A submission to Ofgem's Call for Evidence on the ED2 Business Plans

The Active Building Centre supports the construction and energy sector in realizing the opportunities of buildings as assets in the emerging decarbonised, digitized energy system. Active Buildings (ABs) integrate energy technologies that capture, store, and control the energy use of any building, including the ability to support an associated EV as well as the local distribution grid.

Importantly and noting the findings of the BEIS/Ofgem Smart Systems and Flexibility Plan 2.0, ABs can support the V2X capability of EVs while also in themselves being more capable and site specific Buildings to Grid (B2G) energy assets. Our feedback is based on our emerging findings of the capabilities of ABs, and their deployment to realize whole system benefits.

We welcome the recognition from each DNO that there will be a significant group in low carbon technologies in domestic settings, in aggregate the six DNOs are planning to support the installation of some 8m EV charge points and 3m heat pumps.

We note in the main the DNOs have charge points to heat pumps at a ~ 2.5 to1 ration during ED2. We certainly recognise the greater market penetration of EVs compared to ABs, i.e. buildings with B2G capability, or in many cases Electric Buildings (EBs). It is also clear that government policy will see greater deployment of the technologies that underpin such buildings, not least the push on heat pumps, the *no new gas connection* policy etc; and we expect a growing recognition that the optimal way to deploy such technologies is to integrate them – either by design for new build, or with robust packages for Upgrading existing stock.

ABC's work is focused on integration, at the building scale, at the locality scale and with the network scale – as illustrated in the Active Building Principles at the end of this submission.

In working to determine the best integrated options for a wide range of building types and uses, we have a general concern that consumers will be presented with sub-optimal and more expensive solutions, for them and the DNO, if there is a decade long sequence of smart meter now…. then EV charge point … then heat pump and/or solar … then potential three phase cabling…

This concern is reinforced by the often repeated general expectation that appears in the DNO business plans, and elsewhere, that the installation or connection of technologies such as EV charge points and heat pumps can only lead to higher demand. As an example in para1.22 of WPD's business plan demand growth of 617MW is described as '*equivalent to connecting 171,000 heat pumps, or 385,000 domestic EV charge points* '.

Well possibly yes, particularly if these are deployed singularly and without consideration of the benefit of integration. In deploying these technologies as integrated package that seek to capture, control, storage and use energy, aka Active, we have already seen buildings that show **lower net demand** to the network; demand that is 'de-peaked'.

If single un-integrated and un-optimsied deployments become the norm then the ambition of the Smart System and Flexibility Plan 2.0 will be missed, many consumers will have less effective and more expensive solutions, while the network will have to provide more energy and instigate greater reinforcement that should be necessary; all at greater cost to consumers. That concern is reinforced by the practice of all of the DNOs to have distinct strategies for EV charge-point deployment and for Heat Pump deployment – this further risks missing integration benefits.

We would encourage a narrative that distinguishes between gross demand for electricity, which will undoubtedly go up, and net demand as seen by and met by the grid – that need not increase by anything like the same proportion with an appropriate deployment of Active Upgrades and building standards for new build that provide active solutions.

We hope that as whole systems practice is embedded within the work of the DNO/DSO it will be increasingly recognised that buildings, as well as vehicles, are important energy assets in the system. We are keen to work with each and all of the DNOs, as well as Ofgem, to help integrate what mostly appear to be parallel strategies for EV charge-points, for Heat Pumps, with due regard to the growing development of LAEPs across UK.

Active Buildings and the Active Building Centre

The Active Building Centre (ABC) is a UK national centre developing modern methods of design, manufacturing and deployment for flexible renewable energy systems in buildings and communities.

ABC leads on the integration of energy technologies, to optimise the renewable / low-carbon energy a building can capture, manage, store and use efficiently from day-to-day, week-to-week, season-to-season; including the integration of EV technology where appropriate - exploring a range of building-based technologies that capture, store and redeploy energy from varied sources and in various manners. This means:

- Optimising how a building's design can capture the energy on or around it, using sensors and controls to manage energy use effectively; while ensuring efficiency is in large part addressed by building to high fabric standards. Together these help reduce overall energy demand from buildings.
- Designing in, as well as integrating the operation of, storage technologies to provide warmth, power and mobility at the times they are needed.
- Connecting the resulting Active Building (AB) based nano-grid to the local electricity grid allowing the AB to contribute to flexibly manage demand; helping to manage, reduce or shift peak demand, by providing electricity to the local grid when appropriate.

The principles of Active Buildings are illustrated below, adapted to existing stock with the addition of a monitoring stage - where the challenge is to Upgrade many existing buildings to a sufficiently high standard of energy efficiency and capability. It is possible to upgrade buildings to be 'near net neutral' in their energy use.

Our programmes of work in research, design, development and commercialisation will also, inter alia, explore solutions to the challenge of decarbonising heat. Further information on our programme is here – www.activebuildingcentre.com. Please contact us for further information including the opportunity to view our Active Building Demonstrators.

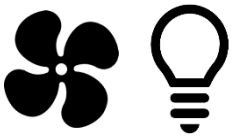
Active Building General Principles [Upgrade]

0. 

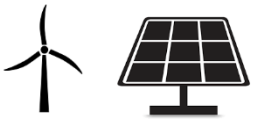
Energy use measurement and analysis - Data capture via inbuilt monitoring and standard-naming schemas enables an assessment of optimal upgrade approach to the building/home, as well as optimisation and refinement of predictive control strategies. Monitoring and feedback continues, forming part of intelligent controls system for continuous and on-going optimisation of energy systems.

1. 

Building fabric and space heating improvements – Assessments of building fabric to inform repairs and **appropriate** upgrades to be made prior to any space heating improvements and on-site renewable [heat] energy generation, and/or integration to heat networks.

2. 

Energy efficient systems - Building on the initial installation of data capture and monitoring equipment, to provide intelligently controlled and energy efficient systems that minimise loads - hot water, HVAC, lighting, vertical transportation.

3. 

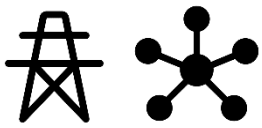
On-site renewable energy generation - Renewable energy generation incorporated where appropriate. Renewable technologies should be selected holistically, given site conditions and building load profiles (following interventions 1 to 3 above).

4. 

Energy storage - Thermal and electrical storage should be considered to mitigate peak demand, reduce the requirement to oversize systems, and enable greater control.

5. 

Electric vehicle integration - Where appropriate Active Buildings integrate electric vehicle charging. As technology develops, bi-directional charging will allow electric vehicles to act as an additional energy store for the building, and deliver energy to them as required.

6. 

Intelligently manage integration with micro-grids & national energy network – In addition to intelligent control of building systems, Active Buildings manage their interaction with wider energy networks, e.g. demand side response, load shifting & predictive control methods