

Social acceptance of hydrogen

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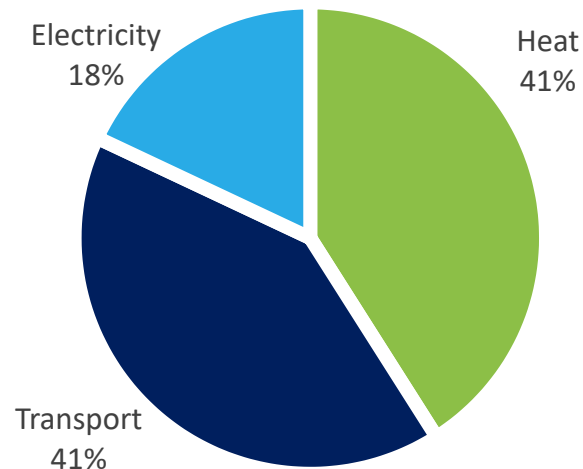
*Geol Soc, ERA, Supergen Energy Storage Network+,
Hydrogen Storage in Caverns, 12th April 2021*

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Talk structure

1. The hydrogen 'lens' for this talk
2. Why is social acceptance of hydrogen necessary?
3. A study of social acceptance
 - The HyDeploy project
 - Aims and methodology
 - Preliminary results
4. Implications
5. Questions

1. The hydrogen 'lens' for this talk



Heat dominates UK energy consumption compared with electricity

Based on UK Energy Consumption Data 2019, BEIS

Committee on Climate Change identifies that hydrogen is a 'necessity', and that grid blending has a key enabling role



2. Why is social acceptance necessary?

Social acceptance a key challenge for new technologies

*“[i]t is difficult to know quite how acceptable hydrogen will be for heating homes at this stage – although it is likely to be no more dangerous than natural gas, **there is a difference between actual safety and perceptions of safety**” CCC, 2018: p27*

*“there is a huge amount of enthusiasm for hydrogen heating, but **there is a question about public perception** and how much you can blend” Claire Perry MP, 2019*

*“Importantly, **public risk perceptions are seen as crucial factors influencing acceptance or rejection...**Among the possible ‘barriers’ to such a [n energy] transition, **public attitudes have been identified as an important constraint**” Flynn et al., 2013*

*Committee on Climate Change (2018) Hydrogen in a low-carbon economy; Claire Perry MP oral evidence to the Science and Technology Committee’s enquiry on Technologies for Meeting Clean Growth Emissions. From: Scott and Powells (2019)
Robert Flynn, Miriam Ricci & Paul Bellaby (2013) Deliberation over new hydrogen energy technologies: evidence from two Citizens’ Panels in the UK, Journal of Risk Research, 16:3-4, 379-391, DOI: [10.1080/13669877.2012.743160](https://doi.org/10.1080/13669877.2012.743160)*

3. A study of social acceptance – blended hydrogen



Project objective

To establish that a blend of hydrogen and natural gas can be distributed and utilised safely & efficiently in the UK distribution network without disruptive changes for consumers.



*Project Funded under OFGEM's
Network Innovation Programme*



Cadent

Northern
Gas Networks

 *Progressive energy*

 **ITM POWER**
Energy Storage | Clean Fuel

 **HSE**

Keele
UNIVERSITY

The benefits of hydrogen blending



Hydrogen blending means...

- ✓ Low carbon heat without disruption for consumers
- ✓ 20% blend means carbon savings equivalent to 2.5 million cars off the road
- ✓ Pathway to deeper savings: developing the science base, regulatory position, supply chain and consumer perceptions of hydrogen



Target Milestones

2021	Publish our Hydrogen Strategy and begin consultation on Government's preferred business models for hydrogen
2022	Finalise hydrogen business models
2023	Work with industry to complete testing necessary to allow up to 20% blending of hydrogen into the gas distribution grid for all homes on the gas grid
2023	By 2023 we will support industry to begin hydrogen heating trials in a local neighbourhood
2025	We hope to see 1 GW of Hydrogen production capacity
2025	Will support industry to begin a large village hydrogen heating trial, and set out plans for a possible pilot hydrogen town before the end of the decade

Sequential progress to achieve the goal



Based on 18 months of extensive rigorous research HyDeploy secured the UK's first permission for blending hydrogen into the grid in November 2018.



HyDeploy at Keele

- On part of private gas network.
Including:
- University buildings (incl. sports centre, laundrettes...)
- Student halls
- 100 Domestic properties



Aim of the social acceptance research

To explore perceptions of hydrogen and blended hydrogen in the home of customers taking part in the HyDeploy trial

A two-stages research process

- i. Pre-trial (presented here)
- ii. During/post-trial (data collection late summer)
(a further study on the public site trial)

The Keele trial provides for the first time an opportunity to learn from customers experiencing a hydrogen blend of gas into their own home.

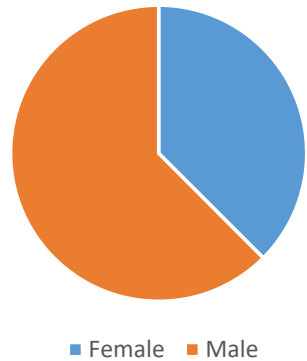
Methodology

- Qualitative approach for greater depth of understanding of experience and perceptions
- Interviews
 - Before blending (June 2019) -16 households linked to the HyDeploy network
 - After a year of blending – 8 households (7 repeat)
 - (Currently undertaking research on public site trial)

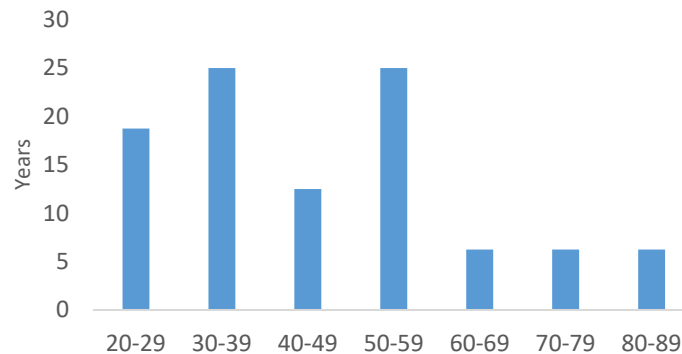
Interviews explored: environmental views; energy behaviours; knowledge and attitude of hydrogen; views of being part of trial and communication strategy.

Characteristics of sample

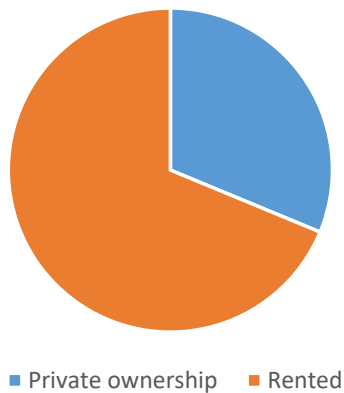
Gender of participants



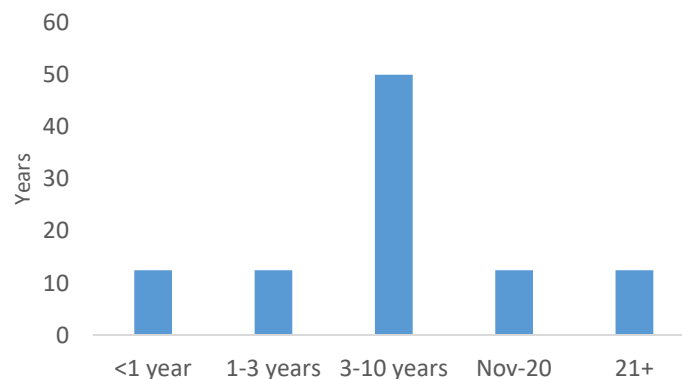
Age of participants



Housing tenure



Length of time in property



Mixed sample in terms of:

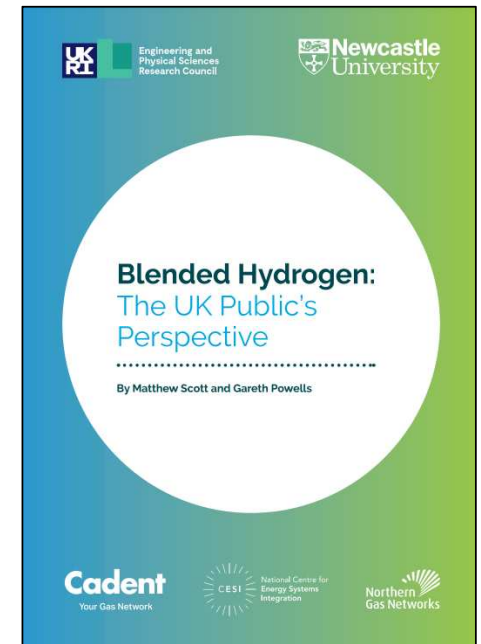
- Gender
- Housing tenure
- Age of participants
- Length of time in property

Resident links to Keele:

- Employee
- Partner of employee
- Former employee

What do we already know about people's perceptions of hydrogen (in the home)?

1. Public knowledge and understanding of hydrogen and hydrogen blending is low
2. Most people perceive hydrogen **neutrally**, and there is no sense of acceptance or rejection of it as a fuel for UK homes
3. Once informed, support for and willingness to use blended hydrogen becomes moderately high
4. Benefits for the environment are recognised, and the impacts on home use are perceived as minimal
5. The perceived cost of hydrogen is the biggest obstacle
6. Safety concerns do not seem insurmountable, but negative perceptions of hydrogen as dangerous are important



*Scott, M. and Powells, G.
(2019) Blended Hydrogen:
The UK Public's Perspective.
Newcastle University.*

Results: key areas

1. Concerns, reassurances and trust
2. What did people think about taking part in the trial?
3. Communications

Concerns, reassurances and trust

Anxiety about safety – association of hydrogen and explosions

Most commonly voiced concerns, or connections with hydrogen, were about hydrogen as an explosive gas

“Safety, yeah that was the other thing that I remember being concerned about just, you know, is this going to make my house more likely to blow up. So I think there was a bit of concern about safety.”

“hydrogen has a risk and it would be nice to know, for example, what happens if the power plant blows up? ... obviously I don’t want the house blowing up”

“Someone quoted the hydrogen bomb quote at me which is ridiculous.”

What about concerns about cost?

Previous research shows that increasing cost is the most important concern that people had when asked about their views on using hydrogen blends in the home (Scott and Powells, 2019)

Varied attitudes towards cost implications, but several mentioned this as an area of initial concern:

“So I think if there’s any conversation it will be how does HyDeploy affect the cost of energy”

“[there]was bit of concern and uncertainty about that and whether it would make things more expensive.”

The process and communication strategy gave reassurance about areas of concern

A communication strategy, allowing access to face-to-face, open conversations reduced anxiety:

“Knowing people who went to some of the open sessions and actually talked to people and felt reassured and having those conversations with people was also quite important ...I think having those drop-in sessions and explaining things was quite helpful as well.”

Visible safety checks helped reassure people:

“We made no concerns or kind of queries at all. And the fact that they did a safety check and then kind of checked your equipment to make sure it was going to work so that was good.”

Several participants referred to the implicit trust in the safety of the project

“I knew that for the project to get to this stage, it would be safe”

“I do have a basic level of trust that the university will not be suggesting doing something that is likely to be harmful to me”

What did people think about taking part in the trial?

Generally (very) positive views about taking part

The majority of participants were positive in support of the trial and being part of it – more than just ‘acceptance’.

“I was really positive about it, I thought it was an excellent thing, yeah.”

Some genuine excitement about being part of it:

“Just excited. I was excited as you can be about hydrogen gas.”

“You’re part of it. Stuck with it. I feel like a balloon was, like, swelling up in my chest, I was very proud.”

Participants valued the environmental and minimal disruption benefits

Supportive of the environmental benefits of the project:

“I think that the planet is heading rapidly towards, well, just the end of it. So, I think it’s very, very serious indeed, the whole HyDeploy thing is an important part of that.”

Appreciated the minimal disruption and effort required to ‘do something good:’

“Thinking about how little I’ve had to think about it means that’s, that’s part of why it’s such a great project...the work is not put in by the consumer...oh I’m contributing by doing nothing. Where else do you get to do that?”

There was little real technical or scientific understanding of the project

Most accepted that the project was a positive thing, and had a broad understanding of the benefits, but demonstrated limited understanding of the technical and scientific aspects:

“I mean apparently it’s good for the environment and therefore it’s good, although I don’t really understand how it’s good for the environment, so I’m not really in a position to assess how good it is...”

Some initial anxiety, but this decreased over time

A number of areas of initial anxiety by some, but this decreased over time:

*“I think there was this initial kind of flurry of anxiety and yeah concerned that they were going to have this enforced on them, you know, how experimental was it, was it going to actually do what they said it was going to do, why were they doing it, **a little bit of suspicion I suppose and anxiety but, you know, I think that’s largely died away** and I think everyone that I’ve spoken to now assumes that it will be rolled out to other places and that’s fine - a good thing. I think that’s the sort of assumption.”*

The importance of communication

The communications process

Diverse communication during project:

- A letter from University senior management
 - Project letters and information
 - Drop-in sessions
 - Web-based information
 - One-to-one discussions with Community Relations manager
-
- Different levels and types of communication were important to different people.

Additional communication took place *between* residents

- Residents discussed their concerns amongst themselves
- The initial information communicated to residents is essential as communication between residents can lead to the snowballing of concerns

Continued communication was desired throughout the process.

- Project communication had concentrated on the initial stages – engaging residents to enable access to properties for safety checks.
- There was less communication to residents during the later ‘build’ phase
- Many residents felt they wanted to be kept more informed
- It seems they felt personally invested in the project and seeing themselves as ‘trial subjects’ and had both the right and interest in being updated about progress
- Several residents expressed their appreciation of being asked about their views – leading to feeling valued.

Additional benefits of the trial

- Several participants felt that the trial had made them more environmentally aware.

Communication around energy transition projects have the potential to influence environmental attitudes and behaviours beyond the immediate project.

Comparison to other studies

- Neutral views about the desirability of a shift toward hydrogen energy systems
- Some concerns about safety, not overwhelmingly strong.
- Desire for more detailed information about benefits, costs and risks.
- Questioning relative efficiency and costs
- Expect more information about 'the bigger picture' before deciding on a clear view.
- Support was conditional and dependent upon perception of the seriousness of the energy crisis, and immediate local circumstances such as unemployment, regeneration or air pollution
- "Simplistic notions about the 'public acceptability' of hydrogen must be questioned: public perceptions are contingent on many different factors, and will also reflect the complexity of different, alternative, future energy scenarios" (Flynn et al., 2013).

Flynn, R., Bellaby, P., Ricci, M. (2008) Environmental citizenship and public attitudes to hydrogen energy technologies, *Environmental Politics*, 17:5, 766-783,

Flynn, R., Ricci, M & Bellaby, P. (2013) Deliberation over new hydrogen energy technologies: evidence from two Citizens' Panels in the UK, *Journal of Risk Research*, 16:3-4, 379-391

4. Summary and implications

- Associations between hydrogen and explosions and safety are part of some people's narrative about hydrogen
- Environmental benefits (and lack of disruption) of use of hydrogen are seen positively
- Positive support for hydrogen (trials) can be achieved, but may be linked to a 'halo effect' or 'pride in place'
- Effective, open, varied, ongoing communication is key to acceptance
- Evaluation of the project with customers is important for learning and for trial participants feeling valued - **don't view trials just as a technical projects – need for interdisciplinary projects across to social sciences.**



Thank you

Questions?

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