REA Members Discussion

Long Duration Energy Storage Support Mechanisms

Date: 6 February 2024

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Agenda and Meeting Purpose

- Policy Objectives
- Policy Options
- Electricity Storage definition and Eligibility
- Duration and Efficiency
- Routes to application
- System benefits
- Setting cap and floor levels
- Contract length and Delivery
- Scheme funding
- Other design features

Purpose:

Discuss the recent release of the DESNZ's consultation on Long Duration Energy Storage Support Mechanisms, ahead of the REA drafting a response to the consultation by the closing date of 5 March 2024

Policy Objectives

Government response to August 2022 Call for Evidence on LDES, found the following barriers to Deployment:

- High upfront capital costs;
- Long build times;
- Lack of a track record of the technologies (many are First-Of-A-Kind (FOAK));
- Lack of revenue certainty;
- Lack of market signals.

As a result, the consultation has sought to overcome these barriers with **key policy objectives**:

Policy Alignment – Policy framework should complement wider energy policy, to deliver net zero and energy secure system.
Reduce System Costs - Policy framework should ensure that consumers are protected from needless costs rooted from high operational costs throughout the lifetime of the project.
Enable Investment - Policy framework should facilitate investment in large-scale LDES by reducing insecurity in revenue projections.
System Benefits - Storage projects should be encouraged to respond to market signals and behave flexibly
Delivery - Policy framework should deliver projects in a timeframe beneficial to the system

Consultation Questions

1. **Do you agree with the policy objectives that have been identified? Please explain your reasoning.**

2. **Are there other factors we should consider in our policy objectives?**

3. **Will these policy objectives help to bring forward LDES projects to help the electricity system reach net zero in the most effective way? If so, why?**

Policy Options

The options provided are **'Do minimal'**; **'Extended delivery year in the Capacity Market'** & the, **'Cap and floor regime'**. The minimal option is only considered as a baseline and options presented were those that satisfied the policy objectives set out.

Capacity Market (CM)

CM ensures electricity supply by a paying for reliable sources of capacity. This payment could potentially be used as a revenue source for further investment in LDES. The previously consulted on additional longstop date and the longer contracts from CM could attract investment as there is more revenue certainty but the CM is unlikely to offer the required revenues needed to increase and encourage private investment in developed LDES technologies due to the high upfront capital costs. ***This option was therefore discounted***.

Cap and floor regime - Recommended

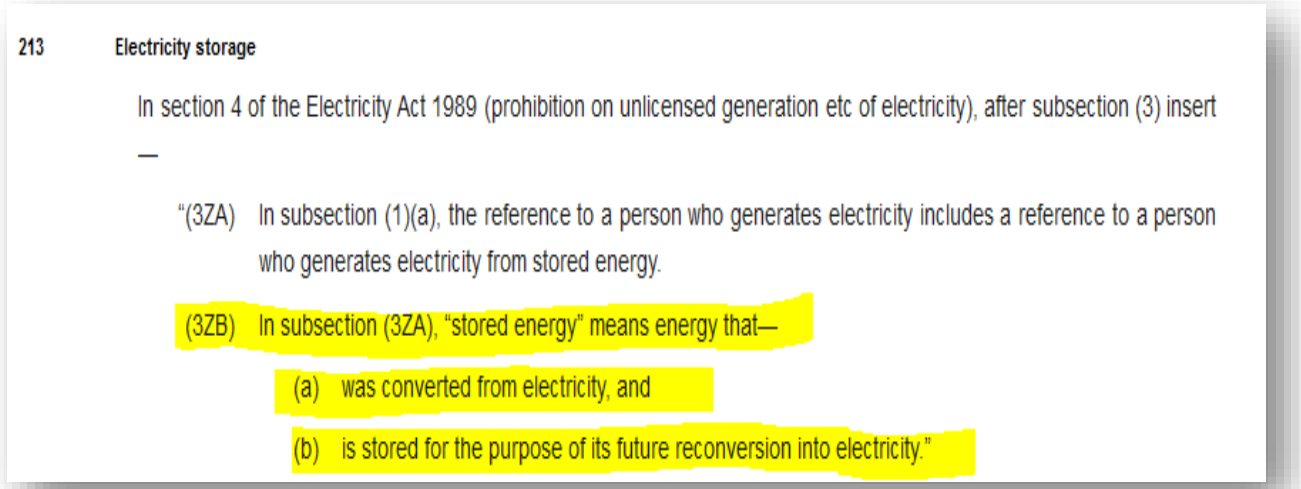
A cap and floor regime, like the one for interconnectors, could be implemented to provide revenue guarantee for investors and provide debt security and a regulated limit on revenues. It is also expected to reduce the Weighted Average Cost of Capital (WACC) for LDES projects by reducing the overall investment risk and invite more investment into the development of LDES technologies.

4. Do you agree with our assessment that a cap and floor is the most appropriate policy option to enable investment and bring forward the required LDES? Please explain your reasoning.

Eligibility 1: Electricity Storage Definition

The LDES scheme will only apply to technologies that fulfil the Energy Act electricity storage definition so: **Stored energy that was converted from electricity and is stored for the purpose of its future reconversion into electricity.**

This will mean that some technologies such as ***thermal storage*** which do not convert the stored energy back into electricity would not be eligible.



213 Electricity storage

In section 4 of the Electricity Act 1989 (prohibition on unlicensed generation etc of electricity), after subsection (3) insert —

"(3ZA) In subsection (1)(a), the reference to a person who generates electricity includes a reference to a person who generates electricity from stored energy.

(3ZB) In subsection (3ZA), "stored energy" means energy that—

(a) was converted from electricity, and

(b) is stored for the purpose of its future reconversion into electricity."

Energy Act 2023

Additionally:

- Must be a technology that is ***feasible but is not currently able to be built under existing market arrangements***. This would exclude lithium-ion battery storage, which the consultation argues already has a significant pipeline for deployment.

- ***Must not receive other government support mechanisms*** (such as business models for Hydrogen).

Consultation Questions

7. Do you agree that only those technologies that meet the electricity storage definition should be eligible for an LDES scheme?

8. Do you agree that it is appropriate to exclude technologies that can already be funded under existing market arrangements and/or those that would be eligible for multiple business model support?

Eligibility 2: Duration and Efficiency

In the CfE in 2021 government sought views on defining long duration storage as 4 hours but over 80% of respondents rejected this claim, suggesting duration should be longer.

Furthermore, LCP Delta and Regen analysis have found that longer duration is more suited to manage prolonged energy shortfalls and excess, and that high efficiency is the next most desired characteristic in providing greater system benefits.

Table 1 – Duration and cycle efficiency characteristics for different LDES technologies, obtained from LDES developers

Storage technology	Storage duration[33]	Efficiency (%)
Pumped hydro storage	4 hours to multiday	78 - 85
Compressed air energy storage	4 - 8 hours	55 - 60
Liquid air energy storage	12 - 16 hours	55
Flow batteries	4 - 20 hours	76 - 96

Hence, it is proposed that to be eligible for the LDES scheme, technologies should have a duration of at least **6 hours** at a particular capacity, and consultation welcomes stakeholder views on whether setting a **minimum efficiency?**

Routes to application

For novel LDES technologies not yet proven at an appropriate scale, lack of track record could mean its harder to secure required funding compared to more established LDES technologies.

Govt. propose two distinct routes to applying for the LDES support. This will allow both novel and established technologies to receive required investment despite disparities in investment risks.

More established technologies will have to have to have a technology readiness level (TRL) of 9, so be considered a ‘marketable product’ whilst novel technologies will be required to have a TRL of 8, which means it has been successfully deployed in a demonstration phase and is a ‘Production Prototype or a saleable Beta product’.

- **Stream 1:** Established technologies with a Technology Readiness Level (TRL) of 9, a supply duration of at least 6 hours at a minimum capacity of 100MW. (For example, but not exclusive to, pumped hydro storage and liquid air electricity storage)

- **Stream 2:** Novel technologies with a TRL of 8, a supply duration of at least 6 hours at a minimum capacity of 50MW. (For example, but not exclusive to, compressed air electricity storage (CAES) and flow batteries)

Potential Pre-qualification Criteria:

- Confirmed financial position,
- grid agreement,
- land/lease ownership,
- planning permission,
- environmental permits,
- electricity generation licence

Consultation Questions

9. Do you agree with our proposal for a minimum duration of 6 hours? If not, please provide a rationale.

10. Do you believe we should be setting a minimum efficiency criterion? Please provide your reasoning.

11. Do you agree with the proposed approach to splitting the streams by TRL level? Please provide your reasoning. If not, please suggest an alternative approach.

12. Do you agree with the different capacity minima set out for the streams? Please provide your reasoning.

30 - 32. Do you agree that the proposed pre-qualification criteria are reasonable for both streams? Please provide your reasoning. How would these effect applications?

Eligibility 3: System benefits

The consultation considers it to be important that each LDES project seeking to benefit from the cap and floor mechanism is **required** to demonstrate a benefit case to the wider electricity system..

Ofgem's interconnector cap and floor scheme requires an independent analysis of the benefits that each project would provide to the system at the proposed connection location carried out by an external consultant on behalf of Ofgem, with input from the National Grid Electricity System Operator (NGESO).

The ideal would be for the LDES scheme to have a similar assessment requirement. This may be used to determine which LDES projects should be prioritised.

<u>According to the consultation benefits offered to the system could include:</u>

- Ancillary services;
- Location based benefits;
- System costs;
- Consumer benefits;
- Local economy benefits;
- Constraint management;
- Energy security.

Consultation Questions

13. Do you agree that the identified wider system benefits should be considered when assessing a project?

14. Would an approach similar to that of the interconnector scheme be appropriate? if not what alternative would you suggest?

15. Are there any wider economic and societal benefits that have not been identified that LDES projects could provide that we should include in the criteria?

Setting cap and floor levels

In setting the cap and floor mechanism for LDES it is considered that it should have the following parameters:

- The **floor level** should be set such that a project can **recover its debt-related costs** to provide certainty to investors that debts will be serviced.
- The **cap** should be set at a level that **incentivises the asset to continue operating to maximise the available storage** in the future energy system and to gain a fair return on its equity investment, whilst protecting consumers from excessive cost.

Similar to interconnectors, it is proposed that the cap and floor is applied to **gross margins rather than pure revenue**. This is seen as simpler and more transparent then basing it on total revenue given market volatilities. The consultation also considers whether any revenue from the CM that a project may receive may need to be accounted for, and stakeholder views on approach to this are welcome.

Gross margins would be defined as the ***difference between revenues earned from dispatching energy and services of the asset and the costs of buying the energy to charge the asset.***

Consultation Questions

16. Do you agree with allowing recovery of debt via the floor and recovery of equity via the cap? Please provide your reasoning.

17. What costs should be eligible for inclusion in the cap and floor reconciliation calculations?

18. How do we design the thresholds to be at the appropriate level to balance investment certainty with potential consumer exposure to additional support costs?

19. Should we require projects to outline how they intend to operationalise the asset to exceed the floor?

20. Do you agree using annual gross margin is a suitable approach to setting the cap and floor thresholds? If not, what alternative would you suggest?

28. Do you agree that cap and floor recipients should also be able to participate in other electricity markets, such as the CM? Please provide reasoning

29. To what extent could finance be needed from UK Infrastructure Bank or elsewhere, alongside the cap and floor scheme, to help address barriers to investment in LDES?

Setting cap and floor levels – Operational risks

There is concerns that the Cap and Floor could lead to dispatch distortions::

- Cap Distortion: assets may not be incentivised to operate above a certain extent as they would surpass the cap threshold and would therefore make reduced gains.
- Floor Distortions: assets will not look to operate where they would surpass the floor threshold and keep revenues below the floor because the guaranteed returns from is floor is too generous.

Possible Floor distortion mitigations

- Setting the floor at the cost of debt, the return on equity is only achieved once the asset is generating returns above the floor level.
- Introducing a longer period (potentially multi-year) to review gross margin, which equally allow assets to transfer revenues between years to smooth out periods above/below cap.
- Setting availability or performance requirements that could withhold floor payments or deduct from other periods above the floor if agreed performance expectations are not met.

Possible Cap distortion mitigations

- Introducing a longer period (multi-year) to review gross margin revenues, allowing the asset to transfer revenues between years to smooth out periods above/below cap.
- Setting soft-caps to return gross margin to asset on sliding scale, where returns are gradually increased to the consumer rather than a cliff-edge point where all returns are immediately removed from the asset operator.
- Setting availability or performance requirements that could penalise the operator if agreed performance expectations are not met

Consultation Questions

21. What performance incentive could be used to encourage full operation of assets to prevent dispatch distortions around the cap?

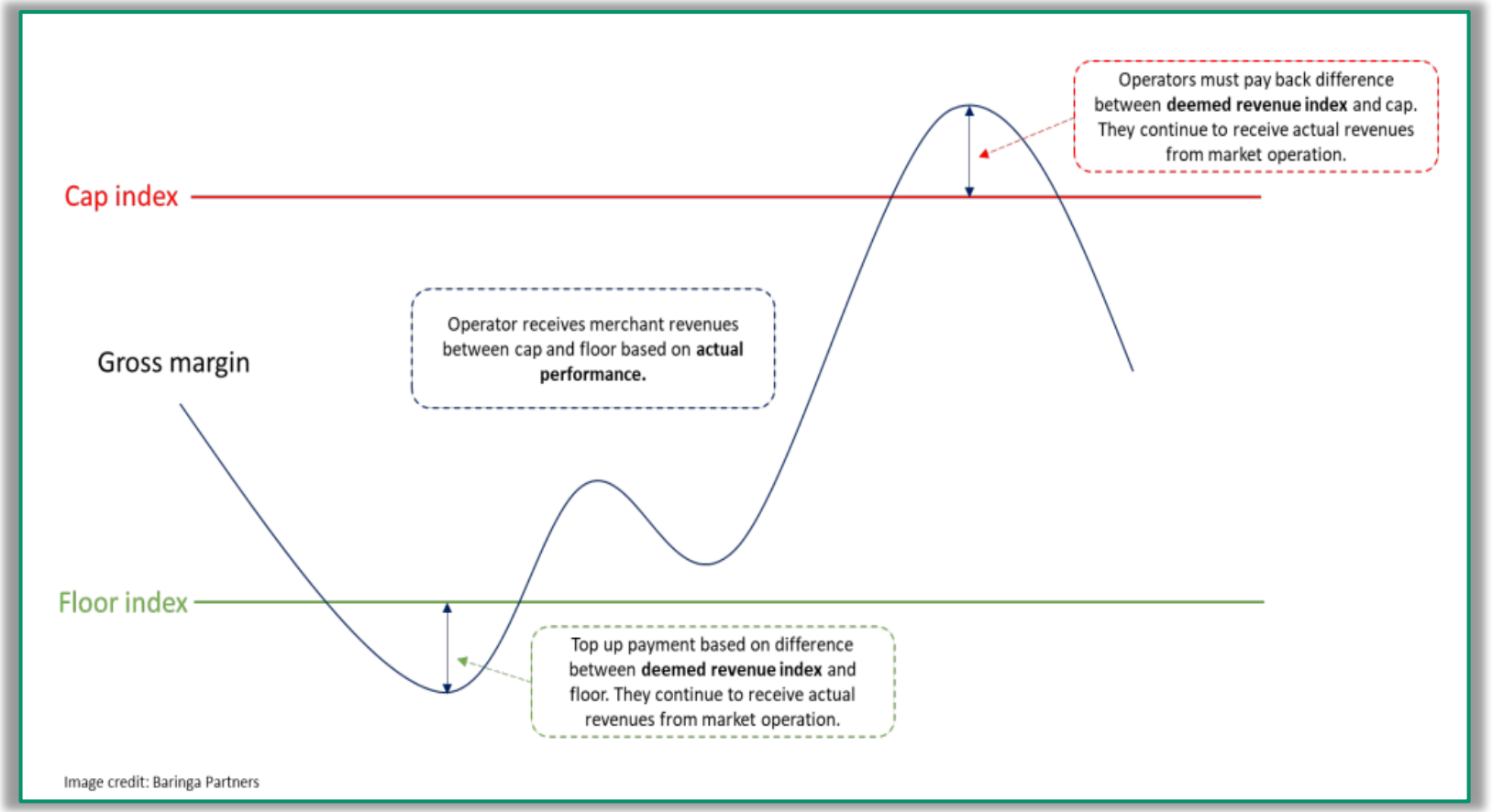
22. What performance incentive could be used to encourage full operation of assets to prevent dispatch distortions relating around the floor?

23. Do you agree with our proposed mitigations, or would you recommend others?

Setting cap and floor levels – Gaming risks

There are concerns that with the help of third parties, asset operators could **'game'** the cap and floor mechanism for financial gain.

For example, an asset operator could sell electricity cheaply at below market rate to ensure its revenues are below the floor, as they will receive top up payments either way. The downstream supplier that they sell the electricity to, could then make additional profit from having sourced electricity cheaply but still selling at the higher market prices, and If the downstream supplier is integrated with the asset operator, it could result in an overall benefit for the umbrella company at the expense of the tax payer.



Setting cap and floor levels – Gaming risks

The proposed possible mitigations against gaming

- Introducing **transparency requirements** to allow easier view of potential gaming. This could require assets to retain data on contracts for how the asset is operated, and how electricity is bought/sold.

- **Banning vertically integrated offtake and supply agreements within an umbrella company**. But this may result in extra cost if the storage asset needs a third party to optimise the charging/discharging operations.

- Developing a **deemed revenue index** to approximate market behaviour of the asset whether it is a **simple or sophisticated index**. This would then be used as the basis for cap and floor payments.

  - **A simple index**: based on the average spread between the highest [x] hours and lowest [y] hours x capacity. However, this would not capture the breadth of revenue opportunities available to the asset, undermining its accuracy.
  - **A more sophisticated index**: based on the simple index plus an index of revenues in other markets such as the capacity market and balancing services.

There could be a mechanism for developers to set out their proposed deemed revenue index that is evaluated as part of the application and contracting process.

Consultation Questions

24. Have we identified relevant operational risks associated with creating an LDES investment scheme?

25. Are our proposed mitigations sufficient for mitigating against the operational risks, like gaming? Please provide your reasoning.

Contract length and Delivery

Instead of setting a definitive contract length, the consultation proposes that contract length will be based on the project lifetime before refurbishment. This should provide flexibility given the different types of LDES technologies that could apply.

The consultation explores 2 different contract routes:

Option 1 – delivered via conditions in electrical generation licences issued by Ofgem.
Option 2 – delivered via government, like the CfD or CCUS business models.

Benefits & Drawbacks of **option 1**

Ofgem have experience administering the cap and floor mechanism like they have done with interconnectors and hold the powers to administer it quickly, but this may introduce complexity in coordinating between different support schemes in REMA, CCUS and hydrogen to power.

Benefits & Drawbacks of **option 2**

This option provides easier policy co-ordination between REMA, hydrogen, CCUS and other flexibility teams over the longer term, but DESNZ currently lacks experience in administering a cap and floor model so additional DESNZ resources would be required to deliver the scheme and more co-ordination between delivery bodies, possibly adding complications to the delivery of the scheme

Consultation Questions

27. Do you agree that length of a cap and floor contract should be based on the project length?

38. What are the important factors for deciding who is the appropriate body to bring forward this scheme?

39. Would either of the delivery routes set out affect the investment case for LDES projects?

40. Are there any additional benefits or risks to a delivery route that has not been identified?

Scheme Funding

The consultation notes that the options chosen will have an impact on how the scheme is funded. If Option 1, this could be done through the transmission network use of system charges. If Option 2, this would likely be through a supplier obligation levy.

Transmission network use of system charge – Linked to option 1

Ofgem's cap and floor scheme for interconnectors is paid for through the Transmission Network Use of System (TNUoS) charges and this is likely how it would fund the cap and floor mechanism for LDES. If a project falls below the floor level, revenue will be topped up through the TNUoS charges process and if the projects revenues go above the cap, projects must transfer the amount back to the consumer through TNUoS charges.

Supplier obligation levy – Linked to option 2

The supplier obligation levy is a mandatory levy on energy suppliers to pay for the CfD scheme. It is also how generators return money when the reference price surpasses the strike price. This supplier obligation levy would be collected by the LCCC who manage the CfD scheme. The levy is calculated per quarter and LCCC sets and notifies suppliers three months before the start of the quarter of their interim levy. Suppliers prepay against this interim levy and at the end of each quarter a reconciliation of these interim levys and the supplier's CfD liabilities take place. Reconciliation payments take place 90 days after this process.

Consultation Questions

41. Do you believe TNUoS charges should be used if the scheme is administered by Ofgem (option 1)? If not, please provide your reasoning and/or an alternate method.

42. Do you believe a supplier obligation levy should be used if the scheme is administered using a CfD style approach (option 2)? If not, please provide your reasoning and/or an alternate method.

Additional Factors

Review periods: LDES cap and floor regime may need review periods to assess if gross margin achieved by the developer has breached either the cap and/or floor thresholds. We suggest that multi-year periods allows the smoothing out of returns over longer periods.

33. What time length would you recommend for conducting reviews of cap/floor threshold (e, g, annual or multi-year)?

Exceptional events: LDES cap and floor scheme should take into account and be adjusted for force majeure and exceptional events.

34. Do you agree that exceptional event should be considered as part of the review of cap/floor? Please provide your reasoning

Proving period: a period at the start of the cap and floor scheme by the end of which the project meets certain criteria to demonstrate commitment, progression and its possible performance.

35. What criteria could a proving period for LDES be based on?

Regime start and commissioning date: If this target is missed by over 12 months, the duration of the delay period will be deducted from the support period.

36. Do you agree that target start dates should be set? If not, please explain why.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Thank you

Mark Sommerfeld
Deputy Director of Policy
msommerfeld@r-e-a.net

Samuel Adekanle
Policy Analyst – Grid & Networks
sadekanle@r-e-a.net

Frank Gordon
Director of Policy
fgordon@r-e-a.net