



---

**Programme Area:** Carbon Capture and Storage

**Project:** High Hydrogen

**Title:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications - Request for Proposal

---

**Context:**

Hydrogen is likely to be an increasingly important fuel component in the future. This £3.5m project was designed to advance the safe design and operation of gas turbines, reciprocating engines and combined heat and power systems using hydrogen-based fuels. Through new modelling and large-scale experimental work the project sought to identify the bounds of safe design and operation of high efficiency combined cycle gas turbine and combined heat and power systems operating on a range of fuels with high and variable concentrations of hydrogen. The goal of the project was to increase the range of fuels that can be safely used in power and heat generating plant. The project involved the Health and Safety Laboratory, an agency of the Health and Safety Executive, in collaboration with Imperial Consultants, the consulting arm of Imperial College London.

---

**Disclaimer:**

The Energy Technologies Institute is making this document available to use under the Energy Technologies Institute Open Licence for Materials. Please refer to the Energy Technologies Institute website for the terms and conditions of this licence. The Information is licensed 'as is' and the Energy Technologies Institute excludes all representations, warranties, obligations and liabilities in relation to the Information to the maximum extent permitted by law. The Energy Technologies Institute is not liable for any errors or omissions in the Information and shall not be liable for any loss, injury or damage of any kind caused by its use. This exclusion of liability includes, but is not limited to, any direct, indirect, special, incidental, consequential, punitive, or exemplary damages in each case such as loss of revenue, data, anticipated profits, and lost business. The Energy Technologies Institute does not guarantee the continued supply of the Information. Notwithstanding any statement to the contrary contained on the face of this document, the Energy Technologies Institute confirms that the authors of the document have consented to its publication by the Energy Technologies Institute.

Title of Services for which Proposals are Requested:

**Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications**

Request Issue Date:

30 June 2010

Deadline for Notification of Intention to Submit a Proposal:

16 July 2010

Closing Date:

Proposals must be received before 5pm on 23 August 2010

Contact for Enquiries:

Justina Zurawliw  
Programme Management Officer  
Tel: 01509 202040  
Email: de@eti.co.uk

Address for Submission of Proposals:

Energy Technologies Institute LLP  
F.A.O.: Justina Zurawliw  
Holywell Building  
Holywell Way  
Loughborough  
LE11 3UZ  
Email: de@eti.co.uk

## Contents

|                   |   |           |
|-------------------|---|-----------|
| <b>1</b>          | <b>Introduction and Overview of the Services Required</b>   | <b>3</b>  |
| 1.1               | Introduction to the Energy Technologies Institute   | 3         |
| 1.2               | Background to the Project   | 3         |
| 1.3               | Outline Scope of the Project  | 5         |
| 1.4               | ETI Funding and Project timing  | 6         |
| 1.5               | Required Outcomes and Critical Success Factors for the Project  | 7         |
| 1.6               | Anticipated Project Organisation Structure  | 8         |
| 1.7               | Test Rig Facilities   | 9         |
| 1.8               | ETI and Health and Safety   | 9         |
| 1.9               | ETI and State Aid   | 9         |
| <b>2</b>          | <b>Request for Proposals: Process and Terms</b>   | <b>9</b>  |
| 2.1               | Content and Format of Proposals   | 9         |
| 2.2               | Acceptance, Review and Selection of Proposals   | 10        |
| 2.3               | Estimated Time-Frames and Procurement Process   | 11        |
| 2.4               | Conditions of this Request for Proposal and participating in the procurement process for the ETI Project: Disclaimer Notice   | 12        |
| <b>3</b>          | <b>Specification of Project Scope of Work and Deliverables</b>  | <b>13</b> |
| 3.1               | Work Package 1: Literature Review   | 13        |
| 3.2               | Work Package 2: Experimental investigation into the limits of flammability, ignition and DDT potential under a range of high hydrogen fuels for CHP and CCGT applications | 14        |
| 3.3               | Work Package 3: Investigation into Fast-Response Gas Composition Measurement for Engine Controls  | 16        |
| 3.4               | Work Package 4: Evaluation and Recommendations Report   | 16        |
| <b>4</b>          | <b>Price and Payment</b>  | <b>17</b> |
| <b>5</b>          | <b>Terms and Conditions for Project Contract</b>  | <b>17</b> |
| <b>Appendix A</b> | <b>Content and Format of Proposals</b>  | <b>18</b> |
| <b>Appendix B</b> | <b>Due Diligence Information Requirements</b>   | <b>25</b> |
| <b>Annex B1</b>   | <b>Background Intellectual Property Questionnaire</b>   | <b>27</b> |
| <b>Annex B2</b>   | <b>Organisational Due Diligence Questionnaire</b>   | <b>28</b> |
| <b>Appendix C</b> | <b>Summary of Terms and Conditions for Project Contract</b>   | <b>29</b> |
| <b>Appendix D</b> | <b>Glossary</b>   | <b>32</b> |
| <b>Appendix E</b> | <b>Multi-Party Confidentiality Agreement</b>  | <b>34</b> |

# 1 Introduction and Overview of the Services Required

## 1.1 Introduction to the Energy Technologies Institute

The Energy Technologies Institute LLP (the ETI) is a private organisation formed as an innovative Limited Liability Partnership between international industrial energy companies and the UK government.

Our mission is to accelerate the development, demonstration and eventual commercial deployment of a focused portfolio of energy technologies, which will increase energy efficiency, reduce greenhouse gas emissions and help achieve energy and climate change goals.

We will do this by leveraging the skills, capabilities and market access routes of our members, working with other organisations worldwide, to take the most challenging large-scale energy projects to full system demonstration, thus bridging the gulf between laboratory proven technologies and full scale commercially tested systems. Our projects will also develop knowledge, skills and supply-chains, and will inform the development of regulation, standards and policy. Hence we aim to overcome major barriers, de-risk the future development and shorten the lead times to market for secure, affordable, low-carbon energy systems for power, heat and transport.

Our portfolio includes programmes in areas such as Wind, Marine, Distributed Energy, Transport, Bio-Energy, Energy Storage and Distribution and Carbon Capture & Storage.

Further information can be found on our web-site at [www.energytechnologies.co.uk](http://www.energytechnologies.co.uk)

## 1.2 Background to the Project

Gas turbine engine operation with hydrogen rich fuels poses several significant challenges. Management of the engine package after undetected flame out creates serious scenarios that must be handled carefully. If an undetected flameout occurs, the control system would increase the fuel flow to the engine and the unburned fuel composition in the exhaust could reach a level above the limits of flammability in the duct.

The hydrogen Deflagration to Detonation (DDT) phenomenon is being studied by research groups around the world and it is clear that the problem is complex and there is a significant effect of geometry on combustion dynamics. Answers to many of the questions are either not available or known, so the proposed program is to perform simulated combustion experiments with realistic exhaust duct configurations to obtain data that can be used to develop analytical models of Combined Heat & Power (CHP) and Combined Cycle Gas Turbine (CCGT) systems and verify their accuracy. The operating conditions need to cover the range of conditions expected during engine operation.

### Main Issues:

- Experimentally derived and verified limits of flammability , ignition and DDT potential for the range of robust operating conditions for high hydrogen engine and turbine operations are limited
- In the event of a flameout, an explosive mixture of fuel and air could be pumped into a hot exhaust and boiler system before the flameout is detected and lead to an explosion

### Main Consequences:

- Significant de-rating (less fuel in the air mix, hence reduced engine efficiency) when running these gases on engine systems and limited uptake in engine and turbine market
- Under-representation and inability to assess robust business case (as scheme efficiencies are lower due to safety factors included)

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications

Given waste, biomass, coal, and the opportunity gas market, the energy potential to exploit high hydrogen gases for heat and power generation for the UK is significant. This work should enable testing of H<sub>2</sub> rich gases for a number of operations (coal/biomass gasification, etc)

Due to the uncertainty around safety and safe operating limits in running high hydrogen systems, there has been limited effective exploitation of fuels with high hydrogen and variable hydrogen content for CHP and CCGT applications. The variability means that the commercial opportunity space is not clear. This is a fundamental pre-cursor to evaluating the area

The following references are the most relevant to the proposed study:

- a) Ciccarelli, G., Ginsburg, T., Boccio, J., Economos, C., Finfrock, C., Gerlach, L., Sato, K., Kinoshita, M., "High-temperature hydrogen-air-steam detonation experiments in the BNL small scale development apparatus", NUREG/CR-6213, BNL-NUREG-52414 (1994)
- b) Ciccarelli, G., Boccio, J. L., Ginsburg, T., Finfrock, C., Gerlach, L., Tagawa, H., Malliakos, A., "The effect of initial temperature on Flame Acceleration and Deflagration-to-Detonation transition phenomenon" , NUREG/CR-6509, BNL-NUREG-52515 (1998)
- c) Dorofeev, S.B., Sidorov, V.P., Dvoinishnikov, A.E., Breitung, W. "Deflagration to detonation transition in large confined volume of lean hydrogen-air mixtures", Combustion and Flame, 104, (1996), pp. 95-110.
- d) Dorofeev et al., "Integral large scale experiments on hydrogen combustion for severe accident code validation-HYCOM", Nuclear Engineering and Design, 235, (2005), pp. 253-270
- e) Chao, J., Lee, J.H.S., "The propagation mechanism of high speed turbulent deflagrations", Shock Waves, (2003), Vol. 12, pp. 277-28

High-level Literature Review Summary:

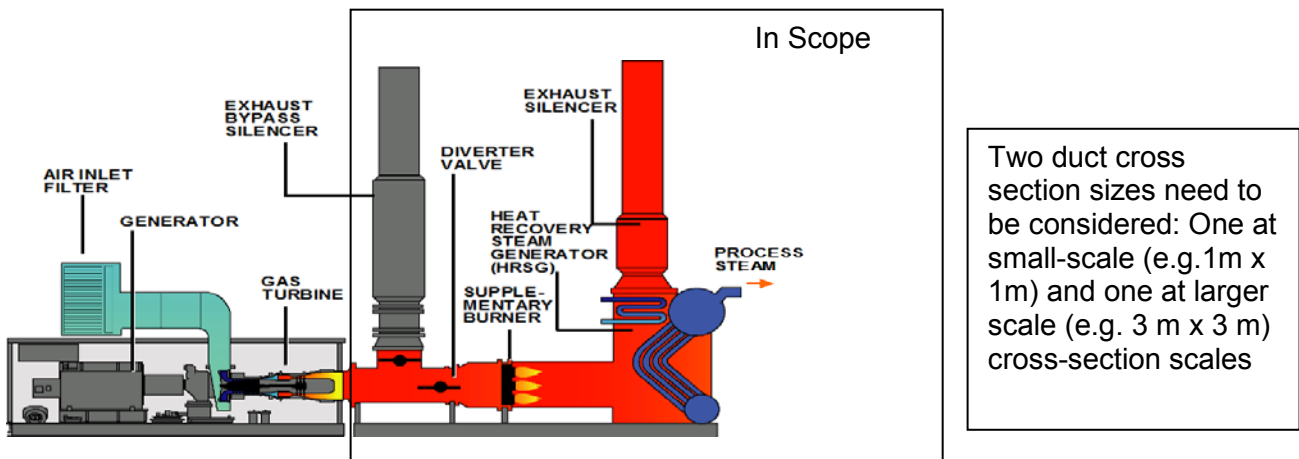
- Laboratory scale rig test data at ambient conditions in simple tubes with and without simple blockages
- Some simple models generated from the data obtained
- Theoretical CFD studies
- Safety documentation
- The Brookhaven National Lab simplified closed end rig test data at 300K, 500K and 650K initial mixture temperatures encompassing gas turbine operating hydrogen/air mixtures which can be considered to be TRL level 4 data. (see refs 1 and 2 above)
- Deflagration-to-detonation (DDT) is a phenomena that is a characteristic of hydrogen combustion and it is influenced by turbulence levels, mixture ratio and geometry
- DDT produces higher pressures than exhaust and CHP systems can withstand
- No data on the ignition of hydrogen/air mixtures in representative exhaust ducts and CHP systems was found

### 1.3 Outline Scope of the Project

The fundamental requirement of this project is to provide experimentally derived data on the limits of flammability, ignition and DDT potential for a range of gases containing high hydrogen systems.

The ETI expects that two rigs will be developed, reusing as much of the Respondents' existing infrastructure as possible. The two rigs should be designed to study the system at two different scales and also to study an appropriate range of the most common system configurations and designs.

The Respondents should indicate which they consider most relevant to the desired outcomes, with the available budget for the project.



**In scope:** H<sub>2</sub> content gases, diluents gases, dynamic and flexible testing rig to enable testing for CHP and CCGT and simulate larger scale systems

**Out of scope:** Combustor flow dynamics, detailed market assessment in EFW/Biomass Arena

The range of relevant production sources for consideration for high hydrogen fuel schemes in the UK context could include the following:

- Significant waste gas CHP opportunities
  - Coke Oven Gas (60% H<sub>2</sub>)
  - COG – Methanol plant tail gas (75% H<sub>2</sub>)
  - Chemical & refinery streams (80 – 95 % H<sub>2</sub> streams)
  - H<sub>2</sub> streams from Ammonia production
- Biomass projects that require duct burners to maximize steam production
  - Syn - Gas can contain 20 – 50 % H<sub>2</sub>
  - Likely to be required with 50% of projects
- IGCC with CCS (Coal, Gas, or Biomass)
- H<sub>2</sub> generation from excess electricity
  - Wind farms
  - Nuclear power

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications

For the purposes of this project, the primary interest is in the following systems:

- High hydrogen content syn-gases (e.g. from waste/biomass/coal)
  - Impure H<sub>2</sub> from natural gas reforming and coal gasification with shift conversion and CO<sub>2</sub>
  - IGCC with CCS (Coal, Gas or Biomass)

The diluent gases of primary interest are:

- Steam
- Carbon Dioxide
- Nitrogen

It is envisaged that the project will involve the following work packages:

- WP1: Literature Review
- WP2: Experimental investigation into the limits of flammability, ignition and DDT potential under a range of high hydrogen fuels in exhaust systems for CHP/CCGT applications
- WP3: Investigation into Fast-Response Gas Composition Measurement for Engine Controls
- WP4: Evaluation and Recommendations Report

The Respondents should suggest an appropriate work package structure, project plan, and stage-gates to manage this work, taking particular note of requisite HSE requirements to manage the project from design, construction through to operations and decommissioning.

#### **1.4 ETI Funding and Project timing**

##### **ETI Funding**

The ETI funds its projects on a capped basis, so that the level of ETI Funding which may be provided is capped at an amount agreed with the successful Respondent(s) prior to the Agreement. The ETI will pay for eligible and actual costs only. Please see section 4 of this RFP and section 14 of Appendix A for further details.

The ETI intends to fund this Project to a capped amount of in the order of £1 million.

The ETI recognises that an enormous scope of work could be developed around the underlying physical and chemical phenomena and different systems and geometries. The ETI may consider proposals that are significantly above or below the proposed cap of £1 million. However, in these circumstances, the Respondents will be expected to set out:

- Why a different level of funding is appropriate,
- What the scope of work and value would be against the planned budget of £1 million;
- Incremental work over and above the planned budget of £1 million;
- The benefit and value that this additional work would provide.

The successful bidding organisation will have to demonstrate the significant progress they aim to achieve in the state of the art within the time and funds available.

## Project Timing

Respondents should provide ETI with a recommendation in terms of anticipated experimental programme design and a time-efficient programme for delivery which includes appropriate time to manage all health, safety and environmental risks. The ETI anticipates that an appropriate programme that meets the requirement would be completed within 18 months.

Please refer to Section 3 of the RfP for a more detailed description of the scope of work and deliverables.

### 1.5 Required Outcomes and Critical Success Factors for the Project

This project will provide the following deliverables:

- A summary on previous work on limits of flammability, ignition and DDT potential of high hydrogen systems under varying conditions, including how this is applicable to exhaust systems of engines/turbines, particularly with respect to CHP/CCGT systems which may include duct burners for turbine applications. The summary should highlight any shortfalls, gaps, and development opportunities along with recommendations of inherently safer designs;
- The empirical results of the experimental investigation into the limits of flammability, ignition, and DDT potential in representative geometries, temperatures and pressures
- An evaluation of the gaps in the experimental work and recommendations on any further required work;
- An interpretation of the results and recommendations/implications on the design of these systems;
- A summary and review of methods and devices for assessing the input gas composition which have sufficiently high response time to allow an engine or turbine to adapt to changes in gas composition over time; and if required, the results from experimental work to validate these approaches
- An evaluation of the greatest areas of concern in design and control of the systems studied along with an outline scope of work of what needs to be done to develop these areas and recommendations for follow-on work

This project should therefore provide a more detailed evidence base and advance the state-of-the-art in the safe and efficient operation of high hydrogen gas mixtures for energy production in order to enable the following outcomes:

- Identify the bounds of safe design and operation of proposed high hydrogen systems to avoid unpredicted hazardous outcomes (limits of flammability, ignition and DDT potential in exhaust systems for a range of CHP/CCGT applications)
- Operate existing systems with more confidence within their bounds of safety in order to increase energy production and avoid unnecessary trips (for example, enabling gas engines to run at higher fuel/air mixes, or operating CCGT system with higher trip set-points)
- Improve the detailed design and instrumentation of high hydrogen systems in order to deliver more robust safety by design
- Outline the applicability of the results for extrapolation to larger duct dimensions and geometries, identifying specific limitations on validity, plus further work to increase confidence of extrapolation

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications



- Inform the development of computer based modelling

Critical Success Factors, which either characterise a successful Project outcome or which are required to facilitate a successful Project outcome, include the following. Any additional factors identified should be described in the Proposal.

- The project should make a significant step forward in developing the evidence base and tools for the safe and more economical design and operation of gas engines and gas turbines using high hydrogen fuels
- The Project must provide sufficient information and present it in such a manner as to enable the ETI to make informed decisions at the end of the Project regarding follow-on work that may be required

## 1.6 Anticipated Project Organisation Structure

It is anticipated that a number of Participant organisations / entities will be required to work together in order to provide all the necessary knowledge, skills, experience and inputs to complete the Project (as detailed in Section 3).

Organisations considering bidding may choose either:

- to form a Consortium, contracted with the ETI, governed by its own Consortium Agreement and led by a 'Lead Coordinator' to manage the Project and act as primary interface with the ETI (each Consortium Member may have Subcontractors) or
- for a single organisation to act as 'Prime Contractor' who shall form a contract with the ETI, and shall manage the Project and act as primary interface with the ETI (and who may have Subcontractors).

Either of these contracting arrangements is acceptable to the ETI, but there must be a single organisation (Lead Coordinator or Prime Contractor) leading and acting as the primary interface with the ETI. This organisation shall appoint a Project Manager to lead and coordinate all activities of the Participants, and to liaise regularly with the ETI's Programme Manager to whom he/she is accountable on behalf of the Participants. This organisation shall also act as the Respondent for the purposes of this Request for Proposals.

The ETI places great emphasis on two critical roles in major projects – Project Manager and Chief Technologist.

The Project Manager is responsible for managing and progressing the project team and programme of work to time and cost, handling information flows and commercial issues, ensuring effective team-working and the continued engagement and support of key stakeholders. In essence this responsibility is to make sure that the ETI benefits from a result at the end of the programme of work that meets the agreed outcomes within time and cost.

The Chief Technologist is responsible for the technical quality and content of the work, ensuring the competence of key technical staff allocated to individual work packages, the effective review of key outputs and the effectiveness of detailed technical planning to ensure that the emerging results of work are fed back into the forward plan. In essence this responsibility is to assure the technical quality of the project and its outcomes.

The ETI will assess the competence, experience and authority of these two people and their ability to work together as critical to project success. The ETI expects these two roles to be filled by the same people throughout the life of the project. The Project Manager and Chief Technologist do not need to be from the same Participant organisation.

Respondents should identify specific individuals for these key positions, including deputies, and other key roles as appropriate. Respondents should state the amount of each individual's time which will be dedicated to the Project, and detail their experience – with CVs included in an Appendix (maximum 2 pages per individual).

### **1.7 Test Rig Facilities**

The ETI is prepared to fund the design, commissioning and testing of test rigs for this Project.

The ownership of the test rigs will be vested with the Respondents who will be expected to own, manage and maintain the test rig facilities during the Project on their own behalf.

The ETI requests that Respondents provide proposals for operation and access to the test facilities following the end of the Project in Section 10 of Appendix A.

### **1.8 ETI and Health and Safety**

The health and safety of those who may be affected by ETI Projects is of paramount importance to the ETI. The ETI expects those who receive ETI funding to demonstrate a commitment to best practice in health, safety and environmental management as well as demonstrating that legal requirements are met.

The ETI expects that:-

- all Respondents will demonstrate their approach to health, safety and environmental matters throughout any Proposal to the ETI (please see section 9 of Appendix A);
- any successful Participant(s) to work with the ETI throughout any ETI Project to assure the ETI that health, safety and environmental risks are being managed appropriately.

### **1.9 ETI and State Aid**

Funding from the ETI for this project may constitute state aid. The ETI has a specific state aid clearance from the European Commission. In relation to their Proposals, Respondents should note:

- Further information may be required to support the specific state aid requirements of any Proposal during the procurement process;
- Successful Respondent(s) will be required to provide full transparency of costs throughout the Project to ensure both the Participant(s) and the ETI comply with EU state aid law;
- Participants will need to agree to certain contractual obligations related to the state aid requirements including the duration of Project records and obligations to return ETI funding in certain exceptional circumstances.

## **2 Request for Proposals: Process and Terms**

### **2.1 Content and Format of Proposals**

Interested organisations are requested to submit a collective Proposal through their nominated Respondent as described in Section 1.5 above. The Proposal shall be arranged according to the structure detailed in Appendix A and shall include all the information listed therein.

The Proposal must be written in a succinct manner and must not include imprecise statements, generalities or repeated information. The Proposal must be easily readable with appropriate font sizes, margins, etc, and **shall not exceed a maximum of 40 pages** (excluding the due-diligence information required under Section 12 of Appendix A).

Additional information (such as organisational brochures, etc) may be provided to accompany the Proposal if this is expected to add value (although it is not necessarily required by the ETI), but such additional information will not usually be taken into account when reviewing Proposals.

The Proposal shall consist of **4 complete hard copies and one (1) electronic copy**. The latter shall be provided in both PDF and Microsoft Word formats.

## **2.2 Acceptance, Review and Selection of Proposals**

Proposals will be reviewed and judged primarily against the criteria listed below.

- Completeness of information content, structure and quality of Proposal (against areas listed in Appendix A)
- Compliance with technical specification (i.e. Sections 1.3, 1.4 and 3 of this RfP)
- Knowledge, skills and experience, which must include ALL of the following. A table should be provided to identify which Participant(s) is/are proposed to satisfy each of the following criteria:

### (a) Generic Criteria:

- Availability and stability of deployable resources to mobilise sufficiently rapidly and for sufficient durations
- Record and ability in quality, timely and on-budget delivery (of technology programmes) to the full satisfaction of the main stakeholders
- Knowledge and previous experience of industry, environment, technologies, and of this type of study, etc
- Ability and experience in collaborative working
- For the lead organisation particularly, project management expertise

### (b) Specific Technical Criteria:

- Experience and understanding of a range of potential gas turbines (both small and large scale,) and engine operations and performance curves
- Experience and understanding of hydrogen firing in HRSG duct burners
- Understanding and demonstrated experience of hydrogen/hydrogen mixture combustion systems
- Understanding of the critical safety and performance characteristics of running high hydrogen content gas in power systems
- Understanding of the critical factors requisite in developing combustion flow modelling tools and hence capability to design a range of tests to be used to help further validate such models
- Combustion engineering
- Facilities suitable for the required testing, including, for example, the capability to deliver air at up to 25kg/s at temperatures ranging from 300 – 800 K.

- Demonstrated capability to design, construct, operate, maintain, and decommission a hydrogen test facility in accordance with all regulatory and health, safety and environmental requirements
- Evidence of leverage of existing facilities and equipment

(c) Commercial Criteria

- Value for money
- Effectiveness of the contracting, organisational, governance and control structures and processes proposed for the participating entities / organisations
- Project approach and plan, including Gantt chart, suitable stage gates & payment milestones, and proposed management of specific risks and issues
- Respondent's willingness to materially comply with the terms and conditions of the proposed Project Contract
- Demonstration that there are no material Background IP (including third party IP) which would prevent the Project proceeding or the Arising IP being exploited
- Appropriate proposal to manage and make available after the Project any Test Facility created during the Project.

### 2.3 Estimated Time-Frames and Procurement Process

Respondents shall notify the ETI of their intention to submit a proposal. This notification shall be in writing to the Address for Submission of Proposals, no later than the Deadline, all as listed on the front cover of this RfP.

The ETI will provide an opportunity for the potential Respondents to attend a face to face meeting to discuss any issues associated with the development of the bid. The meetings are planned to take place at the ETI's office in Loughborough on 30 July. Potential Respondents should advise the ETI no later than 20 July if they wish to take up the opportunity to meet with ETI. In addition, the potential Respondents should confirm by email no later than 23 July any key issues or questions they would like to discuss during a meeting on 30 July.

A non disclosure agreement is attached at Appendix E. Any organisations considering bidding must complete a copy of the NDA. Each organisation bidding and expecting to be a Participant should complete the same NDA. On receipt of the signed NDA, a draft version of the Project Contract will be distributed by the ETI for review. Please see section 5 of the RFP and section 12 of Appendix A. The signed NDA should be provided to the ETI prior to the face to face meetings proposed for 30 July.

The following timetable outlines the anticipated schedule for the contract process. The timing and the sequence of events resulting from this Request for Proposals may vary and shall ultimately be determined by the ETI.

| Event   | Anticipated Date(s) |
|---|---------------------|
| Deadline for Notification of Intention to Submit a Proposal                             | 16 July 2010        |
| [Optional] Face to face meeting with ETI to address Q&A associated with bid development | 30 July 2010        |
| Closing Date for Responses to RfP   | 23 August 2010      |
| Preferred Bidder Identified   | 10 September 2010   |
| Project Detailing and Contract Agreement  | 13 September 2010   |
| Contract Approval   | March 2011          |
| Project Start   | ASAP after approval |
| Project Duration  | approx 12 months    |
|   |                     |

#### 2.4 Conditions of this Request for Proposal and participating in the procurement process for the ETI Project: Disclaimer Notice

- a) The ETI at its discretion may request clarification of a Proposal, and may reject any Proposal which is unclear.
- b) Neither the issue of any documentation in the Request for Proposals process nor any of the information presented in it should be regarded as a commitment or representation on the part of the ETI or any other person to enter into a contractual arrangement. The Request for Proposals is not an agreement to purchase goods or services, and the ETI is not bound to enter into any contract with the Respondent. By responding to this Request for Proposals, the Respondent does not commit itself to entering into a contract with the ETI.
- c) All decisions made by the ETI relating to the acceptance, review and selection or otherwise of Proposals are final.
- d) All documents, including Proposals, submitted to the ETI become the property of the ETI. They will be received and held in confidence by the ETI, subject to the terms of the Non Disclosure Agreement (Appendix E). No part of a Proposal, or documents provided by Respondents, shall be returned.
- e) The ETI reserves the right to (i) change the basis of, or the procedures for, the Request for Proposals process, including the timetable or Closing Date, (ii) make modifications to, or alter any of the information within, the Request for Proposals at any time until the execution of the Project Contract, (iii) reject any or all of the Proposal received, and (iv) not invite any Respondent to proceed further. In cases (i) and (ii) the ETI shall provide a minimum of five working days written notice.
- f) Neither the ETI nor any of its agents or advisers accepts any liability or responsibility for the accuracy, adequacy or completeness of any of the information provided or any opinions contained in this Request for Proposals or of any other information made available during the Request for Proposals process. No representation or warranty, express or implied, is or will be given by the ETI or any of its agents or advisers with respect to such information provided or opinion given therein. Any liability is thereby expressly disclaimed.

- g) Respondents must assess the information and terms contained in this Request for Proposals independently, having taken professional advice if necessary. The Respondent will be deemed to have examined all the documents enclosed with this Request for Proposals and by its own independent observations and enquiries will be held to have fully informed itself as to the nature and extent of the requirements of the Request for Proposals. The Respondent must rely on its own enquiries and on the terms and conditions contained in any agreement, when and if finally executed, subject to such limitations and restrictions as may be specified therein.
- h) Respondents shall be wholly responsible for the costs they incur in the preparation and submission of their responses to the Request for Proposals. The ETI shall not be responsible for, and shall not pay, any costs and expenses which may be incurred by the Respondent in connection with its participation in the Request for Proposals process, including but not limited to any costs or expenses incurred up to the execution of the Project Contract.
- i) The ETI may, at its discretion, shortlist Respondents for the next stage. The ETI does not undertake to accept the lowest bid or to accept part or all of any Proposal and the acknowledgement of receipt of any Proposal shall not constitute any actual or implied agreement between the ETI and the Respondent.
- j) The submission of a Proposal will confirm acceptance of the foregoing provisions by the Respondent without qualification. Any attempt to qualify any of the foregoing provisions in this Disclaimer Notice, either expressly or impliedly, may result in a Respondent being disqualified.
- k) The copyright in the documentation and any other materials supplied by the ETI and/or its advisers in this Request for Proposals process, in whatever format, belongs to the ETI or its appointed advisers. Such documentation and materials may not, either in whole or in part, be copied, reproduced, distributed or otherwise made available to any other third party or used without the prior written consent of the ETI, except in relation to the preparation of the Proposal in the course of the Request for Proposals process. All documentation supplied by the ETI in relation to this Request for Proposals process must be returned on demand, without any copies being retained by the Respondent.
- l) This Request for Proposals, and any dispute or claim arising out of or in connection with it (including any dispute or claim relating to non-contractual obligations), shall be governed by and construed in all respects in accordance with the laws of England and Wales and the parties agree that the Courts of England and Wales shall have exclusive jurisdiction to settle any dispute or claim arising out of or in connection with this document (including any non-contractual disputes or claims).

### **3 Specification of Project Scope of Work and Deliverables**

This project is split into four main work packages.

#### **3.1 Work Package 1: Literature Review**

This work package will examine previous work done with high hydrogen gas systems, both on the safety concerns and the composition measurement, and shall examine how the gas properties relate to the combustion characteristics. The work will include investigation of safety concerns of hydrogen in duct work and HRSGs. Review to include safety systems in place, identifying shortfalls, gaps and development opportunities

A detailed literature survey is required to form an educated basis for analysis. It is important to establish what is known about the impact of geometry, pressure and temperature on the limits of flammability, ignition and DDT potential of gas mixes with high hydrogen.

## **Deliverables:**

- a) A detailed technical report on previous work on limits of flammability, ignition and DDT potential of a range of fuels containing high hydrogen under varying conditions, including how this is applicable to exhaust systems of engines/turbines, particularly with respect to CHP/CCGT systems which may include duct burners for turbine applications. The report should highlight any shortfalls, gaps, and development opportunities along with recommendations of inherently safer designs. This report will be delivered in the first 3 months of the project.
- b) Based on [1], a more detailed and specific proposal on the experimental programme required in work package 2 should be developed for approval by the ETI

### **3.2 Work Package 2: Experimental investigation into the limits of flammability, ignition and DDT potential under a range of high hydrogen fuels for CHP and CCGT applications**

#### **Background**

This work package will focus on the experimental investigation into the limits of flammability, ignition and DDT potential under a range of high hydrogen fuels (with various diluents, inerts, and impurities, operating conditions (temp, pressure, flow rate, etc), blockages (tube/fin exchangers), material (SCR), and configurations (horizontal and vertical))

Having examined the literature for previous work done in this area in work package 1, this WP will build on the information available in the literature and investigate CHP and CCGT applications specifically.

#### **Work Package Structure**

At a minimum, this work package should be structured to include the following:

- Pre-planning for test rig design and experimentation
- Test rig design (according to agreed functional requirements including those below)
- Design of experiments
- Management and operation of test rigs
- Project report and recommendations

#### **Envisaged Test Rigs**

It is envisaged that two test rigs will be required to be utilised, one at a smaller scale cross sectional duct sizing (e.g. 1m by 1m) and one at a larger scale (e.g. 3m by 3m or 3m by 4m). The Respondents should suggest the two representative scales and geometries; with justifications. Vertical configurations should be considered for the smaller scale test rig in order to assess the potential impact of varying HRSG configurations

## Test Rig Design Considerations

- Based on constant airflow test facility
  - Variable temperature
  - Atmospheric pressure
- Fuel/air/diluent premixer
  - Converging-diverging nozzle
  - Turbulence generator
  - Short duration fuel flows
- Fully instrumented test sections
  - Various igniter locations
  - Representative geometries providing blockage
  - Dynamic data logging to capture data
- Test ideas for extending limits of flammability range and reducing pressure rise

## Key Items for Inclusion in Proposal Documents

### Work Package Structure, Project Plan, and Stage Gates

The Respondents should suggest an appropriate work package structure, project plan, and stage-gates to manage this work package, taking particular note of requisite HSE requirements to manage the project from design, construction through to operations and decommissioning.

### Test Rig Costing, Schedule, Quality and Safety

A full costing analysis and breakdown of costs should be included, along with project plan from design, construction through to operation.

### Design of experimental programme

Respondents will need to recommend a carefully designed experimental programme that will provide the greatest insights into the following, within the estimated project budget:

- Effect of exhaust temperature variation and mass flows,
- Effects of cross-sectional scaling, initial turbulence intensity,
- Effect of duct burners, catalyst beds, heat exchanger tube and fin configurations
- Effect of inert gases, steam, CO, methane, and relevant impurities
- Effect of discrete ignition sources and locations
- Enables assessment of dead space and mitigation
- Effect of metal temperatures
- Any additional key factors the respondents feel are relevant to this programme

Respondents will need to recommend an appropriate number and range of measuring devices in place to measure and assess flame acceleration during any DDT – tracked within time and space within the event. Flame front velocity, pressures, flame front pressure, temperature, and dynamic pressure at a minimum. The number and range of measuring and monitoring devices that will be utilised in the envisaged test rig and approximate cost of these devices needs to be articulated in the proposal.

### Management and Operation of Test Rig

Respondents will need to provide assurance of the capabilities of the organisation to manage and run operations of the test rig, as well as its capability and resources to manage the test rig facilities after the end of the Project.

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications



## Deliverables

A report detailing:

- The empirical results of the experimental investigation into the limits of flammability, ignition, and DDT potential in representative geometries, temperatures and pressures with various different CHP/CCGT type arrangements. The report needs to highlight gaps in the experimental work and make recommendations on any further required work
- An interpretation of the results and recommendations and implications on the design of these systems

### 3.3 Work Package 3: Investigation into Fast-Response Gas Composition Measurement for Engine Controls

Currently, gas engines fuelled with high hydrogen content gases are often at significantly de-rated efficiency values (up to 50% de-rate). If high response time input gas composition measurement and control were in place, it may be possible to run these systems at higher efficiency values, and hence define a greater opportunity space for this technology area. This work package will empirically examine methods of measuring and correlating the gas composition to the combustion characteristics via key performance parameters such as, but not limited to, laminar flame speed or lower heating value.

Methods for assessing the input gas composition are required which have sufficiently high response time to allow an engine or turbine to adapt to changes in gas composition over time. These will allow the controls of an engine or a turbine to be dynamically adapted to operate safely, protect the equipment, and maintain efficient performance. A review of the current landscape for these devices and assessment of the potential applicability of current or near market devices will be made (based on lab and field data).

Upon completion of the landscape review, the project proponents should recommend to the ETI whether a validation of these devices or methods should be conducted; and if recommended, an appropriate test plan for validation (based on lab and field data). This will be reviewed by the ETI at an appropriate stage-gate.

It is not envisaged that new sensors be developed in this work, but rather that existing technologies be altered so as to be fit for purpose.

#### Deliverables:

- a) A preliminary report and landscape review of methods and devices for assessing the input gas composition which have sufficiently high response time to allow an engine or turbine to adapt to changes in gas composition over time. The report must outline the range of measurement methods investigated theoretically, including the criteria used for assessment, prioritisation and the down-select process. The report must include a recommendation for validation of these devices, and, if recommended, an appropriate test plan for validation. The report will be reviewed jointly by the ETI and the consortium to agree whether to progress to part 2 of the work package.
- b) Assuming a positive recommendation is jointly accepted after deliverable [1]: A report outlining the results of the experimental work, including a full analysis of the performance and a summary of the required development to bring the sensor to market.

### 3.4 Work Package 4: Evaluation and Recommendations Report

This work package will build on the work delivered in work packages 1 to 3. This should be a summary report highlighting key findings and recommendations for follow-on work.

#### Deliverables:

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications

An analysis on the greatest areas of concern in design and control of systems. Outline scope of work of what needs to be done to develop these areas and recommendations for follow-on work.

Critical Success Factors, which either characterise a successful Project outcome or which are required to facilitate a successful Project outcome, include the following. Any additional factors identified should be described in the Proposal.

The Project must provide sufficient information and present it in such a manner as to enable the ETI to make informed decisions at the end of the Project regarding follow-on work.

#### **4 Price and Payment**

This Project will be paid on a ***“capped cost plus” basis***. The Project Contract will include defined deliverables, with acceptance criteria, and defined Payment Milestones by which one or more deliverables will have been completed. Payments will be made against each defined Payment Milestone according to actual costs incurred by the Participants (plus an agreed profit margin), up to the agreed maximum for each Payment Milestone. This will be subject to acceptance by the ETI of each of the deliverables against their acceptance criteria and acceptance of the actual costs submitted.

Unless otherwise previously agreed as part of a formal contract variation process, the ETI shall not be liable for any payments above the maximum stated in the Project Contract.

Further information is contained in the Summary of Terms contained in Appendix B.

An Accountant’s report shall be required to support selected financial reports and invoiced amounts, dependent upon the total contract value to be paid to each Participant. Details of these requirements will be agreed during the Project Detailing phase.

Respondents must identify all sources of funding or resources to be provided in addition to the ETI Funding (split amongst own funds, third party private funding and third party public funding).

#### **5 Terms and Conditions for Project Contract**

The Project will be governed by a Project Contract. A summary of the key terms and conditions of the Project Contract are included in Appendix B of this RfP. This Contract shall incorporate appropriate information from the ETI’s RfP, the Respondent’s Proposal and information drawn up and agreed during the Project Detailing and Contract Negotiation Stage.

As indicated in Section 2.3, Respondents are invited to submit a notification of their intention to bid, together with a signed non-disclosure agreement in the form included at Appendix D of this RfP. On receipt of the properly executed non-disclosure agreement, the ETI will release the full terms and conditions of the draft Project Contract to the Respondent. The Respondents are required to confirm their acceptance of (or identify any exceptions to) the terms and conditions of the full Project Contract in the Statement of Compliance (see section 12 of the Appendix D). The Respondents’ acceptance of or exception to the terms and conditions will form the basis for contract negotiation following selection of a preferred bidder.

If the Respondents are forming a consortium to deliver the Project, a Consortium Agreement will need to be entered into between the Consortium Members. The Consortium Agreement between the Consortium Members will require review and approval by the ETI prior to signature of the Project Contract with the ETI.

## Appendix A Content and Format of Proposals

The Proposal shall be arranged according to the structure defined below and shall explicitly include all the information listed.

### 1. Executive Summary [maximum 1 page]

A summary of the Proposal, describing briefly:

- The organisation / Consortium undertaking the work
- Summary of the technical approach and **key** deliverables
- Confirmation of compliance with the Specification detailed in the Request for Proposals and/or brief summary of **key** exceptions/deviations
- Total Project cost and duration.

### 2. Project Objectives [typically = ½ page]

The overall Project objectives will be as specified in the Request for Proposals. The Respondent may provide subsidiary objectives if they think this is appropriate. The Respondent should also describe any Critical Success Factors which either characterise a successful Project outcome or which are required to facilitate a successful Project outcome.

### 3. Background to Proposed Participants

The Respondent should provide a brief description of each of the proposed Participant organisations, including any major Subcontractors, **[maximum 1 page per Participant/Key Subcontractor]**, including:

- Key skills, knowledge, experience and previous track record in the area (technical, commercial and project management, including any UK-specific issues such as technology applicability to UK systems, UK industry practice, UK market/industry knowledge, etc)
- Key staff members involved (including a designated Project Manager), with the amount of each individual's time which will be dedicated to the Project, and detailing their experience – with CVs included in an Appendix (maximum 2 pages per individual)
- Alternate resources available to be deployed in the event that the above key members become unavailable
- Relevant quality, health, safety and environment management systems.

#### 3.1 Key Individuals and Roles [maximum 2 pages plus summary CVs]

The ETI places great emphasis on two critical roles in major projects – Project Manager and Chief Technologist.

The Project Manager is responsible for managing and progressing the project team and programme to time and cost, handling information flows and commercial issues, ensuring effective team-working and the continued engagement and support of key stakeholders. In essence this responsibility is to make sure that the ETI benefits from a result at the end of the programme of work that meets the agreed outcomes within time and cost.

The Chief Technologist is responsible for the technical quality and content of the work, ensuring the competence of key technical staff allocated to individual work packages, the effective review of key outputs and the effectiveness of detailed technical planning to ensure that the emerging results of work are fed back into the forward plan. In essence this responsibility is to assure the technical quality of the project and its outcomes.

The ETI will assess the competence, experience and authority of these two people and their ability to work together as critical to project success. The ETI expects these two roles to be filled by the same people throughout the life of the project.

Respondents should identify specific individuals for these key positions, including deputies, and other key roles as appropriate. Respondents should state the amount of each individual's time which will be dedicated to the Project, and detail their experience – with CVs included in an Appendix (maximum 2 pages per individual).

### 3.2 Collaborative working

If the Project is to be undertaken by a group of organisations (whether as a Consortium or where there are Subcontractors), a table **[typically ½ page]** should also be provided to identify which Participant(s) is/are proposed to satisfy each of the specific criteria (skills, experience, etc) listed in the 'Criteria for Review and Selection of Proposals' section of the Request for Proposals.

Also if the Project is to be undertaken by a group of organisations (whether as a Consortium or where there are Subcontractors), evidence of previous collaborative working (or subcontract management as appropriate) should be provided, both within and outside the Participant group **[typically ½ page]**.

### 4. Project Organisation [typically 2 pages]

The Respondent should provide Project organisational, governance and control structures and processes (particularly for Consortia).

The Respondent should indicate in the structure each Participant (including the ETI) and the position of the key individuals identified in Section 3 (including the Respondent's Project Manager).

The Respondent should identify in their Proposal any foreseen issues or difficulties in executing a Consortium Agreement and/or subcontracts (as appropriate).

### 5. Programme of Work [typically 5 – 10 pages]

The Respondent should provide a summary of the overall approach to delivery of the Project, and a Task-by-Task breakdown of the proposed work, identifying for each Task:

- the Task leader
- other Participants involved
- key dependencies
- the technical approach (including use of any specific methodologies, techniques or tools)
- Task objectives
- deliverables, including for each deliverable a specification (e.g. quality, appearance, scope, function and purpose as appropriate) and proposed Acceptance Criteria

The Respondent should be specific about the activities within the Task, e.g. including test/simulation matrices or stating a number of tests/simulations.

Any issues or assumptions in defining the programme or schedule (e.g. inputs required from the ETI or other projects) should be explicitly stated.

A specific project management Task (or Tasks) should be identified describing all the activities in this area (e.g. regular meetings, reporting, Stage Gates etc). **Note that throughout Project delivery the ETI will require reports of monthly progress with supporting financial data, reports to substantiate completion of each milestone, etc.**

If appropriate, a work flow diagram should be provided to illustrate the relationships between Tasks.

Any relevant activities related to but not included within this Project, and the relationships with these activities, should also be described.

### 6. Deliverables & Payment Milestones [typically 1 page]

Following the detailed specifications of each deliverable in the previous section, a summary table should be provided here listing all the Project Payment Milestones (i.e. key points in the Project where one or more Deliverables will have been provided and payment is requested from the ETI), and their constituent deliverables, with due dates for each deliverable and Payment Milestone.

The ETI prefers that Participants aim to have no more than approximately four Payment Milestones a year but more frequent Payment Milestones are proposed, the Respondents should provide reasons why.

Refer also to Section 14 of this Appendix A.

## **7. Project Schedule [typically 1 page]**

The Respondent should provide a time schedule for the Project (e.g. in the form of a Gantt chart) showing the main Work Packages, Project stages and main Tasks within each Work Package and stage. This should clearly identify:

- Task durations and dependencies (including any inputs required from the ETI or other parties and any other external dependencies)
- Project Deliverables
- Payment Milestones and other relevant milestones
- Project Stage Gates, if appropriate (i.e. major review point(s) in the Project).

## **8. Risk and Management [typically 3 pages]**

The Respondent should describe the proposed Risk Management Strategy (i.e. how risks to the successful delivery of the Project will be identified and managed throughout the Project). They should also provide a Risk Register, identifying the key challenges, risks (including any assumptions or dependencies identified earlier), issues and opportunities which may affect the successful delivery of the Project outcomes and identifying planned activities to address / mitigate each item.

## **9. Health, Safety & Environment (HSE) Management [maximum 5 pages]**

Respondents should demonstrate an integrated approach to managing HSE throughout their Proposal.

In this Section Respondents should summarise their approach to manage and coordinate HSE in the Project. This should include key roles and responsibilities of different Participants (and any Subcontractors). Respondents should demonstrate their experience of identifying and managing HSE issues in projects of equivalent complexity and scale, including:

- (a) Coordination of HSE across multiple contractors (if applicable);
- (b) Incorporating safety into design;
- (c) Building/modifying and commissioning of facilities (to the extent applicable to the Respondent's Proposal);
- (d) Operation of facilities of similar scale and complexity;
- (e) Management of major hazards;
- (f) Planning for incident response.

In addition, it is expected that any development of part of test facilities will fall under the CDM Regulations and may be a notifiable project under the CDM Regulations. The ETI expects that the Lead Coordinator or Prime Contractor will elect to act as Client and details should be included to confirm which Participant will elect to be the Client. Details of the proposals to appoint a CDM Coordinator and Principal Contractor should be included if the Project is expected to be a notifiable project under the CDM Regulations. The Respondents should also set out their approach to managing contractors.

The ETI will carry out a full HSE competency assessment against the Respondents (the Prime Contractor and the members of any Consortium), including compliance with the Approved Code of Practice for the CDM Regulations, Appendix 4.

In addition, the ETI expects Participants funded by the ETI to provide evidence throughout the Project that HSE is being managed and that such arrangements are adequate. The Respondents are required to set out in their Proposal how their management arrangements will enable such evidence to be provided.

The Respondent should note that specific health and safety requirements will be included in the Project Contract including reporting against health and safety performance on a periodic basis, as appropriate to the successful Project.

The Respondents will be expected to set out any key HSE risks in the Risk Register in Section 8 of this Appendix A. In addition in Section 11, the Respondents are expected to identify any specific HSE issues related to specific facilities or sites.

Note: to the extent that facilities are sited outside of the UK, the Respondents should deal with the analogous issues as they apply in the local laws of the relevant country of a facility.

#### **10. Test Rig Facilities** *[maximum 4 pages]*

The ETI is prepared to fund the design, commissioning and testing of test rigs for this Project.

The ownership of the test rigs will be vested with the Respondents who will be expected to own, manage and maintain the test rig facilities during the Project on their own behalf.

The Respondents should advise:-

- Whether they propose to use and/or make available the test rigs following the projects and their plans to do so;
- How the ETI members may access the test facilities following the Project and options for preferential rates or access to the ETI members;
- Proposals to make the test rig facilities available commercially;
- Proposals to decommission the test rig facilities if no operational use is planned following the Project or at a subsequent date.

In return for funding 100% of the test rig facilities during the Project and vesting ownership with the Respondents, the ETI would expect:

- that ETI members would be able to access the test rig facility during the first 12 months following the Project on preferential basis;
- no further ETI Funding is made available in relation to the test rig facilities following the end of the Project;
- a form of agreed revenue to flow back to the ETI for a reasonable period from any commercial access (other than ETI members during the first 12 months).

In the event that the Respondents do not propose to use the test rig facilities after the end of the Project, the ETI will expect the Respondents to decommission the test rig facilities at their own cost.

#### **11. Siting of Test Work** *[maximum 5 pages per site plus supporting documentation]*

For the Work Packages which involve experimental work, Respondents should identify the proposed test site, describe the current level of commitment from the site owner/operator to the Project, and clearly identify the outstanding issues which will need to be addressed before any construction and testing commence. For each such site, Respondents should provide, as far as is reasonably possible, the following information.

Note: to the extent that any facilities are sited outside of the UK, the Respondents should deal with the analogous issues as they apply in the local laws of the relevant country of a facility.

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications

Respondents should:

- (a) identify the proposed test site and provide details of any issues which affect the rights to use the site;
- (b) any outstanding issues, dependencies or potential obstacles to the use of the proposed site(s) and specialist facilities for the Project and an explanation provided as to how the Respondent intends to address these issues, to ensure that construction and testing can commence as scheduled;
- (c) identify any additional planning consents are required to use the site(s) for the Project, if any;
- (d) details of any existing environmental and site operating (eg COMAH) permits on the proposed site(s) and whether additional permits are required to allow full implementation by the Participants of the Project;
- (e) what will happen to any waste products produced during the Project and after conclusion of the Project

The ETI expects that the Respondent's Proposal should take into account any additional costs and time required to acquire the relevant planning and environmental consents and permits.

## **12. Statement of Compliance [typically 1 page or less]**

The Respondent shall provide a statement that the Proposal is fully compliant with the Specification and all other aspects of the Request for Proposals, or shall state clearly any exceptions, deviations, alternative approaches or additions to the required Specification, with justification. ***Note that in the absence of any specifically-stated deviation in this section of the Proposal, in the case of any subsequent dispute, the ETI's specification will take precedence over the Proposal.*** Additional comments and clarifications should also be listed where appropriate (for example to clarify interpretation of requirements), but these must be differentiated from any deviations / exceptions above.

In relation to the Project Contract, the Statement of Compliance should set out (a) the acceptance by each Respondent of the terms and conditions of the Project Contract and (b) any exceptions to the terms and conditions of the Project Contract issued by the ETI, if any. The exceptions set out will both be considered as part of the selection process to determine whether there is material compliance of the terms and conditions and as the basis of negotiations with the successful Respondent selected to enter into contract negotiations.

## **13. Intellectual Property (IP) [typically 1 – 2 pages]**

### **Arising IP:**

Any Project commissioned by the ETI will be subject to the appropriate ETI terms and conditions, (a summary of which is included in Appendix B). In this Project, the Arising IP will belong to the ETI, including Arising IP in the designs for the test rigs. The Respondent should provide a brief overview of the nature of any anticipated Arising IP from the Project.

Any licensing of Arising IP from the ETI to the Participants may be discussed if appropriate. If Participants wish to discuss any licence to use the Arising IP, Participants should note that under state aid rules profit cannot be paid for the Project in addition to the grant of a licence of Arising IP.

**Background IP:**

The Respondent should describe any Background IP (e.g. patents, proprietary data, computer algorithms, know how or other IP) only to the extent there is Background IP:

- which is needed (whether by the ETI, or to be licensed from one Participant to another Participant or a Subcontractor, or to be licensed by a Subcontractor to a Participant or to another Subcontractor, or otherwise) to carry out the Project or which may be used during the Project; or
- which may be needed by the ETI to exploit the Arising IP.

The description of any such Background IP should detail:

- the nature of the IP (including the legal nature of the IP right),
- rights to that IP, and
- ownership and control, whether this is by any of the Project Participants or by any third parties.

**Academic Institutions/Publishing:**

Generally, the ETI will grant rights to Participants who are academic institutions for the purposes of academic research and teaching if requested. Publication of appropriate parts of the Project results will generally be permitted subject to an approval process. Participants should include details of their desired requirements in relation to academic research, teaching and publication in their Proposal.

**14. Project Payment [typically 1 – 2 pages]**

(a) The Respondent should provide:

- a figure for the **maximum (capped) total contract value**, and
- a **breakdown** between Tasks and (for consortia or other Participant groups) **between Participants against each Task**.

If there are any assumptions or limitations to this price, these should be clearly stated.

(b) The Respondent should also provide a **breakdown of the total contract value (only) by category**, as specified in the Table below.

|                       | Participant 1<br>(Lead Coordinator or Prime Contractor) | Participant 2 | Participant 3 | Participant 4 | Participant 5 | Total |
|-----------------------|---|---------------|---------------|---------------|---------------|-------|
| Number of Person-days |   |               |               |               |               |       |
| Base Labour           |   |               |               |               |               |       |
| Materials             |   |               |               |               |               |       |
| Capital               |   |               |               |               |               |       |
| Subcontractors        |   |               |               |               |               |       |
| Travel & Subsistence  |   |               |               |               |               |       |
| Overheads             |   |               |               |               |               |       |
| Other                 |   |               |               |               |               |       |
| Profit                |   |               |               |               |               |       |
| <b>TOTALS</b>         |   |               |               |               |               |       |
| Profit Margin, %      |   |               |               |               |               |       |



Notes on Category Breakdown table:

- 1 Base Labour should include direct add-ons (eg NI, pension etc)
- 2 Capital costs should be based on depreciation during the Project x % usage on Project
- 3 Participants will be required to provide justification of overhead calculations during the Project detailing stage. ETI can provide a spreadsheet to calculate overheads on request
- 4 Participants are required to declare their profit margins
- 5 Academic Participants should determine their costs using the JeS system. Note that ETI funds Academic Participants at 100% Full Economic Cost.

***Please note that during Project Detailing (prior to contract signature) the ETI will require more detailed cost breakdowns, including a schedule of payments against the Payment Milestones identified in Section 5 above.***

#### **15. Insurance [maximum 1 page]**

Respondents should identify how they intend to insure against risks in the Project. The Respondents will need to work with the ETI and its insurers in the contract detailing stage to ensure appropriate coverage of Project risks.

## **Appendix B Due Diligence Information Requirements**

The ETI requires due diligence information in two stages. Certain information is required with the Proposal as part of the initial stage when responding to this Request for Proposals and further information will be required if any Proposal is selected to proceed to the Stage 2 (Detailing and Negotiation)

Please note that successful completion of all elements of the due diligence is a pre-requisite to any contract award: failure to meet due diligence requirements at any stage may result in the exclusion of that Respondent or the Proposal from the ETI's selection process.

### **1. Stage 1 Requirements (to be included with Proposal)**

#### **1.1 State Aid**

All Consortium Members shall confirm that there are no potential, threatened, pending or outstanding recovery orders by the European Commission in respect of any funding received by any Consortium Member.

#### **1.2 Organisation Due Diligence**

All Consortium Members (except ETI Members, universities / higher education institutions and UK/EU government laboratories / agencies) which provide more than 20% of the resources for the Project or which provide an input which is critical to the Project's success, shall provide due diligence Information to the ETI according to the table in Annex C2.

#### **1.3 Insurance**

The Respondent should confirm that insurance cover for the following risks is held, and should confirm levels of cover and expiry for each. The ETI will require evidence of these during the Project Detailing phase.

- Property damage (both any Property occupied by the Participants and any third party properties)
- Business interruption
- Employer's liability
- Public liability
- Product liability (or justify its exclusion if not appropriate)
- Professional Indemnity
- The Respondent should identify if it self-insures for any of these risks.
- The Respondent should identify if it is intending to take out any project-specific insurance for the Project and the scope and intended beneficiaries of such insurance.

#### **1.4 Intellectual Property**

The Respondent should complete the Background IP questionnaire in Annex C1.

The ETI reserves the right to request a patent study if appropriate for this Project in stage 2. The ETI does not currently anticipate the technology to be developed in this Project would require a patent study.

## 1.5 General

The Respondent (unless an ETI Member, university / higher education institution or UK/EU government laboratory / agency) shall provide the additional information set out in Annex C2.

## 2. Stage 2 Requirements

These are only required if a Proposal is selected to proceed to the Project Detailing and Contract Negotiation Stage, and will include:

- a) A full health and safety competency assessment will be carried out by the ETI, to assess the organisation's health & safety management systems and specific technical competence to manage the risks in this Project. Any parts of the Project which fall under the CDM Regulations, will be assessed in line with the CDM Approved Code of Practice, Appendix 4;
- b) Further intellectual property due diligence. This will include a detailed Background IP questionnaire. It may include a patent study relating to the Project if appropriate, which the Respondent will be expected to submit to the ETI;
- c) Appropriate evidence relating to rights, planning and permitting for proposed test sites, including, to the extent necessary:
  - Evidence to demonstrate the Respondent's current rights of use of the test site(s) or to reflect the current state of negotiations with the site owners/occupiers (such as heads of terms);
  - plans for integration with existing facilities;
  - if appropriate, agreements with site/facility owners on access to and from the site(s), access to services and utilities; management of the inlet gas supply and disposal/ venting/ return of the outlet stream(s);
  - if appropriate, planning consents or applications to use the site (or evidence that such consents are not required);
  - environmental permits or applications for the site (or evidence that additional permits are not required).
- d) Financial due diligence on the breakdown of costs for the Project to enable the ETI to assess value for money and ensure that it meets State Aid requirements;
- e) Copies of insurance policies;
- f) Any other information that the ETI reasonably requires in order to fund the proposed Project including any information necessary to meet state aid requirements.

## **Annex B1 Background Intellectual Property Questionnaire**

**Each Respondent (Prime Contractor or member of the Consortium) is required to complete this.**

The Respondent should provide details of how the proposed technology is protected through intellectual property rights.

This should include a detailed description of all Background IP (e.g. patents, proprietary data, computer algorithms, knowhow or other IP) which is needed to carry out the Project or which may be used during the Project, or, which may be needed by any ETI member granted access to exploit any Arising IP. The details should include:

- the nature of the IP (including in the case of any registered IP, all applications for or granted registered rights in all jurisdictions);
- rights to that IP;
- ownership and control, whether this is by any of the Project Participants or by third parties;
- details of the relationship with the owner of any third party rights identified.

## Annex B2 Organisational Due Diligence Questionnaire

| <b>Details of organisation</b>   |
|--|
| Full name:   |
| Registered Office:   |
| Type of Business (sole trader, limited company, partnership etc):  |
| Names of directors/partners/owner:   |
| VAT number:  |
| <b>Details of directors, partners or associates</b>  |
| Have any directors, partners or associates of the organisation been involved in any organisation which has been liquidated or gone into receivership? (Yes/No) |
| Have any directors, partners or associates of the organisation been convicted of a criminal offence relevant to the business or profession? (Yes/No)           |
| Please give (and attach if necessary) full details if you have answered 'Yes' to either of the two previous questions.   |
| <b>Audited Financial Accounts</b>  |
| Please supply Audited Financial Accounts for the last 3 years for the organisation, or relevant part thereof.  |
| <b>Claims or litigation</b>  |
| Please provide (and attach if necessary) details of any claims or litigation against the organisation, outstanding and/or anticipated.                         |

## **Appendix C Summary of Terms and Conditions for Project Contract**

### **TECHNOLOGY CONTRACT**

#### **Summary of Terms**

##### **Introduction**

The following represents a summary of the key contractual terms which the ETI would expect to be included in the Technology Contract for a project under which the ETI owns all arising IP. This summary assumes that the Project will be carried out by a single contractor, the Prime Contractor, which may have specific parts of the Project scope subcontracted, subject to the approval of the ETI. Further/alternative provisions are indicated where relevant in the event that the Project is carried out on a multi-party consortium basis.

##### **Structure**

1. Where the Project will be carried out by a Prime Contractor, the Prime Contractor will manage the Project. Where there are Subcontractors, the Prime Contractor shall be solely responsible for the management and coordination of the activities of the Subcontractors. The Prime Contractor will be responsible for and administer payment for all of its Subcontractors.
2. Where the Project will be performed by a multi-party consortium, the Participants shall be represented in dealings with the ETI by a Lead Co-ordinator, who shall, in the majority of instances, be the intermediary for any communication between the ETI and the Participants. This role includes providing notices of meetings and other activities to the ETI, reviewing and commenting on project reports (as required under the Project) and administering payment of invoices for all Participants.

##### **Project Management**

3. The Prime Contractor or, in the event of a consortium, the Participants will appoint a Project Manager for the day-to-day management of the Project. The ETI will appoint a Programme Manager to act on behalf of the ETI with regards to the Project.
4. Where the Project will be performed by a consortium, the Participants shall form a Steering Committee to make decisions on day-to-day matters (excluding decisions affecting the overall scope, structure and timing of the Project). The frequency of meetings of the Steering Committee will be agreed with the ETI. The ETI and its members shall be entitled to attend any meetings of the Steering Committee.
5. The Prime Contractor or, in the event of a consortium, the Participants must fulfil various reporting obligations. The requirements for reports will depend upon the nature of the project, the deliverables under it and the duration of the Project but are likely to include monthly reports and a final report. Each report must address a specified list of topics required by the ETI.
6. The ETI will require the right to carry out a Stage Gate review on completion of a Stage (or from time to time at a frequency to be agreed) in order to assess whether the Project continues to deliver against ETI outcomes and also in order to carry out a validation exercise against the business case. The ETI may carry out Stage Gate reviews more frequently if the Project is in jeopardy. The need for Stage Gate reviews and the definition of a stage will depend upon the nature of the Project.

7. The ETI will require that the Project is carried out in accordance with health and safety law and will require reports and information as evidence of such compliance from time to time (tailored to the Project).

### **Finance**

8. ETI will pay a fixed price against defined Payment Milestones for the work done under the Project (as set out at Section 3 of this RfP, "Price and Payment"). Acceptance of deliverables and milestones will be determined by the ETI, where appropriate, against agreed acceptance criteria. Any increase in costs in carrying out the Project over and above the agreed contractual amounts will only be payable by the ETI in the event that such charges are agreed in accordance with the contractual variation control procedure.
9. Costs are payable in Sterling and ETI will pay valid invoices within 30 days of receipt of invoice following acceptance of a milestone.
10. The ETI reserves the right to require the return of funding in certain circumstances (such as in the event of corruption or fraud, overpayment, costs incurred in respect of unapproved project changes and failure to comply with State Aid obligations).

### **Confidentiality**

11. Restrictions on disclosure of any other party's confidential information will apply. Any publication of results (if appropriate) will be subject to the confidentiality provisions in the agreement.

### **Audits and Records**

12. ETI will require the right to audit the Project, the Prime Contractor (alternatively, in the event of a consortium, the Participants) and any and all Subcontractors during the Project and, in certain circumstances, up to 7 years from the end of the Project on financial or technical grounds.
13. All parties involved in the Project will be required to maintain the majority of Project records for a minimum of 10 years from the Project end date and for potentially more than 20 years where the records relate to registered intellectual property rights. The Prime Contractor shall require no less obligations from its Subcontractors.

### **Sub-contracting**

14. Sub-contracting is not permitted without consent, except for agreed known subcontractors included/detailed in the Technology Contract at signing.

### **Variation**

15. Any variations to the Project must be made via the variation control procedure.

### **Liability/ Warranty / Indemnity etc.**

16. The ETI will require that warranties and undertakings be given by the Prime Contractor or Participants (as appropriate), including without limitation in relation to rights to Background IP and the amount of the Project costs spent on research and development as defined in the Income and Corporation Taxes Act 1988.
17. There will be an indemnity in favour of the ETI members for tax losses in the event that the Prime Contractor or Participants (as appropriate) fails to provide complete and accurate information

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications

relating to the Project costs spent on research and development as defined in the Income and Corporation Taxes Act 1988.

18. The liability provisions relating to the Prime Contractor, alternatively in the case of a consortium the Participants, will be tailored on a case-by-case basis but are likely to be capped at the amounts payable under the Project (except in the case of IP infringement claims, certain third party claims (to allocate risk fully to the Participants for the risks of their activities during the Project) or other liabilities which cannot be limited or excluded by law. For these claims, no cap will apply). Recovery of indirect, consequential etc. damages will usually be excluded. The Prime Contractor will be liable for the acts and omissions of the Subcontractors.

### **Withdrawal**

19. Withdrawal from the Project is only possible with the express consent of the ETI and, in the event of a consortium, with the unanimous consent of the other Participants. In such circumstances, the Contractor or withdrawing Participant(s), as appropriate, cannot recover outstanding costs, unless otherwise agreed.

### **Termination and Suspension**

20. The ETI reserves the right to terminate the agreement in certain circumstances (such as breach by the Contractor (which shall include without limitation a breach by a Subcontractor) or, in the event of a consortium, a Participant, insolvency or change of control of a Contractor/Subcontractor/Participant etc.). The ETI also reserves the right to terminate the agreement unilaterally upon giving a (to be agreed) period of notice to the Contractor or Participants, as appropriate. Upon termination, the ETI will pay the eligible costs incurred by the Contractor or Participants (as appropriate) up to the date of termination.
21. The ETI will reserve the right to suspend the Project in certain defined circumstances.

### **Intellectual Property**

22. All arising IP from the Project will be owned by the ETI. The Contractor (or, in the event of a consortium, the Participants) and any Subcontractor(s) will, to the extent required, be required to assign all relevant arising IP to the ETI.
23. The Contractor (or, in the event of a consortium, the Participants) and any Subcontractor(s) will be required to licence their Background IP: (i) to the other parties (including for the avoidance of doubt Subcontractors) involved in the Project on a royalty free basis where required for the purposes of the Project; (ii) to the ETI or sub-licensees of the ETI, where required for the use or exploitation of the arising IP.



## Appendix D Glossary

| Term                    | Definition   |
|-------------------------|--|
| Arising IP              | Any intellectual property which is created by or for any Participant during the Project or for the purposes of the Project.  |
| Background IP           | Any intellectual property which existed prior to any Participant's commencement of the Project and which was created by or for the Participant.  |
| CDM                     | Construction (Design and Management) Regulations 2007.   |
| Client                  | As defined by CDM.   |
| Consortium              | The group of organisations described in Section 1.5 which may decide together to submit a Proposal to carry out the Project and be governed by a Consortium Agreement between themselves. This will not include the ETI itself or any Subcontractors.  |
| Consortium Member       | An organisation which forms part of the Consortium.  |
| Consortium Agreement    | The agreement to be entered into between the organisations together forming a Consortium, as described in Section 1.5, which governs the execution of the Project within the Consortium.   |
| Lead Coordinator        | The organisation which is a Consortium Member, and which manages and coordinates the activities of all the Consortium members, and which acts as the primary interface between the Consortium and the ETI, as described in Section 1.6.  |
| Participant             | Either the Prime Contractor or a Consortium Member.  |
| Payment Milestone       | A contract milestone with defined constituent deliverables, associated deliverable acceptance criteria, and milestone value (all to be detailed in the Respondent's Proposal and agreed in the Project Contract) which should be completed in order to reach the said milestone, and at which, subject to acceptance by the ETI that the milestone has in fact been reached, payment may be claimed from the ETI on the basis described in Section 6 and on the Terms in Appendix B. |
| Prime Contractor        | A sole organisation which contracts with the ETI to manage the project. It may have Subcontractors.  |
| Programme Manager       | The individual appointed by the ETI to manage the overall ETI programme to which this Project is affiliated, and to whom the Project Manager is accountable.   |
| Project                 | The project for which the purpose, scope of work and other details are described in this Request for Proposals.  |
| Project Contract        | The contract, as described in Section 5, to be entered into between the ETI and the Participants (whether between the Consortium Members or a Prime Contractor)  |
| Project Detailing Stage | The stage of Project commissioning carried out by the ETI if and after it has decided to take forward a Proposal, during which full and final Project details are established and a Project Contract is agreed.  |
| Project Manager         | The individual who is appointed by the Lead Coordinator or Prime Contractor, or is otherwise agreed by the Project Participants, to carry out its responsibilities.  |
| Project Organisation    | The entity or group of entities / organisations, and the contracting and management structure which they adopt, as described in Section 1.5, which together will carry out the Project if commissioned by the ETI and includes any Consortium Members or Prime Contractor and any Subcontractors.  |
| Proposal                | The proposal for the Project submitted to the ETI, as described in Section 2.1, in response to this Request for Proposals.   |
| Public Funding          | Any funding provided by a public authority or agency.  |
| Respondent              | The organisations submitting a Proposal to the ETI, as described in Section 2.3.   |
| Subcontract             | A contractual arrangement between a Participant and another organisation to which work for the Project has been subcontracted.   |
| Subcontractor           | An organisation which has a Subcontract.   |

|                   |   |
|-------------------|---|
| Task              | A significant activity or group of activities (within a Work Package) which results in completion of a deliverable or a significant part of one, or which represents a significant step in the process towards one.                                 |
| Work Package (WP) | A major section of the Project scope of work, which may be identified in this RfP or in the Respondent's Proposal, in order to break up the scope of work into separate manageable parts. A Work Package will usually consist of a number of Tasks. |



## **Appendix E Multi-Party Confidentiality Agreement**

**THIS AGREEMENT** is made on \_\_\_\_\_ of \_\_\_\_\_ 2010

### **BETWEEN:**

- (1) **ENERGY TECHNOLOGIES INSTITUTE LLP**, a limited liability partnership (company no. OC333553) whose registered office is at Holywell Building, Holywell Way, Loughborough, Leicestershire, LE11 3UZ (the **"ETI"**); and
- (2) **The parties named in Schedule 1 of this Agreement** (the **"Participants"**),  
(collectively the **"Parties"** and individually a **"Party"**)

### **BACKGROUND:**

The Parties intend to exchange certain Information on or after the Effective Date for the Purpose. The Parties agree to receive such Information, which shall be treated as confidential information, for the Purpose on the following terms and conditions.

### **IT IS AGREED:**

In consideration of the above and for other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound, the Parties agree as follows:

- 1 In this Agreement, unless the context requires otherwise, the following words shall have the following meanings:

**"Disclosing Party"** means any Party that discloses Information pursuant to this Agreement;

**"Effective Date"** means the date of this Agreement;

**"ETI Affiliates"** means the Secretary of State for Business, Innovation and Skills (and any successor governmental department or agency from time to time) and any other entity which is entitled to appoint the directors or otherwise having the ability to direct management policies of the ETI (together with any affiliates of those entities), together with their respective officers, employees, agents and consultants;

**"Information"** means any and all confidential information or data submitted in respect of or further to the Purpose or prepared in relation to the Purpose, including but not limited to written proposal documentation, due diligence materials, contractual documentation, reports, and the fact that the Parties have entered into this Agreement and are discussing and considering a business relationship;

**"Procurement"** means the procurement by the ETI of the Project including any stages set out in the RFP or as later may be notified or published by the ETI;

**"Project"** means the proposed research and development project, to be funded (in part or in whole) by the ETI to derive experimental data in relation to the operation of CHP (Combined Heat and Power) and CCGT (Combined Cycle Gas Turbine) systems with hydrogen rich fuel systems;

**"Purpose"** means:

**Request for Proposals:** Assessment of Control and Safe Operation of Gas Engine and Gas Turbine Operations for High Hydrogen Content Gases in Combined Cycle and CHP applications

- a the preparation of documents and the making of any proposal in response to the RFP or for Stage 2;
- b any activities related to the assessment of a Respondent's proposal or proposals for the Project including, but not limited to, any technology, commercial offer, financial information, management systems and intellectual property; and
- c any related exchanges of Information, clarifications, discussions, meetings, or negotiations in respect of the RFP, the Procurement and the Project;

**"Receiving Party"** means any Party that receives Information pursuant to this Agreement;

**"Respondent Affiliate"** means any undertaking that is:

- a a holding company of such Respondent;
- b the ultimate holding company of the group to which such Respondent belongs; or
- c a subsidiary of any holding company or subsidiary of the group to which such Respondent belongs,

and for the purposes of this definition, the terms above are as defined in section 1159 of the Companies Act 2006;

**"RFP"** means the request for proposals relating to the Project, issued by the ETI on 30 June 2010; and

**"Stage 2"** means the second stage of the Procurement following the ETI's initial selection of any proposals received in response to the RFP and as described in the RFP and further notified or published by the ETI.

- 2 The Receiving Party shall with regard to any Information disclosed pursuant to this Agreement by or on behalf of a Disclosing Party on or after the Effective Date:
  - a hold the Information in confidence and except as is otherwise stated herein or agreed in writing by the Disclosing Party, shall not disclose or make available the Information by publication or otherwise to any third party (including for the avoidance of doubt, disclosure in any patent application or to any patent office) and shall use any Information disclosed to it pursuant to this Agreement only for carrying out the Purpose;
  - b make copies of the Information (or any further information derived from the Information) in whatever form or medium only to the extent that the copies are reasonably necessary for the Purpose and clearly mark all such copies as confidential;
  - c take all necessary and proper security precautions (and at least as great as those it takes to safeguard its own information) to safeguard every part of the Information to prevent it from being disclosed or otherwise made available to any third party except as permitted by this Agreement; and
  - d at the request and direction of the Disclosing Party, and without delay, return or destroy any Information provided to it pursuant to this Agreement and any copies of such Information, except that one copy may be kept by the Receiving Party for archival purposes and for the purpose of defending itself against any claims arising in connection with this Agreement.
- 3 The obligations set out in clause 2 shall not apply to Information that:
  - a the Receiving Party can prove (using written or electronic records), was lawfully known to the Receiving Party or in its possession prior to its communication by or at the direction of the

Disclosing Party and was not communicated to the Receiving Party subject to any restrictions on disclosure or use; or

- b is or becomes a part of the public domain through no wrongful act of the Receiving Party or any person on its behalf, provided that this clause 3(b) shall only apply from the date that the relevant Information so enters the public domain; or
- c the Receiving Party receives from a third party without similar obligations of confidence in circumstances where the third party did not obtain that Information as a result of a breach of an obligation of confidence; or
- d is required to be disclosed or made available by the Receiving Party pursuant to any applicable law, governmental regulation, or decision of any court or tribunal of competent jurisdiction or any government body, agency or regulatory body.

4 If a Receiving Party believes it is required by law to disclose any Information under clause 3(d) above, the Receiving Party shall (in each case and to the extent not prohibited in law):

- a provide the Disclosing Party with prompt written notice of such requirement or obligation, (together with a copy of any relevant access request, court order or other evidence giving rise to such belief) to enable the Disclosing Party to seek appropriate protective relief and/or to take other steps to resist or narrow the scope of any required disclosure;
- b where it is not permitted in law to notify the requirement for disclosure in advance of the required disclosure, notify the Disclosing Party as soon as reasonably practicable after the disclosure confirming the nature of and extent of the disclosure; and
- c co-operate with the Disclosing Party with respect to such matters,

and in any event disclose only such Information as it has ascertained, after taking advice, it is legally compelled to disclose.

5 ETI shall be entitled to disclose or make available any Information it receives from the Respondents to such of the ETI Affiliates, and either the ETI's or the ETI Affiliates' employees, officers, secondees, agents, consultants, sub-contractors, proposed sub-contractors, professional advisers and proposed professional advisers where such disclosure is necessary for the Purpose, provided that in the case of disclosure of Information to ETI Affiliates, that this is limited to disclosure as is reasonably necessary for the purpose of ETI's governance of the Procurement and the Project.

6 ETI shall be entitled to disclose or make available any Information it receives from the Respondents may be disclosed to the Department of Business, Innovation and Skills and to the European Commission and their advisers as is necessary to seek advice in relation to the application of state aid, to notify or as part of any detailed assessment of state aid in the Project.

7 ETI shall ensure that all such persons to whom any Information under clauses 5 and 6 of this Agreement is disclosed are bound by obligations of confidentiality and ETI shall be responsible for breaches of the obligations by such persons.

8 ETI shall be entitled to disclose or make available any Information it receives from a Respondent to the other Respondent where it is necessary for the Purpose.

9 Each Respondent shall be entitled to disclose or make available any Information it receives from the ETI or the other Respondent to such of its employees, officers, consultants, subcontractors and professional advisers where such disclosure is necessary for the Purpose provided that all such persons to whom any Information is disclosed are bound by obligations that are no less restrictive than those in this Agreement. The Respondent disclosing Information shall be responsible for breaches of the obligations by such persons.

- 10 Each Respondent shall be entitled to disclose or make available any Information it receives from the ETI to the other Respondent where it is necessary for the Purpose
- 11 The Receiving Party expressly agrees and accepts that except in the case of fraud, no representation or warranty, express or implied, is made by the Disclosing Party as to the accuracy, completeness, reasonableness or otherwise in respect of the use of the Information, and that neither the Disclosing Party or any of its affiliates nor any of its or their respective employees, officers, secondees, agents, consultants, sub-contractors and professional advisers (as applicable) shall have any liability to the Receiving Party as a result of the Receiving Party's possession or use of the Information.
- 12 The Parties agree that money damages would not be a sufficient remedy for any breach of this Agreement and that the Disclosing Party shall be entitled to specific performance and injunctive or other equitable relief as a remedy for any such breach. Such remedy shall not be deemed to be the exclusive remedy for breach of this Agreement, but shall be in addition to all other remedies available at law or equity.
- 13 No rights or obligations other than those expressly set out in this Agreement are to be implied and nothing contained in this Agreement:
  - a constitutes an offer by or on behalf of the Disclosing Party; or
  - b confers upon the Receiving Party a licence or other transfer of rights in respect of any Party's interest in any Information or in any present or future patent or patent application; or
  - c affects the present or prospective rights of the Disclosing Party under the patent laws of any country or precludes the filing or prosecution of any patent applications by the Disclosing Party.
- 14 This Agreement represents the entire agreement between the Parties in relation to the subject matter contained herein and supersedes all other agreements and representations, whether oral or written. This Agreement may only be modified if such modification is in writing and signed by a duly authorised representative of each Party.
- 15 Neither Party will make any public announcements, statements or otherwise publicise the subject matter of this Agreement (or its existence) without the prior written consent of the other Party and neither Party will use the business names or trade marks of the other Party in any way without that Party's prior written consent.
- 16 This Agreement shall come into force on the Effective Date and shall continue in full force and effect, notwithstanding the completion of the Purpose, for a period of seven years from the Effective Date unless extended or superseded by subsequent written agreement.
- 17 It is not intended that a third party (other than an ETI Affiliate) should have the right to enforce a provision of this Agreement pursuant to Contracts (Rights of Third Parties) Act 1999.
- 18 The rights of the Disclosing Party under this Agreement are in addition to and not exclusive of rights under the general law and may be waived only in writing and specifically. Delay in exercising or non-exercise of any right under this Agreement is not a waiver of that or any other right, partial exercise of any right under this Agreement shall not preclude any further or other exercise of that right or any other right under this Agreement and waiver of a breach of any term of this Agreement shall not operate as a waiver of breach of any other term or any subsequent breach of that term.
- 19 If any provision of this Agreement is or become illegal, invalid or unenforceable in any jurisdiction, that shall not affect:

- a the legality, validity or enforceability in that jurisdiction of any other provision of this Agreement; or
- b the legality, validity or enforceability in any other jurisdiction of that or any other provision of this Agreement.

20 Nothing in this Agreement is intended to or shall operate to create a partnership or joint venture of any kind between the Parties, or to authorise either Party to act as agent for the other, and neither Party shall have authority to act in the name or on behalf of or otherwise to bind the other in any way.

21 Except as provided otherwise, no person may assign any of its rights under this Agreement or any document referred to in it.

22 This Agreement may be executed in any number of counterparts, each of which when executed and delivered shall constitute an original of this Agreement, but all the counterparts shall together constitute the same agreement. No counterpart shall be effective until each Party has executed at least one counterpart.

23 This Agreement shall be construed in accordance with and governed by English law and the Parties hereby submit to the non-exclusive jurisdiction of the English Courts.

The Parties have caused this Agreement to be executed by their duly authorised representatives.

**ENERGY TECHNOLOGIES INSTITUTE LLP**

By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

**SCHEDULE 1**

| Participant  | Signature   |
|--|---|
| <p><i>[Insert name of Company] (company no. [Insert Company number])</i><br/> <i>[Insert address of Company]</i></p> | <p>By: _____<br/>           Name: _____<br/>           Title: _____</p> |
| <p><i>[Insert name of Company] (company no. [Insert Company number])</i><br/> <i>[Insert address of Company]</i></p> | <p>By: _____<br/>           Name: _____<br/>           Title: _____</p> |
| <p><i>[Insert name of Company] (company no. [Insert Company number])</i><br/> <i>[Insert address of Company]</i></p> | <p>By: _____<br/>           Name: _____<br/>           Title: _____</p> |
| <p><i>[Insert name of Company] (company no. [Insert Company number])</i><br/> <i>[Insert address of Company]</i></p> | <p>By: _____<br/>           Name: _____<br/>           Title: _____</p> |
| <p><i>[Insert name of Company] (company no. [Insert Company number])</i><br/> <i>[Insert address of Company]</i></p> | <p>By: _____<br/>           Name: _____<br/>           Title: _____</p> |
| <p><i>[Insert name of Company] (company no. [Insert Company number])</i><br/> <i>[Insert address of Company]</i></p> | <p>By: _____<br/>           Name: _____<br/>           Title: _____</p> |