

Network Innovation Competition Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☐

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Project code:	NGGDGN01	Question Number	14
Question date	5/9/13	Answer date	9/9/13
Submission section question relates to	2.1		
Topic	Aims and Objectives		
Question	The RESOM Analysis Appendix 3 that compares scenarios with and without Bio-SNG is not clear (It appears to demonstrate negligible benefit to 2030). Could you please provide clarification of the fundamental business case.		
Notes on question			
Answer	<p>Gas supplies in excess of 80% of UK heat demand. Heat demand is highly seasonal which requires the ability to scale up / down supplies considerably. This effect is most evident for building heat demand with larger industrial consumers typically having less of a seasonal swing.</p> <p>Options to decarbonise heat include heat pumps and heat networks or renewable gas.</p> <p>Heat networks, are limited by the level of heat supply and system dependencies. Given the carbon constraints (80% reduction in emissions) heat networks would need to be principally supplied from thermal power stations (CHP) or nuclear generation. Most studies limit heat network market share to no more than 15% of UK heat demand and target commercial or larger energy consumers in urban areas.</p> <p>Electrification of heat through heat pumps will require significant investment in both the generation and network infrastructure. Daily heat demand in winter is 4 times electricity demand a level that the electricity system would not be capable of carrying without system-wide reinforcement.</p> <p>Perhaps even more challenging is the sizeable increase in energy supplies and dependency on highly efficient heat pumps. Our current electricity supplies, through our existing system, are almost 3 times the cost per unit of energy when compared to gas. Consequently, replacing gas with electricity (for heat) is only economically attractive if consumer appliances are replaced by</p>		

	<p>high efficient heat pumps to keep costs close to gas heating levels.</p> <p>However; the seasonal nature of heat requires both sufficient capacity in generation and appliances to cope with high winter and low summer levels. Electricity production does increase in winter as daylight hours reduce, but this level is marginal when compared to heat demand. Consequently, studies that have reviewed low carbon 2050 energy pathways identify that an economic level of generation and heat pump capacity is necessary but supported by additional “top up” fuels including natural gas (on gas grid), or other (off gas grid). This is referred to as the Hybrid or Dual Heating approach and identified by DECC’s Heat Strategy as the most economical method for reaching low carbon targets.</p> <p>Consequently, in the lowest cost solution a balance of fuel types are needed but dependant on the deployment of significant new infrastructure (low carbon generation, networks and appliances).</p> <p>Our base RESOM scenario, and that used by DECC in the Heat Strategy, was developed prior to our Bio-SNG technical analysis and excludes Bio-SNG from waste.</p> <p>The analysis summarised in Appendix 3 includes a sensitivity that includes Bio-SNG from waste based on our findings under IF179. The analysis indicates that a further £37bn saving would be made by 2050 with the model itself selecting waste to Bio-SNG in preference to other options. The inclusion of Bio-SNG alleviates the need for some of the wider network transition and enables a number of consumers to continue to make use of existing networks and appliances.</p> <p>We note that the model also indicates that the system wide benefits include a £1bn saving per year in 2030 rising to £8bn in 2050. Our analysis assumes the technology becomes available shortly following this project and Nth of a kind commercial development benefits are realised by the mid-late 2020’s. RESOM selects 40TWh/a from Bio-SNG by 2030 rising to 95TWh/a by 2040. The level of uptake is constrained by our build rate assumptions rather than economic factors (unconstrained our models would develop the maximum potential earlier).</p> <p>RESOM and similar scenario based methods are designed to help decision makers identify the “ideal” technology choices required for a low carbon economy. Clearly, the RESOM model selects Bio-SNG as a necessary component in the lowest cost pathway providing assurance over longevity and value to the system. Such models are helpful to decision makers in identifying how best to support the development of vital technologies and should not be viewed as prescriptive of the development pathway.</p> <p>Such studies have assisted in creating the case for Government to support developments through various mechanisms including the RHI. Accordingly, our analysis, section 3.6, shows the first of a kind and Nth of a kind commercial development plants. The analysis shows that a wholesale gas price of £22/MWh can be produced with the RHI for the initial developments leading to price levels of £39/MWh without the need for subsidies as the technology matures. The support will be vital in early developments but natural gas market costs could well displace the need before 2030. We also note that DECC have set a target of 7TWh/a by 2020 of biomethane / Bio-SNG and this project could well lead to commercial plants that could exceed the target and push for greater levels by 2030.</p> <p>Renewable gas is the most deployable solution as it utilises the existing network which is sized for peak heat and can decarbonise heat without consumers changing their appliances in the short term. Because of this DECC supports the production of biomethane and Bio-SNG through the RHI. This project demonstrates a technology that can significantly expand that potential.</p>
Attachments	

Verbal Clarifications (Consultants)	
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