Reference
The Future of Distributed Flexibility

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The Future of Distributed Flexibility – Call for Input

This call for input is primarily focussed on the provision of services to the electricity system, so much of this Call for Input is not immediately relevant to the Gas Networks where Cadent operates. We have however, made some observations of relevant considerations around the role of these services as the decarbonisation of heat develops and in terms of the different pathways that could be taken to deliver it. This includes considering the role that hydrogen for heating could play in providing future services and considerations of how peak heat demand may be satisfied and the consequent impact on flexibility services.

Overall distributed flexibility for the electricity system can offer benefits, however the value and delivery mechanisms should ensure consumer engagement is enduring to avoid longer term security of supply and reliability issues. The relative value to the consumer will play a part in this and there is the ongoing risk that the less affluent will provide the service for the benefit of their wealthier neighbours. This sort of undesirable outcome is always a possibility with a market-based approach, however, we note below that an alternative model may become available should hydrogen be rolled out across the gas networks enabling a more homogeneous service to be provided.

The benefits of distributed flexibility for the energy system are clearer on the energy balancing side where a service can be provided at any physical point on the network. System balancing is much more difficult, and the withdrawal or failure of a service can have a more marked and localised impact. Even with network balancing, the value is where relatively small increments of network capacity are involved e.g., 5-20%, allowing network reinforcements to be deferred. Should the required peak reduction on the network be larger e.g., 50% or above, then it is likely that only asset solutions would be the most effective to deliver secure and reliable supplies. For widescale electrification of heat, network capacity would need to increase by >100%.

Should policy for heat in buildings result in large scale electrification of heat, then flexibility services for network balancing may offer little value as network upgrades at a vast scale will likely be the priority. Care is required therefore to ensure that new arrangements for flexibility services are not made effectively redundant should heat policy follow any particular pathway.

Understanding the Impact of Heat

This Call for Input discusses the value of CER provided from various sources including Heat Pumps. We would suggest that the assumptions about the value of distributed flexibility that can be extracted from these heating systems is tested and considered carefully.

For example, an air source heat pump (ASHP) has a lower heat output than a standard gas boiler, and this output reduces with temperature. On an extremely cold winter's day, a typical 7-8kW rated ASHP would be giving out only 3-4kW of heat, compared to a typical 20kW gas boiler. An ASHP is therefore likely to be operating constantly through the day, potentially even calling on thermal back up such as from an immersion element. Under these peak conditions, there is likely to be no scope for these appliances to provide CER, and therefore for network balancing needs. The enduring cost effective solution would be to install the necessary infrastructure.

Consumer behaviour may also be a factor, as on very cold days, they may be more reluctance to participate in a service that turns off their heating. This may be further exacerbated by the nature of a heat pump which has a relatively low heat output, and so will take much longer to get a home back to temperature after being off for a period, compared to a gas boiler.

A further factor to bear in mind with heat demand is the variation between a typical winter's day and an extremely cold 1 in 20 years winters day. The difference is in the region of 25-30%, which means for the electrification of heat, network and production capacity will need to be built that may then only be fully utilised very rarely. This would mean spare capacity exists for much of the time, reducing the need for distributed flexibility to alleviate network constraints. If there is also excess capacity in production, storage or interconnection to support a 1 in 20 winter peak, then this could also dilute the value of distributed flexibility for energy balancing.

We would advise more detailed analysis is undertaken to understand the full practical impacts of the electrification of heat, and to confirm the characteristics of heat pump operation on colder and extreme days. This work would help determine the role heat pumps can play in providing CER, and hence actively feed into the final assessment of the value of distributed flexibility.

A Socialised Approach to CER

If hydrogen is rolled out at scale for domestic heat, new appliances will be required which provides an opportunity for every hydrogen heated home to have appliances enabled to provide a basic flexibility socialised service. For example, if designed into the new appliances, during a network or supply event, a proportion of boilers in an area could be switched off for a short period on a rolling basis, to protect all consumers. Most households would be unaware as a 20kW boiler will quickly restore any lost temperature.

Unlike the proposed market based individual consumer approaches, hydrogen could enable the deployment of a universal service that all homes can provide, and which the system operator has access to on a uniform basis. This would deliver an equitable service that all households provide, and which the networks have confidence will always be available. This certainty would allow everyone to share in the enduring cost benefit, and treat all households equitably whether they are in fuel poverty or wealthy. Additional more transitory or bespoke services could then be subject to a market approach.

We would be happy to discuss any of our comments further if useful, so please do not hesitate to contact us.

Yours sincerely

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