



**Response to BEIS–Ofgem call for evidence on
*A Smart, Flexible Energy System***

**on behalf of
AES Kilroot Power Ltd and AES Ballylumford Ltd**

12 January 2016

As the leading battery energy storage platform developer globally, AES welcomes the BEIS/Ofgem Call for Evidence and is pleased to submit this response. We commend BEIS and Ofgem for their proactive approach to joint working to design a future electricity system which makes the most of new energy solutions for the benefit of consumers and climate.

AES particularly appreciates the Flexibility teams' commitment to the spring 2017 publication date for a plan, 'the Roadmap', during a period of significant national upheaval, in line with the announcement in the 2016 spring Budget. The delivery on time of a robust Roadmap with senior regulatory and ministerial support will send clear entrance signals to industry and investors that the UK will be a leader in flexible technologies during and post Brexit.

About AES

The AES Corporation is a Fortune 200 global energy company, headquartered in Arlington, Virginia, which works across the energy value chain in 17 countries. AES first invested outside of the US with the acquisition of Kilroot Power Station in Northern Ireland in 1992, and later acquired Ballylumford Power Station in 2010. In 2016 AES UK & Ireland comprised 61% of generation capacity in NI, most of which has recently undergone extensive environmental upgrade to comply with EU emissions reduction legislation.

AES is the global leader in battery energy storage, with 156 MW in operation and over 500 MW in construction or late stage development in eight countries. AES was ranked as the #1 energy storage integrator by Navigant in 2015 and 2016. In 2016 AES received the Edison Electric Institute's International Edison Award for its development and deployment of Advancion® 4, our fourth generation, grid-scale, battery-based energy storage platform.

We operate the UK and Ireland's largest battery array, the 10MW AES Kilroot Advancion® Energy Storage Array, a fully commercial project that provides balancing services for the All Island Single Electricity Market (SEM). We are using this investment, made ahead of market certainty, to expand our energy storage platform across the UK.

This response argues that:

- The benefits of a smart, flexible energy system to 'UK plc.' have been well identified in the document. What is now critical is the execution of a plan to catalyse a functioning market for

flexibility in the UK. The spring Roadmap must include a timetabled action plan, including interim indicators, which can be reported against on a quarterly basis. This clarity and transparency will enable investment decisions to be made according to risk appetite.

- The Roadmap should account for the UK's changing position within the EU and the impact on domestic energy policy and investment, ensuring alignment with evolving 'Winter Package' priorities. Removal of barriers to investment in energy storage is a 'no regrets' action during the Brexit negotiation period, sending a clear signal to foreign and domestic low carbon industry participants that the UK is open for business.
- Placing flexibility at the heart of the UK energy system supports the principle that the industry should deliver in the best interest of consumers. By unlocking the value of existing infrastructure and reducing whole system costs, energy storage in particular should benefit from a 'bias towards action' at a time of competing regulatory and policy priorities.
- The delivery of milestones in the Roadmap will be influenced by significant potential policy and regulatory changes, including to embedded benefits, co-location of storage with renewable generation, streamlining of balancing service procurement, and the 2019 Capacity Market review. The Roadmap should be sufficiently sound to ensure that investment decisions taken in the interim period are not penalised for early investment in the UK flexibility sector.

1. Have we identified and correctly assessed the main policy and regulatory barriers to the development of storage? Are there any additional barriers faced by industry?

The barriers identified in the document include the most substantial regulatory and policy barriers to the development of storage. We anticipate that the delivery and deployment of a clearly articulated programme to remove these barriers would be sufficient to catalyse a world-leading energy storage market.

Significant commercial barriers stemming from the complexity of the network services landscape, foremost among which are Balancing Services, remain an important barrier to industry deployment. We recognise that streamlining of these services is beyond the scope of the Call for Evidence, and are encouraged by recent communications by National Grid and some DNOs on progress to be made on this in 2017.

In order to drive forward the removal of the barriers identified in the document, AES would suggest that an overarching Vision for flexibility should be published, emphasising the benefits which barrier removal will bring to the UK to ensure the agenda remains a priority. This Vision should explicitly outline how the flexibility sector can be a key pillar in realising the UK's existing targets for a secure, affordable and sustainable energy system. For example, UK Government has clear legislative guidance in the form of the 5th Carbon Budget's 2030 power sector carbon intensity target of 100 gCO₂ / kWh which deploying storage as a peaking plant alternative can help to realise.

As recently occurred under the Arizona Corporation Commission (who rebuked state utilities for excluding storage from their Integrated Resource Plan), a failure to promote storage and other flexibility measures at the highest level can lead to a falling back on new investment in traditional, higher carbon, lower flexibility plant. The Arizona example explicitly calls out the negative impact on consumer prices of a low flexibility approach as it would,

“increase the risk of higher energy prices that have been historically unstable, but Arizonans would also be forced to pay the unnecessary costs for idled generation infrastructure used a fraction of the year”¹.

AES encourages the swift removal of the main policy and regulatory barriers identified in the document as well as an ambitious Vision for a whole system design which clearly sends investable price signals for the deployment of lower carbon, flexible assets.

2. Have we identified and correctly assessed the issues regarding network connections for storage? Have we identified the correct areas where more progress is required?

The document clearly articulates the drivers behind the current connection challenges, and the issues which must be addressed to move forward in the best interest of industry, investors and consumers. AES appreciates there is significant on-going work in this area and that consultation on the outcomes will take place beyond the Call for Evidence process.

We would however welcome in the Roadmap a clear articulation of how on-going and further work in this area ties in with the removal of other barriers to produce a joined up storage system. For example, will the issue of whether storage added to an existing connection should be treated as a material change to the original connection (Table 3, line 2) be settled in parallel with potential changes to the CfD contract and CfD regulations underway at BEIS to ensure imported electricity is not included in the meter readings used to calculate CfD payments? An investor in an existing CfD site would reasonably expect clarity on both barriers before moving forward. As unlocking the full utilisation of existing renewable assets - whether FiT, CfD or RO – is in the best interest of the consumers who have already invested in them, a joined up approach between network connections issues and other government policies is to be encouraged.

In addition to the actions which Ofgem can drive forward themselves, we would like to see the regulator strongly encourage a common approach between the DNOs whenever possible e.g. heat map development; calculation of benefit in using energy storage to delay or replace network connection upgrades; data sharing between National Grid and DNOs²; and queue management. The latter point in particular should be accelerated as there is wide support for storage projects ‘skipping the queue’ due to the advantages they can bring to the local network. However, this is only the case in credible projects with proven technology and a viable route to market which can demonstrably show that they will alleviate grid constraints. The appearance of 20GW+ of storage applications at DNO level in 2016 indicate that a binary queueing system for generation requests and storage requests, continuing to provide free connection offers, will not necessarily bring the potential value to the system.

3. Have we identified and correctly assessed the issues regarding storage and network charging?

AES commends Ofgem’s consultation with industry on this topic over the past 18 months, and is in agreement with the assessment of the issues pertaining to storage and network charging. We look forward to working with Ofgem on the “immediate” resolution of both the lack of guidance on treating storage as intermittent or non-intermittent, and on contracts for flexible connections.

¹ https://s3.amazonaws.com/dive_static/editorial/12-6-16+Docketed+Tobin+IRP+Letter.pdf

² AES’ response to National Grid’s October 2016 ‘Firm Frequency Response Review’ includes more information on the commercial sensitivity and intellectual property challenges of operational data sharing between networks.

We anticipate that concrete action on DUoS and TNUoS charges in particular will be easier when an agreed-upon storage definition and approach to licencing (see responses to Q5 and Q6 below) are announced, hopefully in the Roadmap. Several guiding factors for industry in the selection of energy storage facility locations- and associated costs and services each facility can offer to the system operator(s) - could be optimised which are currently the product of being treated as standard generation.

While AES agrees with the assessment of the additional storage issues pertaining to cost recovery and final consumption levies, we would strongly encourage as efficient an approach to the resolution of these issues as possible. During the Brexit negotiating period, the regulator should adopt a 'bias to action' on any issues which can be resolved without legislation or parliamentary process, as well as providing a timetable for industry with detail beyond the document's reference to "the longer-term" alignment of levy legislation and guidance.

Any improvements to the status quo which can be made ahead of legislation would improve the commercial case for storage and reduce the system costs ultimately passed on to the consumer. For example, in a September 2015 UKPN *Smarter Network Storage* report³, the operators of the 6 MW Leighton Buzzard facility recommend that the Climate Change Levy could be lifted for energy storage facilities through "Modifications to Climate Change Levy (General) Regulations 2001 (as amended) to alter the definition of end user consumption to exclude imports into electrical energy storage by the Treasury"⁴. The report notes that "This position was expressed in informal guidance from HMRC in the context of treatment under the CCL for the SNS project. If this position can be firmed up for CCL and extended to other installations, then this potential issue for storage assets can be avoided."⁵ AES supports the UKPN recommendation and would urge similar incremental improvements alongside the preparation of a full review of levy legislation.

This two stream approach would be particularly beneficial to UK plc during Brexit negotiations, as it is imperative that UK charging regulation keeps pace with, or goes beyond, European regulatory improvements, if the UK is to maintain its status as an attractive place to invest in energy storage.

AES therefore emphasises the importance of a simple and speedy process to remove discriminatory network charges and the uneven application of consumption levies, as these measures were explicitly committed to in the publication of the *EU Clean Energy for All Europeans* legislative proposals (formerly the *Winter Package*). Anything less than the same scope and timing of networking charging issues will damage the growth of the UK energy storage market.

Do you agree that flexible connection agreements could help to address issues regarding storage and network charging?

Yes, AES agrees that this approach could help to ensure storage's positive impact on system stability and network operator costs are reflected in connection offers. Ofgem's efforts to ensure that a common approach from DNOs to flexible connection agreements would be welcome in reducing locational uncertainty.

4. Do you agree with our assessment that network operators could use storage to support their networks?

³ [http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Smarter-Network-Storage-\(SNS\)/Project-Documents/Report+9.5+19Oct_v2.1_%28Final+Photos%29.pdf](http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Smarter-Network-Storage-(SNS)/Project-Documents/Report+9.5+19Oct_v2.1_%28Final+Photos%29.pdf)

⁴ Ibid page 9

⁵ Ibid page 46

AES strongly supports the usage of storage by network operators to support their networks. Every opportunity should be taken to expedite appropriate incentives for DNOs and the TSO to open competitive markets to storage.

Although we recognise that the provisions within the RIIO framework should enable network companies to procure and use services from storage providers, the lack of take up suggests that the current arrangements are not sufficient to address the National Infrastructure Commission's recommendation that "network owners should be incentivised by Ofgem to use storage (and other sources of flexibility) to improve the capacity and resilience of their networks as part of a more actively managed system". To enable this AES therefore believes that Ofgem should investigate amplified and additional incentives for network operators.

The importance of the competitive inclusion of energy storage in this field cannot be overstated. In National Grid's 2016 Future Energy Scenarios, they anticipate that the efficient management of distribution networks could account for up to 85% of new electricity storage capacity in the short to mid-term. This investment would likely come with reduced costs and planning opposition than the alternatives, so barriers perceived by DNOs, whether procedural or in mindset, should be proactively tackled in the near term.

Are there sufficient existing safeguards to enable the development of a competitive market for storage?

No. The absence of a fair and cost effective remuneration mechanism for flexibility providers for all of the services they can provide to a network operator is a significant competitive disadvantage for storage compared to conventional assets. The current lack of value attributed to critical network support services mean that the risk vs reward signals sent to investors are not catalysing the deployment of flexible assets.

Until price signals are based on technology neutral asset characteristics required by the system, there will be a competitive disadvantage for only partially remunerated flexible technologies. Alignment of competitive contracts to deliver a level playing field for storage and an improved whole system cost is required, and no safeguards exist to ensure network operators adopt such an approach. A more detailed response is provided on this issues in the document's section on 'Providing price signals for flexibility'.

Additionally, procurement models based on cost alone - without requirements for reliability guarantees, integrated system warranties in addition to component part warranties, fire safety standards, safety requirements for lithium ion batteries for stationary applications, cybersecurity provisions and other best practice components of a competitive regulated industry – fails to ensure that the quality required of storage providers in more established energy storage markets can be competitive in the UK networks.

Are there any circumstances in which network companies should own storage?

AES' nine years of fully commercial energy storage operating experience in various system operators' jurisdictions suggest that a market approach should be sufficient in achieving the desired flexible generation capacity on the distribution system, without a presumption of TO, DNO or DSO ownership weakening market entrance signals.

This outcome is predicated on the need for appropriate structures to be in place to facilitate affordable commercial investment, meaning that market design should prioritise a competitive ownership environment. A market structure which encourages the development of flexible capacity will

accelerate deployment of energy storage assets which can be deployed for multiple peaking, ancillary and distribution support services. By prioritising market solutions, these storage assets can be designed to optimise system stability and reduce costs through revenue stacking across unbundled asset lines – a higher value usage of technology than would not be possible under unbundling requirements through network operator ownership.

In AES' view, TOs, DNOs or future DSOs should only be able to acquire their own assets, perhaps through a derogation from the regulator, if the market fails to provide competitive services, necessitating system operator ownership. It is imperative that this only occurs after meaningful attempts to procure a competitive solution. This will necessitate the creation of a market which is based upon:

- Financeable contracts with a contract length suitable to sufficiently de-risk a merchant project and enable an appropriate cost of capital. In order to avoid a long merchant payback period beyond the contract life, we would suggest seven years as an appropriate contract length. This would balance the need to procure assets at the current best available price with declining forecast cost curves. Shorter contracts are possible but they materially raise the risk and therefore cost of capital, which is passed on to consumers;
- Capital investment in traditional network assets with high upfront costs and 30-40 year pay back times are increasingly difficult as economic development patterns and technology innovations can make projections used to place new network infrastructure inaccurate. A mandatory value comparison requirement should be introduced so that network operators must demonstrate the investigation and assessment of options for new energy solutions to provide alternatives to distribution network upgrades and/or construction. This takes place already in several US system operators and would increase transparency around whether best value decisions were taken for consumers.
- More meaningful uptake of the shift to totex (total expenditure) enabled by the RIIO framework, to encourage value driven procurement regardless of impact on capital replacement and asset base. This would create a level playing field for the procurement of distribution support services from storage market participants rather than traditional SO construction and ownership models.

Draft ownership proposals in the Winter Package similarly stipulate that DNOs should not own and operate storage assets unless a detailed assessment has been carried out because no commercial offerings are available in a particular location. AES recognises that this may be the case in certain areas of the UK, particularly islands and far end of the line communities, but regulations should be built to allow these instances as the exception, not the rule.

5. Do you agree with our assessment of the regulatory approaches available to provide greater clarity for storage? Please provide evidence to support your views, including any alternative regulatory approaches that you believe we should consider, and your views on how the capacity of a storage installation should be assessed for planning purposes.

Licensing

The four licensing options outlined in the document are comprehensive, and AES is heartened by the confirmation that “These approaches are not mutually exclusive, and some could be pursued in parallel”. We recognise that a separate asset class for storage would overcome any or all of the identified asset class issues, and that many industry participants are amenable to the pursuit of a separate asset class in the long term. AES has no objection to this longer-term goal, providing that

clarification of an interim solution is not stymied. In this regard, we would support proposed option (b) as a preferred interim arrangement whilst pursuing option (c) as a preferred long term aspiration.

However, we would also note that AES has nine years of fully commercial energy storage operating experience in the USA, where there is no storage asset class. Under FERC rules storage facilities are licenced according to the function(s) they carry out, potentially holding multiple licences for generation, transmission/distribution and consumption. The colloquially termed ‘Forrest Gump’ rule – it is what it does – allows storage to sit anywhere on the system. In late 2016 FERC proposed a rule change⁶ to strengthen that flexibility without introducing an asset class:

“Specifically, we propose to require each RTO and ISO to revise its tariff to (1) establish a participation model consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, accommodates their participation in the organized wholesale electric markets”

Ultimately what is of most importance is that BEIS and Ofgem should clarify the characteristics that an asset should deliver to the system in each asset class, and the role they expect storage to play in networks and systems which optimise those characteristics. A separate asset class is one of the ways to send investable entrance signals for storage technologies which bring greater value to consumers. Alternatively, a clear iteration of how UK storage could simultaneously participate across the three existing asset classes, perhaps under a modified licence or licence exemption, would reflect the approach which has brought success in the USA.

Planning

We appreciate the document’s overview of the rationale for the current lack of clarity around storage in the UK planning systems, and the intention to work across government departments and with the devolved administrations to provide greater clarity in the planning process on storage. We suggest that a roundtable with those stakeholders and energy storage developers with experience of applying for planning permission for storage projects across the UK would be a valuable exercise.

A predictable approach across the country is required, as currently planning officials do not have clear guidance to inform their response to storage planning applications. AES’ experience of the issues requiring clarification include but are not limited to:

- Siting and design;
- Awareness of the Planning Inspectorate’s advice that battery energy storage does not qualify as Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 (subject to case law);
- Assessment of Potential Environmental Effects and the EIA Regulations;
- Appropriate weighting of the policy support for an energy storage proposal without any mention of the technology in National Planning Policy Framework (NPPF) or meaningful mention in National Policy Statement EN-1;
- Lack of inclusion of energy storage at local authority Development Plan level, with particular implications relating to proposed development in the countryside or Greenbelt (which is likely to be the locations with close proximity to network connection infrastructure);
- Safety requirements and technology standards.

⁶ <https://www.ferc.gov/whats-new/comm-meet/2016/111716/E-1.pdf>

The latter point is of particular urgency in setting expectations for the industry. A purely cost-based approach to competitive processes, including the EFR tender, does not provide sufficient guarantees about the viability of safety measures in the absence of UK standards. Although we welcome recent initiatives led by the BSI and Institute of Engineering & Technology to establish standards, there is a need for rigorous minimum health and safety standards to be applied universally for procurement and planning purposes.

6. Do you agree with any of the proposed definitions of storage? If applicable, how would you amend any of these definitions?

AES encourages the immediate publication of a universal definition of electricity storage, with that definition enshrined in new legislation and licence provisions as soon as possible, as well as replaced in existing legislation when appropriate. This will help to realise the value of energy storage by bringing clarity for industry participants and investors, as well as stakeholders with decision making powers on individual developments including local and national planning authorities and network operators.

A universal definition will also send a positive market entrance signal to storage developers and investors as the current potential for misaligned contractual definitions when combining revenue streams across services and asset classes will be removed. This will help to remove the barrier to revenue stacking.

It is critical that this universal definition should not describe storage as a form of generation otherwise the UK will face unintended consequences when deploying storage technologies to bring value in the transmission and distribution networks. It is possible to define a storage system with regard to electricity which was “generated at one time for use at a later time” without restricting storage to a sub-set of the generation asset class, as achieved by the California Bill on energy storage⁷. Storage can then be deployed across the energy value chain at any asset size.

For this reason, AES strongly disagrees with part (b) of the existing Capacity Market definition, “a generating unit which is wholly or mainly used to re-convert the stored energy into electrical energy.” We would therefore request that the existing CM definition is not extended to be the universal definition, and would prefer to see its replacement in the CM legislation with a new definition as part of the upcoming CM review.

AES, in consensus with the energy storage industry, believes that the Electricity Storage Network (ESN) definition is appropriate and agrees with its usage as the universal definition without amendment.

11. What types of enablers do you think could make accessing flexibility, and seeing a benefit from offering it, easier in future?

12. If you are a potential or existing provider of flexibility could you provide evidence on the extent to which you are currently able to access and combine different revenue streams? Where do you see the most attractive opportunities for combining revenues and what do you see as the main barriers preventing you from doing so?

There is widespread agreement that the failure to correctly assign commercial value to flexibility is the most significant barrier to the deployment of storage in GB. We appreciate the document’s iteration of the requirement for “institutional, governance and market arrangements which enable

⁷ California Assembly Bill 2514 Energy Storage Systems - Chapter 7.7 – 2835,
http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=200920100AB2514

solutions to compete based on their value to the whole system” as the current arrangements do not send sufficiently investable price signals in support of the policies which would most benefit UK plc.

We are aware of near term efforts by National Grid and DNOs to promote ‘system value pricing’, perhaps in the creation of blended contracts for various system services which could be competitively bid for by flexibility providers. This streamlining approach would be a positive step, offering network operators access to assets which they could deploy to provide various service characteristics in order to optimise their network at any one time. For example, an energy storage array could be alternately or simultaneously deployed by the network to provide services currently termed EFR, FFR and STOR.

If this blended service procurement approach is chosen, it is imperative that this intention is shared with industry as soon as possible, as significant investment decisions are being made now related to sizing and duration of systems. For example, the winner of an EFR or CM contract is currently only required to deploy a 30 minute energy storage system in order to meet the terms of their existing contracts. However, the commercial viability of a storage asset of 30 minutes duration could be compromised if future blended services require a longer duration. Those investors who provided early benefits to the system may find it difficult to recontract part or all of an energy storage array in which they have invested. AES believes there needs to be a wider industry discussion about the cost and value benefits of different durations, but that investment decisions taken in good faith now should not be retrospectively compromised.

As an alternative or addition to blended service contracts, network operators and other stakeholders could ensure that contracts which remain separate are able to be aligned. Presently, the contractual obligations for services which are technologically stackable preclude that value creation, because the terms contradict each other. Henceforth, contracts should recognise the additional capabilities of storage compared to traditional generation and allow multiple service contracts which do not impact upon the deliverability of each service. Moreover, a nuanced approach to the overall value to the system of contracts which do allow temporary cessation of one service provision to deploy another (e.g. a temporary exemption from CM delivery when called upon for an infrequent but critical locational support service). This would avoid overbuilding the system at unnecessary cost to consumers, by optimising storage assets for the most valuable service at any one time.

Prioritisation in such an instance would be supported by a common framework to quantify flexibility consistently and the system value benefits each service or characteristic brings. Appropriate system value pricing based on this service characteristic led approach would be preferable over a focus on individual technologies. An example of this approach can be found in PJM’s ‘Pay for Performance’ mechanism which lowers the overall cost of frequency regulation by paying a premium to the most accurate responders – largely battery energy storage arrays but not restricted to the technology – thereby allowing the overall quantity of regulation reserve to be lowered. We would also encourage consideration of the All Island of Ireland’s electricity system’s draft DS3 programme, which is working to examine which services the system needs to procure, in which quantities and will aim to price the benefits accordingly, in line with the requirements under the draft EU Balancing Code. The DS3’s transparent approach to future needs – outlining eleven balancing and ancillary services with separately allocated funding and separate auctions to be run for each service – will allow investors to more accurately forecast future market opportunities, thus de-risking investments and lowering the ultimate cost for consumers.

In the very near term BEIS and Ofgem should provide clarity about the existing arrangements for stacking revenue streams from the Capacity Market alongside Balancing Services, as there are

various industry interpretations of the rules. This uncertainty is having an impact on the clarification of other barriers, and should be tackled in a proactive manner by the regulator and governments' legal advisors.

26. What changes to CM application/verification processes could reduce barriers to flexibility in the near term, and what longer term evolutions within/alongside the CM might be needed to enable newer forms of flexibility (such as storage and DSR) to contribute in light of future smart system developments?

Clarifications in the near term and reforms following the 2019 CM review are needed to meet the National Infrastructure Commission's "clear goal [...] to ensure that demand flexibility participates fully in the main Capacity Market". These include but are not limited to:

the Capacity Market to better enable storage to participate, as follows:

- Clarifying the immediate potential for stacking revenues and outlining how unfavourable restrictions on stacking will be overcome, through a review of the CM against the goals of the flexibility and decarbonisation agendas;
- Confirming that the testing regime requires the delivery of full generation for 'a settlement period' three times, and not 'at least a settlement period'. The inclusion of the term 'at least' has caused investor concern that an energy storage array may be penalised for failing to generate for more than the settlement period of 30 minutes. If this is not the intention, it should be clearly stipulated as this small change would partially de-risk projects by giving comfort that the sizing and duration decisions were appropriate ahead of financing;
- A review of the appropriate minimum duration length of CM assets and/or the number of settlement periods which a CM participant should be able to provide during a system stress event. We are aware that Ofgem has received multiple rule change requests regarding duration and energy storage in the CM, and would request these are holistically addressed;
- A review of how the CM's technology neutrality principle can continue with due regard to the UK's climate commitments;