Transposed from Email - Storelectric

Dear Sir or Madam,

I would like to make a submission to your Non-Traditional Business Models consultation on behalf of Storelectric. We aim to provide large-scale (500MW, 6-12GWh per installation, multiple installations) electricity storage at sites across England and Northern Ireland. We would mainly buy from and sell to the National Grid, but other models are possible, including:

1. Receiving direct in-feeds from generators, e.g. wind farms, gas power stations;
2. Providing direct out-feeds to major customers, e.g. petrochemical plants, steel works;
3. Doing either or both of the above, remotely through the Grid;
4. Building smaller plants to do any or all of the above, connected to a distribution network.

In order to support the development of truly grid-scale energy storage of any technology, we need to see changes in a number of areas, which I outline below. Most of them would also support battery-based local storage, and some would benefit other business models such as DSR. Some of this has been submitted to other consultations, but there is much here that is new to this consultation.

A. Classification of Storage

There is currently no regulatory classification for "Electricity Storage". Therefore all storage is classifie as "consumption" plus "generation", and therefore gets hit by the worst of both sets of regulations and costs.

Consequently, whenever a DNO proposes a storage project, it is deemed to create distribution capacity. Whenever someone else proposes one, it is deemed to consume capacity in both generation and consumption - both of which have to be paid for in both connection charges and grid upgrades.

There needs to be a classification for "Storage" which carries an obligation on DNOs and the National Grid to assess its operational mode and determine network capacity based on that - and also propose specific constraints on the installation that would create sufficient network capacity and/or minimise connection charges and grid upgrade costs / delays.

Operational modes include:

- Absorbing surges so that feed-in does not exceed a given amount (can be time-based, e.g. different amounts during demand peaks and troughs)
- Counter-cyclical operation, absorbing during troughs and producing during peaks (can be related to national and/or local peaks and troughs)
- Subject to control by National Grid or DNO
- Supply of balancing and/or ancillary services

- Receiving direct supply from generation (whether renewable or thermal) so that the combined output is baseload or dispatchable, and also limited to NG / DNO requirements (e.g. absorbing storm surges in wind power, while only passing onto grid according to somewhat smoothed demand)

B. Affordability and Supporting the Vulnerable

The biggest current threats to affordability are the subsidies given to renewables, muclear and fossil fuels alike. Renewables gain from ROCs and CfDs, which are excellent - ROCs for ensuring the growth of renewables and CfDs for investment by providing for revenues on a 15-year horizon - they should be higher for immature technologies than for mature ones. Nuclear benefits from CfDs, again excellent for the same reason. Fossil fuels benefit from (a) astronomical prices for peaking support, and (b) the Capacity Market as currently designed. All except the peaking support prices are time independent and therefore give no incentive for generators (whether renewable or not) to be either baseload or dispatchable. The main driver for electricity prices appears to be the cost of peaking support.

By giving enabling renewables to sell their power dispatchably, truly grid-scale storage enables fossil fuelled peaking plants (which have over twice our levelised cost per MWh) to be phased out, together with those subsidies and market distortions. This will in time enable the market for renewable power to be changed, to give 15-25 year contracts for dispatchable power that is generated renewably, thereby restricting CfDs to supporting the introduction of immature technologies.

C. Ownership

Your list of non-traditional owners excludes one major category: SMEs. It is largely SMEs that are developing the new technologies, and we face enormous barriers to entry, including (but not restricted to):

1. Immense volumes of regulations;
2. Hugely complicated bidding processes and documentation;
3. Bid bonds and collateral needed to trade on markets, that dwarf (or are a very large proportion of) the companies' balance sheets;
4. Long delays between a technology coming on stream and being allowed to bid for services (currently post-proving for balancing mechanism; 2 years min. for the Capacity Market), another long delay until the contracts are known, and an even longer minimum delay (currently 2-3 years for the capacity market) between knowledge of results and start of power delivery;
5. Short term (1-3 year) contracts for power, preventing the contractual certainty that enables SMEs to find investors in new (and often innovative) plant.

D. Investing in Storage

NG and DNOs should be permitted to invest in energy storage, because they, their customers, the state and renewable generators would all benefit enormously from it. In order to avoid competition problems, such permission could oblige them to (e.g.) sell off any such assets after 5 years of operation, and/or permit them to invest only in the next 10 years (start date of generation). I note that NG is permitted to make unregulated investments into interconnectors (which cost at least as much, and don't

provide reliable power): the investment vehicles could be similar.

E. Tendering to Provide Stored Power: Duration and Replenishment

The capacity market requires providers to tender to produce power. The variables are switch-on time, start-up time and power. There is no concept of duration. Therefore storage facilities cannot bid into these markets: if (say) the facility stores an hour's power, then if NG keeps demanding it for 2 hours then the penalties will very quickly bankrupt the provider. Duration needs to be defined in terms of MWh between replenishments, which would permit multiple brief / low power demand events.

Nor is there any concept of replenishment period: in the case above, if NG consumes an hour's power then they can demand to consume more power just 5 minutes later, again yielding only penalties.

When replenishment is related to local renewable generation, then the provider must be able to keep their system offline until the weather decides to replenish it, without penalty. If linked to the grid, the provider must be able to keep it offline until replenished at overnight (or equivalent) prices. This would encourage enough such facilities to be built to provide enough power on demand over a long period to keep the system operating as continuously (or as frequently) as needed.

F. Tendering to Provide Stored Power: Delivery Date

Currently a power provider needs to contract to deliver power starting from a fixed date. However the date at which they can start delivery depends not on the provider but on NG / DNO grid connection time. Derogation for connection time delays must be explicit and up-front, not buried in the small print of tender documents that are already too long and onerous for an SME to read.

G. Tendering to Provide Stored Power: Simplified Bidding

There needs to be a simple bidding process to provide stored power. I am aware of one company that bid into the Capacity Market, taking a number of people a few months' intensive work for uncertain outcome: SMEs do not have such resources.

Can a selection of standard "storage services provision" agreements be posted as the basis for bids? Maybe with a minimum purchase quantity of power against each agreement? There would have to be some provision for varying unsuitable terms.

There needs also to be provision for start-ups and SMEs (which will need to be defined to an industry-specific definition, as the energy industry is capital intensive but labour extensive) to bid without bid bonds.

H. Conditional Contracts

Obtaining funding to build power storage projects is exceedingly difficult because there are no guaranteed sales with which to provide at least the beginnings of a return. Some ideas for solving this to release funding for lots of storage projects:

- Permit contracts to be established that will take the storage facilities' ancillary services being offered, when connected, for at least 5 years at market rates;

- Make an open commitment to take all storage facilities' ancillary services for at least 5 years at market rates.

Because market rates are used, this will not commit NG or DNOs to additional costs. 5 years are required because (a) investors would not accept less; (b) the Capacity Market requires 2 years' deliveries before a facility can bid in, and (c) the Capacity Market then has a substantial delay between bid and start of delivery, which this commitment needs to cover - my proposal assumes that this delay is no more than 2.5 years. If the delay between construction of a new technology and start of delivery under the Capacity Market is longer (e.g. because there is a pause between the 2 years' proving and the next Capacity Market tender submission date), then the duration of these conditional contracts needs to be correspondingly longer: indeed, the duration can be made equal to this delay, which would also mean that duration extends automatically if there are delays in the Capacity Market process.

I. NIA / NIC Funding

Energy storage is considered to be out of scope of NIA/NIC funding. All existing projects have slipped through on case-by-case derogations as being projects to relieve transmission bottlenecks.

Therefore, even though energy storage is the biggest new technology needed by grids, they are unable to provide finance to develop it. Generators are uninterested in financing storage, as they see it as out of scope; and because renewable generators have grid preference, they see it as unnecessary.

We seek small amounts of funds to develop truly grid-scale electricity storage (500MW, 21GWh per installation), which NG have said would solve huge problems that they have. All we need to do is build a pilot plant (20MW, £30m) and we have interest already shown in financing full-scale plants thereafter. There is no mechanism for the electricity industry (which would benefit most from it) to finance, or even contribute towards, such a facility.

Can Ofgem create a fund managed by across-industry body (e.g. Energy Innovation Centre, directly managed by them) that can fund industry-important technologies that are out of scope for NG and DNOs individually? Better, supply such funds to 3-4 industry bodies: it is well known that one body may miss a great technology while another picks it up. The remits of at least 3 should cover every field and size, and funding amount needs to correspond with the size of the problem (e.g. so a grid solution receives more funding than a domestic solution).

K. Interconnectors

In your 2013 Electricity Capacity Assessment Report you stated that National Grid cannot rely on interconnectors for any on-demand power requirements because (a) all our neighbouring countries have similar generation capacity crunches to the UK, and (b) they have similar demand curves. You could have added that larger weather systems often create similar renewable generation curves. And that UK demand should be reduced by 1GW to allow for the Irish interconnectors taking demand in the other direction.

You avoided the subject last year. Yet the problems innate in the interconnection strategy were highlighted this February when NG trumpeted the agreement to build an interconnector with Belgium, which is the first EU country to have been obliged to put in place plans for rolling brown-outs.

Ofgem needs to be stronger in this. While interconnectors are excellent and provide for many arbitrage benefits as well as support during strong but geographically small weather systems, they are very limited: for little higher cost than the BritNed connector, two of Storelectric's plants can provide 1GW of reliably available (and UK generated) capacity.

L. Size of Storage Needed

In order to turn 1GW (nameplate capacity) intermittent generation into entirely dispatchable generation, the same power rating of storage is needed, together with a storage capacity sufficient to store (our estimate) 6-12 hours' power at that rating. To provide most of this dispatchability, we estimate that half the nameplate capacity for 6-12 hours would suffice.

There is currently no definition of how much storage, either in power (MW) or capacity (MWh) to enable a quantity (what % of this 1GW generation capacity?) to be counted as dispatchable in NG's Future Energy Scenarios. Such a calculation would create a market for storage, which would contribute enormously to building that storage at no cost to NG or to the DNOs.

A suitable result would be along the lines of: 1GW nameplate offshore wind power in a location that generates with a 33% load factor, backed up by 4GWh storage with 0.5GW absorption and regeneration would provide 0.5GW dispatchable power. Other considerations could include:

- Is additional storage needed for weather events such as mid-winter static high pressures and, if so, how much?
- Would increasing rate of storage (e.g. to 0.75GW, with 0.5GW regeneration) reduce the storage capacity needed by being able to absorb higher peaks in generation?
- Dispatchability for peak demand will require much less storage than dispatchability for baseload: these figures could be broken into deciles of peak demand, so x storage is needed to supply the peak decile of demand (i.e. 55-60GW peaks, assuming that peak demand is 60GW), y storage is required to supply the next decile (i.e. 49-54GW) and z storage required to supply the next decile (i.e. 43-48GW).

These figures would need to be produced, or at least authorised, by Ofgem as the regulator.

M. Demand Side Response

On the "consumer engagement and trust" side, it strikes me that very little PR has been done to prepare the public for Demand Side Response. If it is not done properly, I can foresee a tabloid campaign in 5 years' time along the lines of: "This

government promised to keep the lights on. Yes, they're on - but not my dishwasher, central heating, freezer etc."

It also strikes me that National Grid is banking on too much DSR. 3-5% of peak demand is achievable, but more than that is third-world rolling brown-outs. I define a first-world grid as "when I turn on the switch, the power is there". A third-world grid is "when I turn on the switch, it'll think about it". Therefore DSR above 3-5% of peak demand is paying £billions to degrade our first-world grid to a third-world grid.

Regards,
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