

Network Innovation Competition Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☐

Tick if this answer has been provided verbally: ☐

Project code:	NGGDGN01	Question Number	10
Question date	20/08/13	Answer date	22/08/13
Submission section question relates to	2.1.1		
Topic	Business Case		
Question	<p>Has NGGD compared the 'waste to BioSNG' option with 'offshore wind to Heat Pump' , rather than comparing waste to gasification to electricity as the source of electricity. The intent of the question is to get a high level understanding of the "waste to BioSNG to gas central heating" option compared (in terms of costs, subsidy and CO2) to "wind to heat pumps" as these are the 2 main alternatives. If not, would NGG undertake such analysis by comparing the estimated high level costs and CO2 savings of the BioSNG option with the Electrification Option (ground and air source heat pumps as appropriate) for, say, 200,000 homes in an area of London. The existing subsidy for RHI for Bi-SNG and for domestic heat pumps could be used?</p>		
Notes on question			
Answer	<p>The trade off you have asked for is taken into account in the RESOM analysis already – Appendix 3. The analysis takes into account the competing technologies, to generate energy, infrastructure and appliances needed to meet energy demand in the most cost effective way. It takes into account seasonal demand profiles, technology performance over the year, cost and CO2 performance and optimises to a least cost solution based on 5 year tranches. In doing so it chooses to maximise the amount of BioSNG used up the limits that are put into the model.</p> <p>Trying to compare directly 'wind to heat pumps' to 'BioSNG to boilers' on their own is not a practical comparison. The average annual load factor of offshore wind is 30% and peak load factor is 7%. Therefore, other sources of power generation would be required to meet the heatpump load such as Nuclear or CCGT.</p> <p>If we try to simplify the comparison, as requested, and just look at the cost of the energy generation, networks and appliances without taking into account, seasonality of demand, appliance performance, and availability and</p>		

the wider impacts on the energy system, we get the answer in the table below. But this is fundamentally flawed as it understates the factors mentioned above.

Offshore wind to Air Source Heat Pump	COP	3.0		
	£/MWh	MWh Out	Total	Comment
Offshore wind - strike price 2018/19	135.0	5.7	770.4	
Electricity Network	13.0	5.3	69.3	1
Heat Pump	450.0	16.0	450.0	2
TOTAL			1289.7	
BioSNG to GasBoiler	Boiler efficiency	85%		
	£/MWh	MWh Out	Total	
BioSNG gas Cost - nth of a kind no subsidies	39.0	19.0	741.5	
Gas Network Cost	2.9	18.8	54.6	3
Gas Boiler Cost	350.0	16.0	350.0	4
TOTAL			1146.0	
Comments				
1. average network cost from RESOM includes 7% losses				
2. assumes £6000 installed cost £150pa servicing 20 year life				
3. average network cost from RESOM 1% losses in gas network				
4. assumes £2000 installed cost £150pa servicing 10 year life				

Also the source of the energy supply does not change the need to replace the appliance, the marginal cost of a heatpump over a gas boiler is £4000. Which a significant impact on the consumer. As evidenced in the DELTA report, sample for a semi detached house shown below.

Exploring customer decision making – focusing in on post-war on-gas semi-detached homes

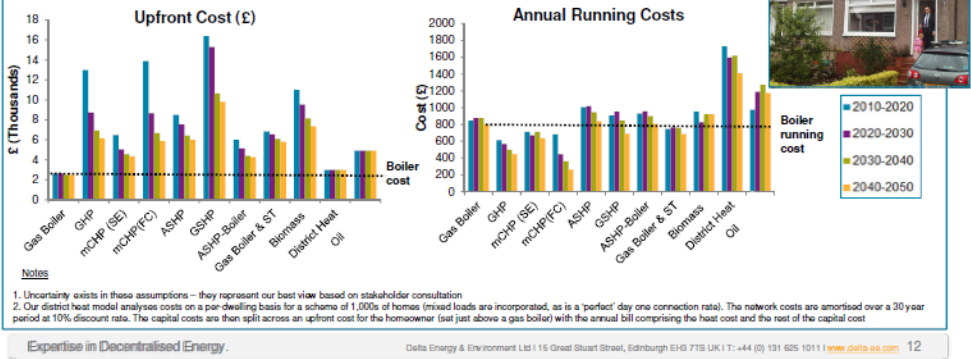


Key customer challenges, in an example segment

- Awareness is low, and low carbon heat is an emerging market in the UK:** Customers are largely ignorant of low carbon heating technologies and our market research shows most are very cautious of 'new' heating technologies. This is important today, but we assume attitudes can shift completely in a couple of decades.
- The retrofit challenges for many low carbon heating technologies are substantial:** for many homes this challenge can be overcome, but for others it will always remain a significant barrier. Overcoming the challenge requires both homeowner acceptance of these challenges, and major development of the UK installer network and heating supply chain.
- Gas appliances have, under our base-case assumptions, substantially stronger customer economics than alternative technologies:** Gas boilers have, by some way, the lowest upfront cost – even factoring in large increases in global volumes for other technologies. DECC projects electricity prices rising more than gas – this results in lower running costs for gas technologies (factoring in performance improvements for gas, micro-CHP and electric heat pumps).

On-gas, semi-detached, built in 1945-2011

This shows the customer perspective (based on our model outputs), decade by decade, for different heating appliances in one of the largest and most challenging housing segments to decarbonise. The vast majority of these homes are in suburbia



Verbal Clarifications (Consultants)	
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