

Gas Network Innovation Competition Full Submission
Supplementary Answer Form

Project: Commercial BioSNG Demonstration Plant

Tick if this answer has been provided verbally: ☐

Project code	NGGDGN02/1	Question Number	8
Question date	25/8/2015	Answer date	27/8/2015
Submission section question relates to	General		
Topic			
Question	What have the results of the pilot plant shown in terms of technical viability of the overall process, conversion efficiencies, waste product management and parasitic loads? How do the results match the predictions in the previous studies?		
Notes on question			
Answer	<p>The learning to date from the pilot plant project has been essential in developing the design of the Commercial Demonstrator and the pilot plant will continue to provide key data for Commercial Demonstration project. The learning from the pilot plant is complemented by recent data from Amec Foster Wheeler as described below..</p> <p>In order to reach the final, as built design for the pilot plant, which has now been constructed, the partners have undertaken significant developmental work as follows:</p> <ul style="list-style-type: none">• Operation of the gasification pilot plant element of the process over the last 18 months has supported the expected syngas compositions based on a variety of input feedstock, including RDF. This has reconfirmed that a cold gas efficiency of 78% can be achieved and has allowed final definition of the individual process reactors, particularly with regard to guard and polishing beds. This is within 0.5% of the figure proposed at the start of the current NIC Pilot plant programme.• There are two key areas of waste products . Firstly the vitrified slag produced from the gasification system, which ensures that the ash is		

stable and non-leachable; this has been thoroughly tested over many years and there is no change to the position with this. Secondly, there are the process waste streams associated with the gas processing, both dry residues and liquid effluents. Based on the analysis of the feedstock selected and the process modelling, there is no change expected to either of these in terms of compositions or volumes.

- Downstream of the gasifier, final process design work has led to detailed P&IDs and duty on process elements to define individual items of plant and equipment and their duty. This has confirmed, for example, that reference parasitic loads for the pilot plant are close to the original estimates, showing that the partners' design process is robust.
- In parallel, over the last 8 months, the partners have undertaken a programme of experimental work on a range of catalyst materials, bracketing a range of potential syngas compositions. The purpose of this work has been to confirm process kinetics and to optimise catalyst selection for the proposed duty.
- The combination of these activities, along with refined process modelling, has provided increased confidence in the expected pilot plant reference performance, with only minor changes to that expected at the outset of the original NIC Pilot Plant programme and therefore provides confidence in the projections for the proposed demonstration plant.

The full Pilot Plant has been installed and is in the commissioning process, which is a progressive exercise through the individual process elements to ensure safe and reliable operation. Therefore there isn't full plant data available at this stage, although it is expected that operational data will become available which can inform the detailed, final demonstration plant design as required. The programme has been designed to enable this.

In developing the design and delivery mechanism for the proposed Commercial Demonstration plant, we have sought partners who can work with us to provide key process elements. For the pilot plant we used a contractor to provide integrated packages to ensure a safe and deliverable project; at the demonstration plant scale this is even more important.

Amec Foster Wheeler (AFW) have, separately, developed a design for the methanation element of the process, which they have piloted. This has operated since 2014. The basis of design for this element is very similar to that which has been developed for the corresponding part of the BioSNG Pilot Plant, providing valuable confidence in the Partners' overall design approach. Furthermore, based on their pilot work, AFW are prepared to guarantee process performance for this element, which is consistent with our own predictions. For example they will provide a syngas to SNG conversion efficiency of 76%. This is higher than that expected on the pilot plant, largely due to being able to use a physical solvent for CO₂ separation at this scale, but consistent with what we would expect to achieve on a like-for-like basis. AFW proposals also underpin production of a gas purity of in excess of 96% which enables compliance with GSMR requirements. AFW are keen to work with us to see their element integrated into the whole scheme, as this has never been done for a waste-derived syngas with

	<p>demonstrated delivery of GSMR specification gas.</p> <p>The combination of data from the pilot plant and AFW provides a high degree of confidence that the design of the Commercial Demonstrator is robust.</p>
Attachments	