Assessment of impacts of the proposed LDES portfolio

Division: Infrastructure

Team: ORE

Associated documents: Window 1: Minded-to decisions – LDES

Coverage: Partial coverage of monetised impacts

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This document assesses the impacts of the proposed Long Duration Electricity Storage (LDES) portfolio, based on the outcome of Ofgem's Project Assessment for Window 1. It builds on prior scheme-level analysis published by DESNZ, which noted that the scale and nature of impacts would depend on the specific projects supported and that further analysis would be undertaken once project-level information became available.

This assessment supports Ofgem's minded-to decision on the outcome of Window 1 by providing a view of the impacts of the proposed portfolio, including the implications of alternative capacity outcomes. It draws on evidence from the Project Assessment, financial analysis and NESO modelling to consider system, consumer, competition and wider economic impacts, including effects on growth and the environment, using representative modelling to capture the characteristics of the emerging portfolio.

This assessment should be read alongside the main Window 1 assessment minded-to decision, which explains in more detail the reasons for our choice of portfolio. It does not determine individual project awards and does not seek to replicate DESNZ's original Impact Assessment. Instead, it provides further evidence on the impacts of the proposed portfolio for Window 1, recognising the uncertainty inherent in forward-looking analysis.

Summary

Executive summary

- This document assesses the impacts of the proposed LDES portfolio based on Ofgem's Project Assessment for Window 1. It builds on prior scheme-level analysis by DESNZ and provides further evidence drawing on additional modelling. The assessment supports Ofgem's minded-to decision but does not determine individual project awards.
- LDES enables electricity to be stored and used over longer periods, reducing reliance on unabated gas, lowering constraint costs and supporting system operability and resilience. However, revenue uncertainty, high capital costs and long development timelines have limited merchant investment. The cap and floor regime is designed to address these barriers by providing a revenue floor while maintaining incentives and protecting consumers through a cap on returns.
- Ofgem's minded-to decision proposes a portfolio of 16 projects totalling 7,645 MW, at the upper end of NESO's advised capacity range. The portfolio spans a mix of technologies and locations and provides an evidenced pathway to delivering substantial LDES capacity in line with system needs in the 2030s. It reflects an assessment of economic, financial and strategic factors, alongside deliverability.
- The key policy trade-off is between under-delivery if too little capacity is supported and increased consumer exposure if too much capacity is supported. Given uncertainty in system conditions and the risk of project attrition, a portfolio towards the upper end of the advised range provides a more credible pathway to timely delivery while remaining within NESO's range. Available evidence indicates that LDES is likely to reduce system costs relative to credible low-carbon alternatives, although the full scale of benefits remains uncertain.
- Overall, the evidence suggests the proposed portfolio is likely to deliver system and consumer benefits, including improved security of supply, reduced emissions and lower system costs. Cap and floor payments are expected to be broadly neutral over time in direct bill terms, with wider system benefits improving outcomes for consumers. The portfolio is therefore a proportionate and evidence-based response to system need.

1. Context to the economic assessment

LDES and the cap and floor mechanism

1.1 Long Duration Electricity Storage (LDES) provides the ability to store electricity and discharge it later over long periods (defined for this policy as 8 hours or more). In a power system with increasing variable renewables, LDES can shift energy from periods of high supply to periods of scarcity, reducing reliance on unabated gas, easing network constraints and supporting system operability.

1.2 A Cap and Floor regime is a regulated revenue framework that limits downside and upside outcomes. Where eligible revenues fall below a defined floor, the shortfall is recovered from consumers; where revenues exceed a cap, a share of excess returns is returned to consumers. For LDES, the regime is designed to enable investment and bankable financing, while protecting consumers and preserving incentives for efficient delivery and operation.

Case for intervention

Problem statement

1.3 Despite the strategic value of long-duration flexibility, no new large-scale LDES assets have been commissioned in Great Britain for several decades. As renewable penetration increases, the system requires firm, low-carbon flexibility to manage multi-hour and multi-day supply gaps, reduce curtailment and maintain security of supply. Without intervention, there is a material risk that the market under-delivers LDES capacity or delivers it too late to meet near-term policy milestones.

Barriers and market failures

1.4 The regime is intended to address several barriers that limit investment in LDES. A central challenge is revenue uncertainty. Merchant storage revenues depend on volatile wholesale price spreads and ancillary service markets, which can create a pronounced “missing money” risk for LDES assets with high fixed costs. Even where projects provide net system value, uncertainty over future revenues can prevent them from securing financing.

1.5 These challenges are compounded by high upfront capital costs and long development timelines, particularly for pumped storage hydro and some novel storage technologies. At the same time, a significant proportion of the value provided by LDES - including reduced constraint costs, improved operability and resilience, and support for decarbonisation - is not fully captured in market revenues. As these benefits accrue across the system, they may not be adequately reflected in the returns available to an individual project.

1.6 Coordination and timing effects may further contribute to underinvestment. Developers may rationally delay investment decisions in response to uncertain price signals, which in aggregate can result in insufficient or delayed deployment relative to system need. Financing constraints reinforce this, as debt providers typically require predictable cashflows before committing capital.

Why Cap and Floor is a proportionate intervention

1.7 The Cap and Floor regime targets a key barrier to investment, revenue risk, while retaining market-based incentives. It does not guarantee returns irrespective of performance, but shares risk between projects and consumers within a structured regulatory framework, including established eligibility and assessment criteria.

1.8 Compared with more open-ended forms of support, the mechanism is designed to reduce the risk of overcompensation while enabling the delivery of Projects that provide wider system value. On this basis, it represents a proportionate intervention to address the identified investment gap and support timely deployment of LDES capacity.

1.9 This assessment builds on prior scheme-level analysis undertaken by DESNZ, which recognised that impacts depend on the portfolio of projects delivered. It provides a more detailed portfolio-level view of impacts, drawing on project-level information, financial assessment and NESO modelling, using representative modelling to reflect the emerging portfolio.

2. System requirements and policy objectives

2.1 The electricity system requires long-duration flexibility to manage periods of sustained imbalance between supply and demand. Evidence from NESO indicates that additional LDES capacity is needed in the 2030s to support system operability and security of supply in a decarbonising system.

2.2 LDES assets are characterised by their ability to store and discharge energy over extended periods, enabling them to contribute during prolonged system need events. To provide system value, assets must combine sufficient power and energy capacity, alongside the ability to respond flexibly to changing system conditions.

2.3 In addition to energy shifting, LDES can reduce system inefficiencies by absorbing excess generation and discharging when needed. The scale and location of these benefits depend on wider system conditions, including network constraints and the availability of alternative sources of flexibility.

2.4 The requirement for LDES is therefore defined at a system level and reflects the need for a portfolio of assets capable of delivering flexibility, reliability and efficient system operation over longer timescales. Consistent with this, the assessment in this document considers how different levels of LDES capacity contribute to meeting system requirements in the round, rather than assessing any single service in isolation.

2.5 This builds on prior scheme-level analysis, which identified a system need for long-duration flexibility but did not determine a single optimal level of deployment. The analysis presented here draws on NESO advice and project-level evidence to consider how a feasible portfolio of projects may contribute to meeting those needs under realistic delivery assumptions.

Policy objectives

2.6 The objective of the Cap and Floor scheme is to support the delivery of LDES capacity in a way that protects the interests of existing and future consumers. This is achieved through the Project Assessment framework, which applies consistent criteria across projects and supports transparent, evidence-led decision-making.

2.7 In doing so, Ofgem seeks to identify a portfolio of projects that can deliver overall value to the electricity system and consumers, taking account of system benefits, costs, risks and deliverability. Decisions reflect a balanced assessment across economic, financial and strategic factors, and do not rely on any single metric or modelling output. Rather, we have considered the relative performance of individual projects alongside the composition of the portfolio.

3. Policy options and assessment

3.1 This section assesses the impacts of alternative LDES deployment outcomes. The assessment compares a small number of high-level options, reflecting different levels of intervention and capacity, rather than detailed re-evaluation of individual projects. It draws on evidence from the Project Assessment and associated modelling, alongside qualitative judgement on risks and deliverability.

3.2 NESO's advice to support the Cap and Floor scheme, based on Future Energy Scenarios and the Clean Power 2030 Action Plan, indicates that between 2.7 GW and 7.7 GW of LDES capacity may be appropriate by 2035. Updated NESO advice that also includes interim outputs from Capacity Expansion Modelling (CEM) developed for the Strategic Spatial Energy Plan (SSEP) remains broadly consistent with this range. The CEM is designed to minimise system cost subject to constraints and therefore provide an important input to assessing system need, but do not fully capture all dimensions of consumer value, which is why our assessment also takes a broader view.

3.3 It is for Ofgem to determine the level of capacity supported through the Cap and Floor scheme, having regard to NESO's advice and the LDES scheme decision by DESNZ. In this context, the assessment considers how different capacity outcomes may affect system, consumer and market impacts, including through comparison with a counterfactual of no cap and floor support. This provides a basis for understanding distributional effects and for testing whether the proposed approach is consistent with Consumers' interests.

3.4 The options considered are:

- Option 1: baseline (no cap and floor) – continuation of current arrangements, under which LDES is expected to deploy, if at all, on a merchant basis.
- Option 2: cap and floor at the lower end of the advised range – a more limited portfolio reflecting a conservative approach to capacity deployment.
- Option 3: cap and floor at the higher end of the advised range (proposed portfolio) – a larger portfolio reflecting Ofgem's minded-to position.

3.5 These options are intended to capture the key trade-offs identified in the Project Assessment, particularly between delivery risk, consumer exposure and the ability to meet system needs within relevant timeframes. They are not exhaustive and do not represent a full range of possible outcomes.

3.6 **Option 1:** Baseline - This option avoids direct consumer support through the cap and floor regime but is expected to result in limited or delayed deployment, given the investment barriers identified. This increases the risk that system requirements are not met and that higher-cost alternatives are relied upon.

3.7 **Option 2:** Lower capacity - This option provides some support for deployment while reducing consumer exposure. However, a smaller portfolio increases the risk of under-delivery relative to system need, particularly given uncertainty around project progression and wider system conditions.

3.8 **Option 3:** Higher capacity (preferred Option) - This option supports a broader portfolio of projects and is expected to provide a more credible pathway to delivery in line with system requirements. While this increases potential consumer exposure under the cap and floor regime, this is mitigated by the design of the regime and the application of our Window 1 Project Assessment framework.

Overall Assessment: Preferred Option vs "Do Nothing"

3.9 Under a baseline of merchant-led deployment, the barriers to LDES investment identified in Section 1 are expected to result in limited or delayed delivery. This increases the risk that system requirements are not met and that higher-cost sources of flexibility are relied upon over time.

3.10 The preferred option supports a portfolio of projects selected through a comparative, evidence-led assessment. It is designed to enable timely delivery of LDES capacity over 2030 to 2035, while applying the protections and incentives inherent in the cap and floor framework.

3.11 The key trade-off is between avoiding direct support costs under Option 1 and accepting a higher risk of increased system costs, reduced resilience, and under-delivery of capacity. By contrast, the preferred option (Option 3) introduces a Cap and Floor regime, which may give rise to floor payments but is expected, on the available evidence, to reduce overall system costs relative to the counterfactual, as discussed in section 4. Additionally, the regime limits consumer exposure and shares upside returns.

3.12 On this basis, the preferred portfolio is expected, on the available evidence, to provide a more credible pathway to meeting system needs and delivering consumer benefits than a baseline without intervention. While there is inherent uncertainty in future system conditions and project delivery, selecting a portfolio within NESO's advised range is considered a proportionate and evidence-based response to that uncertainty.

3.13 Table 1 below sets out the proposed portfolio corresponding to the preferred option. It comprises 16 projects totalling 7.6 GW of LDES capacity, spanning a mix of technologies and locations, and is positioned towards the upper end of NESO's advised capacity range.

Table 1: Proposed LDES portfolio for Window 1

Name	Technology	Region	MW	Duration
Loch Kemp Storage	PSH	N_Scotland	660	22.3
Coire Glas	PSH	N_Scotland	1440	32
TeesCAES	CAES	NE_England	50	30
Earba PSH	PSH	N_Scotland	1800	15
Field Netherton	Li-ion BESS	N_Scotland	400	16.3
Field New Deer	Li-ion BESS	N_Scotland	400	18.03
Field Rigifa	Li-ion BESS	N_Scotland	200	18.03
Field Fyrish	Li-ion BESS	N_Scotland	200	16.5
Field Long Stratton	Li-ion BESS	E_England	400	16.05
East Claydon Storage	Li-ion BESS	E_England	500	12
Ocker Hill BESS	Li-ion BESS	W_Midlands	145	8
Sundon Storage	Li-ion BESS	E_England	500	8
Drakelow (Innova)	Li-ion BESS	W_Midlands	385	8.7
Frontier Legacy	VFB/Zn	N_Wales	65	8
Springwell	Li-ion BESS	E_Midlands	400	11.1
Thornton BESS 2	Li-ion BESS	E_Midlands	100	11.11

Overall economic benefits of the portfolio

3.14 In support of the LDES scheme, Ofgem and DESNZ asked NESO to assess both the appropriate range of LDES capacity and the economic benefits of deploying LDES. This evidence informs the assessment of the proposed portfolio but is considered alongside the wider Project Assessment and does not determine the minded-to decision on its own.

3.15 NESO's capacity expansion modelling CEM indicates that some level of LDES deployment forms part of a least-cost pathway to 2050 across a wide range of assumptions. The modelling co-optimises investment in generation, storage and networks to meet demand, security of supply and carbon constraints. Within this framework, LDES is selected in many scenarios as a cost-effective source of longer-duration flexibility. However, the level of deployment varies across scenarios, reflecting uncertainty around key drivers such as weather, demand and technology costs, and does not point to a single preferred capacity outcome.

3.16 NESO supplemented this analysis with dispatch modelling to provide an indicative comparison of system costs with and without LDES. This involved modelling a counterfactual for single years from 2031-2035 in which LDES is not deployed and existing gas generation partially fills the gap and alternative technologies including either shorter-duration batteries, or CCGT with CCS, or hydrogen-to-power generation are introduced to meet the resulting unserved energy.

3.17 The costs of these alternative technologies were estimated separately by applying technology-specific capital costs on a 1:1 MW of LDES replacement basis, or in the case of short duration batteries on a 1:1MWh and estimating the associated fuel and carbon costs of replacing LDES in the counterfactual. As such, this does not represent a fully modelled system-wide counterfactual for each technology, but an indicative comparison.

3.18 NESO also considered another counterfactual in which existing unabated gas generation also met the unserved energy left by removing LDES. While this could result in lower system costs in the near term under certain assumptions, it would lead to higher emissions and increase the risk of breaching carbon targets. It is therefore not treated as a central counterfactual for the purposes of this assessment.

3.19 Overall, the analysis shows that, under central assumptions, credible low-carbon alternatives to LDES are generally associated with higher system costs, although results remain sensitive to assumptions on weather conditions and technology costs.

3.20 Table 2 below presents illustrative results for an example case of 5.3 GW[1] of LDES deployed by 2035. The results are expressed as average annual additional system costs over that period. NESO modelling for this case suggests that, without LDES, additional investment of around £1 billion per year may be required, with associated annual capital costs of over £500 million under typical financing assumptions.[2]

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[1] 5.3GW of capacity reflected the midpoint of the recommended LDES range (2.7GW-7.7GW). This was assumed to be 24hr duration storage.

[2] Based on cost of capital and depreciation costs associated with an additional £4-5 billion of additional capital over 5 years.

Table 2: NESO's analysis of additional annual costs of deploying alternative technologies instead of LDES[3]

	6hr-Batteries	CCGT with CCS
Annualised Capex Delta from LDES for 5.3GW (£m)	906	938
Annual Fuel Cost (£m)	0	52
Annual Societal Cost of Carbon (£m)	0	74
Total Annualised Costs (£m)	906	1,064

3.21 Table 2 therefore provides directional evidence of the value of LDES relative to credible low-carbon alternatives. It does not represent a direct estimate of the marginal impact of moving to the proposed 7.6 GW portfolio but illustrates that replacing LDES is associated with material additional system costs. There is therefore no costless alternative pathway to meeting system requirements and decarbonisation objectives if awards were not made under the LDES Cap and Floor scheme.

3.22 One exception identified in NESO's analysis is hydrogen-to-power, which in some scenarios results in similar system costs to LDES. However, given uncertainty over whether it could be deployed at scale within the relevant timeframe, it has not been considered as a central substitute for LDES capacity in Window 1.

3.23 NESO's capacity modelling provides support for the role of LDES in reducing system costs relative to credible low-carbon alternatives, but it does not determine a single optimal capacity outcome. Consistent with the minded-to decision, the proposed portfolio therefore reflects a broader assessment of consumer value, system benefits and deliverability, considered in the round and within NESO's advised range.

[3] These costs reflect higher capital costs, increased fuel use and the societal cost of additional emissions.

Assessment of alternative LDES capacity levels

3.24 Building on the evidence set out above, this section considers the implications of setting LDES capacity towards the lower or upper end of NESO's advised range.

3.25 A lower capacity level (around 3 GW) would reduce potential consumer exposure but increases the risk that deployment does not fully meet system needs, particularly as renewable generation expands. This may result in higher system costs and continued reliance on alternative sources of flexibility.

3.26 A capacity level towards the upper end of NESO's advised range is more consistent with the range of potential system requirements identified across scenarios. NESO advised that between 2.7 GW and 7.7 GW of additional LDES capacity may be required by 2035, without identifying a single optimal level.

3.27 A key consideration is delivery risk. While projects are assessed for deliverability, some degree of attrition is expected. A higher starting capacity provides greater confidence that sufficient projects are delivered in practice.

3.28 On this basis, a capacity level of around 7.6 GW provides headroom for attrition while remaining within NESO's advised range. This represents a proportionate response to uncertainty in both system need and project delivery.

3.29 Consistent with the minded-to decision, this reflects a balanced assessment of consumer value, system benefits and deliverability, rather than reliance on any single metric.

3.30 Table 3 provides a high-level comparison of the relative strengths and risks of each option, based on the evidence set out above.

Table 3: Comparative analysis

Criterion	No Cap and Floor	Lower capacity (bottom of range)	Higher capacity (preferred)
System need	Low - high risk of under-delivery	Medium - some delivery, but risk of insufficient capacity	High - better alignment with system need and attrition risk
Consumer protection	High - no direct support, but risk of higher system costs over time	High-Medium - reduced exposure, but risk of higher system costs	Medium - greater exposure, mitigated by regime design and selection process

Assessment of impacts of the proposed LDES portfolio

Deliverability / pace	Low - limited investment expected	Medium – partial delivery	High - more credible pathway to timely delivery
Market compatibility	High - no intervention	Medium–High – partial intervention alongside market outcomes	Medium - targeted intervention to support delivery
Implementation complexity	Low	Medium	High

4. Consumer and competition impacts

4.1 The deployment of LDES may have implications for both consumers and market participants. While the Cap and Floor regime is designed to be broadly neutral over time, it may give rise to short-term exposure to floor payments. At the same time, increased deployment of LDES is expected to reduce price volatility and peak prices, which may affect revenues for some merchant assets. This section provides our initial assessment of these effects.

Distributional impacts

4.2 Overall, we expect the LDES portfolio to deliver improved outcomes for consumers. The system benefits set out in section 3 indicate approximately £1 billion of annualised benefits relative to alternative technologies.[4]

4.3 Direct cap and floor payments are expected to be broadly neutral over time, while wider system impacts - such as reduced system costs, improved security of supply and lower emissions - are expected to benefit consumers. NESO's project analysis indicates that there is expected to be positive consumer welfare from the wholesale market effects of the projects proposed for Window 1.

4.4 In the central case, no material net direct impact on consumer bills from the LDES Cap and Floor is expected. This reflects the design of the regime, under which payments made when revenues are low are expected to be balanced by payments returned when revenues are high.

4.5 Impacts are expected to be broadly shared across consumers. No specific differential impacts on particular groups of consumers who may be in vulnerable situations, have been identified on the available evidence.

Estimating potential consumer cost

4.6 The Financial Assessment compares expected project revenues against Cap and Floor and revenue levels over the regime term. This provides a consistent basis for assessing the extent of potential reliance on floor payments and the distribution of risk between projects and consumers.

4.7 While the Cap and Floor scheme is expected to be broadly neutral in a central case, there remains a risk to consumers if revenues are lower than anticipated, for example under sustained low utilisation scenarios.

[4] Several important benefits are also not fully captured in the quantified analysis, including improved security of supply during prolonged stress events, reduced reliance on unabated gas, enhanced operability and system resilience, and option value under uncertainty.

4.8 Under a central case, our financial assessment suggests a limited exposure to floor payments of around £87 million per year, equivalent to approximately £1 per domestic consumer per annum. Whether such costs arise in practice depends on a range of uncertain factors, and it would be expected to be offset by wider system benefits and/or cap receipts.

4.9 Under a low revenue scenario where wider wholesale market conditions mean that LDES is less frequently used, there is the potential for floor payments to rise to around £171 million per year, or approximately £2 per domestic consumer annually. This represents a downside case based on conservative assumptions.

4.10 These estimates should be seen alongside system benefit modelling showing that LDES is expected to reduce overall system costs compared to credible alternatives, with NESO analysis suggesting savings of around £1 billion a year versus shorter-duration batteries or CCGT with CCS gas, which helps put the downside risk in context.

4.11 The consumer cost effects should also be seen alongside NESO's assessment of wholesale and balancing market effects of the LDES projects, which suggests positive consumer welfare and therefore lower consumer costs from LDES investments. As a result, the investments associated with the scheme are assumed to have a neutral direct effect, on the basis that cap and floor payments are expected to be broadly in balance over the life of the scheme.

4.12 While there is uncertainty in the direct bill impacts associated with the Cap and Floor regime, it is also important to consider the counterfactual. Where LDES is not deployed, the system is expected to rely more heavily on alternative sources of flexibility, which may result in higher overall system costs. To the extent that these costs are recovered through consumer bills, this would also increase costs for consumers over time.

Table 4: Floor exposure and indicative bill impacts

Scenario	Floor (£m/year)	Capacity (GW)	Consumer exposure (£m/year)	Domestic consumer impact (£m/year)
Base case	1,425	7.7	87	1
Low revenue scenario	1,425	7.7	171	2

Competition impacts

4.13 The introduction of a Cap and Floor regime may affect competition where supported LDES competes with other technologies operating on a merchant basis.

4.14 LDES and shorter-duration storage (SDES) overlap to an extent in capability but may not be fully interchangeable. They differ in duration, cost and operational characteristics, and modelling indicates that both are deployed together in cost-optimised systems.

4.15 Increased deployment of LDES may reduce revenues for merchant SDES to some extent. Evidence indicates that any impact is limited and is consistent with the displacement of higher-cost alternatives, rather than widespread direct substitution

4.16 Where reduced revenues affect investment incentives, the market response may include adjustments in the level and timing of SDES deployment. The implications of any such adjustment depend on wider system needs and market developments, including the extent to which flexibility requirements continue to be met in a cost-effective manner.

4.17 As LDES and SDES can provide similar services, increased deployment of LDES may affect the revenues available to SDES assets through increased competition across shared revenue streams. Further detail on the potential scale of these effects is set out in paragraph 4.20.

4.18 We note that Window 1 proposes up to 7.6 GW of LDES capacity (assuming no attrition). By contrast, the total SDES capacity implied by NESO's Clean Power 2030 plan is between 23 and 27 GW. This suggests that, while revenues for SDES may be affected, these technologies are expected to continue to play a material role within a cost-optimised system.

4.19 NESO's modelling does not directly isolate the impact of LDES deployment on SDES revenues. However, the results are consistent with both technologies continuing to be deployed in combination.

4.20 External analysis provides an indication of potential impacts.[5] For example, LCP-Delta analysis suggest that battery gross margins could decline by around 12%, with returns falling by around 2 percentage points under an LDES Cap and Floor (limited to PHS, CAES, and LAES). These estimates are scenario-dependent but in our view are consistent with impacts on SDES being moderate rather than structural.

4.21 Taken together, this evidence indicates that any impacts on SDES are modest and must be considered alongside the wider system benefits

[5] LCP-Delta-Value-of-long-duration-BESS-April-2025.pdf, summary in pages 5 and 9

associated with LDES deployment, including the delivery of the flexibility requirements identified in NESO's Clean Power 2030 plan.

4.22 Overall, the evidence indicates that any impacts on competition are proportionate and are expected to be offset by wider system benefits associated with LDES deployment.

5. Wider impacts

Impact on economic growth

5.1 This section focuses on medium- to long-term, supply-side growth channels (consistent with Ofgem's IA guidance on Growth Duty approach). It considers both direct effects of the Cap and Floor regime and indirect effects through system operation, investor behaviour, and consumer bills. It does not attempt to estimate headline GDP impacts; rather it assesses direction, materiality, and key uncertainties, and identifies monitoring metrics.

5.2 Ofgem's Growth Duty framework emphasises medium- to long-term, supply-side drivers of growth. For this assessment, the impacts of the LDES decision are considered channels: (1) investment, (2) productivity / efficiency, (3) skills, (4) competition, and (5) innovation. Administrative burden is also considered given their influence on investment and market participation. The analysis focuses on plausible mechanisms by which the LDES decision may affect these drivers and identifies direction and uncertainty rather than providing precise quantification.

Investment

5.3 The Cap and Floor framework is designed to unlock investment by reducing revenue uncertainty and improving bankability. This is expected to lower financing costs and support projects in reaching financial close. External impact assessment evidence also indicates that greater revenue certainty can reduce the costs of capital, although such effects are project-specific and not fully captured or monetised at the scheme level.

5.4 To the extent the minded-to decision results in timely awards to deliverable projects, it is expected to support increased private investment in UK electricity infrastructure and associated supply chains. This represents the primary growth channel within the Growth Duty framework, consistent with the role of infrastructure investment in supporting long-term productivity and economic capacity.

5.5 The impact on investment outcomes is sensitive to the design and implementation of the regime:

- Strengthens investment outcome where awards are predictable and transparent; the portfolio is resilient to delivery risk; and licence obligations protect Consumers without materially undermining financeability.
- Weakens investment outcome where project selection leads to high attrition or delay for example due to planning or construction risk, or where unreasonable operational or licence constraints materially limits LDES use, or where

constraints on operation materially limit LDES use, increasing Consumer exposure and discouraging investment.

Productivity/Efficiency

5.6 LDES can improve system efficiency by shifting energy across time, reducing curtailment of renewables, and reducing reliance on high-cost peaking generation. These mechanisms are expected to lower overall system costs and emissions in the transition to net zero pathways. LDES may contribute to reducing constraint costs where assets are located in areas of transmission constraints and can absorb generation that would otherwise be curtailed.

5.7 From a growth perspective, the main pathway is through lower and potentially less volatile electricity costs over time, which may support productivity improvements for firms. The scale of these effects depends on delivery timing, wider market reforms, and the location of assets relative to constraints.

- **Key uncertainties:** future wholesale market design and charging arrangements; the pace and location of renewable deployment and constraints; the degree to which LDES substitutes for unabated gas vs complements other flexibility (DSR, interconnection, low-carbon dispatchable power).
- **Indicators to track:** constraint costs; curtailment volumes; frequency and severity of scarcity pricing events; Expected Energy Not Served; and indicative impacts on business electricity costs (recognising attribution challenges).

Skills

5.8 LDES projects involve substantial development, engineering and construction activity and can support capability-building in the UK supply chain (civil works, electrical engineering, power electronics, control systems, and operations). The IA carried out as part of the Planning and Infrastructure Bill (Annex 5) anticipates increased investment and supply chain development in this sector and notes wider business benefits via lower bills.

5.9 In line with Growth Duty guidance, this assessment does not treat gross job numbers as a net measure of economic impact. Rather, the relevant consideration is the extent to which the LDES scheme increases domestic value-added, strengthens scarce skills, and contributes to long-run productivity. The scale and nature of these effects will vary by technology mix and procurement choices, for example between more civil-intensive pumped storage projects and more modular battery-based deployment.

Wholesale market efficiency

5.10 A predictable, technology-neutral Cap and Floor regime can support competitive entry by widening the set of investable LDES technologies and developers. However, stakeholder evidence also indicates potential interaction effects with merchant SDES. For example, changes in price spreads and minimum duration thresholds may affect operating margins for shorter-duration batteries and influence investment outside the scheme.

5.11 From a Growth Duty perspective, the key consideration is whether the decision improves overall market functioning and allocative efficiency (by better matching flexibility capability with system need) while avoiding undue effects on efficient private investment in adjacent flexibility markets.

- Mitigations: maintain transparent selection criteria; ensure comparability across technologies; avoid avoidable “cliff-edges” around duration thresholds; and explicitly assess interactions with other flexibility mechanisms where relevant.
- Indicators to monitor: investment and commissioning trends in merchant storage; outcomes in ancillary service and wholesale markets; and evidence of reduced competition or market participation.

Innovation

5.12 The evidence base indicates that the Cap and Floor regime may provide a “route to market” for LDES by reducing financing barriers, which can support deployment at scale and facilitate learning-by-doing. This may be particularly relevant for less mature technologies.

5.13 Innovation impacts are likely to depend on whether the portfolio supports capability development within the supply chain while maintaining a focus on deliverability and consumer value. In this context, innovation benefits are expected to be incremental and contingent on project delivery and market development, rather than guaranteed.

Administrative burden and regulatory certainty

5.14 growth framework identifies administrative burden and regulatory clarity as factors influencing investment and productivity. The design of the cap and floor regime therefore seeks to be predictable and proportionate, with processes and obligations that are transparent and auditable.

5.15 For Window 1, the approach emphasises consistency and clarity in decision-making and monitoring, to avoid unnecessary complexity that could increase transaction costs, delay delivery or deter participation in future windows. Where additional safeguards are introduced, the relevant trade-off is between closer alignment with policy objectives and potential impacts on financeability and delivery risk.

Emissions and 2030 targets

5.16 This section considers the expected greenhouse gas emissions impacts of deploying LDES supported by Ofgem's Cap and Floor regime, compared with a counterfactual in which the policy does not result in LDES deployment. Available evidence indicates that additional LDES is associated with lower power-sector emissions relative to that counterfactual, although the scale of the effect depends on wider system conditions.

5.17 LDES can reduce emissions through several mechanisms. By shifting energy across time and sustaining output during tight periods, it can displace higher-carbon generation, including unabated gas peaking. By absorbing surplus low-carbon generation and discharging it later, it can reduce renewable curtailment and increase utilisation of low-carbon output. Where located in constrained parts of the network, LDES may also reduce redispatch actions that would otherwise curtail renewables and bring on alternative generation.

5.18 In system planning scenarios, additional LDES may also support a lower-carbon capacity mix by substituting for some peaking capacity and, in some cases, reducing the need for other plant required to maintain security of supply. The scale of these effects depends in part on the duration, location and operating characteristics of the storage deployed, and on the broader decarbonisation pathway.

5.19 Available evidence indicates that LDES deployment is expected to reduce operational emissions relative to a counterfactual without LDES. The Planning and Infrastructure Bill Impact Assessment identifies emissions reduction as a non-monetised benefit of increased LDES deployment. Evidence also suggests that these benefits are likely to be greater in systems with higher renewable penetration and tighter carbon constraints, including pathways aligned with Clean Power 2030 and Carbon Budget 6.

5.20 The magnitude of emissions reductions remains scenario-dependent. NESO's modelling shows that the value of LDES varies with the availability of other sources of low-carbon flexibility and dispatchable power, including abated gas and hydrogen. As such, the emissions benefits of LDES should be understood as directional but potentially material.

6. Risks and uncertainties

6.1 There are some risks related to our Minded-to-Decision to set LDES at the higher range of NESO's optimal capacity range and the impacts of the overall portfolio, which provides headroom for a reasonable level of attrition. In addition, our analysis of bills impact includes sensitivity analysis for a scenario with low revenues, showing that in a pessimistic scenario, LDES still achieves good Value for Money (VfM) for Consumers.

6.2 The analysis is subject to significant modelling uncertainty, as it depends on assumptions about future system conditions, including weather patterns, technology costs, and the deployment of other generation and flexibility assets. Variations in these assumptions could materially affect both the level and timing of estimated benefits.

6.3 A central limitation is that due to these uncertainties the modelling cannot provide a fully optimised whole-system counterfactual to 2050, meaning the estimated benefits are partial. The absence of a comprehensive system cost comparison introduces uncertainty around the true scale of economic value, particularly longer-term effects and interactions across the energy system.

6.4 There is uncertainty around the persistence and scalability of benefits, as savings observed in individual years may not translate proportionally over time or under different system conditions.

6.5 There is also uncertainty related to the treatment of system interactions and second-order effects. The modelling focuses on operational costs (fuel use and carbon) and does not fully capture broader impacts such as changes in investment decisions, network constraints, or market dynamics, which could either enhance or reduce the estimated benefits.

6.6 Finally, the analysis depends on assumptions about what would replace LDES in the counterfactual (for example, increased use of unabated gas or alternative technologies). The choice and feasibility of these alternatives introduce uncertainty in both cost and emissions outcomes, meaning the estimated benefits are sensitive to the specification of the counterfactual pathway.

7. Conclusions

7.1 The evidence supports a clear case for intervention. High capital intensity, long development timelines and uncertain merchant revenues have historically limited new LDES deployment in Great Britain, despite increasing system need as renewable penetration grows. The Cap and Floor regime is designed to address this investment gap by providing revenue certainty while protecting consumers through the cap on excess returns and structured project assessment

7.2 In this context, the regime is intended to support timely delivery of projects while maintaining proportionate consumer safeguards. This includes applying a structured and consistent assessment framework, placing weight on credible evidence of deliverability, and ensuring that regulatory design continues to support efficient operation and availability. Where relevant, the approach may also provide signals on future opportunities in a way that reflects delivery risk and the readiness of projects over time.