Storelectric – received via email

Q1: Do you consider there is value in expanding the NOA to allow network and non-network solutions across the transmission and distribution networks to compete to meet transmission network needs at least cost? Yes the problems of grid stability are felt at all levels of the grid, as more intermittents connect to the distribution grid the problems will become more acute and right now the DNO's are not responsible for stability issues although the transition to DSO's, if it happens, will start to change their focus and the change proposed for NOA would/could be a step in accessing more proactivity at this level. **What are the downsides or complexities we should consider?**
To allow the NOA to be more broad based requires that we allow different incumbents to enter the market - right now neither the TO's nor the DNO's are able to own and operate storage facilities. Grid scale storage of the type being promoted by Storelectric Ltd (Compressed Air Energy Storage) helps address all 3 key issues at both small and grid scale: fault levels, rocof (inertia) and voltage (reactive power compensation) as well as being generation and demand side. By preventing these entities from owning and operating such assets
(and concomitantly allowing them to profit) unnecessarily eliminates major potential players in this field. Regulatory changes are needed and the broad based benefits of CAES need to be compensated for, right now inertia is secured free of charge but with conventional plants closing down this will leave a very dangerous shortfall and as such has to change. **How could we go further in promoting competition?** See answer to previous question

Q2: What do you see as the opportunities and limitations of bringing a probabilistic approach into analysis? The straightforward and cost effective advantage would be the opportunity to more correctly size the system requirements (i.e. not based on peak demand but on likely peak demand) after allowing for mitigation measures such as correctly positioned storage assets which should help reduce the peak and data analytics to enable better accuracy/predictability of forecasts (generation and demand side). This is the area of large data analytics and new improved artificial self learning algorithms.

Q3: Do you consider there is value in expanding the network needs covered by the ETYS and NOA to a greater extent across the year and to more regional voltage challenges? Yes for regional voltage challenges - its very clear that over the next 10years there are specific areas where non synchronised generation creates more acute voltage instability issues - these need to be highlighted as major problem spots and can result in rolling blackout problems (if not adequately addressed), for developers to even consider investing in solutions to support local voltage issues they need the right market signals, these market signals clearly must be of a commercial nature but also provide information on geography. CAES can provide 24hr reactive power support but without knowing the specific locations where such a service would be of sufficient value makes financial modelling more complex **What are the downsides or complexities we should consider?**

Q4: Do you consider there is value in expanding the NOA to cover system stability needs? Yes its essential **What are the downsides or complexities we should consider?**

Q5: Which other network requirements do you consider the NOA approach could be expanded to cover in order to drive value to consumers? Inertia, Reactive Power and solutions that address problems of Fault levels, it is the contention of Storelectric that Inertia should be a paid ancillary service, that dynamic reactive power control should be a paid service and support for Fault levels should be a paid service - more to the point we see that an asset that can provide all three should be weighted more highly than solutions offering only individual

services however the current structures and processes NG employs to contract these services tends to be complicated and even more so when multiple offerings from a single asset need to be contracted together (i.e. tranched, which for storage is essential to make the economics viable) unless this process is simplified and made workable some market incumbents will be handicapped **What are the key benefits and considerations?**

Q6: **Do you agree with the proposed approach to phasing information throughout the year? If not, how could we best present this information, with the aim of avoiding publishing all in one large publication per year?** One report per year with summary reports every quarter could be of benefit

Q7: What information and in what format would you find beneficial in order to understand the network needs and submit well thought-out options? This could be specific data (such as future expectations, size of the problem), guidance to understand the process you have followed to establish the Network Options (meaning the underlying assumptions and whether they remain valid now or tomorrow). It should also be noted that it is more useful to know the amount of reactive power (dynamic and static) required in a specific location than to know there are voltage concerns, its more useful to know the additional inertia required in a specific location than to know there are rocof problems, it is more useful to know the ride through capability requirements of the generator (e.g critical clearing times or short circuit ratios) than to know there are fault protection issues - data needs to be translated into something that is tangible and meaningful vis a vis the equipment required - this makes the information more actionable.

As a general point I believe NG needs to become more aware of the new solutions that are now available and I refer here of course to grid scale compressed air energy storage. This can provide multiple services and services that we all recognise are becoming more and more necessary over time. I believe it is essential that NOA starts to model the full functionality of such assets, I am personally quite convinced that a model when assessed with CAES and without CAES will show a substantially more favourable cost profile with CAES. As a developer we cannot model this ourselves but is essential in understanding the full value of the asset - it needs a joint effort and although we have suggested this several times we get little traction to what is a simple, easily implemented, proven and cost effective solution, this has led some to wonder whether we are serious about solving the problems you succinctly highlight in your consultation paper. Lastly those assets that have multiple benefits need to be appropriately and fairly compensated, I see this requiring careful thought.

Tallat Azad

On reviewing the Network Development Roadmap consultation, I have the following comments.

The focus is always on cutting costs, not on building the network to cope with future demand. National Grid is grossly underestimating future demand: in forecasting (Two Degrees, the only legally permissible scenario under the Climate Change Act) that all cars electrify by 2040 (and they use as much energy as the entire grid) and that ~40% of heating (which again uses as much energy as the entire grid) is electrified, you are tripling the demands on the grid while only forecasting a 15% increase in peak demand. The sums don't stack up. And the primary focus of National Grid should be to predict the distribution of this demand and reinforce its capacity to be able to meet it.

Likewise, supply is moving to major point sources (wind, solar, tidal farms and interconnectors) that are in very different locations from today's point sources (power stations. Yes, distributed generation will form a significant part of the solution but far from all of it. Yet all your planning and all your grid innovation / development actions focus on distributed generation and storage, and on the interface between the distribution and transmission grids. You need to focus a lot of attention also on the transmission grid itself, and of coping with these major intermittent point sources.

Moreover, you plan on interconnectors being dispatchable. They only deliver electricity according to prior contracts, and so are not dispatchable without major costs for breaking those contracts. And interconnectors face an additional problem that you completely fail to address: Brexit. The one certainty is that we're leaving the single market and the oversight of the European Court. These are the only two things that prevent our neighbours, in a period of shortage, saying "I don't care how much you wish to pay, our consumers are more important to us than yours". The moment they say that, blackouts follow.

Thus you are placing over-reliance on a highly dubious Future Energy Scenarios report. Please find attached my analysis of the 2017 report.

And while you are increasingly aware of the hazards arising from loss of inertial generation, your entire focus is on developing incentives to mitigate each hazard, treating the symptoms rather than the cause and thereby working towards a stack of sticking-plaster solutions that will be very costly and unwieldy. How much better to treat the cause, incentivising inertia itself rather than EFR's fake inertia, and reaping the benefits of all these other services as by-products?

I agree with your bulleted proposals on p4. However they run entirely counter to your current practice, the foreword's focus on cost reduction and the prior focus on FES.

Your proposal for commercial tripping systems p5 are a proposal for rolling brown-outs. These are not a solution. The purpose of the grid is to keep the lights on with assured security of supply, not to switch them off whenever there's a spike upwards in demand or downwards in generation. And your illustration perfectly shows how you're failing proactively to reinforce the network for future needs - this instrument is proposed to enable you to continue failing in this same way, and is therefore wrong.

Your proposal p6 for assessing all proposals on their merits and follow that by bilateral contracts is good. I would enhance that by enabling an initial assessment to be made prior to planning application and grid connection, leading to an enforceable letter of intent to purchase the services of the installation once those services are available, conditional on the services being close to "as promised". Such letters must not be time limited (it can take you over a decade to supply a new transmission connection, for which the supplier should not be penalised), but dependent on ongoing work / progress towards completion. This would liberate lots of private investment into new solutions and reduce the burden on the grid of evolving to meet future needs.

Your proposals p7 for enhancing the NOA assessments are good. I wonder if transmission system boundaries are necessary in today's world of digital system models which can model every part of the system: the boundaries were set in pre-computer modelling days to simplify analysis, and may no longer be either needed or fit for purpose - especially as the connection to the transmission grid of distributed demand and generation may provide the bottlenecks of the

future - and these occur within boundaried areas. (This also applies to p13.)

A deterministic (as opposed to probabilistic) approach should be taken: the grid should not be the constraint on future energy supply, as it hasn't been since the creation of the grid. If a probabilistic approach were established, the probability criterion would always drift for political and commercial expediency (to save money), at increasing risk of grid-created blackouts.

P8 Yes I do think that other seasonal variants should be analysed. And, because of the nature of intermittency, climactic / weather variants e.g high/low winds with/without high/zero solar with/without high imports/exports (and in future with/without high/low tides and with/without high/low waves), for durations long enough (Germany uses 2 weeks as a maximum for each weather scenario) to reflect actual weather and climactic patterns. Currently the only durations considered are instantaneous, leading to an over-reliance on very short duration solutions (DSR, batteries) and an inadequate focus on longer duration solutions, thereby jeopardising the grid in future.

P9-11: please see above on the fact that you are focusing almost entirely on distribution networks and on their interfaces with the transmission system, to the exclusion of looking at transmission issues. You are also focusing on quickly implementable sticking plasters to the (at least partial) exclusion of those that take longer to develop and build, but which actually meet the challenges.

Please accept this as my submission to the consultation.

Kind regards,
Mark Howitt