

Dear Jeffrey,

Thanks for meeting with George and me earlier in the week—it was useful to gain the background to your recent consultation (Non-Traditional Business Models: Supporting Transformative Change In The Energy Market). I have summarised below VCharge's activities and the regulatory and industry barriers that prevent consumers from enjoying the full benefit of our promising technology.

VCharge was established in the US in 2009 to develop optimisation software for grid balancing through coordinated electric vehicle charging. It soon became clear there was a more immediate opportunity to do the same using electric storage heating (ESH). We entered into contracts with transmission operators like PJM and ISO-New England for frequency regulation and with consumers for energy supply and remote management of their ESH.

Our experience in the US opened our eyes to the even greater opportunity for grid-enabled ESH in the UK and Ireland based on its legacy. We believe we can make a real difference by significantly improving the quality of storage heat and reducing consumption and costs. The features that make this market attractive for our services include:

- 1.6m households with ESH in GB
- 6.5m individual storage heaters—an estimated 13 GW of load with ~60 GWH of energy storage at less than £20/kWh of storage
- 550,000 dynamically tele-switched households, most with ESH
- Thin capacity margins, especially in winter
- Room for improvement: the original focus of ESH was to soak up surplus nuclear generation, not optimise heating comfort (Ofgem's report on dynamic teleswitching is [full of quotes highlighting the challenges](http://bit.ly/ofgem-excerpts); see <http://bit.ly/ofgem-excerpts>)
- Concentration of ESH in cities (in tower blocks and multi-dwelling units) or in remote off-gas areas—often in households with the highest levels of fuel poverty
- Storage heaters are a highly deferrable load. They don't care when they are charged, making them excellent for providing grid balancing services

VCharge entered the UK and Irish markets through a variety of projects, including:

- Dispatching ESH in student accommodation in the Republic of Ireland to improve comfort levels and utilise available wind energy (working with Airtricity)
- Dispatching ESH and electric cars on the Orkneys to utilise available wind energy and avoid curtailment
- Dispatching ESH on Mull to improve comfort and utilise constrained local hydro generation (working with Community Energy Scotland, Local Energy Scotland, SSE and others)
- Dispatching ESH for CityWest Homes in Westminster to reduce consumption and costs on a Heat-with-Rent tenant package

Our work now focuses on the delivery of a new balancing service, **Fast Dynamic Frequency Response** (FDFR), in partnership with National Grid. VCharge will dispatch 60MW of ESH via a continuous control signal with 2-second response--while increasing tenant comfort and savings.

To do this we fit communications, sensing, and dispatch controls to every heater; we track brick temperature and match charging and heat release with the lifestyle of each household.

Controlling aggregated ESH will benefit the entire energy supply chain:

- **National Grid:** New balancing tools that reduce the need for other ancillary services
- **DNOs:** Load switching and monitoring services, especially on constrained networks (relevant given the planned removal of radio teleswitch)
- **Energy Suppliers:** Cheaper renewable energy for heating; reduced imbalance costs
- **Renewables generators:** Less curtailment, deeper market for intermittent generation
- **Landlords:** Free controls that monitor heating, maximise tenant comfort, and provide sub-metering to aid compliance with EU efficiency directives regarding metered heat
- **Tenants:** Better heat with reduced consumption and costs

Based on the above, the road ahead may appear smooth, but there are regulatory and market barriers that we highlight to Ofgem in the hope they can be removed. These include:

- **Wholesale/retail separation.** Specialist and Big Six inter-company traders optimise in-day positions but consumers don't benefit because organizational barriers separate traders from retail marketers—and pose a challenge to engaging the Big Six.
- **Balancing and settlement.** Current “dumb” dual rate meters only differentiate between traditional day/night on-peak/off-peak. ESH aggregation presents an opportunity to manage down imbalance charges and share this benefit with consumers, but requires interval metering and settlement. Smart meter rollout (see below) is a partial solution to this problem, but will take a long time and is only the first step towards the ultimate goal of settling residential load—especially controllable load—on the basis of actual half hourly usage.
- **Domestic smart meters.** The building types in which ESH predominate (i.e., tower blocks, multi-dwelling units) are the most fraught with problems for the smart meter roll-out program, due to building fabric and the multiplicity of suppliers. We believe there is a strong case for an alternative solution for the control and metering of ESH and hot water in tower blocks that allows for interval metering and half-hourly settlement, which can be implemented sooner and at lower cost than a full smart meter roll-out. This alternative solution is especially important since heating and hot water account for up to 80% of household energy consumption, and ESH customers are disproportionately in fuel poverty.
- **Dumb tariffs.** The smart grid requires smarter tariffs. To realise the full consumer benefits of demand response, suppliers and DNOs must develop creative tariffs that reward flexible loads that can rapidly respond to changing grid and market signals.
- **Collective Buying.** Heating in social housing today follows one of two business models: *Heat-with-Rent* where landlords buy electricity and allocate costs to tenants, and *Tenant-Pays* where tenants select suppliers and tariffs that support off-peak charging. We urge Ofgem to encourage a third model where buying collectives procure and manage ESH loads as **virtual district heating** (like wet district heating but without the cost, disruption,

and environmental impact of underground pipes).

- **ECO funding.** ESH is traditionally viewed as being inefficient, since it has traditionally been dependent on fossil fuel and nuclear generation. As such, it garners little ECO funding, despite its ability to opportunistically sweep up large quantities of renewable generation. This needs to change both for new heaters and retrofitted controls on old heaters. A heater that is mostly charged with renewable energy and allows greater amounts of renewable generation to come onto the grid, is the greenest heat of all.
- **DNO DUoS charges.** We believe Ofgem should review DUoS charges for multi-unit dwellings that encourage the setting up of aggregated ESH loads, settling on a half hourly basis, as single commercial MPANs to ensure that such end consumers are not disadvantaged.

Our NTBM activity addresses all three themes that you identify:

- **Community Energy.** We are involved in remote island examples to date but shortly hope to be involved in an inner city project where a residents' group have already formed a buyers' collective.
- **Energy Service Companies.** The available technology lends itself to an ESCO business model where the ESCO might offer a lower energy cost and then through optimising energy procurement, deliver tenant comfort and grid balancing services.
- **Peer-to-Peer Energy.** We have been involved in a number of smaller rural schemes but are confident that given the regulatory support this concept can be transferred to urban applications to the benefit of many more customers.

You cite four main drivers for NTBMs:

- **Low carbon energy transition.** Our model offers a very real opportunity to utilise existing renewable energy, differentially charge to prefer low-carbon electricity, and reduce curtailment and curtailment payments when networks are constrained from accepting embedded generation.
- **Rapid technology innovation.** We have already proven the technology in the US market and are primed to roll it out on ESH and vehicle charging control in GB once some of the above mentioned barriers are removed.
- **Lack of consumer engagement and trust.** The immediate opportunity to lower bills will quickly resolve this issue.
- **Affordability and supporting vulnerable customers.** Early trials suggest consumption savings for social housing tenants of around 20% before considering tariff reductions which will flow from suppliers rewarding collective switching and their new-found ability to source when renewables are available at an attractive price. Ofgem should grasp this as way of tackling fuel poverty.

Your consultation document seeks "desirable outcomes for consumers" as lower bills, lower environmental impact, better quality of service and better social outcomes. Aggregated ESH loads can achieve all of these outcomes--especially for those in fuel poverty who are more likely to live in properties with ESH.

We look forward to the opportunity to further develop this discussion face-to-face.

Yours sincerely,

Kenny Cameron
Vice President, Business Development, UK and Ireland