to review CVs of those proposed to ensure alignment with the SZC requirements and expectations.

## 12 SPECIFIC REQUIREMENTS AND CONDITIONS

Any sub-contracting, joint ventures etc shall be detailed within the return. The justification and value added to the project through this partnership or strategy should be detailed. Note those who can detail value added incentives and cost reductions to SZC will be deemed most favourable during the review and shortlisting process.

## 13 QUALITY ASSURANCE REQUIREMENTS

The specialist providing a return shall have a SZC approved QA Program, or an ISO 9001 accredited quality system in place. Prior to commencement of the task, a Quality Plan must be submitted to SZC for approval, giving evidence of the above and describing the organisation for this task, demonstrating that the workers involved are SQEP for the task that they are performing, and providing details of any anticipated sub-contractors.

**NNB Generation Company (SZC) Ltd reserve the right to change the terms set out in this document at any time and without any prior notice. In case NNB Generation Company (SZC) Ltd does so, it will issue a revised version of the document.**



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