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Consultation response

November 2020

Environmental Audit Committee: Technological Innovations Inquiry: Heat Pumps

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About Energy Saving Trust

Energy Saving Trust is an independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy use to address the climate emergency.
Our work focuses on reaching net zero targets by taking action to reduce energy consumption, installing new infrastructure and accelerating a move to sustainable, low carbon lifestyles.

A trusted, independent voice, we have over 25 years' sector experience. We provide leadership and expertise to deliver the benefits of achieving carbon reduction targets: warmer homes, cleaner air, healthier populations, a resilient economy and a stable climate.

We empower householders to make better choices, deliver transformative programmes for governments and support businesses and community groups with strategy, research and assurance – enabling everyone to play their part in building a sustainable future.

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Call for evidence

In October 2020, a Westminster parliamentary committee, the Environmental Audit Committee issued a call for evidence for an inquiry into heat pumps. The terms of reference for the enquiry are outlined below.

Terms of reference

The Committee is inviting written submissions to inform its forthcoming evidence session. These should focus on, but not be limited to:

- What steps can the Government take to increase uptake of heat pumps?
- How can we ensure that the regulatory frameworks in place work together to guarantee heat pumps are used in the most effective places, alongside other technological solutions?
- What steps can be taken to lower heat pump installation costs?
- What role should gas or hybrid heat pumps play in helping the UK reach the target of net zero emissions by 2050?
- How can the Government tackle the current skills gap for designers, builders and installers of heat pumps?
- How can public awareness of heat pumps be improved

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Summary of our response

Our key recommendations to the Inquiry questions are summarised below:

Role of government: The key role of the government here is to provide long-term policy stability, strong regulation and a clear policy framework. The current demand-led approach has failed to grow the market as anticipated, the tariff-based subsidy programme has not proved cost-effective and so stronger government intervention is required. This should include regulation to phase-out new/ replacement fossil-fuel heating in new-build, conversions and homes both off and on the gas-grid. An early strategic decision on the long-term future of the gas network would clarify the direction of travel. We recommend that the short-term focus in this area should be on building a mass-market for heat pumps that can work without subsidies.

Skills gap: the supply chain will not invest in personnel and skills at the rate required until there is more policy certainty in this area.

Quality standards: As a consumer-focussed organisation, we support mandatory quality standards. Customer protection and high standards are paramount to building trust in what is currently a niche technology in the UK.

Bringing down the cost of heat pumps: Experience from Sweden and Finland shows that once fossil-fuel heating is no longer the cheapest option, the market can change rapidly. Our submission makes recommendations for reducing both the upfront and running costs of heat pumps. Combined with new business models and future income from flexibility services, these would make subsidy-free heat pumps a viable prospect.

Consumer awareness: Whilst reducing costs is necessary to grow the market, equal attention must be paid to building consumer awareness. Heating is an emotional as well as an economic decision. From our experience of helping home-owners transition and adjust to low carbon heating, this will require a concerted approach to 'hand-hold' consumers throughout the transition. Our key recommendations here are for a Government-backed i) communication campaign to build a narrative on low-carbon heat as part of the net zero transition and ii) for a Low Carbon Homes Advice Service to provide expert, impartial and trusted advice, tailored to both households and the likely heat options for their home and region.

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1. Role of the Government

The key role of the government here is to provide long-term policy stability, strong regulation and a clear policy framework.

The current demand-led approach (as pursued in the Domestic Renewable Heat Incentive) has failed to grow the market as anticipated (Committee of Public Accounts, 2018[1]), the tariff-based subsidy programme has not proved cost-effective (National Audit Office, 2018[2]) and so stronger government intervention is required.

This should include regulation to phase-out new/ replacement fossil-fuel heating in new-build, conversions and homes both off and on the gas-grid. A timeline for a strategic decision on the long-term future of the gas network would support this.

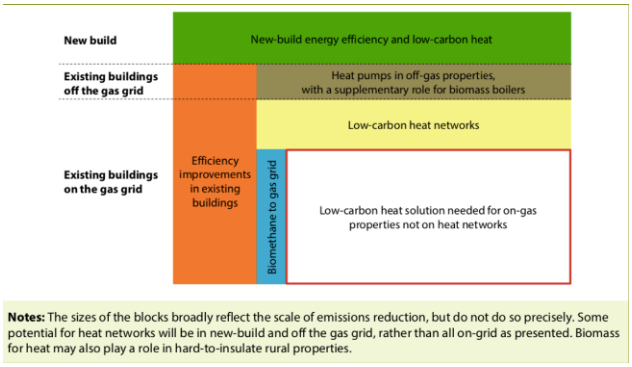
Approach to scale-up heat pump deployment

Our view is that, whilst low carbon gases (such as hydrogen) could play a useful supporting role in decarbonising heating, the current uncertainties around safety, running costs and timescales suggest that energy efficiency, heat pumps (including hybrid systems) and heat networks will be the least-cost pathway to decarbonising heat (with direct electric heating in space-constrained properties and some use of biomass in hard-to-insulate, off-grid properties). Our view aligns with the position set out by UK Energy Research Centre (UKERC) here[3]

The Government's current position on the comparative role of low carbon gas and electrification is to pursue '*no/low regrets*' activity (as set out in the green and gold rectangles of this diagram from the Committee on Climate Change [CCC] below) whilst keeping all options open. Given this, we have set out an example of how deployment could be greatly accelerated within these 'no-regrets' sectors (where electrification is most likely).

[1] https://publications.parliament.uk/pa/cm201719/cmselect/cmpubacc/696/696.pdf
[2] https://www.nao.org.uk/report/low-carbon-heating-of-homes-and-businesses-and-the-renewable-heat-incentive/
[3] https://ukerc.ac.uk/publications/net-zero-heating/

Fig. 1: Low-regrets measures and the remaining challenge for existing buildings on the gas grid (CCC, 2016)[4]



Scale of deployment required by 2030

Net Zero by 2050 implies a phase-out of new fossil-fuel heating by/ before 2035 (assuming an average boiler life of 15 years). In 2019, 1.7 million gas boilers were sold, compared with less than 30,000 heat pumps, and 100,000 additional homes were connected to the gas-grid. Since heat pumps (electric and hybrid) could account for between one-half to two-thirds of the market by 2035, we agree with the CCC[5] that the sector needs to scale-up to deliver 1 million units a year by 2030.

Whilst we are optimistic that a subsidy-free mass-market can be built for heat pump retrofit by the end of the 2020s, this will take time to develop. In the meantime, the focus should be on market sectors where subsidy is not required (new build) or where heat pumps can significantly reduce running costs now (homes off the gas grid, with older direct electric heating, social housing and more efficient on-gas properties) thereby reducing the subsidy required.

This approach can be used to grow the market whilst other changes to reduce costs (see 1.3), increase consumer familiarity and develop innovative retail offerings take effect. It would also provide space for the development of both national policy and regional heat plans (which will provide greater clarity for the options for the 85 percent of homes currently heated by gas boiler).

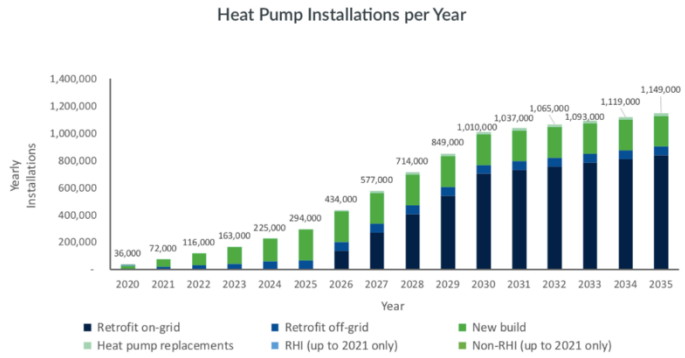
Alongside this, there must be a determined focus throughout the 2020s on bringing all homes up to an adequate level of thermal efficiency (or low-carbon heat 'readiness' - roughly equivalent to Energy Performance Certificate 'C'). Delay here will impact the mass rollout of low carbon heating.

[4] https://www.theccc.org.uk/wp-content/uploads/2016/10/Next-steps-for-UK-heat-policy-Committee-on-Climate-Change-October-2016.pdf
[5] https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/

Building the supply chain whilst reducing reliance on subsidy

The Heat Pump Association (HPA) suggests[6] the following deployment trajectory to build to one million units per year. This trajectory results in about 3.3 million cumulative units by 2030 (in line with the CCC's 'Further Ambition' scenario in the Fifth Carbon Budget[7]).

Fig. 2: HPA deployment trajectory scaling to 1 million units per year by 2030 (HPA, 2020)



This could be achieved by focussing on the following areas:

A. **New build**: Heat pumps in new-build have a lower capital cost as the lower heat demand means a smaller, lower cost unit can be used and other changes (resizing the heat emitters, changing pipework) can be avoided.

This analysis[8] suggests that capital costs are a third lower (around £6,000) and that even where this cost is passed through, the lower running costs will deliver an overall saving for the homeowner. We therefore think that regulation here is warranted.

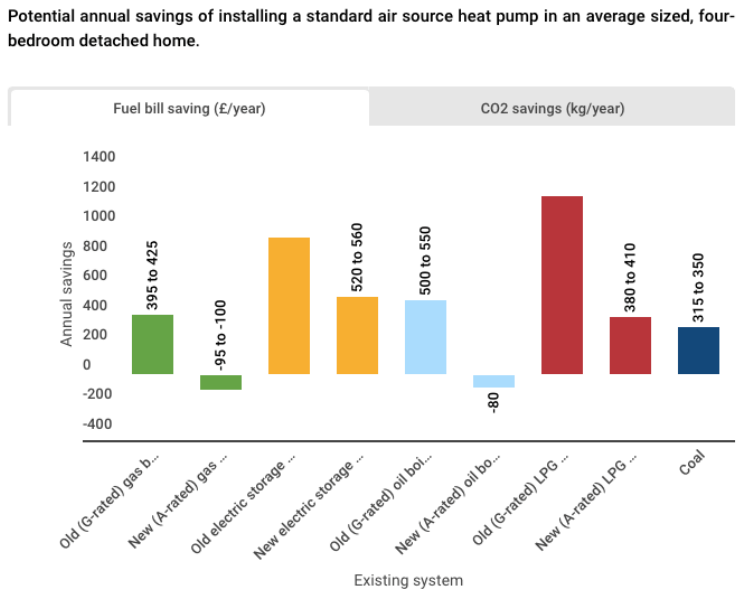
Whilst proposed changes to the building regulations (the Future Homes Standard) would make heat pumps the dominant form of heating in new build from 2025, there is scope to bring this forward to 2024 or 2023. Government forecasts around 250,000 new homes a year (England). If the changes were bought forward to 2023, and 200,000 homes per year were fitted with a heat pump, this would yield at least 1.4 million heat pumps by 2030 with no public subsidy.

B. **Retrofit:** Energy Saving Trust data shows that the current retrofit costs are £9-11,000[9] for air source heat pumps (ASHP), and £14,000- £19,000[10] for ground source heat pumps (GSHP).

[6] https://www.heatpumps.org.uk/wp-content/uploads/2019/11/A-Roadmap-for-the-Role-of-Heat-Pumps.pdf
[7] https://www.theccc.org.uk/publication/the-fifth-carbon-budget-the-next-step-towards-a-low-carbon-economy/
[8] https://www.theccc.org.uk/wp-content/uploads/2019/07/The-costs-and-benefits-of-tighter-standards-for-new-buildings-Currie-Brown-and-AECOM.pdf
[9] https://energysavingtrust.org.uk/advice/air-source-heat-pumps/
[10] https://energysavingtrust.org.uk/advice/ground-source-heat-pumps/

Off-grid homes using oil, coal and LPG: Government has committed to introduce regulation to phase-out replacement high-cost, high-carbon heating by 2030. Energy Saving Trust calculations (see below) show that replacing an older G-rated oil boiler with an ASHP would save £500 per year (£7,500 over its 15 year lifetime).

Fig. 3: Comparison of running costs in heating systems (Energy Saving Trust, 2020)



Whilst a subsidy would still be required here, a £4,000 upfront grant (as proposed for the Government's Clean Heat Grant from 2022) could be an attractive incentive (assuming a capital cost of £9,000-£11,000). The level of grant may need to vary according to several variables – the income of the household, the size of the system (larger ASHPs or GSHPs can be considerably more expensive) and the likely bill savings from the unit. For 'able to pay' households however, the size of the grant could be reduced if the comparative running costs were improved (see section 3) or by using low-interest loans or innovative financing methods). France has introduced similar regulation to phase-out new oil and coal boilers from 2022 (alongside income-based grants).

If regulation to phase out high-carbon fossil fuels was bought forward to 2025, alongside support to help householders make the transition for example, a free, impartial advice service and a time-limited scrappage scheme (this could be lower and higher accordingly to the relative size/ cost/ likely bill saving for replacement heating, averaging £5,000 per home), **this could deliver up to 1 million heat pumps by 2030**. It would require a subsidy of £5bn. Part of the necessary subsidy for both the heat pumps and associated enabling works could be met through the anticipated £2.5bn Home Upgrade Grant [HUGs] scheme.

Note on price variability: This year has seen unusually low oil prices which has reduced the economic incentive in switching from oil boilers to heat pumps. It highlights that, in addition to reducing the cost of electricity, it may be necessary to increase the cost of polluting fuels. To avoid reducing heat affordability, we would suggest that this must be done alongside measures to reduce consumption such as improving insulation. In the Netherlands, a progressive increase on fossil fuels is used to reduce taxes on electricity.

Electric heating: the Energy Saving Trust table shows that homeowners with older electric heating could save around £900 per year (a lifetime saving of £13,500) with a £500 (£7,500) saving for newer electric heating. Whilst there is an economic case to install a heat pump on the bill savings alone for older systems, it is likely that some subsidy will be required (especially whilst the market is developing and people become more comfortable with the technology).

An option here would be a grant fund which reduces throughout the 2020s as the market develops and costs reduce (potentially converting to a loan fund as suggested by the CBI's Heat Commission[11]). This could support retailers to supply heat pumps in a similar manner to mobile phones - where the user pays off the capital cost through a long-term contract. Here the contract would be for heat provision, with the energy bill savings helping to pay off the capital cost. Successful pilots on this 'heat as a service' approach, supported by the Energy Systems Catapult highlight the opportunity here. There is interest from energy retailers in supplying heat pumps on this basis if regulatory barriers can be overcome and a stable grant fund is in place.

Assuming a grant fund that starts at £4,000 and reduces over a 10 year period to £2,000 with an average grant of £3,000, this could stimulate at least 1 million conversions to heat pumps at the cost of £3bn. Part of this subsidy could be provided by the forthcoming £3.8bn Social Housing Decarbonisation Fund as there is particular scope for social housing providers to lead early adoption here.

The worked example above suggests an approach to scale-up the supply chain, focussing on the 15 percent of off-gas grid homes. The public subsidy set out here totals £8bn. The level of the subsidy needed will partly depend on success in bringing both capital and running costs down. We have listed our suggestions for this in section 3 of our response.

Supporting consumers

Currently there is a very limited awareness of the need for low-carbon heating. This survey[12] by Energy Systems Catapult suggest that half of people are not aware that gas

[11] https://www.cbi.org.uk/media/5123/heat-policy-commission-final-report.pdf
[12] https://es.catapult.org.uk/news/1-in-2-not-aware-of-gas-boilers-climate-impact-survey/

boilers are one of the main ways households contribute to climate change and how that needs to change. The CCC's latest Progress Report[13] highlighted this as the key barrier to low carbon heat.

Whilst reducing costs (capital and running costs) is necessary to build the market, equal attention must be paid to building consumer awareness. Heating is an emotional as well as an economic decision and from our experience of helping home-owners transition and adjust to low carbon heating, this will require a concerted approach to 'hand-hold' consumers throughout the transition. We have responded to this more fully in section 6 of our response.

[13] https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/

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2. Lowering costs

Experience from Sweden and Finland shows that once fossil fuel heating is no longer the cheapest option, the market can change rapidly. Energy Saving Trust data suggests that the average cost of air source heat pumps is £9,000 -11,000 (with £14,000 -£19,000 for ground source). Assuming a £10,000 cost for an ASHP and £2,300 for a gas boiler, the changes listed below could **reduce the cost of an ASHP by 45 percent to £5,500**. Whilst this is probably not enough (unless heat pumps are sold on a different basis – see below) by itself, it could make a mass-market viable when combined with operational savings and income from flexibility services.

Capital cost

Cost reduction: The CCC[14] have estimated that there is scope for a 20 percent reduction in the upfront-cost by 2030 if the supply-chain can be scaled up.

Energy efficiency: A recent study[15] by the Carbon Trust into the potential affordability of retrofitting heat pumps into eleven of London's most common housing types found that better energy efficiency (equivalent to Energy Performance Certificate band 'C') reduced upfront costs by an average of 20 percent (due to the smaller unit cost and reduced need for 'enabling' works such as new, larger radiators/ pipework). This highlights the need for a concerted push to improve the average energy efficiency of the stock, particularly in areas where heat pumps are likely to be the main technology.

VAT: since changes in 2019, many heat pumps installations are now subject to a 20 percent VAT rate for part/ all of the installation. Reducing this rate back down to 5 percent would deliver an immediate 15 percent cost reduction.

Lifetime costs: Data by the Buildings Services Research and Information Association (BSRIA) suggests that boilers are replaced every 13 years on average (with a 10-15 year range) with heat pumps lasting, on average, for 15 years (with a range of 15-20 years). Boiler warranties vary from 2-10 years. Selling heat pumps with longer warranties of 15 years would increase the value proposition for the consumer (the comparative cost per year of each for the warranty period would be £666/ year for the heat pump compared with £230 for the boiler) when combined with lower running costs.

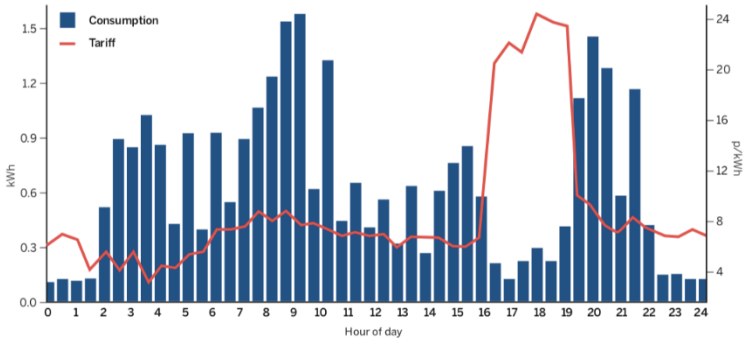
[14] https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/
[15] https://www.carbontrust.com/resources/heat-pump-retrofit-in-london

Running costs

Rewarding flexibility: Unlike buildings with fossil-fuel boilers, buildings with heat pumps can engage with emerging markets for electricity demand flexibility, by changing heating patterns to avoid peak times when electricity is both more expensive and (generally) more carbon-intensive.

i) Time-of-use tariff (TOU): Switching to a TOU (and changing heating patterns to avoid peak times) can reduce running costs by 23- 46 percent according to UKERC and the Carbon Trust. As TOU tariffs require smart meters, this highlights the importance of ensuring the smart meter roll-out is completed by the mid-2020s.

Fig. 5: Example of TOU with load shifting (RAP, 2020)



Grid-balancing: Shifting usage away from peak times reduces both costly network reinforcement and traditional sources of flexibility such as thermal generation (subject to carbon pricing). Current regulation, network incentives and market rules mean that customers are not fully rewarded for the value they provide in avoiding grid-balancing costs.

Changing this, and allowing aggregators to automate demand-shifting for domestic users could transform the market for heat pumps (with these flexibility payments offsetting higher capital costs of heat pumps). This report for Ovo Energy by Imperial University suggests that smart electric heat could '*provide enough flexibility to enable renewable generation from wind and solar displace the need for both nuclear and CCS, whilst providing savings of up to £3.9bn / year.*'

Shift the cost of environmental and social levies away from electricity: Ofgem (2020)[16] analysis shows that the UK has below average gas prices but above average electricity

[16] https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits

prices. This is partly to do with decisions the UK has made about how to distribute the costs of energy market environmental and social programmes. The cost of these overwhelmingly sits on the electricity bill – making up 23 percent of unit cost of electricity but only 2 percent of gas bills. The intention here was to both distribute the costs as widely as possible (all households use electricity but only 85 percent use metered gas) and to avoid increasing fuel poverty (the UK's leaky housing stock means that even with lower than average gas prices, around 11 percent of households struggle to afford adequate heating). This distribution of costs though now needs urgent review as by increasing electricity prices, it is a barrier to heat pump take-up. Similarly, whilst efficient electric heating is now the lowest carbon option, electricity is the only form of heating subject to a carbon price (electricity generation is subject to a carbon price which is passed through to consumers whereas other heating fuels are not). As highlighted elsewhere, moves to increase heating costs must be accompanied by action to reduce consumption (to avoid increasing fuel poverty). A short-term approach could be to shift part of the levy cost to general taxation as Germany has done as a stimulus measure.

Standing charge: Removal of the gas meter will cut heating bills by £87.60 per year (15 percent of the £572 average gas bill according to Ofgem). The impact of this will be more significant for smaller properties where the standing charge makes up a higher proportion of the bill. The Carbon Trust found that the combined impact of reducing the standing charge and swapping to a TOU tariff can be enough to make heat pumps a lower cost than gas in some of their 11 house architypes.

Innovative retail offers: As highlighted in section 1.1, the development of innovative retail offers such as 'heat as a service' where heat pumps can be provided as a part of a heat service contract without an upfront cost provides good scope for future mass-market deployment.

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3. Regulation

Building regulations (new build): We hope that regulatory phase-out dates for fossil-fuel heating in new build homes (and conversions), and in homes both on and off the gas network will be included in the Heat and Buildings Strategy. Where low-carbon heating is not installed, there is an opportunity for regulation to ensure that the home is made 'heat-pump ready' to reduce future retrofit costs with sufficient fabric standards, adequate electricity supply connections and space for future hot water-cylinders.

Building regulations: For new central heating (new or existing homes), regulation could require a maximum flow and return temperature of 55 degrees Celsius and ensure that heat emitters are sized for a future heat pump.

Mandating quality standards: As a consumer-focussed organisation, we feel that customer protection and high standards are paramount to building trust in what is currently a niche technology in the UK. BEIS data suggests that only 30 percent of heat pumps are currently installed under the Microgeneration Certification Scheme (MCS), which is required where public subsidy is used. There is anecdotal evidence that smaller, lower cost units are being installed in new-build homes. If not sized correctly, the heat pump could struggle to meet the heat requirements of the home or increase running costs. For this reason we think a mandatory quality standard (MCS or equivalent) should apply whether a public subsidy is used or not.

Ensure public/ bill funded investment supports rather than conflicts with the low-carbon rollout: An example here would be Ofgem's Fuel Poverty Network Extension (FPNES) scheme. This provides subsidies to connect fuel poor households to the gas network. Funded by energy bill payers via District Network Operators (DNOs), this has connected around 91,000 households by 2021. Whilst it has been a successful mechanism for reducing energy bills in the past, there should be a shift to supporting these households to transition to low carbon heat instead as this is likely to have lower *future* running costs. Recommitting to the current approach in the medium term risks locking low-income households into higher future bills.

EPC/ Green Building Passports: it is likely that Energy Performance Certificates (EPC) will evolve and be supported by more detailed, regionally-specific Green Building Passports. These changes could include room-by-room heat loss and heating emitters to highlight the 'enabling' changes the might be require to get the home 'low carbon heat ready'. This information will better equip the householder to schedule these alongside complementary refurbishment work.

4. Role of hybrid heat pumps

We think that hybrid heat pumps could have a valuable support role in larger homes that are more difficult to insulate, where housing density is too low to support a heat network and as a bridging technology where the local electricity grid is not sufficient. We would like to see larger trials of different types of households, their usage and the capital and running costs to better understand the role they could play.

For hybrid systems to be a long-term solution, they would need to be backed up by lower carbon gas such as hydrogen or biomethane.

In the medium term, there is a risk that hybrid systems could be sold as a means to lower emissions without needing to improve the fabric of the home.

Whilst this might be necessary for a minority of homes (heritage homes or those that are particularly disruptive or expensive to insulate), it could result in both higher emissions and higher bills for the majority of homes that can be insulated effectively. If the home has poor thermal efficiency, it will not be able to retain heat well. This means that the household will need to use either the electricity or gas system to heat during these expensive periods regardless of the price, potentially leading to higher bills (and less control for the household).

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5. Tackling the skills gap

Again, the most important driver here is for the Government to commit to long-term policy certainty so the supply chain invests in personnel and skills. Whilst subsidized training could encourage new entrants, if not set within a wider policy framework that sets out a clear pathway, supported by regulation, for a viable market not dependent upon subsidy, it will not deliver the required scale-up.

In France, new regulation rules out new/ replacement oil boilers from 2022 alongside a grant ('Coup de Pouce') covering up to 80 percent of low-carbon replacement. This has resulted in a 264% increase in new installers compared to the same period in 2018.

The HPA suggest that 50,000 HP installers will be needed by 2030 compared with 1,800 now. They think that there is sufficient capacity to scale-up the training but the incentive for people to train is absent. Rather than scaling-up, this from UKERC suggests that we are currently going in the wrong direction with 16 percent fewer MCS-accredited installers compared to 2011 and lower deployment than the 2014-15 peak.

A recent survey of heating engineers suggested that the following factors would be influential in making the decision to retrain

- 58% rated 'obligatory training for organisation membership' as very important.
- 50% rated 'new mandatory installation standards' as very important.
- 42% rated 'future mandatory installation standards' as very important.
- 38% rated 'demand from customers' as very important.

Reskilling: This industry survey suggests that in 2017, there were around 108,000 domestic gas engineers (with a median age of 55, and average age of 46), and that engineers start to retire or leave the Gas Safe Register aged 55. It suggests that, whilst the initial growth needs to come from reskilling existing gas engineers (and electricians), there needs to be a concerted attempt to bring new entrants into the market. This may be particularly relevant for the more highly-skilled designer role. This requires more training and so may be less attractive to older engineers looking to scale-down commitments.

New entrants: The need to scale up this sector is a prime Green Recovery opportunity to create jobs by rapidly retraining, reskilling and upskilling thousands of locally based workers, to develop a skilled zero-carbon workforce. A former deputy Governor of the Bank of England, Sir John Grieve, cited a major ten-year 'boiler replacement project' as a top pick for a pick for a higher wage, higher skill and higher productivity recovery.

As heat pathways will have a strongly regional dimension, there is scope to devolve relevant skills and education budgets to support this, and to encourage collaboration with the private sector. Collaborations between the off-shore wind industry, regional government and education providers in Teeside provide scope for replication here.

As noted previously, we support mandatory quality standards such as MSC (or equivalent) to protect consumers and to build trust in the sector. As this report from Citizen's Advice sets out, problems with construction and home maintenance created around of £7.6 billion of consumer detriment in 2016. Of these UK consumers, just over half (51%) were satisfied that the issue had been resolved in a reasonable manner[1].

To protect consumers and build trust, we would additionally support:

- stronger standardisation in training to ensure installers have both the technical skills necessary and the softer skills required to support the householder in using the system effectively.
- mandatory public indemnity (PI) insurance
- the creation of an oversight body with powers to regulate the quality of an installer to deter underqualified installers

Heat Pump Sector Deal: A way to drive both skills training, investment, cost reduction and confidence in the market would be for the government to agree a Heat Pump Sector deal with industry to look at how to bring costs down, improve quality and consumer protection and scale-up just as the off-shore wind sector has over the past decade. Off-shore wind's share of annual UK generation increased from 0.8% in 2010 to 6.2% in 2017, and is expected to reach around 10% by 2020. Heat pumps (in a pure or hybrid form) are likely to play as impart a role in decarbonising heating as off-shore wind has in decarbonising power. A sector deal would deliver on the government's strategic objective of Clean Growth and could ensure that the financial benefits are retained within the UK where possible (by supporting local manufacturing etc.).

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6. Improving public awareness

As highlighted in section 1, there is currently low public awareness that heating needs to change. There is an urgent need for concerted government-backed action to change this and to highlight the benefits of a shift to low-carbon heating (health, employment, comfort and potentially lower future bills).

Moving from a gas boiler to a pure electric heat pump is not 'plug and play'. It is a different approach to heating (from rapid response high temperature heating to low temperature heating over a longer period). This shift and the behaviour change required to optimise bills savings/ earnings from future electricity flexibility markets may be challenging for consumers (particularly those already marginalised by the energy market). This transition needs to be effected within 30 years (2 heating replacement cycles) - faster than the market-led shift to central heating (uptake here was concentrated over a 40-year period).

For these reasons we feel that there will be a considerable need to 'hand-hold' consumers throughout the transition. There is no provision for this currently in England.

The emerging customer journey starts with the Government's digital advice platform Simple Energy Advice which provides tools to suggest measures that might be suitable for the household's home and highlights installers that are suitably qualified to take part in the current Green Homes Grant scheme. Going forward, installers will need to work within a new quality framework aimed at a 'whole house' approach to retrofit (PAS2035) led by a Retrofit Coordinator to ensure measures complement each other and are sequenced appropriately.

We support both of these features (whilst noting that on-going work to improve and update the information provided by Simple Energy Advice is necessary) but feel that the current approach is not sufficient. Whilst the digital platform is helpful for internet-savvy householders with a reasonable idea of what measures they are interested in, it is less well placed to introduce and make consumers comfortable with newer technologies, particularly where these may require ongoing behaviour change (external wall insulation, heat pumps) or other physical changes to the home.

We feel, moreover, that there is a gap in customer journey to support homeowners and tenants to get on board (and to stick) with this long-term journey to retrofit their home (managed through the PAS2035 process) which we would recommend is filled with an impartial, expert advice service.

As building a mass-market here will require homeowners to invest their own money into installing unfamiliar technologies in their home, it is vital that the process is perceived as low -risk and positive – and something that the consumer is in control of.

Our key recommendations here are for:

- A government-backed communication campaign alongside the lines of the digital switchover to provide the narrative around the low-carbon heat transition.

- A government-backed advice service to support the digital advice platform. This needs to provide expert, impartial and trusted advice (by phone, email, and potentially home visits too), tailored to households and informed by the likely heat options for their home and region.

There are different ways to deliver this but we recommend central coordination to ensure consistent advice and quality, combined with regional/ local delivery (heat pathways are likely to have a strong regional dimension