

Darren Jones MP
Chair, Business, Energy and Industrial Strategy Committee
House of Commons
London
SW1A 0AA

19 April 2021

Dear Darren,

Thank you once again for inviting me to give evidence to your inquiry into decarbonising heat in homes. It was great to meet you and the other members of your Committee, and I do hope the session was useful.

May I extend an invitation to the whole Committee to visit our headquarters in Oxford Circus, to see first-hand how our world-leading technology is transforming the UK energy market for the better? We could arrange suitable experts from our team to demonstrate equipment and answer questions on the capabilities and emerging capabilities of heat pumps and other aspects of electric heating.

I said that I would write to you to follow up on some of the points that were made towards the end of the session. I hope the below sets out in a clear way why I object to some of the central claims that Cadent Gas made about the merits of using hydrogen over heat pumps for domestic heating. This is just an overview, and I'd be delighted to bring this to life more vividly if Committee members were to visit us at our offices as soon as circumstances allow.

The “quick fix” myth of hydrogen

One of the main arguments put forward by Cadent Gas in favour of hydrogen heating was that the physical switch from gas to hydrogen would offer minimal disruption, at little or no added cost. This is misleading at best.

Even after spending £8bn to upgrade some of the national gas network to handle hydrogen, another £22bn is required. And that only takes the hydrogen to the meter in people's homes. Pressure tests still need to be carried out on gas pipes and joints to determine if it is both safe and workable to replace gas with hydrogen in households. If it is not, then everything from the meter upwards will need to be replaced (stripping out all the pipes between the mains and the boiler, and replacing every gas cooker and fire).

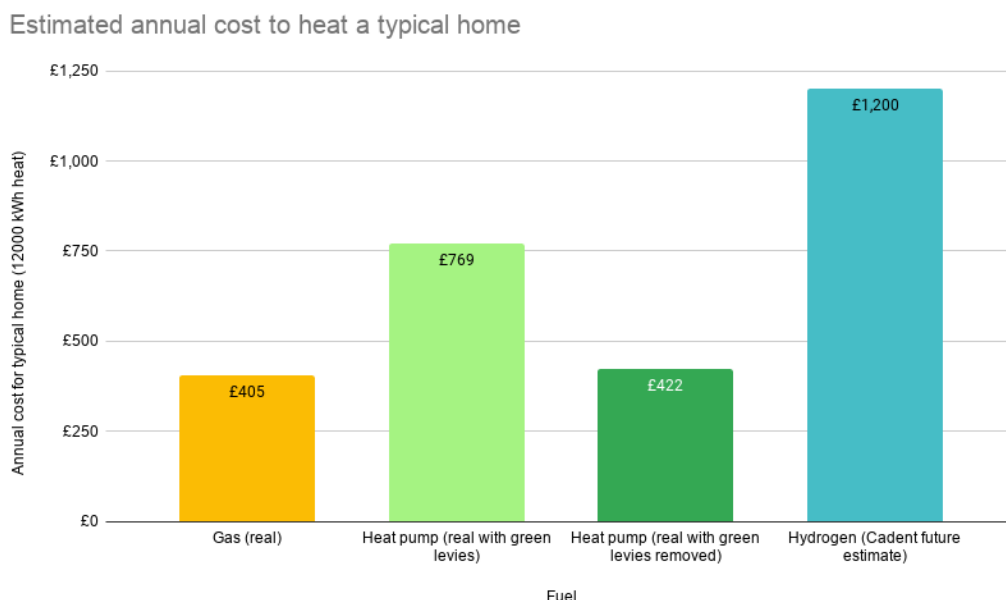
The cost of this transition would also be significant, with Cadent's own evidence¹ estimating that it would cost £3-£4k per household to install a hydrogen boiler. Currently, there is no low-carbon alternative that does not incur some cost for the consumer. We are all working to try to find ways to drive costs down. In the meantime, it is so important that companies are honest about the cost and disruption that transitioning to any low-carbon heat source will incur.

Hydrogen is a bad deal for customers

Cadent Gas also claimed that hydrogen offered better ongoing value for money for consumers. Not only do we disagree with that statement, but it isn't supported by the figures Cadent themselves used to back it up.

¹ Cadent Gas, Written Evidence to the Public Accounts Committee inquiry on Achieving Net Zero, January 2021

In the session, Cadent Gas stated a cost of 9p/kWh for hydrogen to the home. As the chart below shows, not only is this extremely expensive relative to gas, it's also expensive compared to the current costs of running a heat pump, even when assuming a very conservative 250% heat pump COP (see input table on page 3). If you compare that to the cost of electric heat if green levies were removed, the cost of hydrogen heating then becomes almost three times more expensive than a heat pump, by Cadent's own estimation.



In subsequent tweets they claimed a figure of 4.5p/kWh may be achievable by 2050. Not only is this 50% more than we pay today for gas (or heat pumps if we reduce levies), it is 30 years away. But even more importantly, they seem to assume in comparing the cost of hydrogen with heat pumps, that electricity (which is required for the production of hydrogen) is simultaneously free to them while being costly for consumers. Obviously, both of these statements cannot be true. The price they have quoted for green hydrogen today seems optimistic, is unproven and is therefore subject to significant uncertainty and would require major upfront investment to achieve.

Heat pumps are the proven alternative - running costs today can be the same as gas

The bottom line is that it is palpably not true that hydrogen is cheaper, or more convenient, than electric heating.

There is, however, ample evidence to demonstrate that heat pumps are the most efficient alternative to gas heating. We know this because, unlike hydrogen boilers, heat pumps are available now. Across Europe, countries that are further ahead in the rollout of heat pumps, are already benefiting from reduced carbon emissions and lower household bills.

As I said to the Committee, the case for heat pumps is already strong. Indeed, were it not for the fact that electricity today carries almost all the carbon taxes – unlike gas – heat pumps could be run for similar costs to gas (see chart above). With renewables falling to costs comparable with fossil fuels (and continuing to fall) this means green heating can be cheap heating -today.

This is because of the basic laws of physics:

- A heat pump generates 2.5kwh – 3.5kwh of heat for every kwh of electricity generated
- A hydrogen boiler will generate c. 0.3kwh of heat for every kwh of electricity generated

Put simply: generating electricity and using it in a heat pump is c. 10x more efficient than converting it to hydrogen and then burning the hydrogen in homes.

Heat pumps are the proven alternative – capital costs will fall to similar levels to gas boilers with scale

Fundamentally, heat pumps are simple. They contain the same parts as an air conditioner or a fridge. They are expensive in the UK because 63% are imported and they are manufactured and distributed at levels which are subscale.

Manufacture in the UK at scale will not only bring costs down, but will improve quality and installation costs as they will be designed with the UK in mind – and will generate thousands of jobs. Today, installation costs are expensive as the installations are highly bespoke. Octopus is investing heavily – building a training centre to drive costs down with standardisation – and creating the opportunity for thousands of skilled jobs in the heat pump industry.

Finally, the fabric of our homes is often described as a reason not to move forward with heat pumps. The reality is that millions of homes are “heat pump ready” and most others typically need relatively little effort to be made so.

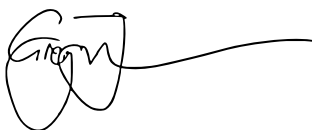
A ‘level playing field’

Finally, it’s often said that it’s a good thing for the market that there is so much commercial competition between hydrogen and heat pumps. This is in itself a fallacy, because there is currently no consumer choice in the way that energy is funded (and the way gas networks are proposing to fund hydrogen). Instead, everyone is paying to subsidise gas, and so meaningful commercial competition is impossible.

So, if we do want the market to compete to find the best solution, we must ensure there is a level playing field to begin with by addressing historic inequalities and structural biases. As it stands, everything from the way we tax green electrons, to the funding model for gas DNOS, to a decarbonisation model that’s biased towards large, centralised infrastructure, is stacked against low-cost, consumer-centric electrification.

Once again, many thanks for inviting me to give evidence to the Committee. It was a pleasure to speak with you all and I do hope to be able to welcome the Committee to our offices soon. In the meantime, if you require any further detail on the information set out above, please do let me know.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Greg Jackson', with a long horizontal line extending to the right.

Greg Jackson, CEO
Octopus Energy

Data input table

Fuel	Cost of delivered fuel (p/kWh)	Efficiency	Cost of heat (p/kWh)	Annual cost for typical home (12000 kWh heat)	Data source
Gas (real)	3.04	90%	3.38	£405	Octopus view of supply cost
Heat pump (real with green levies)	16.03	250%	6.41	£769	Octopus view of supply cost
Heat pump (real with green levies removed)	8.79	250%	3.51	£422	Octopus internal modelling
Hydrogen (Cadent future estimate)	9	90%	10.00	£1,200	ENA Gas Goes Green report https://www.energynetworks.org/assets/images/Project%20Altair_H2%20Cost%20to%20the%20Customer_Nov%20update%20v4_final.pdf

COP: Coefficient Of Performance