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Selection of LDES projects for Window 1 Cap and Floor regime

Dear [REDACTED]

SSE Renewables support the use of a Multicriteria Assessment (MCA) approach for evaluating LDES projects in the round as it is designed to inform Ofgem's decision-making and judgement while avoiding overly mechanistic outcomes. In this response we set out the areas where clarifications and improvements would strengthen the framework in our view.

Splitting LDES target into indicative targets for different technologies

We encourage Ofgem to split the LDES target into separate categories with indicative targets for different LDES technologies with distinct operational and technical characteristics, different risk profiles, durations and lead times. We believe separating targets for lithium-ion battery storage, Liquid Air Energy Storage (LAES) / Compressed Air Energy Storage (CAES) and Pumped Storage Hydro (PSH) can offer a practical way forward for Ofgem to focus on delivering Cap and Floor contracts to the most mature and best value projects in each technology group in parallel.

While Ofgem's Technical Decision Document referenced NESO's analysis suggesting the security of supply and operability benefits of LDES duration over 8 hours are limited, LCP Delta's analysis commissioned by DESNZ showed reduced system costs, increased consumer benefits and emissions reduction from longer LDES durations, with durations of 16-32 hours considered 'optimal' due to having the largest impact. We would strongly encourage Ofgem to attach weight to LCP findings and set separate targets for PSH to retain the focus on delivery of electricity storage with duration over 8 hours. Splitting the target offers a hedge by retaining strategic focus on delivery of large-scale PSH projects which uniquely offer storage duration in excess of 8 hours and a wide range of valuable system services. We need focus on delivery of an appropriate level of lithium-ion storage, *and* we need focus on delivery of PSH for 2033 and beyond. Not splitting the target risks delaying Ofgem's decision making due to a surplus of applicants, putting at risk clean power policy targets.

When splitting LDES into categories, we also encourage Ofgem to give meaningful weight to the broader economic benefits of technologies with a significant local content, such as PSH. PSH

offers significant long-term value through job creation, regional economic growth, and the development of local supply chains. Scottish Renewables and BigGAR Economics analysis¹ has found that PSH projects under development will create 15,000 jobs and generate up to £5.8 billion for the UK economy by 2035. Moreover, PSH assets have a multi-generational lifespan, providing enduring system value and strategic flexibility for decades to come.

If the LDES target is not split, there should be a legitimate expectation that PSH projects sufficiently contribute to the overall LDES target to ensure that socio-economic and strategic benefits of this technology are delivered.

Appropriate Emphasis on Economic and Strategic Assessment

We support an assessment approach which recognises that it is acceptable for a project to have a lower financial ranking when showing a significant economic and strategic value. We strongly encourage Ofgem not to put undue weight on cheapest bids and financial ranking but adopt a value for money approach by recognising that the socio-economic and strategic value delivered by specific LDES projects should outweigh higher bids reflective of these projects' risk profiles and technical and operational characteristics. In a cost benefit analysis, it is the net position of benefits against the costs that is of interest and that fundamental logic should not be lost with an MCA approach.

Economic and Strategic Assessments represent a project's long-term value and contribution to consumer and system needs and must be given due weight in Ofgem's assessment. This is particularly important given that the Financial Assessment is unlikely to reflect fully the broader system value of the project, when long-term ancillary services of benefit to the system cannot reliably be included in the business case. Benefits and the full value of ancillary services that PSH can provide should be fully recognised, be it through monetised or non-monetised benefits in the assessment. At present, there is tangible evidence available of NESO procuring ancillary services, including inertia, at significant cost to consumers. The most recent pathfinder round for delivery 2025 -2035 NESO procured 17 GVA.S of inertia from the market at a cost of £1.9bn.² Coire Glas can provide 8GVA.S of inertia to the GB system accounting for ~7% of the current minimum needs. NESO and Ofgem cannot ignore this and must find a way of attributing the value to PSH. Where these benefits are not monetised, we strongly encourage Ofgem to give these benefits a sufficient weighting in the economic assessment or, if relevant to wider policy goals, in the strategic assessment. While there may be several projects able to contribute to system needs, large-scale PSH projects, such as Coire Glas, will have unparalleled operational, technical and storage duration capabilities, which must be fully recognised in the assessment process.

Finally, further clarity is needed on how the ranking adjustment would be made objectively to reflect differences in the level of non-monetised benefits between the projects. We understand the

¹ [Economic Impact of Pumped Storage Hydro in the UK \(May 2023\)](#)

² [ESO announces new contracts to deliver over £14 billion in savings | National Energy System Operator](#)

need to not be overly mechanistic at this stage but request that Ofgem clearly sets out its approach in this area.

Current modelling approach disadvantages larger scale projects

Separately, our view is that the proposed marginal additional (MA) approach disadvantages larger projects with later delivery dates. Such projects are penalised due to the assumption that the market is more saturated and, therefore, adding large project capacity has a diminished marginal value. Larger projects would be more likely to displace other capacity than smaller projects and, therefore, the lack of optimisation in the proposed approach further penalises larger projects with later delivery dates. We recommend adjusting the factual to achieve the same total LDES capacity inclusive of the candidate project and using a combination of the First Additional and Marginal Additional approaches.

Larger projects scheduled for later delivery under Track 2 risk being evaluated under the assumption that Track 1 projects will succeed, a counterfactual that could lead to flawed assessments. In our view, this creates a significant risk of error, particularly given Ofgem's current approach to awarding LDES Cap and Floor Window 1 contracts, which may inadvertently encourage a winner's curse for at least two key reasons:

- a. The eligibility criteria for Track 1 projects (delivery by 2030) does not require evidence of planning approval whereas Track 2 projects (delivery by 2033) do. This creates a perverse incentive for less mature projects, those without planning approval, to position themselves as Track 1 candidates by claiming they can meet the 2030 deadline. In reality, no new PSH project is likely to achieve this, and other technologies may also face delays due to the lengthy planning consent process; and
- b. Ofgem's focus on competitive bids for the floor means the projects with least mature cost forecasts will show up better in the financial assessment because they are still subject to typical early-stage optimism bias prior to extensive engagement with the supply chain.

We would urge that Track 2 projects are appraised at the same time as Track 1 and that the counterfactuals are identical between the two tracks. Successful Track 1 projects should not be assumed in the counterfactual to Track 2.

We also have significant concerns regarding the limited modelling horizon, particularly for long-lived infrastructure projects such as Coire Glas. A short-term view risks undervaluing the enduring system benefits these assets provide. The economic lifetime of PSH projects extends well beyond the 25-year regime duration with significant components of the asset with a technical lifetime in excess of 100 years the value of which should be recognised in the project assessment. Given a multi-generational lifespan of PSH assets, compared to a limited lifespan of imported lithium-ion storage, Ofgem must be clear on the long-term value proposition of each technology and ensure that the Cap and Floor assessment approach delivers the assets which provide enduring system value and strategic flexibility for decades to come.

Our detailed responses to the specific consultation questions are provided further this response.

Annex: Responses to the list of consultation questions

1. Do you have any views on our overall approach to the MCA, including specifically the proposal to assess the three main areas set out in 2.2?

The proposed MCA framework enables Ofgem to make informed decisions while avoiding a rigid, mechanistic approach.

However, we recommend setting separate targets for different LDES technologies, reflecting their distinct technical characteristics, risk profiles, and development timelines. This approach would allow Ofgem to undertake a more efficient project assessment and award Cap and Floor contracts to the most mature and cost-effective projects within each technology group in parallel. Splitting the target also provides strategic flexibility ensuring continued focus on large-scale PSH which uniquely delivers over 8 hours of storage and a broad suite of system services.

Importantly, the framework must put appropriate emphasis on the projects demonstrating strong value through the Economic and Strategic Assessments, even if they rank lower in the Financial Assessment. In addition, the proposed evaluation and scoring approach must ensure that non-monetised and strategic impacts have the required weighting in overall rankings and decision-making. We endorse a split of the LDES target by technology type in order to recognise distinct characteristics of LDES technologies and make the assessment process more efficient.

We support the inclusion of a qualitative Strategic Assessment. However, we are concerned that insufficient weight is being given to strategic factors such as domestic energy security and economic growth. Many high-value impacts, particularly those related to system security and resilience, are not easily monetised but are essential to a reliable, decarbonised energy system. Recognising these contributions is vital to ensuring the overall assessment framework delivers outcomes aligned with long-term system needs and the policy intent.

In addition, larger projects with later delivery in track 2 also risk being appraised assuming successful track 1 in the counterfactual. We would urge that track 2 projects are appraised at the same time as track 1 and that the counterfactuals are identical between the two tracks. Successful track 1 projects should not be assumed in the counterfactual to track 2.

2. Do you have any views on whether our proposed in-the-round assessment that will rank projects based on NPV and then adjust with non-monetary impact will provide a robust result?

Subject to our comments in response to Q.1, we consider the proposed assessment framework is designed to support Ofgem in reaching a balanced final decision without defaulting to a mechanistic process. Given that LDES, particularly PSH, can deliver significant system and consumer value, elements of which are not easily monetised, it is essential that the in-the-round assessment gives appropriate weight to both monetised and non-monetised components. This will help ensure that the final outcome reflects the full value these assets bring to the energy system.

Importantly, further clarity is needed on how the ranking adjustment would be made objectively to reflect differences in the level of non-monetised benefits between the projects. We understand the need to not be overly mechanistic at this stage but request that Ofgem clearly sets out its approach in this area.

It remains unclear how Ofgem intends to define and evaluate strategic assessment factors within a competitive process, or how these non-monetised impacts will influence the final project rankings. We are particularly concerned that technologies like PSH, which offer substantial ancillary services and long-term strategic value, may be undervalued due to all benefits not being monetised.

This reflects a broader market failure, positive externalities such as system resilience, inertia, and long-duration flexibility have historically been undervalued, contributing to the lack of new pumped hydro development for decades. To correct this, the in-the-round assessment must give meaningful weight to these non-monetised and strategic contributions to ensure a fair and future-focused assessment.

3. Do you have any views on using competitive bids – based on project-specific parameters – to inform the financial assumptions and C&F levels in each project’s assessment? How might this approach work on a technology-neutral basis?

We will set our views on this point in a separate letter to Ofgem.

4. Do you agree that some revenue streams - such as from re-optimisation or ancillary services - cannot be fully captured in the Economic Assessment? How could NESO or Ofgem better account for or validate these in the assessment process?

Unlike the Interconnector CBA assessment, LDES system benefits such as frequency response, reactive power and restoration services are not proposed to be monetised in the LDES project assessment despite PSH impacts in these areas being potentially greater than Interconnectors. Wherever possible we support monetisation of system benefits especially where these benefits could be of high value. If a robust monetisation approach is not available, it will be vital to ensure those impacts are given sufficient weighting as a non-monetised impact in the economic assessment or, if relevant to wider policy goals, then in the strategic assessment (see further details in our response to question 6 on system level benefits).

Even where a robust methodology cannot be identified for monetising economic impacts e.g. capacity market, the revenue should still be monetised as far as possible for the financial assessment. Failing to monetise these revenues risks underestimating revenues. NESO should seek to monetise re-optimisation revenues beyond the day ahead trading through use of net imbalance and error forecasting modelling.

5. Are we considering the right impacts for the Economic Assessment, and have we correctly characterised both monetised and non-monetised impacts?

We note that while constraint management costs are monetised, Ofgem proposes to quantify avoided renewable curtailment but not monetise it. These are interdependent elements and, while the quantified scale of avoided renewable curtailment should clearly support a positive case for large-scale PSH, we suggest that Ofgem should monetise this benefit to provide a comparable basis for the assessment.

Additionally, the impact on jobs during construction and operation is likely to vary significantly between projects, largely due to differences in scale and supply chain composition. For example, PSH projects typically involve high levels of local content, supporting domestic employment, whereas BESS depend heavily on international supply chains, particularly for battery components.

Where such differences in wider, non-monetised impacts are material, the assessment framework should allow for differentiated scoring to reflect these broader socio-economic contributions.

Carbon emissions should be quantified at both a global scale and GB scale. This is because although emissions targets are set nationally, from a global warming impact perspective it is the global emissions that count. Interconnection can cause emissions to marginally increase in a renewable dominated exporting country displacing significantly more emissions in the connecting country.

6. Are there important system-level benefits from LDES that are not well captured in the Economic Assessment but could significantly impact outcomes? If so, what are they, and can they be consistently assessed across projects?

Ofgem should give allowance for system operation utility of the plant. Large-scale PSH is tried and tested by NESO, whilst dealing with one large unit reduces the number of instructions and NESO's administrative burden for re-dispatch compared to contracting with multiple smaller LDES.

Forecasts of inertia show provision is declining from thermal and nuclear closure and with CP2030 ambitions to maintain a stable grid the need for low-carbon inertia provision is growing. In the most recent pathfinder round for delivery 2025 -2035 NESO procured 17 GVA.S of inertia from the market at a cost of £1.9bn.³ Coire Glas can provide 8GVA.S of inertia to the GB system accounting for ~7% of the current minimum needs. If Ofgem chooses not to quantify inertia in monetary terms, then the project's contribution to GB inertia needs should still have an appropriate weight in the scoring assessment.

Short circuit level needs are very localised and will grow in regions such as Scotland with significant wind buildout alongside the retirement of thermal plants like Torness. Coire Glas, being a synchronous machine, will provide 5-7 times more short circuit level (SCL) than any grid forming inverter-based technology of similar size providing large benefits to the reliability of the Scottish power system and the GB power system as a whole. If Ofgem chooses not to quantify SCL in monetary terms, then the project's contribution to regional SLC needs should still have an appropriate contribution in the scoring assessment.

In addition, as a large generator Coire Glas, and other large Scottish PSH, will contribute significantly to the reactive power provision in Scotland ensuring a safe and reliable GB power system. Provision of reactive power will become particularly important to maintain the voltage of the system within acceptable limits as the growth in electrification of transport and heat sectors alongside wind capacity will drive up voltage stability needs. If Ofgem chooses not to quantify reactive power in monetary terms, then the project's contribution to regional reactive power needs should still have an appropriate contribution in the scoring assessment.

Furthermore, the future renewables-based system will require significant restoration services capabilities which historically were provided by large fossil fuel generators. Ofgem should focus on LDES projects that are capable to meet the technical requirements for restoration services, including, block loading size, frequency and voltage regulation, reactive power and inertia as well as

³[ESO announces new contracts to deliver over £14 billion in savings | National Energy System Operator](#)

a high level of availability and reliability and consider which each plant is able to offer. Coire Glas meets all of these requirements.

We note that the need for wider network reinforcement required to connect the project is not proposed to be assessed unlike the Ofgem interconnector CBA. Wider constraint management costs are not necessarily a good proxy for local reinforcement required. The project Connections Infrastructure Options Note (COIN) should provide local network reinforcement costs and feed into the project assessment. Given that network reinforcement is a direct economic impact and could differ significantly between projects Ofgem should include this in the assessment.

Wider network reinforcement will have a large bearing on the monetised constraint management costs, therefore, the background network needs to be as up to date as possible anticipating future reinforcement. Additionally, given its importance we would like to see sensitivities to earlier or later reinforcement.

7. Do you have any views on the relevance, appropriateness and completeness of the impacts proposed in the Strategic Assessment?

Yes, we are supportive of all the elements included in the Strategic Assessment.

Separately, we support recognising greater option value for projects that do not share a water resource with others. These projects offer enhanced long-term viability, greater operational independence, and increased scope for future expansion making them more resilient and strategically valuable on a decarbonised energy system. We consider that option value for such projects should be given a due weight in the overall assessment.

For example, Coire Glas is a single PSH project that relies on the water resource of Loch Lochy. The project has taken steps to ensure that it has the legal right to access the water required to operate the project by securing a Schedule 5 Water Order (Electricity Act 1989). This takes into account the existing demands on Loch Lochy by other users and is linked to the section 36 planning consent, forming part of the full set of consents necessary for the operation of large hydro power stations in Scotland. Coire Glas has also obtained a CAR licence from the Scottish Environmental Protection Agency which is critical to the project's operation and takes into account the environmental operational impacts on the entire Loch Lochy water catchment.

8. Are there other aspects that we should be considering in the Strategic Assessment?

Yes, project's alignment with wider government policy objectives should be explicitly considered and given weight in the Strategic Assessment. The assessment should focus on the projects that support the development of homegrown, low-carbon infrastructure. Projects like Coire Glas, a PSH asset with a significant proportion of civil works, support domestic jobs creation and economic growth. In contrast, battery storage technologies are often heavily reliant on imported components and overseas manufacturing, which limits their contribution to the UK economy and introduces supply chain risks.

We also suggest that Ofgem considers incorporating benefits that are difficult to monetise, such as stability impacts, not only in the economic assessment but also within the strategic case. Restoration services, as shown in the recent outages in Spain and Portugal are particularly valuable from a national security strategic perspective.

9. Do you have specific suggestions for how the Financial Assessment output should be considered alongside the Economic Assessment?

We strongly support an assessment approach which recognises that it is acceptable for the project to have a lower financial ranking when showing a significant economic and strategic value. We strongly encourage Ofgem not to put undue weight on cheapest bids and financial ranking but to adopt the value for money approach by recognising that the socio-economic and strategic value delivered by specific LDES projects should outweigh higher bids reflective of these projects' risk profiles and technical and operational characteristics.

Economic and Strategic Assessments represent project's long-term value and contribution to consumer and system needs and must be given a due weight in Ofgem's assessment. This is particularly important given that the Financial Assessment is unlikely to fully reflect the broader system value of the project, especially in the absence of long-term ancillary services contracts that can reliably be included in the business case.

10. Do you agree with our proposal to assume that LDES projects will remain revenue neutral following balancing market actions?

We understand a revenue neutral approach for the economic assessment. However, we would advocate that revenues used in the financial assessment should be reflective of the real-world competitive and commercial nature of the market.

11. Do you have any views on the proposed Marginal Additional method and whether it provides a robust basis for assessment?

Ofgem should ensure a non-discriminatory approach to large and small assets. We believe the Ofgem marginal addition (MA) approach as currently proposed inherently disadvantages larger projects with later delivery dates. Large projects are particularly penalised due to the assumption that the market is more saturated and diminishing marginal returns i.e. large project adds significant extra capacity in a system that has no space to accommodate it. This is in direct contradiction to DESNZ's stated policy aim for putting in place a Cap & Floor for LDES, namely, to facilitate the delivery of high capex long lead time LDES projects, which the market is unlikely to deliver without intervention. Larger projects would be more likely to displace other capacity than smaller projects and therefore the lack of optimisation is an extra penalty. We propose adjustment of the factual to achieve the same total LDES capacity inclusive of the candidate project. Additionally, the archetype approach proposed for the marginal addition method removes any realism from the LDES development pathway, i.e. based on equal LDES in all 37 zones in the NESO model. This provides a common reference grid but risks removing any locational benefits of LDES compared to other assets.

A first additional (FA) approach, if used, could eliminate the projects that do not perform well on a stand-alone basis. We support using a combination of the FA and MA approaches.

12. Do you have any views on the counterfactual to use for this assessment and sensitivities that we could use?

While we agree with the principle that using the latest available data with regard to Future Energy Scenarios and assumptions is important, we recommend that Ofgem allows stakeholders to

engage meaningfully with the substance of the chosen scenario once it is agreed. This could be facilitated through a stakeholder workshop.

We have significant concerns regarding the limited modelling horizon proposed (Plexos simulation up to 2044 and assessment across 25 years), particularly for long-lived infrastructure projects such as Coire Glas. A short-term view risks undervaluing the enduring system benefits these assets provide. The economic lifetime of PSH projects extends well beyond the 25-year regime duration with significant components of the asset with a technical lifetime that could be in excess of 100 years, the value of which should be recognised in the project assessment.