Department for Business, Energy and Industrial Strategy

Heat Decarbonisation - Review of Evidence

Submission from CIBSE

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Name:	Dr Julie Godefroy
Position:	Technical Manager
Name of organisation:	Chartered Institution of Building Services Engineers
Address:	222 Balham High Road, London, SW12 9BS
Email address:	JGodefroy@cibse.org

The Chartered Institution of Building Services Engineers (CIBSE)

- CIBSE is the primary professional body and learned society for those who design, install, operate and maintain the energy using systems, both mechanical and electrical, which are used in buildings. Our members therefore have a pervasive involvement in the use of energy in buildings in the UK with a key contribution to sustainable development. Our focus is on adopting a co-ordinated approach at all stages of the life cycle of buildings, including conception, briefing, design, procurement, construction, operation, maintenance and ultimate disposal.
- CIBSE is one of the leading global professional organisations for building performance related knowledge. The Institution and its members are the primary source of professional guidance for the building services sector on the design, installation and maintenance of energy efficient building services systems to deliver healthy, comfortable and effective building performance.

CONSULTATION RESPONSE

Overall, the review of evidence seems comprehensive in terms of the technological options appraised; we also welcome the reference to whole system thinking, the attention to consumer implications, and the acknowledgement that policy will be needed. However, we have some concerns about the scale of ambition and the lack of firm proposals, particularly in relation to the **timescale for develoment of policy** and the urgent need to address **energy efficiency in new and existing buildings**. We agree that some areas need more time and flexibility (e.g. which technology or energy vector to support); however, other areas are unequivocal: the need for a strong policy framework, and the need to reduce heat demand.

We are also very aware that this consultation closes the day after the publication of the latest Committee on Climate Change Report on the fitness of the UK housing stock for future climate change, and that this makes some significant recommendations which relate to this consultation. In the short time available we have attempted to identify the links, but clearly this is something that the Department will need to address in more detail now.

TECHNOLOGICAL OPTIONS

We agree with the assessment that there is no clear single contender to replace gas heating in the near future, and that a mix of options is likely to be required including electric heating (often with heat pumps), hydrogen (whether in systems such as fuel cells, or injected into the gas grid), and heat networks.

Table 1.2 *"we invite views on priorities for further development and proving of emerging technologies":* we would like to stress that it is not just technologies that are needed, but also whole building systems, building fabric measures, and processes; it is also essential that existing measures are used better and more widely, and that monitoring and evaluation is carried out to assess performance and disseminate lessons learnt.

The public sector can have a significant role in this, leading by example in reducing the energy consumption of its buildings, supporting market penetration by adopting high-performance design measures and best practice processes (as it has done with BIM and Soft Landings on public projects), and disseminating lessons learnt.

As a general recommendation, we would encourage research into **impacts at system level**, in particular:

- **Storage and demand management options**, both thermal and electrical: this is a crucial aspect of a low-carbon future; in addition to sources of low-carbon heat and electricity, government need to investigate storage options which will support the development of these low-carbon sources, from individual to large-scale, and both thermal and electrical e.g. batteries, individual and communal heat storage, role of hydrogen in areas of high renewable energy generation where it could be produced at times of excess generation; interaction between with the building and transport sector, for example using the same batteries; trials on electric vehicle charging and consumer behaviour, to inform policies on demand management etc.
- **Whole system impacts beyond energy and carbon**, including health, wellbeing, and environmental consequences of the various options; in particular, the fuel poverty, comfort and health benefits of carrying out energy efficient retrofits (and how to avoid unintended negative consequences); the impacts of alternative sources such as energy-from-waste and biofuels (e.g. land use, biodiversity, and air quality).
- **Retrofitting of the existing building stock** – see further down in our response.

Electric heating - CIBSE already have guidance on heat pump systems and are in the process of producing a new publication on the topic[1]. We are also looking to expand our guidance on all-electric buildings, storage and demand management, and would be happy to discuss these activities with BEIS.

Following its work with BEIS on a Code of Practice for **heat networks**, which addresses 3rd generation networks, CIBSE will continue to develop guidance in this area and would be very happy to discuss ways to continue collaborating with BEIS, in particular:

- The future-proofing and retrofitting of heat networks to a variety of low-carbon sources (e.g. replacing gas-fired CHP with other sources, if lower-carbon and lower air-polluting sources are available)
- The evolution of heat networks: 4th and 5th generation, which operate at lower temperatures, and ambient loops, which take advantage of synergies between different building uses, such as heat rejection from cooling systems in retail or office buildings, and heat demand from neighbouring residential or hotel uses.

It is important to note recommendation 7 in the latest CCC report (21st February 2019) about new homes not connecting to the gas grid from 2025, which leads to a need to address

[1] CIBSE CP3, 2019 – upcoming on open-loop groundwater source heat pumps; CIBSE CP2, 2016 on surface water source heat pumps; CIBSE TM51, 2013 on ground source heat pumps.

cooking in new homes (in addition to the obvious implications on space heating and hot water requirements). This has led to significant attention in the media about the "ban on gas" and user perceptions of gas heating and cooking as easy and convenient, which will have to be addressed in policy.

POLICY

We welcome the recognition that policy will be needed, given the scale of changes required and the initial investments required (e.g. infrastructure, R&D). However, we are concerned that there are no firm proposals yet, with statements that "it is an open question as to what form this new long term policy framework might take" and that BEIS "aim to publish roadmap within eighteen months" (§1.12). We note that recommendation 14 of the CCC report covers this in some detail and sets out six specific areas that the roadmap needs to address.

We agree with the BEIS proposal that buildings that are not connected to the gas grid could be early "test beds" of future low-carbon heat options; this is something CIBSE have recommended for a number of years. However, we would also point to the latest CCC recommendation by the Committee on Climate Change, that no new housing should be connected to the gas grid by 2025. This CCC report is very recent and we have not reviewed the evidence leading to this conclusion, but clearly even with a slightly different timescale BEIS would need to identify action very soon to respond to the CCC recommendations.

Policy proposals need to be explored as soon as possible in order to develop a clear and consistent framework of regulations and incentives, with clear objectives and enforcement mechanisms. Incentives should be put in place to support the framework. This will send strong signals to industry and academia, and government can then support developments in particular areas that need initial support. The current proposals (§1.14) defer to the outcomes of the next Spending Review; on this topic, we would highlight our previous recommendation for an overall review in order to better align incentives with policy objectives: support to low-carbon heating and demand reduction may not all be an additional expenditure; it could also derive from removing support to high-carbon solutions and to inefficient use of energy. For more detail, see point C of our response to the call for evidence[2], as well as the the CCC commentary on the need for funding and supporting finance mechanisms.

As the BEIS analysis highlights, the changes required will be significant and there are few precedents. We previously highlighted[2] the need to learn from timescale involved for condensing boilers to achieve significant market penetration; this does not seem to be referenced in the review of evidence. We think it is a very relevant example, which highlights the need for policy to drive change in this sector. See also our remarks under Training below.

[2] CIBSE response to the call for evidence on A Future Framework for Heat in Buildings A future framework for heat in buildings - Call for evidence

REDUCING THE DEMAND FOR HEAT

We welcome the fact that reducing heat demand is listed prominently as part of the heat decarbonisation strategy, including a statement to "improve the energy efficiency of new and existing buildings via updates to building standards and through the Industrial Strategy Buildings Mission, to halve the energy used in new buildings by 2030".

We agree this is needed, but at present this is only a very high level statement, and there is little evidence of firm policy action elsewhere. Reducing demand is not only crucial in order to deliver the total carbon savings required, but also to increase the feasibility of low-carbon heat options: simply put, without demand reduction in the building sector, it is unlikely we will have enough capacity to supply heat entirely from low-carbon sources, particularly when huge increases in electricity demand are also expected in the transport sector. Recommendation 9 from the CCC supports the government's ambition for new homes, and the report focuses on the need to retrofit existing homes much more effectively.

Table 1.1: "innovations in demand reduction": Reducing demand merits much more attention; importantly, it should not only be addressed by innovation, but by wider and better deployment of existing measures (technologies as well as other design measures and processes and incentives to change patterns of behaviour).

A robust policy framework for energy efficiency (including retrofit of the existing building stock) is urgently needed, consisting of coherent requirements and incentives and effective enforcement mechanisms. The current policy framework is currently ineffective, incoherent in places, and poorly enforced. We have stressed this on numerous occasions, including in our 2018 response to this call for evidence[2], and more recently to a parliamentary inquiry by the Business, Energy and Industrial Strategy Committee[3].

This also requires support to **upskilling the whole design and supply chains.** Initiatives such as Trustmark are a first step in this direction, which could have benefits beyond the housing retrofit sector. Government should explore ways to support and expand similar approaches, for example introducing requirements on all publically funded projects. See also our remarks under Training below.

CONSUMER AWARENESS

The analysis states the importance of increasing consumer awareness; while we agree this may be beneficial, we would caution against relying on it: convenience, affordability and the advice from installers about new products are likely to remain the key drivers in heating choices for the majority of consumers, hence the need for regulations. As noted above, this is illustrated by the coverage in the broadsheets on 21st February in response to the CCC report. There is a significant communications challenge to win over consumers, which can

[3] https://www.parliament.uk/business/committees/committees-a-z/commons-select/business-energy-industrial-strategy/inquiries/parliament-2017/energy-efficiency-17-19/

only be undertaken in collaboration with those who recognise the need for and inevitability of change.

As well as consumer awareness, there is a need to win over the installer base. Generally they will install established products and systems to operate conventionally, as this helps deliver efficient estimation, specification, installation, commissioning and aftercare. New low carbon technologies can disrupt this model. These are highly price-sensitive markets, where the cost of being thorough, of meeting good practice guidance and of spending time recommending appropriate new solutions may be the difference between winning work and losing it. There are significant lacks in expertise and awareness about new systems and best practice among installers – at least two of our technical team members have recent very discouraging experience of engaging with the supply chain on technical issues in the domestic retrofit market. The installer base needs to be "converted" to the new ways of working, learning, and delivering new technologies and approaches. This requires:

TRAINING

Decarbonising the built environment is a huge project, that will affect everyone in some way. It will require the introduction of new technologies on a grand scale. The only two examples of this in the past 50 years are the introduction of condensing boilers in 2006 and the switch to natural gas 50 years or so ago.

In 2005/6 when condensing boilers came into widespread use through changes to building regulations, there was a major training project run in collaboration with the industry, bringing together manufacturers, trainers and installers. There are still those active in the sector with knowledge and experience of this, who should be consulted and their experience captured.

There is going to be a need to retrain, or upskill, much of the installer base, at the same time as addressing some of the concerns about skills and competence which have emerged through the independent review of building regulations. Training can be expensive. We need however to recognise that not training, or not training properly, is even more expensive and will serve to undermine public trust and confidence in the new technologies and the wider carbon saving and retrofit agenda (see for example the consumer backlash against sub-standard low quality compact fluorescent lamps compared to incandescent lamps in recent years). This aligns with recommendation 3 from the CCC report.

Unless policy is developed so that the costs of and requirements for training are factored into the programme, and it is done so that being trained and being seen to be trained and competent is more economically advantageous than not, then policy is set to fail. This aligns with recommendation 14 from the CCC report.

OTHER COMMENTS

§1.8 Collaboration with devolved administrations: this seems essential if the UK as a whole is to meet its carbon objectives, in particular in relation to low-carbon electricity: for example,

England can benefit from large-scale renewable energy generation in Scotland, while at the same time helping make these renewable systems viable and helping with grid stability in Scotland.

END

Please do not hesitate to contact us for more information on this response.