



HOUSE OF LORDS

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Cc: Philippa Pickford, Director, Delivery and Schemes, Ofgem; James Cartlidge MP, Exchequer Secretary to the Treasury; Lee Rowley MP, Parliamentary Under Secretary of State, Department for Levelling Up, Housing and Communities; The Rt Hon Robert Halfon MP, Minister for Skills, Apprenticeships and Higher Education.

22 February 2023

Dear Minister,

The Boiler Upgrade Scheme and the wider transition to low-carbon heat

As you will know, the Environment and Climate Change Committeeⁱ has been conducting an inquiry into the Government's Boiler Upgrade Scheme (BUS)^{1,2} building on previous parliamentary work on low-carbon heat.³ We are grateful to you for coming before us to give evidence on 14 December 2022, your letter dated 12 January, and engagement from your department with our inquiry.⁴

With 17 per cent of the UK's greenhouse gas emissions coming from homes,⁵ transitioning to low-carbon heating systems in homesⁱⁱ is essential to reduce our greenhouse gas emissions in line with the UK's statutory climate targets. It can also help reduce the UK's dependence on imported fossil fuels and provide skilled jobs.⁶ The Government has a commendable but ambitious target for 600,000 heat pump installations per year by 2028 and is introducing a policy framework for the development of heat networks.⁷ Yet, there is a long way to go and time is short. In 2021, less than 2 per cent of homes in England and Wales had low-carbon heating systems and only around 50,000 heat pumps were installed across the UK that year.⁸ Public awareness of low-carbon heating is also very limited.

The BUS could be a key tool to grow the low-carbon heat market ahead of other important policy measures, including mandated targets on industry and regulated phase-out dates for

ⁱ The Committee Members' interests are available on our website:
<https://committees.parliament.uk/committee/515/environment-and-climate-change-committee/publications/7/declarations-of-interest/>

ⁱⁱ While the BUS is also open to small non-domestic properties, our inquiry has focused on domestic properties.

fossil fuel systems in new and existing homes. We understand that the scheme is intended to pump-prime the market, however, **the BUS is seriously failing to deliver on its objectives** with a disappointingly low take-up of grants. **If the current take-up rate continues, only half of the allocated budget will be used to help households switch to low-carbon heating systems,ⁱⁱⁱ a healthy market of installers and manufacturers will not be in place in time to implement other low-carbon heating policy measures smoothly, and the Government’s 2028 target is very unlikely to be met.** Phase-out measures like the Future Homes Standard⁹—which could make a substantial contribution to the 2028 target, if implemented as proposed, and in turn help supply chains to develop—rely on the adequate development of supply chains now to be successful.

It is right that the main focus of the BUS is on supporting the rollout of heat pumps.¹⁰ Heat pumps are a mature technology which have been adopted to a much greater extent in some other European countries.¹¹ The majority of low-carbon heating systems installed in all homes from now through to both 2030 and 2050 will be heat pumps of one type or another according to the Committee on Climate Change (CCC)’s balanced pathway.¹² BEIS, before it was replaced by the new department, had said 90 per cent of homes in Great Britain have sufficient insulation measures to be heated comfortably with a low temperature heat pump, while a similar proportion may require changes to radiator sizes for the heat pump to work effectively on the coldest winter days.¹³ While views differ on the proportion of households that are suitable for a typical air source heat pump installation considering constraints like space,¹⁴ different installation designs—such as networked heat pumps—will help overcome these challenges in many cases.¹⁵ **To assist households in evaluating options, the Government must clarify which types of properties should be the near-term priority for typical air source heat pump installations and which properties would be better suited by other installation designs.**

While not a core focus of this inquiry, heat networks also need to be rolled out at scale and other technologies will be needed for a minority of households that cannot be served by heat pumps or heat networks.¹⁶ **Hydrogen is not a serious option for home heating in the short to medium-term** and its use is expected to be limited in the long-term, but the high level of misinformation and confusion that exists around hydrogen—not helped by mixed messages from Government such as the hydrogen-ready boiler consultation—is undermining take-up of heat pumps. **The Government must provide greater clarity to industry and consumers on feasible options for low-carbon home heating through a consistent policy framework, public communications and advice.**

We set out below the main issues with the BUS and wider policies that are acting as barriers to the transition to low-carbon heat in homes. We would be grateful if your department would coordinate with His Majesty's Treasury, the Department for Levelling Up, Housing and Communities, and Department for Education to provide a response to our questions by Wednesday 29 March.

ⁱⁱⁱ As of 31 January 2023, 9,889 vouchers have been issued worth a total value of £49,730,000. The Committee's position on the take-up rate is based on the total value of vouchers issued. By the same date, 7,641 vouchers have been redeemed, meaning there have been 7,641 installations under the BUS. £150mn has been allocated for each year of the scheme and £450mn is available in total. Source: <https://www.ofgem.gov.uk/publications/bus-monthly-scheme-update>

Very limited take-up

We hope you are considering multiple means to increase take-up of the BUS. Public awareness of low-carbon heating systems is very limited, and promotion of the BUS has been wholly inadequate to stimulate demand.¹⁷ 62 per cent of people have little or no awareness of the need to change the way homes are heated to reach Net Zero, and 80 per cent of people have little or no awareness of air source heat pumps.¹⁸ **While we welcome plans for a further marketing push for the BUS,¹⁹ we are concerned that the campaign planned is not of the scale needed to ensure the scheme is a success.** *How will the effectiveness of the BUS marketing campaign be monitored, and is there a review point scheduled for considering what further marketing activities are needed?*

Upfront costs are often a major barrier to heat pump installation and we go on to discuss these in more detail later. **Even with the help of the grant, the remaining costs are too high for many households.²⁰ Increasing the grant levels could help address this.** *What evidence has been used to determine the grant levels? What factors are you taking into account when reviewing the grant levels, and what consideration are you giving to increasing the grant levels in general to support scheme take-up?*

While the BUS is supporting some air source heat pump installations, very few installations of ground source heat pumps are happening and, according to the evidence received, this is because the grant level is not high enough to match the higher relative cost.²¹ **Ground source heat pumps can deliver greater energy efficiency and so should also be adequately incentivised.²²** *What assessment have you made of the implications for the BUS' emission savings and supply chain development of the low ground source heat pump take-up? What thought have you given to increasing the grant level for ground source heat pumps?*

In some properties though not all, heat pump installation can be a trigger for energy efficiency improvements—including improved insulation and switching to larger radiators—which would be beneficial regardless of the heating system used.²³ However, requiring a certain Energy Performance Certificate (EPC) rating and corresponding level of insulation as an eligibility criterion for the BUS acts as a barrier for some households and contributes to misconceptions about the relative cost of heat pump installations compared to other technologies.²⁴ We discuss flaws with EPC recommendations for some properties and call for improved advice services further below. **We support improving insulation, but since households can install a new fossil fuel boiler without a requirement to improve insulation, the Government should consider the effects of this extra hurdle on its aim of pump priming the low-carbon heat market. The use of EPC ratings and the associated insulation requirements as an eligibility criterion for the BUS should be removed, alongside ensuring households can access reliable advice on how running costs differ according to the levels of insulation.** *What assessment has been made of the impact of using EPC ratings as an eligibility criterion on BUS take-up, and the benefits of removing the requirement to improve take-up?*

Local authorities are well-positioned to work with local communities and coordinate low-carbon heat installations in several nearby properties at a time—including on a street-by-street basis—and bring benefits from economies of scale.²⁵ **BUS take-up could also be increased with local authorities' help.** *What consideration have you given, or will you give, to*

designing in an explicit, optional role for local authorities within the BUS, and providing incentives for them to undertake this role?

We are disappointed that the Government has not committed to rolling over the remainder of the first year's BUS budget into the second year,²⁶ especially given the scheme opened some weeks after the beginning of the financial year and the portal for applications only came online in late November 2022. You and His Majesty's Treasury explained that the budgeting principle of annularity, which means authorised spending must take place in the related year unless there are exceptional circumstances, is the reason why the funds cannot be rolled over.²⁷ *To what extent were the delayed launches of the BUS and the digital portal considered as exceptional circumstances that might justify rolling over the first year's budget? Has there been, or will there be, wider consideration of the appropriateness of applying the principle of annularity to the first year of the BUS, given the urgent need to scale up the low-carbon heat market?*

Scheme administration

We are glad you and Ofgem recognise that smooth administration of the BUS and prompt processing of applications are key to minimise the administrative and cashflow burdens placed on installers.²⁸ We welcome Ofgem's focus on these aspects and efforts to work through delivery issues in the early months of the scheme.²⁹ The launch of the online portal is a positive development, though it is unfortunate this was not in place earlier.³⁰ We understand Ofgem has developed its digital capability to manage the portal.³¹ *What lessons have been learnt from setting up the scheme, including the online portal, and how will these lessons be shared across the Department for Energy Security and Net Zero and other government departments?*

Skills, research and development and policy certainty

A shortage of relevant skills is another major barrier to take-up of the BUS and low-carbon heat more widely.³² There are far fewer heat pump installers available than gas boiler fitters—estimated at under 2,000 heat pump installers in 2019 compared to 130,000 Gas Safe registered heating engineers—meaning households are more likely to be advised to replace a gas boiler with like-for-like and they must work harder to get a range of quotes for low-carbon heating systems.³³ The Government's Heat and Buildings Strategy refers to estimates that at least 12,400 heat pump installers will be needed by 2025 and 50,200 by 2030. It also states that the Electrification of Heat Task Group and Net Zero Buildings Council will consider any barriers to upskilling heat pump installers.³⁴ While the Government is funding some training places and different parts of industry have training capacity,³⁵ **would-be heat pump installers**—be they existing gas and electrical engineers minded to retrain or young adults—**need much greater certainty from Government about the future trajectory of the heat pump market to invest their time in training.**³⁶ *What barriers have been identified by the Electrification of Heat Task Group and Net Zero Buildings Council to training 12,400 heat pump installers by 2025 and 50,200 by 2030, and what action is being taken by Government to address these barriers?*

Policy certainty and a clear government strategy are also critical to spur investments in research and development (R&D) and manufacturing capacity. As you know, we heard evidence from Octopus Energy and visited their training centre in Slough

as part of this inquiry.³⁷ We were impressed by their considerable efforts to improve low-carbon heating technologies, installation processes and the consumer experience, as well as train new heat engineers. The Government is supporting some R&D,³⁸ and other firms are also making welcome investments,³⁹ **but these investments must be multiplied to achieve much-needed cost-reductions and an improved consumer experience, and to ensure that supply chains are in place to meet the Government's 2028 target.** *How will the Government spur the necessary investments in R&D and manufacturing capacity to enable the successful roll-out of heat pumps in line with the 2028 target? Is the Government developing an R&D and technology roadmap, as called for in the Rt Hon Chris Skidmore MP's Net Zero Review, and, if so, will heat pumps form a part of this?*

The scale and duration of the BUS mean it does not provide the signal needed for the market of installers and manufacturers to grow at the rate needed.⁴⁰ Schemes in some other countries, while not identical in design to the BUS, are of a significantly larger scale and duration. If trends from mid-year statistics continued throughout 2022, France's MaPrimeRénov scheme will have allocated around £390mn towards air source heat pump installations in a single year. This compares to the three-year budget of £450mn available in England and Wales for the BUS.^{iv} Germany's budget is also significantly more generous than the BUS.⁴¹ **It seems to us and others that the size of the budget is insufficient for the size of the task.**⁴² We recognise that possible cost-reductions, if realised, could warrant changes to the scheme.⁴³ **The Government should establish a review point to consider extending the BUS. This review should assess whether the aim of pump-priming the market—developing supply chains and delivering cost reductions—has been achieved, and what changes may be needed to the BUS and wider policies to ensure installation rates are consistent with the 2028 target.** *What plans does the Government have to review the scale of the BUS with a view to increasing the overall budget, and will you commit to conducting a review to consider extending the BUS based on the criteria above to provide industry, would-be heat pump installers, and consumers as much certainty as possible on plans for the scheme beyond 2025?*

Wider government policies are also failing to provide certainty on the future of domestic low-carbon heat, but there are opportunities to rectify this. It is unhelpful the Government's ambition to phase out gas boilers by 2035 has not been put forward in stronger terms.⁴⁴ Mixed messaging around the use of hydrogen for home heating is similarly unhelpful, given that hydrogen is not a serious option in the short and medium-term for home heating and any use for this purpose in the long-term is likely to be limited.⁴⁵ Keeping the option of hydrogen open, including through the recent consultation on hydrogen-ready boilers,⁴⁶ is negatively affecting take-up of established low-carbon heating technologies like heat pumps.⁴⁷ On the other hand, **timely development of the market-based mechanism for low-carbon heat^v presents an opportunity to provide the certainty needed for the market of installers and manufacturers to grow.**⁴⁸ Providing a

^{iv} MaPrimeRénov funds various measures including insulation and energy audits. It had a budget of €2bn for 2022. From January to June that year, 22% of the budget was spent on air source heat pump installations which would equate to €440mn, or around £390mn, if the trend continued throughout the year and all of the budget was allocated. Source: Yannick Monschauer, International Energy Agency (IEA) (BUS0030) and the references provided by Mr Monschauer.

^v This has been put forward as 'Low-carbon heat schemes' in the Energy Bill and would involve placing mandated targets for low-carbon heat systems on industry.

stronger indication of how the £6bn announced for energy efficiency for 2025-28 will be allocated would also be beneficial. *Is work ongoing in parallel to the Energy Bill to produce draft regulations to implement the market-based mechanism for low-carbon heat, and what indication can you give of the direction of travel to industry, would-be heat pump installers, and consumers for the market-based mechanism and £6bn of energy efficiency funding for 2025-28?*

Costs

Upfront costs of installing a heat pump make them out of reach for most lower-income households, even with the BUS grant taken into account.⁴⁹ Some schemes exist to support low-income and fuel-poor households with energy efficiency,⁵⁰ but these do not reach all households in those groups.⁵¹ BEIS put the cost of installing an air source heat pump in a domestic property within a range of £7,000-£14,000 before any grant is taken into account, and ground source heat pumps are more costly.⁵² Further, **while heat pump running costs are becoming competitive with gas boilers in some modelling, progress is urgently needed through some of the policies we discuss below to ensure running costs are affordable for all households in practice.**⁵³ *Does the Government accept that current grant levels preclude low-income households from benefitting from the BUS? What work has the department done to establish low-carbon heat pathways for households across income levels and ensure that lower-income households are not left behind?*

Upfront costs are also a challenge for many middle-income households. Government-backed low-interest loans, which are available in other jurisdictions including Scotland,⁵⁴ and new financial products and heat-as-a-service offers developed by the private sector could help households to meet heat pump installation costs.⁵⁵ They could also be used to support energy efficiency improvements, such as insulation, to reduce running costs and energy demand.⁵⁶ *What consideration has been given to offering government-backed low-interest loans, and how is Government supporting the private sector to develop new financial products and heat-as-a-service offers which could help households meet heat pump installation costs?*

We welcome the Government's aim to ensure retail energy prices send the right signals to consumers to switch to low-carbon heating systems.⁵⁷ Weakening the link between wholesale gas and electricity prices through electricity market reform could help bring down the cost of electricity for consumers overall and ensure heat pump running costs are competitive.⁵⁸ *When can we expect the next update on the Government's Review of Electricity Market Arrangements, including proposals to weaken the link between wholesale gas and electricity prices?*

Running costs could also be brought down through a greater use of retail tariffs which reward heat pump owners for using electricity when overall demand is lower.⁵⁹ *What steps are the Government and Ofgem taking to promote a greater take-up of time-of-use tariffs, given the reductions in running costs they could deliver to households?*

Advice and support

Installing a heat pump is more complex than a like-for-like gas boiler replacement and it is an unfamiliar product for many people, despite using established technologies.⁶⁰ We heard from people who have installed heat pumps in their homes with support from the BUS and were impressed by their commitment to reduce their carbon

footprints and work through the installation process, but if take-up rates are to increase the process needs to be made easier.⁶¹ Advice and support could be delivered through a personalised advice service, like those which exist in Scotland and France,⁶² and wider promotion of the role of retrofit coordinators who can act as a single point of contact for households throughout installation.⁶³ **Households want independent advice which includes detailed guidance regarding their own homes.⁶⁴ We are not convinced that current government advice tools are sufficient to help households cope with the complexities of the process.** *What assessment have you made of how advice is currently being provided to households about energy efficiency and low-carbon heating, and what steps are being taken to promote best practice? What consideration has been given to introducing a personalised advice service across England and promoting the role of retrofit coordinators to help households navigate low-carbon heating installations?*

Aftercare for heat pump installations is sometimes limited, partly because there are not enough installers to meet demand for new installations and aftercare.⁶⁵ This means some households struggle to iron out teething problems and ensure that their system is operating as efficiently as possible. Knowing that aftercare may not be available or sufficient could also be dissuading people from taking up low-carbon heat.⁶⁶ *What assessment have you made of the adequacy of aftercare support available to households and policy measures that could be used to encourage greater support?*

Other policy barriers

Heat pumps and heat networks could both be potentially viable low-carbon heating solutions for some properties.⁶⁷ We welcome that the Energy Bill seeks to put in place a policy framework for the development of heat networks, and that work is ongoing on how heat network zones will be designated.⁶⁸ **To inform their decision on installing a new heating system, households need clarity on the priority local areas for new heat networks and on plans to change the heat source of existing heat networks.** *What is the timeframe for launching the heat network zoning delivery consultation and what plans are there to put forward a deadline for zone designations? What resources will be provided to enable local authorities to participate in this process?*

EPCs are currently being used for various purposes, including to establish eligibility for the BUS, however, they are recognised as having multiple flaws. EPCs do not consistently value the installation of a heat pump and installation can sometimes even result in a poorer EPC rating, weakening the incentive for property-owners.⁶⁹ More widely the certificates give recommendations for some types of properties which cannot feasibly be achieved.⁷⁰ **The EPC methodology must be corrected so that certificates properly reward households for making the switch to low-carbon heating and flawed EPC recommendations cease being a barrier to BUS eligibility.** *What is the timeline for the Government's next round of updates to EPCs, and will these changes ensure that heat pump installations are consistently valued, and recommendations for all properties are feasible?*

New heat pumps are quieter than older models due to technological improvements and yet Permitted Development Rights still require heat pumps to be sited a certain distance from neighbouring properties.⁷¹ **We are glad that you and the Department for Levelling Up, Housing and Communities have also identified PDR requirements for heat**

pumps to be an issue and hope it can be resolved in a timely manner.⁷² *What plans are there to relax the requirement arising from Permitted Development Rights to site a heat pump a certain distance from neighbouring properties?*

Thank you again for your engagement in our inquiry, we know you share our view that the transition to low-carbon heat is fundamental in the path to net zero. We urge you and colleagues to work to address the barriers set out above and enable the growth in take-up of low-carbon heating systems that is vitally needed if we are to meet our Net Zero ambitions.

Yours sincerely,



Baroness Parminter

Chair, Environment and Climate Change Committee

¹ The Government's webpage for the BUS, which offers grants to support installations of low-carbon heating systems in domestic and small non-domestic properties, can be found here: <https://www.gov.uk/apply-boiler-upgrade-scheme>

² Further information relating to the Committee's inquiry is available at the following webpage, including links to oral and written evidence received. We are grateful to those who gave evidence, especially several members of the public, Anthony Hibbs, John Taylor, Dr Robert Whitmarsh, Jan Davis, and Julian Clarke, who told us about their experiences installing heat pumps: <https://committees.parliament.uk/work/6858/boiler-upgrade-scheme/publications/>

³ Previous work on low-carbon heat by the House of Commons' Business, Energy and Industrial Strategy Committee, the then Housing, Communities and Local Government Committee, and the Environmental Audit Committee is available at the following pages: <https://committees.parliament.uk/work/645/decarbonising-heat-in-homes/publications/reports-responses/>; <https://committees.parliament.uk/work/1081/local-government-and-the-path-to-net-zero/publications/reports-responses/https://committees.parliament.uk/publications/7690/documents/80183/default/>; <https://committees.parliament.uk/work/684/technological-innovations-and-climate-change-heat-pumps/publications/3/correspondence/>

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- ⁴ The evidence session with Lord Callanan is available here: <https://committees.parliament.uk/oralevidence/12472/html/>; written evidence from BEIS ([BUS001](#)) and Lord Callanan ([BUS0038](#))
- ⁵ Page 23, BEIS, 'Heat and Buildings Strategy', October 2021, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1036227/E02666137_CP_388_Heat_and_Buildings_Elay.pdf
- ⁶ [Q 53](#) (Dr Richard Lowes), [Q 33](#) (Alex Schoch)
- ⁷ Page 21, BEIS, 'Heat and Buildings Strategy', and Part 7, [Energy Bill](#)
- ⁸ For the proportion of low-carbon heating systems in England and Wales, see: <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/census2021howhomesareheatedinyourarea/2023-01-05> and https://www.ons.gov.uk/datasets/TS046/editions/2021/versions/1?showAll=heating_type#heating_typehttps://www.ons.gov.uk/releases/housingcensus2021inenglandandwales. The percentage quoted includes those who responded to the 2021 census as heating their homes with renewable energy only, with two or more types of central heating (including renewable energy), and district or communal heat networks only. The figure for heat pumps installed across the UK in 2021 is from written evidence from the Committee on Climate Change (CCC) ([BUS0037](#))
- ⁹ Ministry of Housing, Communities and Local Government, 'The Future Homes Standard: summary of responses, and government response', January 2021, available at: <https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings>
- ¹⁰ [Q 13](#) (Andrew Sissons), [Q 28](#) (Alex Schoch), [Q 28](#) (Mark Robson), written evidence from the CCC ([BUS0037](#)), Regulatory Assistance Project (RAP) ([BUS0018](#)), BRE ([BUS0022](#))
- ¹¹ Written evidence from Dr Richard Lowes ([BUS0028](#)) and the Nature article referred to in the submission.
- ¹² Written evidence from the CCC ([BUS0037](#)). All CCC scenarios include a significant proportion of heat pumps.
- ¹³ Written evidence from BEIS ([BUS0001](#))
- ¹⁴ [Q 28](#) (Alex Schoch), [Q 28](#) (Mark Robson), [Q 39](#), [Q 41](#) (Mike Foster), [Q 39](#) (Bean Beanland)
- ¹⁵ Written evidence from BRE ([BUS0022](#)) and Kensa ([BUS0034](#))
- ¹⁶ Written evidence from the CCC ([BUS0037](#)), Kensa ([BUS0034](#)), Vaillant ([BUS0012](#))
- ¹⁷ [Q 57](#), [Q 62](#) (Dr Richard Lowes), [Q 3](#), [Q 9](#) (John Taylor), written evidence from Which? ([BUS0005](#)), MCS ([BUS0009](#)), CAST ([BUS0026](#)), Heat Pump Association ([BUS0010](#)), Mitsubishi Electric Residential Products Group ([BUS0011](#)), Vaillant ([BUS0012](#)), EDF ([BUS0014](#)), PropertyMark ([BUS0017](#)), Green Alliance ([BUS0019](#)), Historic Houses ([BUS0023](#)), Centrica ([BUS0024](#)), Electrify Heat Coalition ([BUS0025](#)), IMS Heat Pumps ([BUS0035](#))
- ¹⁸ Pages 2 and 6, BEIS, 'Public Attitudes Tracker', Autumn 2022, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1123573/BEIS_PAT_Autumn_2022_Heat_and_Energy_in_the_Home.pdf
- ¹⁹ [Q 67](#) (Lord Callanan), [Q 67](#) (David Capper), written evidence from Lord Callanan ([BUS0038](#))
- ²⁰ [Q 11](#), [Q 16](#), [Q 18](#) (Zoe Guijarro), [Q 50](#) (Polly Billington), [Q 50](#) (Dr Richard Lowes), written evidence from Which? ([BUS0005](#)), Energy Systems Catapult ([BUS0006](#)), National Energy Foundation ([BUS0008](#)), Nesta ([BUS0021](#)), CAST ([BUS0026](#)), Heat Pump Association ([BUS0010](#)), Vaillant ([BUS0012](#)), Calor ([BUS0015](#)), PropertyMark ([BUS0017](#)), Green Alliance ([BUS0019](#)), Energy Saving Trust ([BUS0020](#)) Historic Houses ([BUS0023](#)), Electrify Heat Coalition ([BUS0025](#)), IMS Heat Pumps ([BUS0035](#)), EUA ([BUS0036](#))
- ²¹ [Q 6](#) (John Taylor), [Q 22](#) (Andrew Sissons), [Q 44](#) (Bean Beanland), [Q 50](#) (Yannick Monschauer), written evidence from MCS ([BUS0009](#)), Nesta ([BUS0021](#)), NIBE Energy Systems ([BUS0013](#)), IMS Heat Pumps ([BUS0035](#))
- ²² [Q 44](#) (Bean Beanland), [Q 50](#) (Yannick Monschauer), written evidence from Kensa ([BUS0034](#))
- ²³ [Q 1](#) (Anthony Hibbs), [Q 39](#) (Bean Beanland), written evidence from Which? ([BUS0005](#)), written evidence from Energy Systems Catapult ([BUS0006](#)), BRE ([BUS0022](#)), MCS ([BUS0009](#)), Heat Pump Association ([BUS0010](#)), Kensa ([BUS0034](#)), Mitsubishi Electric Residential Products Group ([BUS0011](#)), NIBE Energy Systems ([BUS0013](#)), Energy Saving Trust ([BUS0020](#)), Electrify Heat Coalition ([BUS0025](#)), IMS Heat Pumps ([BUS0035](#))
- ²⁴ Written evidence from Green Alliance ([BUS0019](#)), [Q 50](#), [Q 55](#) (Polly Billington), [Q 20](#) (Zoe Guijarro), written evidence from Which? ([BUS0005](#))
- ²⁵ [Q 50](#), [Q 53](#), [Q 60](#) (Polly Billington), written evidence from UK100 ([BUS0029](#)), Kensa ([BUS0034](#))
- ²⁶ [Q 64](#) (Lord Callanan), written evidence from HM Treasury ([BUS0027](#)), Regulatory Assistance Project (RAP) ([BUS0018](#)), [Q 33](#) (Mark Robson), [Q 46](#) (Bean Beanland)

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- ²⁷ [Q 64](#) (Lord Callanan), written evidence from HM Treasury ([BUS0027](#))
- ²⁸ [Q 44](#) (Lee Brown), [Q 37](#) (Alex Schoch), [Q 44](#) (Bean Beanland), [Q 70](#) (Lord Callanan), [Q 70](#) (Philippa Pickford), written evidence from NIBE Energy Systems ([BUS0013](#)), EDF ([BUS0014](#)), Kensa ([BUS0034](#)), IMS Heat Pumps ([BUS0035](#))
- ²⁹ [Q 65](#) (Philippa Pickford), written evidence from Ofgem ([BUS0002](#)), [Q 44](#) (Bean Beanland), Heat Pump Association ([BUS0010](#)), EDF ([BUS0014](#)), IMS Heat Pumps ([BUS0035](#))
- ³⁰ [Q 65](#), [Q 70](#) (Philippa Pickford), written evidence from Ofgem ([BUS0002](#)), [Q 44](#) (Bean Beanland), written evidence from MCS ([BUS0009](#)), NIBE Energy Systems ([BUS0013](#)), IMS Heat Pumps ([BUS0035](#))
- ³¹ [Q 65](#) (Philippa Pickford)
- ³² [Q 12](#) (Andrew Sissons), [Q 34](#) (Mark Robson), [Q 55](#) (Dr Richard Lowes), [Q 55](#) (Polly Billington), written evidence from Energy Systems Catapult ([BUS0006](#)), MCS ([BUS0009](#)), Nesta ([BUS0021](#)), Vaillant ([BUS0012](#)), NIBE Energy Systems ([BUS0013](#)), Federation of Master Builders (FMB) ([BUS0016](#)), Centrica ([BUS0024](#)), Electrify Heat Coalition ([BUS0025](#)), EUA ([BUS0036](#))
- ³³ Written evidence from Which? ([BUS0005](#)), Electrify Heat Coalition ([BUS0025](#)), Energy Systems Catapult ([BUS0006](#))
- ³⁴ Pages 52-53, BEIS, 'Heat and Buildings Strategy'
- ³⁵ [Q 15](#) (Andrew Sissons), [Q 34](#) (Alex Schoch), [Q 47](#) (Bean Beanland), [Q 47](#) (Mike Foster), [Q 69](#) (Lord Callanan), written evidence from BEIS ([BUS0001](#)), Heat Pump Association ([BUS0010](#)), Mitsubishi Electric Residential Products Group ([BUS0011](#)), Kensa ([BUS0034](#))
- ³⁶ [Q 22](#) (Tom Elliott), [Q 47](#) (Bean Beanland), [Q 52](#) (Yannick Monschauer), [Q 52](#) (Andreas Graf), [Q 55](#) (Polly Billington), [Q 12](#) (Andrew Sissons), written evidence from Nesta ([BUS0021](#)), Mitsubishi Electric Residential Products Group ([BUS0011](#)), Vaillant ([BUS0012](#)), Green Alliance ([BUS0019](#))
- ³⁷ See contributions from Alex Schoch, <https://committees.parliament.uk/oralevidence/11948/pdf/>, and <https://committees.parliament.uk/committee/515/environment-and-climate-change-committee/news/175656/lords-environment-and-climate-change-committee-visit-octopus-energy/>
- ³⁸ <https://www.gov.uk/government/publications/heat-pump-ready-programme/information-about-the-heat-pump-ready-programme>
- ³⁹ See contributions from Mark Robson, Ovo Energy, <https://committees.parliament.uk/oralevidence/11948/pdf/>, and written evidence from Mitsubishi Electric Residential Products Group ([BUS0011](#)), Vaillant ([BUS0012](#)), NIBE Energy Systems ([BUS0013](#)), Kensa Group ([BUS0034](#))
- ⁴⁰ [Q 50](#) (Polly Billington), [Q 56](#) (Dr Richard Lowes), written evidence from MCS ([BUS0009](#)), Heat Pump Association ([BUS0010](#)), Vaillant ([BUS0012](#)), Kensa ([BUS0034](#)), Regulatory Assistance Project (RAP) ([BUS0018](#)), IMS Heat Pumps ([BUS0035](#))
- ⁴¹ [Q 50](#), [Q 51](#) (Andreas Graf), [Q 50](#) (Yannick Monschauer)
- ⁴² [Q 18](#) (Zoe Guijarro), [Q 33](#) (Mark Robson), [Q 62](#) (Dr Richard Lowes), [Q 62](#) (Yannick Monschauer), written evidence from the CCC ([BUS0037](#)), Regulatory Assistance Project (RAP) ([BUS0018](#)), Green Alliance ([BUS0019](#)), CAST ([BUS0026](#)), Kensa ([BUS0034](#)), IMS Heat Pumps ([BUS0035](#))
- ⁴³ [Q 33](#) (Alex Schoch)
- ⁴⁴ [Q 55](#) (Polly Billington)
- ⁴⁵ [Q 54](#) (Yannick Monschauer), [Q 54](#) (Polly Billington), written evidence from MCS ([BUS0009](#))
- ⁴⁶ [Q 66](#) (Lord Callanan)
- ⁴⁷ [Q 54](#) (Polly Billington), written evidence from MCS ([BUS0009](#)), Nesta ([BUS0021](#)), Kensa ([BUS0034](#)), IMS Heat Pumps ([BUS0035](#))
- ⁴⁸ Part 3, Chapter 1, [Energy Bill](#), and [Q 62](#) (Andreas Graf), written evidence from MCS ([BUS0009](#)), Regulatory Assistance Project (RAP) ([BUS0018](#))
- ⁴⁹ [Q 18](#) (Zoe Guijarro), [Q 50](#) (Yannick Monschauer), written evidence from Green Alliance ([BUS0019](#)), Electrify Heat Coalition ([BUS0025](#))
- ⁵⁰ [Q 73](#) (Lord Callanan)
- ⁵¹ Written evidence from Centrica ([BUS0024](#))
- ⁵² Page 104, BEIS, 'Heat and Buildings Strategy'
- ⁵³ [Q 51](#) (Yannick Monschauer), [Q 50](#) (Andreas Graf), written evidence from Nesta ([BUS0021](#)), BRE ([BUS0022](#)), MCS ([BUS0009](#)), Mitsubishi Electric Residential Products Group ([BUS0011](#)), Vaillant ([BUS0012](#)), Energy Saving Trust ([BUS0020](#)), Electrify Heat Coalition ([BUS0025](#))
- ⁵⁴ [Q 19](#) (Andrew Sissons), [Q 51](#) (Yannick Monschauer), [Q 60](#) (Dr Richard Lowes), written evidence from Heat Pump Association ([BUS0010](#)), Energy Saving Trust ([BUS0020](#)), IMS Heat Pumps ([BUS0035](#))

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- ⁵⁵ [Q 20](#) (Zoe Guijarro), [Q 22](#) (Andrew Sissons), [Q 52](#) (Dr Richard Lowes), written evidence from MCS ([BUS0009](#)), Heat Pump Association ([BUS0010](#)), Vaillant ([BUS0012](#)), Dr Richard Lowes ([BUS0028](#)), [Q 16](#) (Tom Elliott), [Q 20](#) (Zoe Guijarro), [Q 26](#) (Mark Robson)
- ⁵⁶ [Q 22](#) (Zoe Guijarro), [Q 50](#), [Q 51](#) (Polly Billington), [Q 50](#) (Yannick Monschauer)
- ⁵⁷ [Q 71](#) (Lord Callanan), written evidence from BEIS ([BUS0001](#))
- ⁵⁸ [Q 51](#) (Polly Billington), [Q 51](#) (Dr Richard Lowes), [Q 16](#) (Tom Elliott), [Q 39](#), [Q 41](#) (Bean Beanland), [Q 51](#) (Yannick Monschauer), [Q 51](#) (Andreas Graf), written evidence from MCS ([BUS0009](#)), Mitsubishi Electric Residential Products Group ([BUS0011](#)), Regulatory Assistance Project (RAP) ([BUS0018](#)), Electrify Heat Coalition ([BUS0025](#)), IMS Heat Pumps ([BUS0035](#))
- ⁵⁹ [Q 26](#) (Alex Schoch), Vaillant ([BUS0012](#)), Electrify Heat Coalition ([BUS0025](#))
- ⁶⁰ [Q 3](#) (Anthony Hibbs), [Q 39](#) (Mike Foster), [Q 11](#) (Andrew Sissons), [Q 11](#) (Zoe Guijarro), written evidence from Energy Systems Catapult ([BUS0006](#)), Ombudsman Services ([BUS0007](#)), Vaillant ([BUS0012](#)), EUA ([BUS0036](#)), [Q 39](#) (Bean Beanland), written evidence from Energy Systems Catapult ([BUS0006](#)), Mitsubishi Electric Residential Products Group ([BUS0011](#)), Centrica ([BUS0024](#))
- ⁶¹ [Q 2](#), [Q 3](#) (Anthony Hibbs), [Q 2](#), [Q 3](#) (John Taylor), [Q 2](#), [Q 3](#) (Dr Robert Whitmarsh), written evidence from Jan Davis ([BUS0003](#)), Julian Clarke ([BUS0004](#)), Which? ([BUS0005](#)), Ombudsman Services ([BUS0007](#)), National Energy Foundation ([BUS0008](#)), Electrify Heat Coalition ([BUS0025](#)), the CCC ([BUS0037](#))
- ⁶² [Q 11](#), [Q 13](#) (Zoe Guijarro), [Q 57](#) (Yannick Monschauer), written evidence from MCS ([BUS0009](#)), Energy Saving Trust ([BUS0020](#)), Electrify Heat Coalition ([BUS0025](#)), IMS Heat Pumps ([BUS0035](#))
- ⁶³ [Q 13](#) (Andrew Sissons)
- ⁶⁴ Written evidence from the CCC ([BUS0037](#))
- ⁶⁵ [Q 14](#), [Q 21](#) (Zoe Guijarro), [Q 8](#) (Dr Robert Whitmarsh)
- ⁶⁶ Written evidence from CAST ([BUS0026](#))
- ⁶⁷ [Q 39](#) (Bean Beanland), [Q 52](#), [Q 53](#) (Yannick Monschauer), [Q 61](#) (Dr Richard Lowes)
- ⁶⁸ Part 7, [Energy Bill](#), and see: <https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-contextual-note-heat-network-zoning-and-the-planning-system>
- ⁶⁹ [Q 23](#) (Andrew Sissons), [Q 55](#) (Dr Richard Lowes), written evidence from Jan Davis ([BUS0003](#)), Which? ([BUS0005](#)), EDF ([BUS0014](#)), Electrify Heat Coalition ([BUS0025](#))
- ⁷⁰ [Q 50](#), [Q 55](#) (Polly Billington), written evidence from UKI00 ([BUS0029](#))
- ⁷¹ [Q 6](#) (Anthony Hibbs), [Q 48](#) (Bean Beanland), [Q 48](#) (Lee Brown), written evidence from MCS ([BUS0009](#)), Heat Pump Association ([BUS0010](#)), Vaillant ([BUS0012](#)), Dr Richard Lowes ([BUS0028](#)), IMS Heat Pumps ([BUS0035](#))
- ⁷² [Q 63](#) (Lord Callanan), [Q 63](#) (David Capper)