MILFORD HAVEN: ENERGY KINGDOM

Milford Haven : Energy Kingdom
M/S 24 - Co-designing a Switch to Hydrogen with the Customer

Consumer research de-brief

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Milestone 24: Research objectives

- To explore how to solve practical challenges when switching to hydrogen, for example:
  - What will people do when they need to use gas during the period of time when it is off?
  - What if the switchover takes longer due to unforeseen circumstances?
  - What will happen to people with gas boilers, hobs, ovens or fires that aren't hydrogen ready?
- To explore consumer concerns about rolling out a hydrogen switchover at scale.

- Activity started on 28th Jan 2022.
- Research fieldwork was completed on 25th Feb.
- Presentation delivered to the project on the 16th March and summary provided for the final project report.

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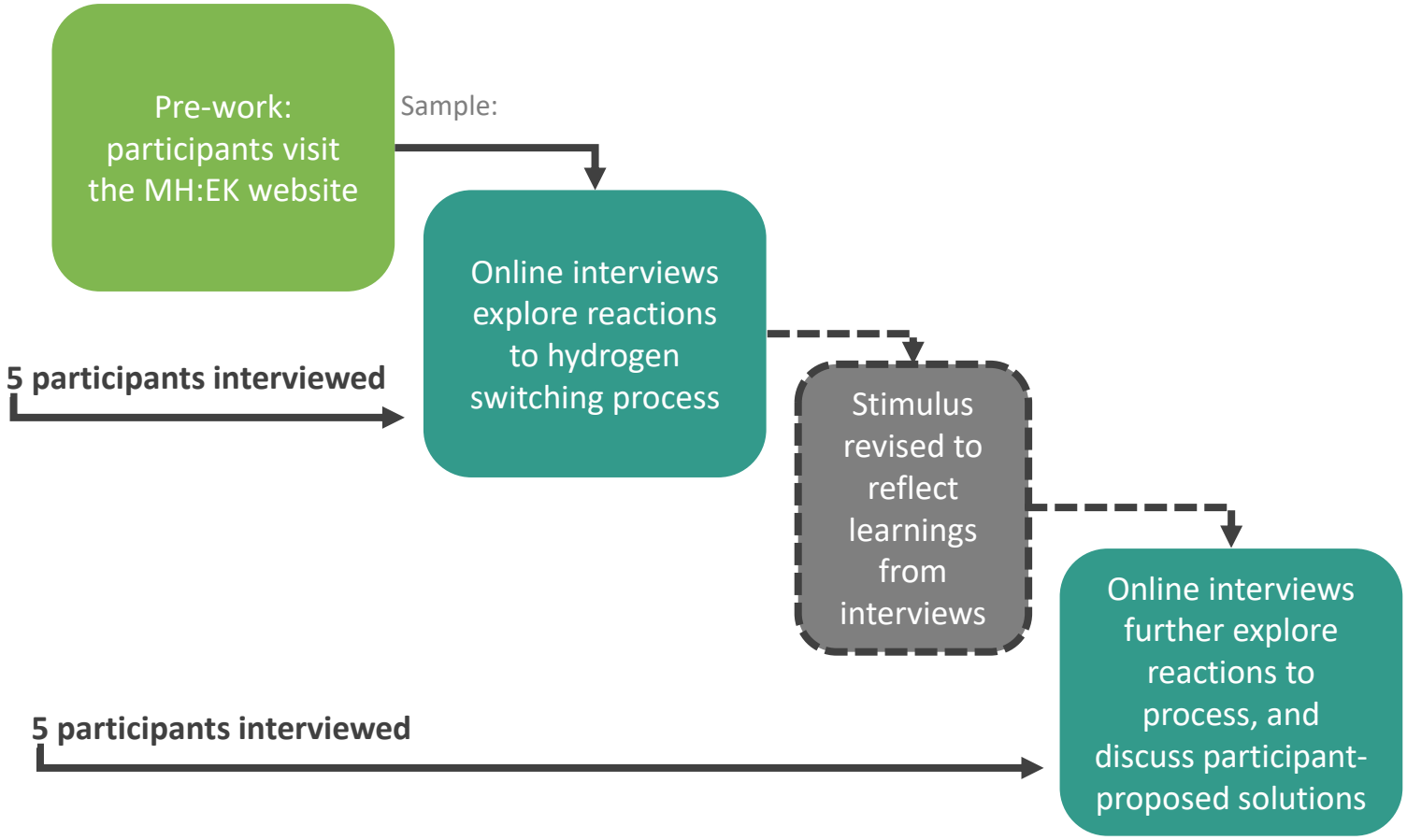
Research Method: project journey



Sample

- All had gas central heating.
- Represented a range of demographics:
  - Household composition
  - Age
  - Type of home
  - Employment
- Self-selecting:
  - Strong interest in what was happening in their community.
  - Concerned about climate change and feel it's a threat.
  - Note: findings may not be representative of the wider Milford Haven population.

A consumer segmentation for peoples views on hydrogen can be found in appendix 1.

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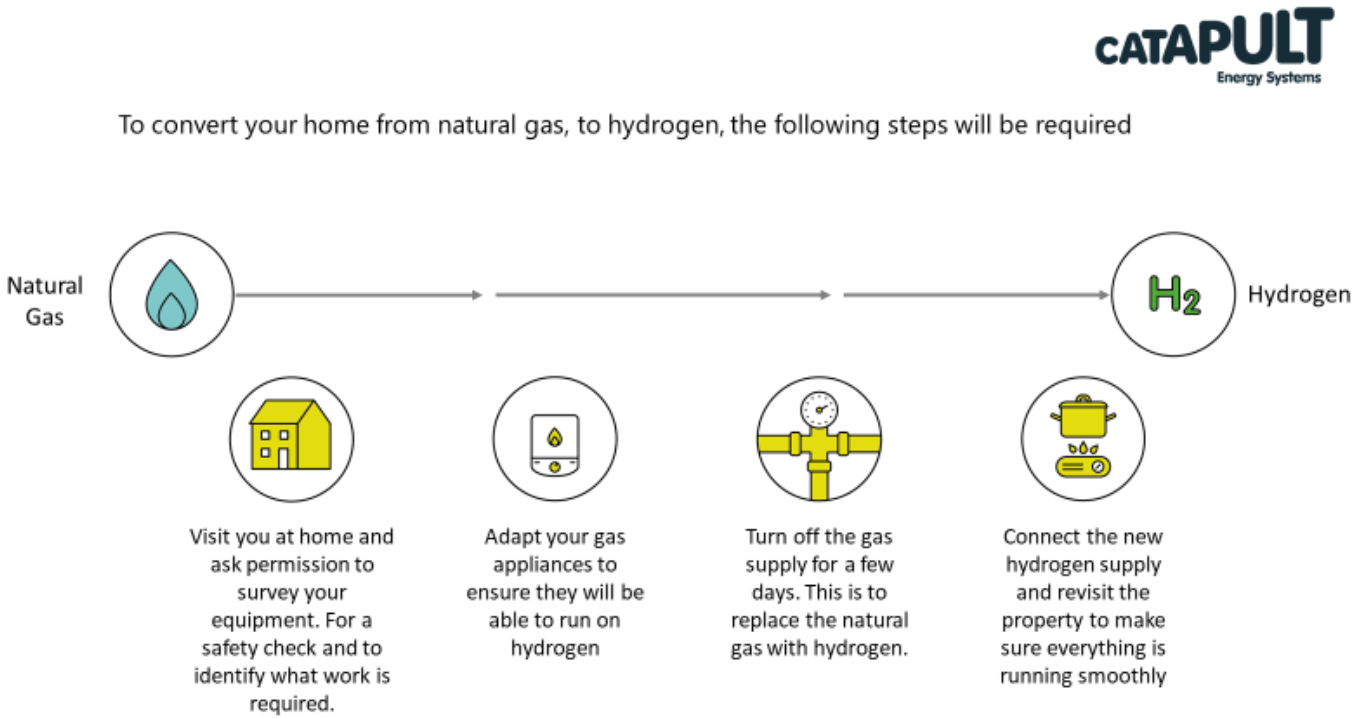
Research Method: key topics discussed

- Participant background
- Attitude to climate change
- The switch to hydrogen
- Hydrogen switching process
- How to encourage switching



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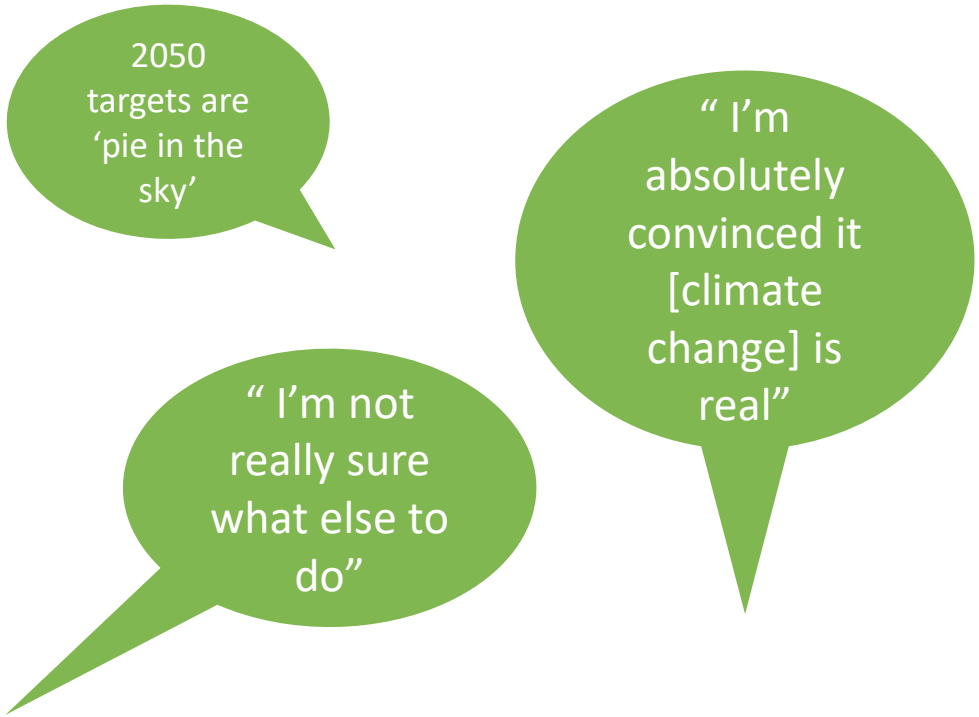
Views on Climate Change

Key insights

- Participants were concerned about climate change. Although they weren't all aware of the impact of home heating on the environment, when they learned of the role hydrogen could play in reducing carbon emissions, they felt positive about the change.
- Increasing awareness of the relationship between gas central heating and carbon emissions could help people understand - and accept - a switch to hydrogen.



- Participants were very concerned about climate change and saw it as something affecting them at an individual, local, national and global level.
- They felt they were 'doing their bit' by doing things they knew reduced their environmental impact (from day-to-day activities like recycling and not eating meat, through to substantial investments e.g. buying a hybrid car).
- They felt government should be responsible for leading change to reduce carbon emissions, but were sceptical of the current targets, which they felt were intangible and unrealistic.
- Some weren't aware of the link between home heating and carbon emissions, although learning of this link helped them understand the need for change.
- It was believed a switch to hydrogen would be for "the good of society" but participants still wanted to understand what the impact and benefits would be for them.

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Views on Hydrogen

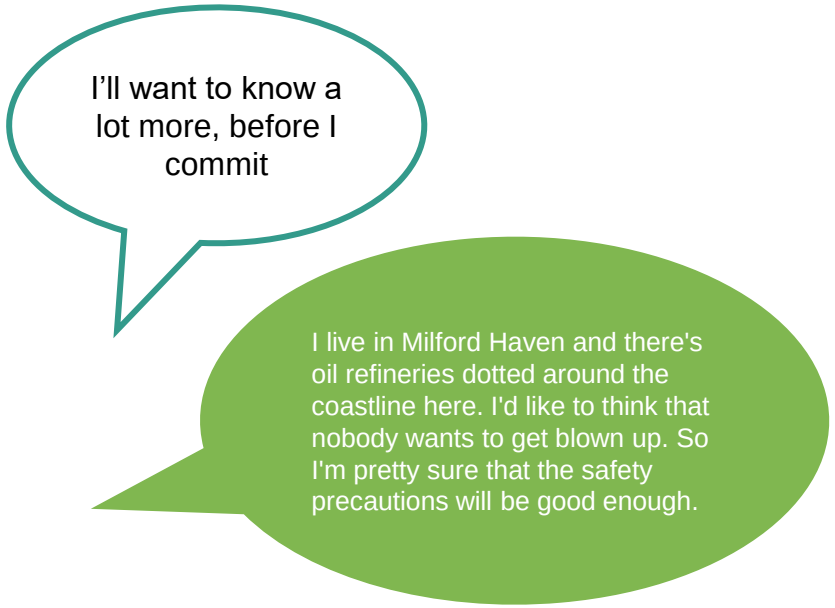
Key insights

- Participants were not concerned about the safety of hydrogen, as they assumed appropriate precautions would be taken as they had been for other infrastructure in the area, e.g. oil refinery.
- More information was required on the whole process, with preference for a gradual build up of information.

- Although the concept of using hydrogen to heat homes was unfamiliar, participants felt it was plausible and believed the current gas infrastructure could be repurposed.

- Participants suggested that communication about the project should build up residents' understanding over time, so that they could understand the context, the switch over process and what their options were.

- Safety was not a concern as people were familiar with other hazardous infrastructure in the area e.g. oil refinery
  - Nevertheless, they expected communication about the project to explain safety measures.



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Hydrogen Switchover - Communication

Key insights

- It was hard participants to put costs out of their mind, with many wanting information such as return on investment to help them make decisions.
    - They also wanted to know what financial support might be available to them.

- The key perceived benefits of hydrogen were:
    - It could be used in the same way as gas is used now, so no behaviour change or adjustment to a new heating system would be required.
    - Reduced carbon emissions.

- Participants were generally prepared to put up with some short-term disruption.
    - However, they were unclear about what the disruption might be and how it might impact them, so wanted more information about what to expect and guarantees that their home would be left 'as it was' after any changes were made.

- Trust in and a good rapport with those managing the switch would help give people confidence in a smooth transition.

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If a switchover from natural gas to hydrogen were to happen in Milford Haven residents wanted to know about:

- Disruption in their homes:
  - Participants were unclear about what disruption they might experience in their homes.
  - Another decision point after the initial survey visit could allow them to make a decision with understanding of the disruption they would experience.
  - They wanted guarantees that their home would be left "as found", and, would expect compensation if that wasn't the case.
  - They also wanted reassurance that appointments for surveys and work in their homes would be kept: *"I don't want to be taking days off and nobody turning up"*

- Who are the people involved
  - Building trust with the switch over organisation(s) would offer reassurance.
  - Uncertainty about The Port involvement. *"They can be a bit standoffish – an "us and them" type of scenario"*

- Support and Information – individual and community
  - Residents want be to be guided through the transition and have a ready point of contact where they can ask questions regarding their personal circumstances.
  - Information and education on the fuel and energy specifics is likely to be required including introducing hydrogen as a greener fuel that can be used like natural gas.
  - People need active engagement – where to get information from and where to get reassurance from, both on an individual and community level.
  - Keeping people up to date – even
  - Use a variety of platforms for communication so everyone will see information.
    - Local offices or communication points *"like at the train station, or just the pub",* Website/Facebook page, Visits to homes, Texts, emails and letters with updates, 24 hour contact point – telephone/live chat.

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Views on Hydrogen

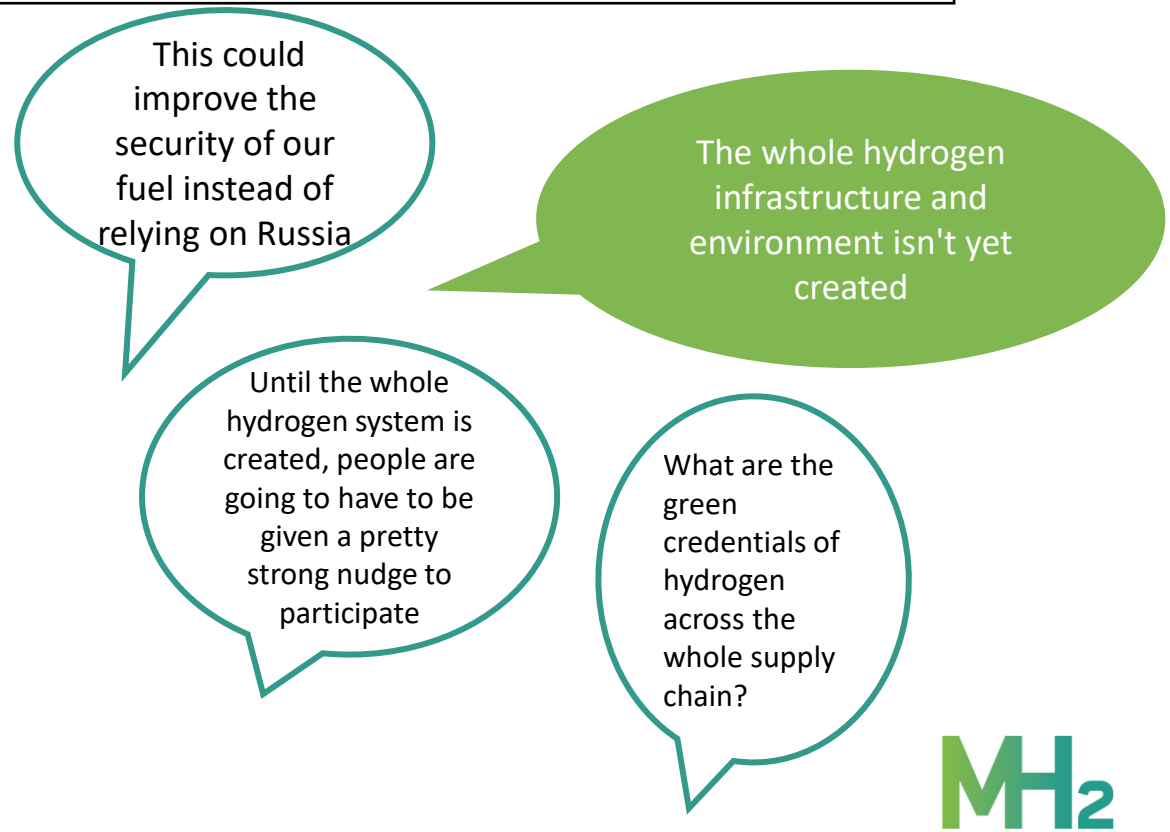
Key insights

- Participants wanted to know about how hydrogen would be supplied in the long term.
  - This was driven by a lack of familiarity with hydrogen.
  - Some felt that it could represent a more secure and stable fuel source than natural gas.

Some participants questioned the hydrogen infrastructure, with this driven by a lack of familiarity of hydrogen and how it might be sourced and delivered to homes.

One participant questioned the carbon impact of producing hydrogen.

One participant felt that electricity was a more ‘flexible’ option than either hydrogen or natural gas, reflecting on the number of sources that can generate electricity.



Views on Hydrogen

Key insights
There were mixed views of the Milford Haven Port. It was regarded as ‘an eyesore’ and as having poor relationships with the community, but there was an acceptance of the economic benefits it brings to the area and positive attitude towards that being leveraged more in the future with hydrogen. There is an opportunity for Milford Haven to be seen as ‘at the cutting edge’ of hydrogen.

- The participants interviewed were interested in a switch over to hydrogen from a community view point as well as their individual point of view.
  - Milford Haven was seen as a deprived area, with one describing it as a “boom and bust town”.
  - The Port had a reputation of not being well integrated with the Milford Haven community.
  - The refinery was seen as a ‘blight’ on the landscape, though there was some acceptance that it was necessary infrastructure.
  - Hydrogen production and switchover was seen as an opportunity to bring jobs to the area.
  - Some felt positive and enthusiastic about the prospect of Milford Haven becoming known for being at the cutting edge of a hydrogen switchover.

A breakdown of residents demographics in Milford Haven, Pembrokeshire and Wales can be found in appendix 2.

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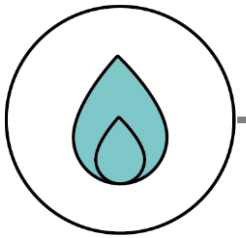
The Hydrogen Switching Process

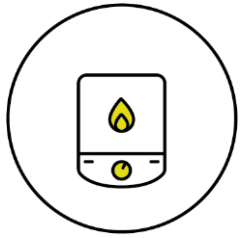
The hydrogen switching process was shown to the research participants and the challenges of being without gas for 3-5 days were discussed.

To convert your home from natural gas, to hydrogen, the following steps will be required

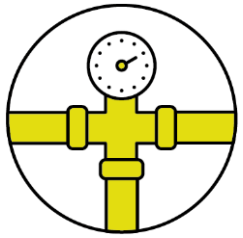
Natural Gas



Visit you at home and ask permission to survey your equipment. For a safety check and to identify what work is required.

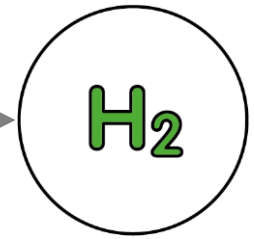


Adapt your gas appliances to ensure they will be able to run on hydrogen



Turn off the gas supply for a few days. This is to replace the natural gas with hydrogen.

Connect the new hydrogen supply and revisit the property to make sure everything is running smoothly



Hydrogen Gas

The Hydrogen Switching Process - Findings

- Customer Resilience
  - Participants have experienced unexpected disruption before and so a planned disruption felt manageable.
- Ability to Plan
  - Building up information over 2 years in advance of a switch to hydrogen was felt to give ample opportunity for people to plan for the change.
- Disruption
  - People were willing to accept disruption in their homes, as long as their home was put back in good order.
  - However, they wanted more tangible information about what exactly would need to happen in their homes.
- The hot water challenge
  - Nearly everyone had a combination boiler and had no method of storing hot water.
  - Being without hot water was seen to be an issue for longer period of outages (i.e. a number of days rather than a number of hours) and alternatives such as showering elsewhere were met with mixed opinions.
- The heating challenge
  - While some could manage without heating, there was some feeling that those in vulnerable situations might not.
    - 53% of disabled consumers could not manage without heating for even 2-5 hours. *Source: RIDC electrification of heat survey n=708*
- The cooking challenge
  - People were generally happy to manage with an alternative cooking method or have food or restaurant vouchers.

Quotes for all these findings can be found in appendix 3.

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Hybrid Boiler – Gas and Air-source heat pump (ASHP)

The research participants had the hybrid boiler concept explained to them. This heating system was introduced as an alternative appliance that could be fitted in the early stages of the hydrogen switching process and provide heat and hot water via a heat pump in the absence of gas, ensuring access to heat during the switchover process.

There were mixed views of the hybrid system.

- The principle was appealing, but participants wanted to understand the full economics of the hybrid boiler proposition in order to work out whether it would be suitable for them.
- It was seen as a credible alternative to some participants as it was ‘future proofing’ heating and home comfort.
- This could be offered as an option after the survey stage of switch over, as a method of avoiding further disruption. Some expected that they might be required to contribute a small amount towards this (up to £1000).
- Others with more awareness of ASHPs understood that they run at a lower temperature than some might set their gas boiler to deliver. This was felt to be for old houses with little insulation, therefore these limitations need to be made clear to the customer to ensure satisfaction.

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Summary and Recommendations

- Participants were concerned about climate change but not all aware of the contribution of home heating to carbon emissions. Learning that hydrogen could reduce carbon emissions led to acceptance of the concept.
    - Increasing awareness of the relationship between heating and carbon emissions could help people understand the need for a switch to hydrogen, and potentially increase acceptance.
- All the safety aspects of hydrogen were assumed to have been considered.
    - Nevertheless, participants expected this to be explained in communication about a hydrogen switch.
- The switchover process was easy to understand and the ability to plan ahead was seen as a big advantage.
    - Building up awareness and understanding over time with tangible information that helps people understand the impact on them and their options gives them more time and understanding to plan and make decisions about what is best for them.
- When considering the switchover process, participants had numerous solutions to having the gas cut off, and the various solutions provided were seen very positively. For some homes, hybrid heating systems that can use a heat pump to generate heat (in the absence of gas) could help manage a transition.
- Lack of hot water during the switchover process was a key concern, particular among those with combi boilers.
    - For some, this represented a bigger concern than not having heating.
- The majority of people felt a hydrogen switchover would represent good economic opportunities for the community.
    - Communication that conveys messages about the positive economic impacts of the project could help increase acceptance.
- The sample represented in this research may not be representative of the wider Milford Haven community. A quantitative survey could validate some of the findings from the current research and seek to explore other views from those not represented here.
- The MH:EK project could also take advantage of the consumer-focused work undertaken by The Hydrogen Village Research Programme due to be published in 2022 (see Appendix 4 for other useful reports on hydrogen). Furthermore, if the MH:EK project becomes a Smart Local Energy System demonstration project, the impact on consumer views about smart local energy systems could be assessed through the ERIS project.

Appendix 1 - Hydrogen Segmentation

H21: Public perceptions of converting the gas network to hydrogen

Social Sciences Study

Prepared by: Dr Fiona Fylan, Dr Martin Fletcher, Dr Simon Christmas
Leeds Sustainability Institute, Leeds Beckett University

June 2020

LEEDS BECKETT UNIVERSITY
LEEDS SUSTAINABILITY INSTITUTE

RIIO NIC NETWORK INNOVATION COMPETITION

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Appendix 1 - Hydrogen Segmentation

20%

Group 1
Accepters

This group is positive about a change to their gas supply for environmental reasons and in favour of using hydrogen. People accept changes to their lives in order to reduce climate change and improve the environment, believing that climate change is a significant challenge that needs to be addressed. Effective messages for Group 1 are environmentally focused, with reassurances centred on cost and safety.

28%

Group 2
Cautious

This group is positive about a change to their gas supply but unsure about using hydrogen. They share similar attitudes to Group 1, but have less confidence in their own knowledge and understanding of climate change issues and this impacts their willingness to change. They are motivated by the environmental benefits of a hydrogen conversion but are more concerned about the likely disruption.

30%

Group 3
Disinterested

This group is unsure about a change to their gas supply and also unsure about using hydrogen. Despite believing in the importance of climate change, they are disinterested in a potential hydrogen conversion as they do not believe they understand the issue well enough. As a result, the most appealing messages for Group 3 are centred on safety, cost, and the local economy rather than environmental benefits.

10%

Group 4
Unconvinced

This group is concerned about a change to their gas supply and unsure about using hydrogen. They are concerned about climate change but lack confidence in their knowledge of the issues, which means they are unconvinced that a transition to hydrogen is the most appropriate response. They want to be reassured about cost.

12%

Group 5
Rejecters

This group hold mixed views about a change to their gas supply and are against using hydrogen. They do not accept the role of humans in climate change and are reluctant to make lifestyle changes to reduce their environmental impact. They reject the need for a hydrogen conversion and are sceptical about the need for a change. They need convincing that hydrogen is a novel, renewable energy technology and need reassurance about safety and cost.

A representative sample of over 1,000 respondents from across the UK completed the survey, enabling insight into attitudes towards a hydrogen conversion.
Source: H21: Public perceptions of converting the gas network to hydrogen Social Sciences Study Prepared by: Dr Fiona Fylan, Dr Martin Fletcher, Dr Simon Christmas Leeds Sustainability Institute, Leeds Beckett University

Appendix 2
Milford Haven - demographics

date	2011		2011		2011	
geography	Wales		Pembrokeshire		Milford Haven BUA	
measures	value	percent	value	percent	value	percent
Household Composition						
All categories: Household composition	1,302,676	100.0	53,122	100.0	6,028	100.0
One person household	400,768	30.8	16,392	30.9	1,999	33.2
Aged 65 and over	178,334	13.7	7,978	15.0	948	15.7
Other	222,434	17.1	8,414	15.8	1,051	17.4
One family household	817,464	62.8	33,848	63.7	3,746	62.1
All aged 65 and over	115,928	8.9	5,777	10.9	568	9.4
Married or same-sex civil partnership couple	427,800	32.8	17,578	33.1	1,794	29.8
No children	163,935	12.6	7,513	14.1	726	12.0
Dependent children	181,340	13.9	7,060	13.3	717	11.9
All children non-dependent	82,525	6.3	3,005	5.7	351	5.8
Cohabiting couple	125,796	9.7	4,637	8.7	583	9.7
No children	60,399	4.6	2,189	4.1	208	3.5
Dependent children	58,784	4.5	2,223	4.2	347	5.8
All children non-dependent	6,613	0.5	225	0.4	28	0.5
Lone parent	147,940	11.4	5,856	11.0	801	13.3
Dependent children	98,141	7.5	4,027	7.6	545	9.0
All children non-dependent	49,799	3.8	1,829	3.4	256	4.2
Other household types	84,444	6.5	2,882	5.4	283	4.7
With dependent children	28,609	2.2	1,079	2.0	118	2.0
All full-time students	8,067	0.6	8	0.0	0	0.0
All aged 65 and over	4,452	0.3	227	0.4	19	0.3
Other	43,316	3.3	1,568	3.0	146	2.4

Appendix 2
Milford Haven - demographics

date	2011	
geography	Milford Haven BUA	
measures	value	percent
Tenure		
All households	6,028	100.0
Owned	3,525	58.5
Owned outright	1,973	32.7
Owned with a mortgage or loan	1,552	25.7
Shared ownership (part owned and part rented)	10	0.2
Social rented	1,720	28.5
Rented from council (Local Authority)	1,366	22.7
Other	354	5.9
Private rented	709	11.8
Private landlord or letting agency	624	10.4
Other	85	1.4
Living rent free	64	1.1

Stimulus material

Appendix 3

Scenarios of Challenges

To conduct the assessment the surveyor will need to arrange for someone to let them into your property.

Depending on the location of your pipework and gas meters etc they may have to access hard to reach parts of your home e.g. attic space. The assessment will require accessing any room with a radiator or gas appliance.

During the property assessment, a gas device is found to be unsafe. This could be a boiler for example.

The surveyor feels it is best to disconnect the device until it can be repaired or replaced. This may take a few days.

In a very small number of cases it may be that a appliance in your property cannot be converted from natural gas to hydrogen.

In this instance the appliance will have to be removed and a new (compatible) one provided.

In some older properties, some of the pipework may require replacing. This is to be sure it is safe and prevent any leaks.

This could mean some engineering work is required at your property e.g. to access pipes underground or beneath floorboards

Heating and cooking aren't the only things that rely on gas. Hot water from the tap can also often use gas.

This could mean those without an electric shower and/or a dishwasher will require a means to bathe and clean during the transition.

The types of support provided will also have to account for where people live.

A person living in a city centre for example may have more local amenities to support them during the conversion. Someone living in a less populated area may be more likely to be given temporary equipment to use.

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Appendix 4 – Relevant Reports on Hydrogen

- H21: Public perceptions of converting the gas network to hydrogen Social Sciences Study Prepared by: Dr Fiona Fylan, Dr Martin Fletcher, Dr Simon Christmas Leeds Sustainability Institute, Leeds Beckett University
- WWU – The Hydrogen Village Project – to be published
- NIA 270 Initial Hydrogen Strategy Report Northern Gas Networks (lead partner), Wales & West Utilities and National Grid Gas Transmission Report No.: 10267889-1, Rev. 4a Date: June 2021 Logistics of Domestic Hydrogen Conversion Frazer-Nash Consultancy Prepared for the Department of Business, Energy & Industrial Strategy October 2018FNC 57239/47448R Issue 1
- UK Hydrogen Strategy Presented to Parliament by the Secretary of State for Business, Energy & Industrial Strategy by Command of Her Majesty August 2021
- Public acceptability of the use of hydrogen for heating and cooking in the home Results from qualitative and quantitative research in UK Hanna Williams, Tara Lohmann, Sam Foster, Gareth Morrell
- Gas Goes Green – Britain Hydrogen Network Plan DNV.GL Energy Networks Association

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