Ofgem Consultation – Smart Systems and Flexibility Plan

This document is written based on the update report published in December 2018. Each comment starting with page (i.e. Acrobat page, which is 1 higher than numbered page) and paragraph numbers referring to that report.

In summary, you are proposing many good actions and some not so good, but in aggregate they only address a part of the problem which risks destabilising the system by neglecting other parts of it.

P6 para.6: Defining storage as a subset of generation greatly disadvantages it. Storage doesn't generate, it stores. This definition distorts assessments of loads on grids because generation needs grid access at all times, whereas the generally countercyclical nature of storage does not. Storage moves electricity from when it's not wanted to when it is, just as interconnectors move it from where it's not wanted to where it is. Defining it as a subset of generation discriminates against storage by creating inappropriate grid access and renewable obligation / CfD / FiT etc. charges, disqualifying it from HMRC incentives (e.g. EIS is unavailable for generation, but available for other technologies) and prevents the creation of contracts for "storage services". The function of storage is to deliver a portfolio of grid services of time displacement, conversion from intermittency to flexibility, and provision of balancing and ancillary services: storage is a grid service, not generation. Therefore the definition should be as an asset class in itself, based on that of interconnectors.

Treating storage as a subset of generation was merely a caving in to large incumbent fossil fuel generators who lobbied hard to keep the definition of storage as "generation plus consumption": rather than taking the logical decision to give it its own definition, you took the path of least resistance and split the difference. The result is an ugly compromise that discriminates against storage in favour of interconnectors which cannot provide the security of supply that storage can, and which means that we are using British money to subsidise overseas generators.

P6 para.7: Grid operators should be allowed to develop storage where it's needed, subject to a condition that they have to sell it on within 3-5 years of going live. This way they can ensure that their grid needs are met.

P7 para.2: See my comments on P6 para.6.

P7 paras 4-6: These focus on batteries and ignore large-scale long-duration storage.

P7 para.7: This is treating the symptoms rather than the cause, for which see my comments on p6 para.6. It gives yet more opportunity for large and influential fossil fuel generators to influence charges against storage. It also fails to give credit to different durations of storage: long-duration storage is wholly dispatchable, whereas batteries are exhausted within 20-60 minutes.

P9 para.4: smart meters are failing dismally. If one is installed, then the householder changes energy supplier, then the meter instantly becomes dumb, much less readable than the earlier dumb meters, so owners are worse off than they started. I know, it happened to me - on a recent installation.

Smart meters are also currently predicated on users actually using them to modify their behaviour. Very few people will want or be able to spend the time and effort to do this, and even fewer to correlate energy use with smart meter readings - and those most capable of doing so are likely to be those for whom a 2% saving on the electricity bill is quite simply not worth the effort.

P9 para.5: half-hourly settlement is much too coarse for domestic DSR. Although from a user's point of view it's fine for items like washing machines whose use is movable over periods of hours, but not for items like fridges and heating whose use is only able to be delayed by a quarter of an hour or so. And from a system operator's viewpoint it's grossly inadequate to provide the kinds of frequency and voltage response services to which DSR is best suited.

P10 para.3: A Clean Growth Buildings Mission is like a sticking plaster on a deep wound caused by the abandonment of net-zero-energy homes standards. The wound needs healing first.

P10 para.4: I don't think anyone has thought through the financial flows of using EVs to provide balancing and ancillary services:

- If used for evening peak demand, then they will be charged during the day at offices or shopping centres while the sun is up - who will pay for the electricity? Will it be paid for at retail prices, because at those prices EVs are more expensive than petrol cars? Will the energy be provided for free, in which case will that be in-kind remuneration / incentivisation that will attract taxation, and also attract people using public parking when they could use private?
- How much will they be paid for use? Because every discharge reduces the life of the battery, and every externally controlled discharge uses the batteries in sub-optimal ways in terms of battery life?
- What proportion of a vehicle's charge will be ring-fenced, because nobody will want their car to be out of charge when needed for an emergency, or for a trip that they hadn't pre-programmed?

Nor have they thought through the burdens on the grid, which will be extreme unless the technology is so advanced that only vehicles within the local area of the need are called upon - and we don't have a grid that is even remotely capable of doing that.

P11 para.3-4: I believe that the cyber security of the Internet of Things (not just of EVs) is a grossly underestimated challenge. We already have domestic appliances

being recruited illegally into bots, and we could easily envisage cyber-crime disabling and blackmailing a person or company, or cyber-warfare causing massive disruption. Just turning off everyone's fridges and freezers would cause massive strains on our food supply, including shortages to the point of widespread starvation.

P12 para.1: This is correct as far as it goes, but will result in gross and critical distortions if other factors aren't taken into account such as the incentivisation of new build major generation and storage infrastructure, the introduction of innovation and the elimination of emissions. Please see the attached document A 21st Century Electricity System. And even this doesn't consider the other aspects that need incentivisation, e.g. real inertia which delivers vast benefits in comparison with EFR, but is not contractable under current regulations.

P12 para.3: The CM is designed to back up renewable generation. Lulls in renewables usually occur for hours and even days. DSR has a typical duration of 15-30 minutes. There is no way in which we should be equating DSR with capacity support. Duration is of primary importance; the CM's de-rating of sub-4-hour storage is correct.

It gets worse when one considers the recent consultation on enabling renewable generators to engage in CM contracts: how can renewable generation back up renewable generation?

P12 para.4: TERRE suffers the same problems as interconnectors, which cannot be relied upon for back-up as they are jeopardised by:

- Daily peaks in demand, which happen largely simultaneously across Europe and are currently only manageable due to a surplus of fossil fuelled power stations which will have to close due to emissions - then where will we get the energy from on a windless winter evening after DSR and batteries are exhausted?
- Weather-related issues such as the *kalte dunkel Flaute* identified by Germany and France but also affecting the UK, in which negligible renewable generation occurs over most of the continent for periods of up to 10 days every couple of years, and much more often over smaller geographies and/or durations.
- Brexit, which removes us from the single market and the jurisdiction of the European Court of Justice, which are the only two things that guarantee that our neighbours don't say "I don't care how much you want to pay, our consumers are more important than yours".

P13 para.1: Splitting contracting into the TSO and multiple DSOs risks fragmenting the market and losing all economies of scale without corresponding increase in competition due to regional monopolies: instead of having an English and Welsh market with 55GW demand, we would end up with 9 markets varying between Dutch

and Luxemburgish size, all overlaid with a TSO market. Worse, it makes it ever harder to plan for the medium and longer term because of the risk of free-loaders. All this needs to be taken care of in the regulation of this change in the industry.

P13 para.4: The RIIO-2 framework is very short-term focused and will provide no incentives to build long term capacity, to keep the system affordable in the medium and longer terms, to clean up the system or to introduce new technologies, as per my representation to that consultation, attached. Please re-consider it.

P14 para.2: Please see my comments on the Balkanisation of the system, p13 para.1

P14 para.3: Changing your regulation of the system to maximise utilisation means that when you hit the ceiling of utilisation, you are going to hit it much harder: simultaneously in many more locations and with much more severe problems and costly solutions. Much better to keep increasing the system capacity.

You permit National Grid to get away with constantly whitewashed future projections. FES 2018, for example, is much more realistic than FES 2017 but still assumes that by 2040 most heating, transportation and industry is decarbonised – indeed, that it's mostly electrified whether directly or via electrolysed hydrogen, unless you actually believe in their triumph of hope over experience in expecting CCS to be a viable alternative, having overcome its problems of capital and operational costs, of 1/3 efficiency reductions in the power stations and of the near-eternal insurance risks of CO_2 storage. Each of these three sectors (heating, transportation, industry) consumes roughly the capacity of the entire electricity grid, thereby quadrupling the load on it; yet in that time only a 20% increase in electricity demand is forecast. Quite incredible. And the means that they select to deliver the energy is 85% uncertain. Please see the attached report, Matching the Solution to the Problem – FES 2018.

P14 Case Study (left): Project TERRE should not be mentioned in the context of Limejump's exercise. Limejump proved "minute-by-minute" DSR. According to Ofgem's own documentation, "The different cross-border scheduling steps that will be admissible by the TERRE platform will be 60, 30 or 15 minutes." Initially it will be 60 minutes because the system can't cope with more. See section 2.3.1 on p15 of https://www.ofgem.gov.uk/ofgem-publications/104724.

P15 para.1 to P16 para.3: This innovation support does not provide for any large-scale first-of-a-kind plants, or for the public incentivisation of private sector money to build them. Without such provision this will never yield large-scale innovations, i.e. on a scale commensurate with the scale of the challenge.

Moreover, it is administered through the DNOs and National Grid, all of whom are banned from involvement in generation or storage, and therefore the innovation funds cannot be spent on generation or storage technologies (see p6 para.7).

Although it is true that feasibility studies for large-scale storage have been funded, we have been told repeatedly that no actual work on it can be, and therefore not to bother even applying, since we have already done the feasibility studies in conjunction with PwC, Costain, Fortum, Mott MacDonald, Siemens and others who have found it to be sound, necessary for the grid, robust, deliverable with today's technology and the world's most efficient widely implementable large-scale long-duration technology.

Another hazard of this fund is that all intellectual property developed with this funding is claimed by the government for public use, which discourages businesses from using it to develop technologies. Thus winning a competition could easily kill a company.

P16 para.2: The Prospering from the Energy Revolution Challenge fund spent its first £102m on 3 areas: Smart local energy systems demonstrators and designs; Innovation Accelerator Fund; Research and Integration Services. No room there for large Storage demonstrators.

P17: All this focus on smartness and flexibility is great, but if there isn't enough capacity it doesn't matter how smartly or flexibly, we use it, it just isn't enough. And the lack of incentivisation of new major infrastructure investment or first-of-a-kind full-scale storage plants means that there simply won't be enough capacity. As can be seen in the Matching the Solution to the Problem – FES 2018 document, all four National Grid scenarios yield negative supply margins by 2021.

P17 para.4 to p18 para.8: See my comments on P6 para.6. These initiatives on removing these particular barriers, while welcome and beneficial, are treating a tiny subset of the symptoms rather than curing the problem – a cure would be creating its own regulatory class based on that of interconnectors which deliver analogous services.

P17 para.5: Omitted is a focus on grid connection, which takes longer than planning at both transmission and distribution levels. New transmission connections for large-scale storage are particular problems, with lead times ranging from a minimum of 4 years up to 15 years or more – totally unfeasible in encouraging private investment into transmission scale storage. (There are no "spare" transmission grid connections over the Cheshire salt basin. Or, for that matter, over the Somerset or Dorset basins.)

Also omitted is incentivisation of renewable generation to build in conjunction with storage of equal or similar scale. For example, a 1GW wind farm needs a 1GW grid connection to deliver intermittent energy that will de-stabilise the grid; if connected through large-scale long-duration storage it will need a 400-700MW grid connection to deliver baseload or dispatchable energy which enhances grid stability. Everyone gains – if you put in place the right incentives. But the storage has to be of at least half the farm's nameplate capacity, and with durations of at least 4 hours, or it cannot provide the grid stabilisation services required of it.

P19-20: My comments above will suffice.

P20 para. 9 to end p21: see my comment on p17 above.

P22: See my comment on P15 para.1 to P16 para.3, above.

P22 para.4: It is excellent that the government is delivering real, useful amounts of money into an innovation challenge. But why put it all into batteries?

- We are playing 20 years of catch-up with the rest of the world in lithium technologies: why not fund technologies in which we already lead the world or are close to leadership?
- Of all the 40-60 gigafactories that have been announced, not one is in the UK: why finance R&D into a technology that will not build up British industry?
- According to figures from The Economist, if all these gigafactories are built, they will exhaust all lithium deposits currently being mined, and those currently being developed, in 8.5 years (again, discussed in Matching the Solution to the Problem – FES 2018): why support a technology in which we have such a small possibility of muscling into the market?

Q1: A number of areas, including:

- Large-scale long-duration storage, particularly full-scale first-of-a-kind plants;
- A proper evaluation of the effects on grid demand of decarbonising other energy sectors;
- Ditto of the effects on need for transmission and distribution capacity.

Q2: Building a first-of-a-kind large-scale long-duration storage plant, such as Storelectric's TES CAES and CCGT CAES plants, both of which have the potential to make major contributions and both of which need assistance in building the first-of-a-kind plant because private sector finance won't do so without government revenue guarantees or assistance.