Project title: Decarbonisation of heat and transport using hydrogen as an energy vector – technology assessment and systems modelling

Discipline  
Energy Engineering and Policy

Key words: Energy Technology, Energy Policy, Hydrogen Energy,

Supervisory team: William Nuttall and Stephen Burnley

URL for lead supervisor’s OU profile  
http://www.open.ac.uk/people/wn334

Highlights:

- Very high levels of UK policy relevance
- Possibility of international travel and research community membership
- Possibility of industrial support (financial and supervisory)

This proposal fits with a thread uniting the research interests of Professors Nuttall and Krishnamurthy. Professor Nuttall has co-authored a book Fossil Fuel Hydrogen with Springer in 2020. There is the potential for OU hydrogen energy research to advance significantly in visibility in advance of REF 2021. Hydrogen is also increasing greatly in terms of its possible importance in future UK energy policy as attention turns away from the challenges of decarbonising electricity (arguably an almost complete challenge) to the far more difficult challenges of heat and mobility.

This research project is motivated by its policy timeliness and relevance and has is rich in possible ‘impact’ as seen by UKRI for both its REF and grant awarding roles.

Project Description:

This project seeks to build upon recent extensive UK assessments of the conversion of domestic and industrial heat demand from to hydrogen to natural gas by considering in greater depth the mobility decarbonisation challenge and various consequential issues arising from national plans.

It builds upon a body of work by Professors Nuttall and Krishnamurthy. It will use similar research methods to those employed successfully by George Matthew (PhD OU 2018) and currently being pursued by Andy Wilson, Richard Pearson, Madhu Madhavi, Chris Speddin and David Webbe Wood. These students form a mutually reinforcing community of scholars contributing to the OU’s research environment.

The main UK policy action in this space (in 2018 and 2019) relates the active consideration of a possible transition from natural gas to hydrogen as a national pipeline gas, starting with the North of England. The predicted cost of such a shift is of the order of £20 billion for the first phase, but it could, if rolled out nationally, reduce total UK GHG emissions by 258 million Tonnes by 2050 [1]. To place this in context total UK GHG emissions in 2016 were approximately 600 million Tonnes. Senior policy makers in Whitehall see the potential for a major step change in emissions target progress at a cost that is low when compared to the expenditure required for marginal improvements in electricity decarbonisation. The link to transport and mobility is however not fully though through by government (in professor Nuttall’s opinion). Much analysis remains to be done.

Potential research methodologies:

- Technology Assessment
- Technology Roadmapping
- Scenario planning
- System Dynamics
- Agent Based Modelling
- Techniques associated with management under uncertainty and real options

Team prior relevant hydrogen experience:


Please contact **Prof William Nuttall** - [william.nuttall@open.ac.uk](mailto:william.nuttall@open.ac.uk) for further information.

Applications should include:

- A 1000 word cover letter outlining why the project is of interest to you and how your skills match those required
- an academic CV containing contact details of three academic references
- [Open University application form](https://www.open.ac.uk/)
- Applicants will need to demonstrate good competence in the English language. International students need an overall IELTS score of 6.5 with no less than 6.0 in any of the four categories of reading writing, speaking and listening.

Applications should be sent to [STEM-EI-PhD@open.ac.uk](mailto:STEM-EI-PhD@open.ac.uk) by 28.02.20 (UK time)