LCN Fund Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☐

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Project code:	SSET204 – PATHS	Question Number	SSEP018
Question date	06/09/12	Answer date	10/09/12
Submission section question relates to	Section 3		
Topic	Business Case		
Question	At the meeting between the PATHS project team and Ofgem's consultants on 4th September it was stated that it was expected that the cost of hydrogen produced by electrolysis in 2020 would be one and a half to twice the cost of that produced by conventional means. Please can you confirm that this is the expected difference in hydrogen production costs.		
Notes on question			
Answer	Fossil-derived hydrogen by steam methane reforming (SMR) is currently predominant on cost grounds. However the cost of delivery also needs to be factored into the equivalent cost of hydrogen at the point of use. For example, electrolyser-derived hydrogen is the most commercial option for small volumes of hydrogen, because distribution costs from centralised SMR are too high. Therefore as well as the primary energy source, the centralised/decentralised origin of hydrogen must be factored into the cost at the point of use. By 2030, costs to produce a kg of hydrogen by different methods are: • Centralised SMR: 2-3 Eur/kg • Decentralised SMR: 4.5 Eur/kg • Water electrolysis: 4 – 5.5 Eur/kg (Portfolio of powertrains for Europe, 2011) In all cases, we have designed PATHS with an expectation to deliver hydrogen to transport applications at a price of ca. £4-5/kg, which is		

	equivalent to taxed diesel (and accounts for improved efficiency for hydrogen drivetrains). Based on current PATHS prices and the forecast position by 2030, it is reasonable to suggest that electrolysis costs in 2020 would be one and half to twice the price of SMR. Fossil-derived hydrogen production is exposed to fuel prices, and costs are expected to rise. As the hydrogen demand market expands, electrolysis is recognised as a more flexible and lower risk production method. It is important to note that cost is not the only or predominant issue. The driver for hydrogen vehicles is as an ultra-low carbon drivetrain option. Fossil derived hydrogen is not able to deliver the "well to wheel" (complete energy chain) carbon savings that are required. Ultra low carbon emissions are only possible with renewable hydrogen. All car manufacturers accept that a significant renewable component of hydrogen production is a requirement for Fuel Cell Electric Vehicle (FCEV) deployment. This is reflected in all hydrogen national deployment plans (Germany, UK, Denmark) where renewable electrolysis comprises about 50% of production. When compared to a "balanced portfolio" of hydrogen generation, an all renewable scenario results in a 5% increase in total cost for FCEV ownership by 2030 (source: Powertrains for Europe, 2011) For completeness we note that in the longer term (2030+), fossil-derived hydrogen production with CO_2 sequestration (e.g. precombustion carbon capture and storage CCS) is expected to be more economic than electrolyser-derived hydrogen, but the CCS energy chain faces significant technical and economic challenges and is a medium-long term option only.
Attachments	
Verbal Clarifications (Consultants)	