

AES Energy Storage Comments on Ofgem Consultations

As a leading energy storage system integrator with over 478MW of projects delivered for customers in operation, construction or late stage development across 4 continents, AES Energy Storage welcomes the opportunity to respond to Ofgem's consultations on DNO storage [ownership](#) and [licensing](#).

Consultation 1: Enabling the competitive deployment of storage in a flexible energy system: changes to the electricity distribution license

Executive Summary

Energy storage has an important role to play in making distribution grids operate more efficiently and at lower cost to consumers.

In this response we have outlined:

- Numerous operational and proposed cases where regulated network company ownership of storage provides or has identified significant value.
- That in the US storage ownership has been given considerable thought. Major policy precedent has been set by FERC (PL17-2-000) which approves DNO equivalents rate-basing storage as a network solution whilst also participating in system service/wholesale markets and provides guidance as to how to approach any perceived concerns.
- That regulatory precedent has been set in specific markets (e.g. ERCOT) that are broadly similar to the EU/GB unbundled market structure and ruled that DNO ownership is consistent with these requirements.
- Why relying on 3rd party solutions for storage as a first resort is unlikely to ultimately deliver the most optimal solution unless the regulator can encourage the DNO to be the 'anchor' reason that assets are deployed through competitive tenders (which is not the case today).
- Our proposed approach to assessing DNOs procuring 3rd party storage services alongside owning assets in tandem to ensure the best value is always achieved for consumers.

We encourage Ofgem to consider these examples as they craft their positions on ownership and licensing, so as not to preclude DNOs from finding innovative and economically efficient solutions that use storage as an alternative to traditional investments.

Examples of Contracted/Operational Storage owned by DNO/TNOs

AES Energy Storage has deployed 6 MW of energy storage across three different projects for Arizona Public Service (APS), a vertically integrated transmission and distribution utility in the US Southwest. The first two projects, deployed early in 2017, function as alternatives to distribution substation upgrades in areas of the APS grid where there is high penetration of solar PV. [Here](#) is an article with more information on those projects. The third 2 MW, 4 hr project, [announced](#) this summer (with further insights provided [here](#)), provides a transmission upgrade deferral for APS. APS found that energy storage **was half the cost** of the alternative line replacement. All of these projects are owned and operated by APS and rate-based. Some additional background on the second project from GTM [here](#) and Utility Dive [here](#).

Another Advancion 20 MW 1 hour array was also delivered by AES Energy Storage to Indianapolis Power and Light, the first large grid-scale battery-based energy storage system operating in MISO (the Mid-Continent Independent System Operator). This also provides a transmission network service to its offtaker. The array provides [frequency and voltage control service](#), which is mandated by the North American Electric Reliability Council (NERC), to the IPL territory and is also a rate-based asset.

In addition to AES Energy Storage delivered T&D projects for clients, other energy storage projects built and planned point to the importance of allowing network operators to utilize storage to serve needs that would otherwise require more costly or bulky investment.

French TSO RTE is pursuing an innovative solution to transmission congestion in “[Project RINGO](#),” using storage located at both the high and low side of a congested line to solve congestion in what is becoming known as a “virtual power line”. RINGO is a novel project that could set global precedence on the use of batteries for avoiding transmission congestion. Because the two battery resources operate in tandem (one charging and one discharging), there is no difference at all electrically compared to building out a larger transmission line and no energy market imbalance as the charge and discharge actions cancel out instantaneously.

In the US another T&D operator AEP Texas has sought approval for two battery arrays to be installed at locations at the edges of their electrical grid in locations prone to outages. The two battery systems would cost approximately \$2.3 million, while the equivalent line upgrades would cost \$8 million, so the project is economically efficient from a single use case as a wires alternative. ERCOT, the Electric Reliability Corporation of Texas, is deregulated and unbundled across generation, transmission, and distribution, similar to the UK and EU so this sets a relevant regulatory precedent.

In Texas, storage is classified as generation but not strictly, meaning it can serve other functions for the grid. This is markedly similar to the Ofgem proposals of treating storage as a subset of generation. Under these conditions, a [judicial ruling](#) in Texas found there is no rule that prevents T&D utilities from owning and rate-basing storage. Importantly, energy used for charging and discharging the storage assets is considered “unaccounted for” energy – essentially like losses in the T&D system. This ensures the T&D operator is not taking any market positions with respect to generation. We encourage Ofgem to consider these examples as they craft their positions on ownership and licensing, so as not to preclude DNOs from finding innovative and economically efficient solutions that use storage as an alternative to traditional investments.

Why requiring solutions from 3rd parties as a first resort may not be most efficient or economic

We believe implementing New Condition 43B in its current form would prevent DNOs from fully realizing the benefits to their systems that storage could provide for a few reasons.

First, longer duration energy storage systems are usually needed to meet the needs of distribution system non-wires alternatives. The current market constructs and revenue opportunities for storage result in single primary use, short duration systems. EFR or dynamic FFR products for instance are optimised in the range of 30min – 60min, whereas the needs for distribution applications is typically 2-5hours (as evidenced by UKPN’s [recent flexibility tender](#)). The selection of battery and use case conditions of such a frequency regulation system are typically designed and warranted to maintain a 50% state of charge and small cycles; whereas DNO applications call for a more robust and flexible system usage and a requirement for deeper cycling. Unplanned DNO revenue stacking may not be possible for asset providers without breaching warranties, thus constraining the technical abilities of assets through market design.

Second, without DNOs being able to own or operate storage, there is a risk that market participants will not deploy assets optimally located and sized to serve distribution needs, but rather deploy where optimal for their specific use case(s). If the DNO is able to deploy on their own land as part of a competitive procurement process to obtain a storage solution, the DNO will reap additional operational efficiencies of having assets located in needed positions on their grid and with potential synergies for maintenance.

Third, with regard to section 2.13 noting that in order for a “DNO to justify a request to depart from the usual unbundling rules” that a DNO must demonstrate best efforts to obtain a market-based solution first, we note that that structure would inhibit DNOs from:

1. Responding to urgent needs on their system in a timely manner. First a lengthy 3rd party procurement process would need to be run, deemed to not deliver an appropriate solution, and a second lengthy procurement process set up and also run for a DNO-owned solution. This would both significantly delay the carbon, cost and reliability benefits delivered to consumers and would double the administrative overhead costs vs a single procurement process considering a DNO-owned option at the same time.
2. Identifying circumstances where DNO-owned or operated storage is the most economic and efficient solution. This is because with a '3rd party only' procurement it is not possible to assess whether the best of the available 3rd party solutions is more or less optimal than a DNO-owned solution 'base case'. There are numerous reasons DNO storage could be more optimal for consumers: because rate based assets attract a lower cost of capital than the equity usually funding 3rd party battery developer projects, DNOs may have the best land access to optimally solve a network constraint etc.

We propose as an alternative that market-based solutions are evaluated alongside DNO-owned or operated storage solutions rather than as a last resort, which would ensure the most economically efficient solution for consumers is chosen on a reasonable timeline. An independent arbiter could judge which solution is of best value to consumers.

Addressing perceived concerns around non-compliance with unbundling

We believe that there are various commercial structures that can be adopted to address the concerns around violating unbundling requirements, which we address in more detail in responses to questions below.

In the best interest of consumers, storage resources should be enabled to provide all the services that they can across the generation, transmission and distribution spectrum. A regulatory constraint that forces the resource to only provide a specific service will lead to a sub-optimal solution for the entire system. Storage is connected to the grid 24X7 – in a peak load relief type of application it discharges completely to help avoid a transmission or distribution upgrade project. But this happens only for a fraction of the time in a year during peak hour periods. Under economic first principles, it would make sense to use the resource for additional functions in the grid during the periods when it is not providing that peak load relief.

Commercial structuring arrangements can help address concerns regarding unbundling while still meaningfully utilizing all the capabilities that the resource would offer to the market. It clearly will not be a one-size-fits-all type of solution. Aside from the issue of DNO ownership or operation, in order to procure the needed type of storage (2-4 hour duration) in desired locations, the regulator should still encourage the DNO to be the first reason that assets are built through competitive

tenders for services. Under new proposals the capacity market is likely to reward a four hour storage system with a better derating factor, but it is still too small a proportion of project revenue to guide investment to longer duration – developers will more likely continue to build 30-60 minute duration systems optimal for other ancillary services. To encourage longer durations and robust infrastructure assets needed for distribution grid applications, Ofgem and DNOs must send explicit market signals to developers to build 2-4 hour duration systems and make DNO usage the foundational ‘anchor’ application.

AES Energy Storage responses to selected questions:

Section 2

Question 1: Do you agree that the proposed new condition will ensure legal unbundling of DNOs from the operation of storage that benefits from an exemption to hold a generation licence?

We believe there are commercial structures that can both enable DNOs to benefit from storage as a distribution asset and keep the unbundled structure separating DNOs from generation activity.

For example, energy storage can serve as an alternative to a costly substation or line upgrade when a DNO is faced with load growth on a particular feeder. The energy storage asset would charge during a period of low demand on the substation or line, then discharge when the distribution asset is constrained, ensuring all loads on the feeder are served completely.

If direct ownership by a DNO is unpalatable, a third party storage provider can still respond to directions from the DNO, and in return receive a capacity payment for their availability during a set period of time. The DNO would not receive any revenues from operating the storage asset in the balancing market. In order for such an arrangement to be optimal for the DNO and the consumer, the DNO must take an active approach to selecting sites where storage can help solve a problem, and offer visibility to developers in the form of long term contracts.

With the right market structures in place, the storage owner could utilize the asset when not providing a service to the DNO for other services, such as regulation or balancing. For instance a leasing structure that makes available the asset to 3rd party energy market participants during times where it is not being used for a network purpose would address the unbundling requirement. This ensures maximum investment efficiency but preserves separation of DNO from the energy market.

It is worth noting that in other markets where energy storage has been around longer this topic has been given considerable thought. Major policy precedent has

been set in the US by FERC ([PL17-2-000](#)) which approves DNO equivalents rate-basing storage as a network solution whilst also participating in system service/wholesale markets and provides guidance as to how to approach any perceived concerns. In the introductory overview we also outlined the [judicial ruling](#) in Texas on the eligibility of storage to be DNO owned and rate based whilst still maximise investment efficiency by operating across markets.

Question 2: Do you agree that the same principles of unbundling should apply to IDNOs?

We believe the same commercial structures we propose in our opening comments and in our answer to Question 1 above could apply to IDNOs just as they do to DNOs.

Question 3: ...Do you think DNOs should be able to directly own and operate storage for any other specific applications?

Yes, in addition to being able to contract for services from energy storage operators, there are situations where ownership of a storage asset would make sense.

As described above, when owning a storage asset to exclusively perform a function that would otherwise require a more costly traditional solution (as in the cases of APS, AEP and Project RINGO), it makes sense for a DNO to be able to own and/or operate the storage asset themselves. These situations may include (but are not limited to):

- Distribution substation upgrade deferral
- Distribution line replacement/upgrade deferral – Like the APS project to defer investment on an expensive line replacement to serve a remote load, energy storage can defer or avoid completely upgrades to long radial lines that serve remote locations
- Distribution system reliability – May include supporting greater penetration of intermittent renewables by injecting real or reactive power to maintain voltage stability and improve power quality
- Peak load relief
- “Virtual Power Lines” as described in Project RINGO

Question 4: Do you have any views on the treatment of existing islanded system generation currently owned by DNOs?

For islanded systems where there is a vertically integrated and regulated utility (for example, in the Channel Islands), they should be able to own and operate storage and optimize its use across the whole system. This would be in line with the current status of islanded utilities, where they plan for generation alongside transmission and distribution in an integrated fashion.

Do you have any views on the treatment of future use of DNO owned and operated generation of storage in similar island situations?

Same as for the current arrangement of existing generation currently owned by DNOs, they should be able to continue to procure the least cost technologies to serve their customers, including energy storage, for applications across the generation, transmission, and distribution spectrum.

Section 3

Question 1

For the high level criteria, we echo our position from our opening remarks that one issue with putting the burden of proof that all market solutions are not economically efficient on the DNO is timing – it makes sense to consider market and DNO owned/operated solutions concurrently, and only then can the DNO prove which one is most economically efficient for consumers.

In addition, we would expand the list of explicitly named activities in Section 3.6 to include those we name above in our response to Section 2, Question 3.

Question 2

[No comments]

Question 3

[No comments]

Consultation 2: Clarifying the regulatory framework for electricity storage: licensing

We support the proposed definition of electricity storage as outlined in the consultation. We do not see any problem with inclusion of the qualifier “in a controllable manner” to the definition, as the dispatch of electricity and charging of energy storage systems is highly controllable and flexible. We would submit that “in a dispatchable manner” may be more appropriate, as it brings the definition more in line with non-storage generation terms.

Our understanding of the inclusion of energy storage in the generation license is largely a decision based on timelines, where a new license condition could go live in the first half of 2018, whilst a new license category would be a protracted effort and impose unnecessary delays and barrier to the growth of energy storage solutions. We are supportive of Ofgem’s speed moving forward with this initiative.

However, in the proposal Ofgem suggest amending the license to use ‘*Electricity Storage Facility*’ in the licence – where appropriate and depending on each condition –

alongside either 'generating station' or 'generation set' to further clarify that conditions apply to electricity storage as well. We are unsure why this is alongside rather than instead of. We considered this issue already settled with the whole industry supportive of the ESN definition which deliberately avoids use of the word 'generation'. Introducing the word 'generation' potentially unnecessarily narrows the scope of energy storage for current and future applications and creates issues in the planning system.

Final consumer levies

In the creation of addition text for Condition E1: *"The licensee shall not have self-consumption as the primary function when operating its storage facility"* we provide the following comments:

- The language as semantically written could be interpreted to mean that the storage facility itself has a primary purpose to self-consume (and never export) energy. This is presumably not the intent as clearly there is no rational case for an energy storage facility ever to store energy without the intent to re-export it.
- Alternatively, it could be interpreted to mean only auxiliary energy that is consumed by an energy storage facility (e.g. to run loads such as lighting, comms, HVAC etc) that is not exported will still be subject to levies. This is rational as it represents true end user consumption. As aux load is usually separately metered we would seek clarity to ensure net metering is completed at individual storage facilities rather than by an industry standard or average (this is to ensure that there is an incentive and continual innovation to improve energy efficiency and reduce any self-consumption).
- Our best understanding of the interpretation however based on the clarifying notes provided by Ofgem is that this refers to 'behind the meter' (BTM) storage that is essentially part of a private wire network on, for instance, an industrial energy user's site and that would reduce net import from the grid but never 'backfeed' or export onto the distribution network. We are unsure what this would achieve other than shift BTM projects to those where export capabilities are possible.
- It appears that the intent behind this reasoning is to avoid 'grid defection'. What is less clear is if an energy storage facility BTM allows an end consumer to go off grid entirely and form a microgrid if the levies would still apply to the facility. It does not make sense that they would, yet the text as written does not make any distinction.
- We note Ofgem's acknowledgement that the 'Requirement to Export' condition based on 'primary function'. Ofgem acknowledge this is an intentionally loose definition but one that we believe will create investor uncertainty and legal ambiguity.