

12 January 2018

Response to the National Infrastructure Commission Consultation: National Congestion, Capacity, Carbon: Priorities for national infrastructure

Sir/Madam,

I welcome the opportunity to respond to this consultation. The Energy Policy Group is the UK's leading academic hub for the interdisciplinary study of energy policy. We place sustainability and progress at the heart of debates about energy policy, economics and governance. Our high impact, collaborative research challenges old assumptions and offers new thinking about the transition to an equitable and sustainable energy system.

This response focuses on the elements of the consultation linked to the decarbonisation of the energy system, specifically around heat. This an area on which my research is focused. This includes my PhD which is investigating the development of UK heat policy, a UK Energy Research Centre project investigating the role of businesses and incumbents in the transformation to low-carbon heat as well as a project investigating the future of heat and gas in Denmark.

A truly sustainable heat system should be the aim of UK heat policy and this system should have low levels of heat demand, primarily run on renewable energy and have a significant level of smart capability and storage. In light of the Paris agreement on climate change this must be achieved rapidly, certainly in advance of the UK Climate Change Act obligation which requires a decarbonised heat system by 2050. Heat decarbonisation is therefore clearly an infrastructure priority for the UK.

Overall, the most important aim of heat policy and the transformation to low carbon heating should be to reduce the demand for heat. This directly reduces greenhouse gas emissions, increases the suitability of buildings for low-carbon heat sources and reduces the system wide impacts of heat decarbonisation such as 'peak heat' demand. There is little point attempting to decarbonise heating if we continue to use heat in such leaky buildings. Therefore, we believe when it comes to heat, the priority of the NIC should be to focus on heat at the demand level and consider the building stock as a greater infrastructure priority than the associated networks or energy generation infrastructure. That is not to say that energy networks and generation are not vitally important parts of the puzzle, but to emphasize that as buildings are made to be more energy efficient, a much clearer and easier path to heat decarbonisation will be apparent.

More detailed responses to the specific heat related questions are below.

I am overall supportive of the NIC's work and would of course be keen to engage further on these heat issues. Please do get in contact if you believe I may be able to provide any further information that may assist your work.

Yours faithfully,

Richard Lowes

Responses to selected questions

13) What will the critical decision factors be for determining the future of the gas grid? What should the process for deciding its future role be and when do decisions need to be made?

In light of the limited availability of bio-energy resources in the UK (Committee on Climate Change, 2011) it is clear that bio resource should be used in industrial processes where high temperature (grade) heat is needed. Therefore, in the longer term, biogases will be unable to offer any meaningful decarbonisation potential for the gas grid or domestic heating. It is also the case that current biomethane being produced from energy crops and injected into the grid causes only limited carbon savings (DECC, 2016).

If heating is therefore to be decarbonised, the only option which may be able to decarbonise the gas grid is low-carbon hydrogen. This is however a solution which is not being seriously considered anywhere else in the world and is primarily being promoted by incumbents¹. It has a number of issues including but not limited to:

- Unknown costs
- Increased reliance on gas imports
- Unknown technical operation

A critical deciding factor for the future of the gas grid will be if it becomes apparent from ongoing research that hydrogen cannot decarbonise the UK's heat system. If this is the case, then the gas grid's future will be time limited and the Government will then, in cooperation with Ofgem need to consider steps to decommission the gas grid and replace gas heating with known low-carbon heat sources, i.e. low-carbon district heating in more densely populated areas and individual (or linked) heat pumps in more rural areas. This decision must be at the latest by 2025 and should be a key consideration in the upcoming price control negotiations for RIIO GD2 which runs from 2012 onwards.

In the meantime, while research takes place to consider the role of hydrogen, my concern is that the delivery of known measures to decarbonise heat are being delayed because hydrogen is seen as a magic bullet. The NIC should be aware that the option of gas decarbonisation via hydrogen may be a play by the incumbents to maintain the existing system and market. If hydrogen cannot be proven to work, which in my opinion seems likely, the incumbents will have succeeded in slowing down the UK's move towards low carbon heat.

14) What should be the ambition and timeline for greater energy efficiency in buildings? What combination of funding, incentives and regulation will be most effective for delivering this ambition?

¹ <https://heatpolicy.wordpress.com/2016/07/15/is-hydrogen-at-hype-cycle-peak/>

- All new buildings should be built to Passivhaus standard or be at least net zero carbon immediately. This is perfectly possible, would avoid new homes being retrofitted before 2050 and would build a stronger low-carbon heat market as well as develop sustainable house building skills. This will need regulation.
- As recognised by UKERC research, domestic energy savings of 25% could be made cost effectively (Rosenow *et al.*, 2017). This 25% saving should be an immediate infrastructure priority and will also need regulation as well as financial support. This could be a combination of energy supplier incentives but must also involve local authorities. This must also apply to private landlords.
- Clearly much further levels of energy efficiency in buildings are possible. This would not just reduce carbon emissions but have wider macro-economic impacts from for example from the reduced imports of energy and the wider availability of consumer cash (Verco and Cambridge Econometrics, 2014). The NIC should investigate the economic impact of reducing demand not just as an energy issue but as a wider social and economic issue. There are much wider savings than simply reductions in consumer bills particularly when some much gas is being imported – this clearly has productivity impacts too.

16) What are the critical decision factors for determining the role of new nuclear plants in the UK in scenarios where electricity either does, or does not, play a major role in the decarbonisation of heat? What would be the most cost-effective way to bring forward new generation capacity? How important would it be for cost-effectiveness to have a fleet of nuclear plants?

In light of the expectation that the gas grid cannot be decarbonised, the level of heat demand in the system will be the most important factor in determining the requirement for new electricity generation (be it nuclear, CCS or renewable). In its analysis the NIC should first focus on how much heat demand can be reduced (in light of our response to question 14) and then look at how much generation may be required. If there is only a small amount of residual heat demand, there is no reason why a smart, renewable based energy system combined with heat storage could not provide the necessary heat demand².

I also fundamentally question whether, in light of previous experience, ‘cost-effective’ nuclear plants will ever be possible.

17) What are the critical decision factors for determining the role of carbon capture and storage in the UK in scenarios where electricity either does, or does not, play a major role in the decarbonisation of heat? What would be the most cost-effective way to bring it forward?

The UK has struggled to deliver CCS. If hydrogen conversion is a possibility for the UK gas grid, then CCS will be vital for production of the hydrogen. If the gas grid cannot be decarbonised (which I see as unlikely) then the value of CCS may be in providing lower carbon electricity to the grid to support electrified heat. However, these issues are similar to those for nuclear. CCS is likely to be expensive and it may be the case that a low demand heat system with storage and smart capabilities may not need CCS or nuclear – or the role of either may be very limited.

References

Committee on Climate Change (2011) *Bioenergy Review*. London.

² See this blog on the examination of the peak heat issue which received media attention in 2017 <http://blogs.exeter.ac.uk/energy/2017/07/10/is-the-peak-heat-issue-all-its-made-out-to-be/>

DECC (2016) *Impact Assessment: The Renewable Heat Incentive, A reformed and refocused scheme*. London.

Rosenow, J., Eyre, N., Sorrell, S., Guertler, P. (2017) *Policy briefing: Unlocking Britain's First Fuel: The potential for energy savings in UK housing*. London.

Verco and Cambridge Econometrics (2014) *Building the Future : The economic and fiscal impacts of making homes energy efficient*.