
Briefing – March 2023

Hydrogen heating is the next energy crisis in the making

Hydrogen has become the latest buzzword in the energy transition debate. From industry conferences to opinion pieces, the term has made a sharp entry into climate discourse. But its proponents are not coming from climate activism, or groups that have spent years warning of a climate crisis. Instead, it is those most responsible for global warming – the fossil fuel companies – who are now extolling the virtues of hydrogen and pushing for its political support. Faced with mounting public pressure on governments to tackle climate breakdown, hydrogen has become the emperor’s new clothing for the oil and gas industry – a thinly veiled attempt for these companies to stay relevant and profitable, and to stall a genuinely green transition.

In the UK, this dynamic is playing out at large through the Energy Bill, that is currently passing through the House of Lords and will then move into the Commons. In 2021, the Government set out its vision for a so-called “low carbon” hydrogen strategy, which it said should play a critical role in the UK’s transition to net zero. This strategy outlined a number of potential uses for hydrogen, including in industry, transport and for domestic heating. The strategy flagged the government’s intention to set up trials of hydrogen heating – beginning with a hydrogen neighbourhood trial by 2023, followed by a large hydrogen village trial by 2025, and potentially a hydrogen town pilot before the end of the decade.

Now, nearly two years on, hydrogen heating is a key component of the Energy Bill, which would introduce a hydrogen levy on energy bills, compel people in selected areas of the country to take part in hydrogen heating trials and extend gas companies’ right of entry into people’s homes. Why is this a problem?

Problems with hydrogen heating

There are two ways of producing “low carbon” hydrogen - either using fossil gas with carbon capture and storage¹ or using electricity.² Both are extremely **energy intensive, inefficient and costly**.³ The gas industry is trying to paint hydrogen as the future of home heating, because it will extend the lifespan of its assets and infrastructure at a time when the world is waking up to the need to phase out gas.⁴ But this is the next energy crisis in the making - for these reasons it would be a disaster to heat our homes using hydrogen:

- > **Explosive:** Hydrogen is four times more explosive and four times more likely to result in a fatality or injury in homes than fossil gas – as shown by the Government’s own commissioned safety assessment.⁵
- > **Costly:** Hydrogen is significantly more expensive than using fossil gas for heating and could add on average 70% to heating bills from 2025 for both electricity and fossil fuel-based hydrogen, according to a study by Cornwall Insight.⁶ Some estimates suggest far higher costs for hydrogen from renewable electricity. To run a boiler on hydrogen from renewable electricity compared to a heat pump could cost twice⁷ or even six times as much, according to the Hydrogen Science Coalition.⁸
- > **Harmful to health:** Hydrogen produces dangerous nitrous oxide (NOx) emissions when burned⁹, which can have serious health impacts. Even short-term exposure can cause inflammation of the airways and increase vulnerability to respiratory infections and allergens, as well as worsening the symptoms of people with existing lung or heart problems.¹⁰
- > **Polluting:** Hydrogen is terrible for the climate. If produced from fossil gas, hydrogen’s greenhouse gas footprint is more than 20% greater compared to directly using the gas for heating, according to research by Cornell and Stanford University.¹¹ If produced using electricity, it would require extensive additional renewable electricity.¹² This risks diverting renewable electricity from other uses¹³ or could mean that fossil fuel-based electricity is used instead.¹⁴ Estimates suggest that until around 2030, hydrogen production using electricity would require a mix of sources and therefore result in higher carbon emissions than using conventional fossil gas boilers, according to David Cebon¹⁵, Professor of Mechanical Engineering at Cambridge University and a member of the Hydrogen Science Coalition.¹⁶
- > **Insecure:** The UK’s dependence on fossil gas would increase rather than decrease. The war in Ukraine is one of the latest stark reminders that the UK needs to move away from its reliance on fossil fuels which so often drive conflict.¹⁷ Using fossil gas to produce hydrogen for heating would require 45% more fossil gas than if using it directly for heating, according to the Hydrogen Science Coalition.¹⁸
- > **Uncertain:** The carbon capture and storage technology needed to produce low carbon hydrogen using fossil gas has not been proven at scale.¹⁹
- > **Delaying:** Relying on any form of hydrogen for heating - no matter how it will be produced - creates serious delays to existing climate friendly and cheaper alternatives, such as heat pumps.²⁰

The evidence against hydrogen for heating in the UK is well known – a review of 32 independent studies revealed that none of them support widespread use of hydrogen for heating.²¹ The

Government should be aware of this as the House of Commons' own Science and Technology Select Committee determined that low carbon hydrogen will at best have a limited role in heating homes.²² According to an industry insider, the oil and gas companies are also aware that hydrogen is a poor choice for heating, as reported by Recharge News.²³ The same insider has said that even cautious estimates suggest it would cost approximately £171 billion to convert appliances and infrastructure to hydrogen across the UK.²⁴

Hydrogen heating in the UK Energy Bill

Despite the evidence, the Energy Bill is currently passing through the House of Lords including several measures that would be great for the hydrogen industry but pose real risks for citizens. The main issues with the Energy Bill are that:

> It includes a hydrogen levy on energy bills.²⁵ This means the Government is choosing to increase energy bills at a time when prices are already at an all-time high²⁶ and many people are struggling to pay.²⁷ Additionally, the levy will be used to fund hydrogen developments²⁸ which will not benefit people who will have paid for it, because hydrogen is very unlikely to be used to heat homes.²⁹ Funds from the levy would be used to pay for fossil fuel and electricity-based hydrogen, according to the independent think tank E3G.³⁰ This means bill payers would subsidise gas companies which have already recorded billions in profits.³¹

Energy bills have already more than doubled since 2021.³² Levies on gas and electricity bills hit the poorest disproportionately, because they already spend a greater percentage of their income on energy bills than wealthier people, according to the UK Energy Research Centre.³³ The Government has not estimated the cost of the levy to energy users, suggesting that this information is not relevant to Peers and MPs who will have the right to vote on the Bill.³⁴

> The Government will select one of two locations (Redcar or Whitby, Ellesmere Port) to take part in a hydrogen village heating trial³⁵, which is expected to last for around two years.³⁶ Provisions in the Energy Bill mean that people in the selected area will be forced to take part in the trial³⁷ and will not be able to stay on fossil gas. They will instead have to opt for hydrogen boilers or electric heating.³⁸ If locals were to choose electric heating, this raises concerns whether a gas company should be trusted to adequately install a competing technology that is not in its own interest.

> Currently gas distribution operators are allowed to enter people's homes if there is a gas leak. The Bill proposes to extend these powers of entry to allow the companies to connect households to hydrogen, including any necessary in-home changes such as installing hydrogen boilers.³⁹ This is a real concern, particularly in light of the recent scandal involving companies gaining forced entry to people's homes to install pre-payment metres.

Because the gas network in the trial area will be converted to hydrogen, it will not be possible to keep single households connected to fossil gas. In an interview, Professor David Cebon said that, if a resident chose not to cooperate with the trial by refusing to have neither electric heating nor a hydrogen boiler installed, the gas companies would be in a difficult situation. If a household neither disconnects from gas to switch to electric heating nor upgrades the pipes and appliances to be

hydrogen ready, it would not be safe for the gas company to start pumping hydrogen through the whole network. So, if any household refuses to collaborate, the gas company would either be unable to start the trial or would have to force entry into that household and install an alternative heating system.

There is a real danger that the gas industry has played a role in getting these measures into the Energy Bill – it has been cosy up to politicians and pushing hydrogen-for-heating for some time. Plenty of evidence shows [lobbying](#) of the UK Government⁴⁰, such as the hydrogen lobby's latest targeting of [Labour](#) and [Conservative Party conferences](#).⁴¹ The Government also recently launched a consultation on mandating that all newly installed gas boilers be hydrogen ready from 2026⁴², something the industry has been calling for.⁴³ Another example includes Cadent Gas' Head of external affairs boasting about meeting with Number 10 to discuss hydrogen heating and the hydrogen village.⁴⁴ Given the evidence against hydrogen for heating, this paints a clear picture that the hydrogen provisions in the Energy Bill are not based on science but on lobbying.

Jacob Young, Redcar's Conservative MP⁴⁵ seems a prime example of the strong ties between the hydrogen lobby and the Government. Until recently he was the Chair of the All-Party Parliamentary Group (APPG) on Hydrogen⁴⁶, a group of MPs and Peers set up to work with businesses and organisations to look at options to implement hydrogen projects and policies.⁴⁷ The APPG's Secretariat receives funding from several gas companies, including Northern Gas Networks.⁴⁸ Young has been campaigning for his own constituents to become the test site for hydrogen heating – [advocating for Redcar to take part in the hydrogen village trial](#).⁴⁹ He has said that hydrogen is a 'crucial part of the UK's green economy recovery' that will create jobs in his constituency. The company that would be responsible for running the trial and ultimately benefit from it is Northern Gas Networks.⁵⁰ The other proposed location for the village trial is in Whitby, Ellesmere Port and would be run by Cadent Gas, which also funds the Hydrogen APPG.

The current Energy Bill does not inspire confidence that all the evidence is being properly considered. It seems clear to us that – intentionally or otherwise – Jacob Young and other UK politicians are acting in the interests of the at-risk gas distributors and boiler makers. Whether they are acting in the best interests of British consumers and the planet is another question.

In summary, the Government is pushing ahead with hydrogen for heating despite all the counterevidence: It will be more expensive to run than both fossil gas and heat pumps, it is dangerously explosive, it creates emissions that are hazardous to people's health, the required technology does not exist at scale, it would increase the UK's energy insecurity, and it will worsen rather than address the climate crisis.

The gas industry is in favour of hydrogen for heating because it would ensure that gas infrastructure and production is maintained and continues to bring in profits. If the Government goes ahead with the Bill it will cost citizens, play into the pockets of gas companies and delay immediate and effective climate change mitigation. Instead, we need an Energy Bill that will serve people and planet.

When asked for comment, Northern Gas Networks commented: *“Hydrogen is being explored by the Government as one option for decarbonising home heating. It is cited in several Government documents*

including the Hydrogen Strategy, Energy White Paper and Heat and Buildings Strategy. Northern Gas Networks was invited to put forward a proposal for a hydrogen village by the Government and energy Regulator, Ofgem.”

Cadent Gas also responded, stating that there were “*counter views*” that hydrogen was green and safe and that the company would give the government technical and safety data. The company also said the Energy Bill’s current hydrogen levy would “*support the production of hydrogen to support industrial decarbonisation and support flexible power generation,*” but the “*mechanism is not for hydrogen heating.*” Additionally, “*The path towards the UK’s 2050 net zero target will require us all to change and adapt our behaviour, and ultimately rely on new, and different types of energy. Hydrogen is one of the options being explored as part of government’s ambitions to create a diversified and domestically-focused energy strategy. We will continue to work with industry partners, as well as local and central government as we collectively look for solutions as we move towards a net zero future.*”

Jacob Young MP did not respond to requests for comment.

Endnotes

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