INSTRUCTIONS FOR RESPONDENTS

Thank you for agreeing to participate in this survey. This document provides instructions and assumptions to help you respond. Please keep it open for reference while you are completing the survey.

Before starting

- The survey will ask your views on hurdle rates for electricity generation, storage, network and demand response technologies. It may help to make sure you have any relevant internal information to hand, before you start the survey.
- The survey will take around **30 minutes** to complete, depending on how many technologies your organisation is involved in.
- The survey will be open until **Friday 6 December 2024** (unless an extension is agreed).

Questions?

If you need more time to respond, or have any other questions, please contact either:

- CEPA: Ella Pybus at ella.pybus@cepa.net.au.
- DESNZ: Jennifer Inwood at generationcosts@energysecurity.gov.uk.

Quick reference

The links below will take you to instructions for each section of the survey.

1. GENERAL INFORMATION

1.1. PURPOSE OF SURVEY

The Department for Energy Security and Net Zero (DESNZ) is updating its hurdle rate assumptions for electricity generation, storage, network and demand response technologies.

CEPA has been engaged to conduct the survey on DESNZ's behalf. For more information on how DESNZ will use the survey results, please see the letter of support available on the same web page as these instructions.

1.2. DATA MANAGEMENT AND PUBLICATION

All responses will be treated in confidence and individual survey responses will not be made public. Responses will be collected anonymously, such that neither CEPA or DESNZ will be able to attribute responses to specific respondents or organisations. The only exception is if you consent to participate in a follow-up interview.

The aggregated results of the survey may be published. CEPA and DESNZ will ensure that individual respondents cannot be inferred from any aggregated data that we publish.

DESNZ will make a copy of the aggregated survey results available to all respondents that complete the survey, in recognition of your time.

1.3. RESPONDING

This survey should be completed by appropriately qualified people within your organisation. For example:

- If your organisation invests in energy generation and storage projects, this would be a person who is familiar with your organisation's investment criteria (e.g., hurdle rates, risks that impact hurdle rates).
- If your organisation provides debt finance to energy generation and storage projects, this would be a person who is familiar with lending criteria and terms for such projects.
- If your organisation advises others on investments in energy and storage projects, this would be a person who is familiar with the advice that you provide on investment criteria (e.g., hurdle rates, risks that impact hurdle rates).

The survey link in the invitation email allows multiple people within your organisation to contribute to / review the survey response before it is submitted.

2. SURVEY SECTION A

Question A2 asks you to select what technologies your organisation is actively involved in. The table below contains some key definitions.

Technology	Definition
Geothermal (pre-drilling or post-drilling phase)	The survey is only seeking information on **deep geothermal projects**. Projects can be for either heat or power.
Novel long-duration storage	This category includes: • Liquid Air Energy Storage (LAES) • Compressed Air Energy Storage (CAES) • Flow batteries • Gravitational storage
New compound batteries	This category includes non-lithium-based batteries, with lower technology readiness levels.
Interconnectors	This category includes: • Point-to-point interconnectors. • Offshore hybrid assets – multipurpose interconnectors (projects with GB-connected offshore wind only). • Offshore hybrid assets – non-standard interconnectors (projects with foreign-connected offshore wind only). • Offshore hybrid assets – multipurpose interconnectors (projects with both GB- and foreign-connected offshore wind). **The survey is seeking hurdle rates for the transmission assets only (i.e. not including offshore wind assets).** Later survey questions will ask you to specify what type of interconnector your answers refer to.
Demand response aggregator	The survey is seeking the hurdle rate required by a demand response aggregator to invest in metering, aggregation systems / processes, customer acquisition, and any other investments necessary to operate their aggregation business.

3. SURVEY SECTION B

Sections B asks you to confirm whether your responses in Sections C, D and E are based on the assumptions listed below.

Please note:

- While the assumptions listed below are preferred, **Question B1 allows you to specify alternative assumptions** if these better reflect the projects you are involved in. For example, you may wish to assume a different revenue model than stated below (e.g., CfD for nuclear instead of a RAB model).
- If you assume a **merchant revenue model** for any technologies, please state this in the box provided.

Description	Assumption
Date	An investment decision is being made by early 2025.
Location	The project is being developed in the United Kingdom.
Policy environment	The current policy environment applies unless specified below – i.e. assume that Review of Electricity Market Arrangements (REMA) reforms are not implemented.
Revenue model	The following Government support schemes have been awarded to the project: • A 15-year contract for difference (CfD) is awarded to eligible technologies[1], assume AR6 terms and conditions. • The nuclear regulated asset base (RAB) model supports all nuclear technologies. • A Capacity Market contract is awarded to gas fired energy generation, interconnectors, demand-side response aggregators, and short-duration storage. Otherwise, for these technologies assume that 'typical' revenues earned through the wholesale and balancing markets apply. • The Net Zero Hydrogen Fund and Hydrogen Production Business Model supports hydrogen electrolysers. • The cap and floor regime applies to interconnectors. • The proposed cap and floor regime (in its current form) for long-duration energy storage applies to pumped hydro storage, compressed air energy storage and flow batteries. • The proposed business model for power Bioenergy Carbon Capture and Storage (BECCs) applies (including for BECCs conversions), i.e., the dual CfD mechanism. • A Dispatchable Power Agreement (DPA) – with or without a variable payment – applies to hydrogen-powered CCGT. • No support scheme currently applies to tidal range. **Please assume that after the relevant revenue support scheme ends, the project operates on a fully merchant basis.**
Technology	The technology adopted (e.g., turbine for OCGT) reflects the current state-of-the-art standard.
Project size	The project is grid-connected, and of a minimum size to achieve efficient construction costs and be appealing to a broad variety of investors. If you consider that project size is material for hurdle rates, please state what size you have assumed in the text box provided in the survey.

[1] Solar PV, Onshore Wind, Remote Island Wind, Offshore Wind, Floating Offshore Wind, Geothermal, Hydropower, Tidal Stream, Wave, Advanced Conversion Technologies, Anaerobic Digestion, Energy from Waste, Sewage Gas, Landfill Gas, Biomass.

4. SURVEY SECTION C

4.1. QUESTION C1

Questions C1 asks which risks have the most material impact on hurdle rates for each technology. The risks listed in the survey are defined below.

Risk category	Risk sub-category	Definition
Development risks	Planning risk	Risks associated with obtaining the planning consents necessary for the project to proceed to the construction phase.
	Delays in cross-chain infrastructure	Risks associated with delays in the development of essential supporting infrastructure required for the project to move to construction, such as ports and roads.
	Technology maturity	Risks that the technology required to develop the project is not available when needed. For example, the development phase takes longer and is more costly than anticipated due to unforeseen design complexity or an immature supply chain.
Construction risks	Construction cost and delay risk	Risks of construction cost overruns and construction period delays. These may be more accurate for projects with higher capital intensity, longer and/or more complex construction periods and a lower technology maturity (i.e., FOAK vs. NOAK).
	Macroeconomic risk	Construction cost and delay risks that are specifically linked to macroeconomic conditions. For example, related to inflation, supply chain constraints, and the price of imported components (foreign exchange rates).
Operational risks	Price risk	Risk associated with uncertainty around the price the project receives for its output. This may be partly mitigated by the support mechanisms listed in the assumptions above.
	Network congestion risk	Risk associated with uncertainty around generation output due to network congestion.
	Volume risk	Risk associated with uncertainty around generation output, for example due to: uncertainty around resource or fuel supply; uncertainty around operational performance; exposure to economic curtailment.
	TNUOS risk	Risk associated with variability in Transmission Network Use Of Service (TNUOS) charges.
	Cost risk	Risk associated with uncertainty around both fuel costs (for non-renewable technologies) and non-fuel operating costs.
Decommissioning risks	Decommissioning cost risk	Risk associated with uncertainty around the costs of decommissioning the project, to the extent this is borne by investors.

4.2. Question C3

The table overleaf presents a ranking of each technology from lowest to highest risk. Lower risk technologies are assumed to have relatively low hurdle rates, while higher risk technologies have higher hurdle rates. Technologies with the same risk rating are assumed to have similar hurdle rates.

Question C3 asks if you agree or disagree with this ranking, for the technologies you are involved in.

When responding, please consider the assumptions listed in Section B above.

Please note: the ranking and reasons are a 'test case' designed to elicit survey responses, and do not represent CEPA's or DESNZ's view on the risks faced by the technologies.

The ranking is designed to elicit survey responses and does not represent a CEPA or DESNZ view on risks.

Test case risk ranking	Technology	Revenue Model	Test case reason
Low	Solar PV	CfD	Established, mature and relatively simple technology. Substantial construction / operating experience in the UK.
Low-medium	Onshore wind	CfD	Similar maturity to solar PV, but greater complexity in construction and operation. Recently, has faced planning restrictions and supply chain constraints.
	Hydropower	CfD	Similar maturity to solar PV, but greater complexity in planning and construction. As a long-lived asset, greater exposure to merchant price risk in the period after the 15-year CfD expires.
	Anaerobic digestion	CfD	Similar maturity to solar PV, but face uncertainty around the future availability / cost of feedstocks and greater operational complexity.
	Sewage gas	CfD	
	Landfill gas	CfD	
	Large-scale nuclear	RAB	A mature technology with significant operating experience in the UK. Construction cost and delay risk is material, but there is some mitigation via the RAB model risk-sharing arrangements.
	Interconnectors	CM contract, cap and floor	There is now substantial experience with offshore interconnector development in the UK, and an established regulatory regime. Construction challenges remain, given the marine environment.
Medium (continued overleaf)	Offshore wind	CfD	Relative to onshore wind, a more challenging and complex construction and operating environment.
	Remote island wind	CfD	
	Advanced conversion technologies (standard, advanced)	CfD	Relative to anaerobic digestion/sewage gas/landfill gas, greater uncertainty around future availability / cost of feedstocks. Advanced conversion technologies / energy from waste are also less mature, implying higher risk across the project lifecycle.
	Energy from waste	CfD	
	Biomass (dedicated / conversion, unabated / with CCUS)	CfD / BECCs business model	
	Gas-fired generation (CCGT / OCGT / reciprocating engine, unabated / with CCUS)	CM contract	Gas-fired generation is an established mature technology. However, for unabated gas there is policy risk related to carbon emissions reductions and for gas with CCUS there is a higher degree of technology maturity risk. Relative to the other mature technologies, higher price risk results from the assumed revenue model.
	Lithium-based battery storage	CM contract	A mature technology, increasingly deployed in the UK. However, the assumed revenue model may involve greater price risk exposure relative to low-medium technologies.

The ranking is designed to elicit survey responses and does not represent a CEPA or DESNZ view on risks.

Illustrative risk ranking	Technology	Revenue Model	Reason
Medium	Pumped hydro energy storage	LDES cap and floor	A mature technology, but subject to construction cost and delay risk (similar to hydro). The cap and floor regime may involve greater price risk (within the cap and floor limits) relative to hydro with a CfD.
	Demand response aggregators	CM contract	While demand-side aggregation is increasingly mature, there is risk associated with finding providers (i.e., consumers willing to shift their demand) and retaining them (e.g., they may move to another aggregator). Relatively high price risk.
Medium-high	Geothermal	CfD	Relative to medium-risk technologies, higher development and construction risk, concerns around supply chain maturity, and less UK experience.
	Novel long-duration energy storage	LDES cap and floor	Relative to pumped hydro (with the same revenue model), a higher degree of both construction and operating period risk related to technology maturity.
	New compound battery storage	CM contract	Relative to lithium-based batteries (with the same revenue model), a higher degree of both construction and operating period risk related to technology maturity.
	Hydrogen electrolyser	NZHF and HPBM	While a relatively nascent technology, maturity-related risk is partly mitigated by the assumed Government support mechanisms.
	Hydrogen CCGT	DPA	While hydrogen powered CCGT is an emerging technology, the construction complexity is comparable to a gas CCGT. The DPA may provide less exposure to price risk than the assumed revenue model for gas CCGT.
High	Floating offshore wind	CfD	Immature technologies that have not yet been developed at scale and will be deployed in a challenging marine environment. While floating offshore wind is more mature than tidal / wave, it is facing material supply chain pressures.
	Tidal stream	CfD	
	Tidal range	No support scheme	
	Wave	CfD	
	Small modular nuclear reactors / Advanced modular nuclear reactors	RAB	These technologies are relatively immature, with substantial scope for construction cost/delay risk and no operating history. The risk sharing arrangements under the nuclear RAB model may partly mitigate this.