Department for Energy Security & Net Zero

Full Business Case for East Coast Cluster (ECC) Carbon Capture, Usage & Storage (CCUS)

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APPROVAL HISTORY

NAME	ROLE	DATE BUSINESS CASE APPROVED	VERSION APPROVED
Alex Milward and Paro Konar	SRO	30/05/2024	1.0
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Purpose

Since April 2021, all infrastructure and construction projects and programmes on the Government Major Projects Portfolio (GMPP) have been required to publish their Full Business Cases (FBC). This is to provide greater transparency on how HMG FBCs are developed and how decisions are made. This FBC supports investment in the East Coast Cluster (ECC) for the deployment of carbon capture, usage and storage (CCUS).

[Note: This FBC contains information that, although correct at the point of writing, may now be out of date. Furthermore, some content within this FBC has been redacted to comply with HMG publication guidelines.]

CONTENTS

Acronyms

ALB	Arm's Length Body
AP	Availability Payment
APDP	Approved Development Plan
BCR	Benefits Cost Ratio
BEIS	Department for Business Energy and Industrial Strategy
BM	Business Model
BP	Business Planning
CAPEX	Capital Expenditure
CB6	Carbon Budget 6
CBA	Cost-benefit Analysis
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Usage and Storage
CDEL	Capital Departmental Expenditure Limit
CfD	Contract for Difference
CGL	Central Grants and Loans
CIF	CCUS Infrastructure Fund
CO2	Carbon Dioxide
COD	Commercial Operation Date
CTP	Cluster Touchpoint
CX	Chancellor of the Exchequer
DBT	Department for Business and Trade
DD	Deputy Director
DEL	Departmental Expenditure Limits
DESNZ	Department for Energy Security and Net Zero
DEVEX	Development Expenditure
DPA	Dispatchable Power Agreement
ECC	East Coast Cluster
EfW	Energy from Waste
ERR	Economic Regulatory Regime
ETS	Emission Trading Scheme
FBC	Full Business Case
FOAK	First Of A Kind
FID	Financial Investment Decision
GMPP	Government Major Projects Portfolio
GSP	Government Support Package
GVA	Gross Value Added
GW	Gigawatt
GW0	Gateway Zero
H2	Hydrogen
H2P	Hydrogen to Power
HAR	Hydrogen Allocation Rounds
HMG	His Majesty's Government
HMT	His Majesty's Treasury
ICC	Industrial Carbon Capture Usage and Storage
ICP	Initial Conditions Precedent
IDC	Industrial Decarbonisation Challenge
IDH	Industrial Decarbonisation and Hydrogen

IDHRS	Industrial Decarbonisation and Hydrogen Revenue Support Scheme
IPA	Infrastructure and Projects Authority
LCCC	Low Carbon Contracts Company
LDO	Lowest Defendable Offer
LLP	Limited Liability Partnership
M&E	Monitoring and Evaluation
MPRG	Major Project Review Group
Mt	Megatonne
Mtpa	Megatonne per Annum
NDC	Nationally Determined Contribution
NDC	Net Dependable Capacity
NAO	National Audit Office
NEP	Northern Endurance Partnership *(the T&SCo for ECC)*
NFE	Negotiation Funding Envelope
NLT	Negotiation Leadership Team
NPV	Net Present Value
NSTA	North Sea Transition Authority (formerly the OGA)
NZHF	Net Zero Hydrogen Fund
NZT	Net Zero Teesside
OBC	Outline Business Case
OBR	Office for Budget Responsibility
Ofgem	Office for Gas and Electricity Markets
ORB	Online Reporting in BEIS
OPEX	Operational Expenditure
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
PB	Programme Board
PIC	Portfolio and Investment Committee
PMO	Project Management Office
QSRA	Quantitative Schedule Risk Analysis
RAB	Regulated Asset Base
RAV	Regulated Asset Value
RAID	Risks, Assumptions, Issues, and Dependencies
RDEL	Resource Departmental Expenditure Limit
RSA	Revenue Support Agreement
SCA	Supplementary Compensation Agreement
SOBC	Strategic Outline Business Case
SoS	Secretary of State
SR	Spending Review
SRO	Senior Responsible Owner
T1/T2	Track-1/Track-2
T1x	Track-1 Expansion
T1M	Track-1 Negotiation Mandate
T1PNL	Track-1 Project Negotiation List
T&S	Transport and Storage
T&SCo	Transport and Storage Company
TDS	Technical Details Schedule
TRI	T&S Regulatory Investment
VfM	Value for Money

UK	United Kingdom
UK ETS	United Kingdom Emission Trading Scheme
XWH	Cross Whitehall

1. Executive Summary

1.1 Why CCUS?

CCUS (carbon capture, usage and storage) is the process of capturing carbon dioxide (CO_2) and storing it safely underground. CO2 can be captured from industrial plants (e.g. cement, chemicals, energy from waste), hydrogen production (blue H2) and power stations, henceforth referred to as 'capture projects'. CO2 is then transported via pipelines, compressed and stored in deep geological formations such as depleted oil and gas fields or saline aquifers underground.

CCUS is essential to deliver on the UK's net zero ambitions, to achieve energy and supply chain security and to enable hard-to-abate sectors to decarbonise. For many hard-to-abate sectors, CCUS presents the only feasible method for decarbonisation (e.g. cement production) and is currently the most cost-effective method of decarbonisation for various others (e.g. dispatchable power). CCUS will also stimulate innovation and growth across the country, protecting industry and jobs.

CCUS has been operational globally since the 1970s; the Sleipner project in Norway was the first carbon capture and storage project to deploy at commercial scale in the 1990s and carbon capture has been used since the 1970s in the USA. Successful projects are also in operation in Canada and Brazil and deployment in Europe is moving forward at pace with national subsidy schemes and legislation proposed or in place to incentivise CCUS. The global market for CCUS is growing (estimated to require $120bn p.a. globally by 2050)[1] and the UK is well positioned to take advantage of this due to its geology, skills, and infrastructure. The UK has up to 78bn tonnes of CO2 storage capacity in the North Sea,[2] one of the largest in the world. Investing in CCUS now could allow the UK to become a global leader and export its expertise and storage services to Europe and beyond, boosting the UK economy by up to £5bn per year in GVA in 2050.[3]

1.2 Lessons learned: The UK's approach to CCUS

There are multiple market barriers which inhibit the development of a CCUS market in the UK. The Carbon Price is currently too low to incentivise deployment, there is a first-mover disadvantage due to high start-up costs and innovation spillovers, and developing a CCUS market requires complex investment coordination and substantial risk. Government intervention is necessary to address these initial challenges and enable CCUS deployment at scale.

To achieve its ambition, HMG has co-developed, across multiple industries over several years, a market intervention based around a CCUS cluster model. This cluster model focuses on industrial areas of dense co-location of hard-to-abate sectors, which are close to potential storage sites. It then aims to address the market barriers above to stimulate the growth of a pioneering CCUS industry at scale via sector-specific interventions (the business models). This approach has considered lessons learnt from previous failed attempts to launch CCUS in the UK which ended in 2011 and 2015 respectively. Additionally, government has run various smaller-scale development and demonstration projects in recent years, including through the Accelerating CCUS Technologies, CCUS Innovation and Industrial Decarbonisation Challenge programmes. These have built a better understanding of the project pipeline within government and have helped to prepare the UK CCUS sector for commercial-scale deployment. This process has allowed us to continuously gather information and learn lessons from real-world projects in developing the business model agreements.

The Cluster model has a Transport & Storage Company (T&SCo) operating a CCUS Transport and Storage (T&S) network, which takes the CO2 emitted by the capture projects and stores it underground. The T&SCo and the capture projects have a contractual relationship, with the capture projects paying a fee to the T&SCo to store their CO2 emissions.

Currently, the costs of constructing and operating a CO2 capture plant are higher than the costs incurred by emitting CO2 into the atmosphere. To address this, HMG provides 'capture projects' with economic incentives through subsidy contracts and in some instances capital grants for initial projects. These contracts, which can last up to 15 years, ensure that capture projects are economically motivated to build and operate the necessary infrastructure to capture their CO2 (and pay the storage fee to the T&SCo) rather than emitting it. Cost and plant performance

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[1] www.mckinsey.com. (n.d.). Global Energy Perspective 2023: CCUS outlook | McKinsey

[2] GOV.UK (2023). North Sea 'treasure map' to grow the economy and unleash the UK's carbon capture and storage industry.

[3] Internal DESNZ analysis based on the Energy Innovation Needs Assessment (2019) Available at: https://assets.publishing.service.gov.uk/media/5dc5872be5274a4f2286fc76/energy-innovation-needs-assessment-ccus.pdf

requirements are generally fixed under the business models, meaning that the delivery and performance risk sits with the industry.

Initially, the T&SCo operates as a monopoly and is therefore regulated by Ofgem through a Regulated Asset Base (RAB) model. Under the terms of an economic licence, Ofgem sets a total 'allowed revenue' for the T&SCo which is recovered from the fees charged to the capture projects. The allowed revenue covers the T&SCos operating costs, capital investment and provides an agreed rate of return. The T&SCo is subject to several incentive structures, whereby its rate of return can be increased or decreased based on key operational performance measures.

HMG intervention on the T&SCo side aims to address the initial deployment barriers. If there was a shortfall in demand for the network, and aggregate User fees did not meet the T&SCos allowed revenue, government guarantees these fees through the exchequer-funded Revenue Support Agreement (RSA). Additionally, government will underwrite several key high-impact, low-probably risks – principally relating to CO2 leakage – via the Supplementary Compensation Agreement (SCA). In this first deployment, the RSA and SCA are 25-year contracts, to provide investors with confidence in the stability of the returns and stimulate growth and investment. However, if support provided reaches a defined threshold, DESNZ SoS has the right to discontinue the T&S network.

In addition, HMG covers some of the 'cross-chain' risks from the interdependencies between T&SCo and capture projects. Through lengthy negotiations, we have sought to allocate risks to the party most suited to manage them, ensuring the private sector can raise private investment and that the model is deliverable.

This world-leading economic model[4] has the potential to establish a self-sustaining CCUS industry in the UK. As the costs of emitting CO2 increase, the cost of CO2 capture is anticipated to decrease, fostering increased competition for T&SCos and opportunities for reduced HMG intervention and economic regulation. As the market matures, this will enable the emergence of a commercial and competitive private sector led CCUS market and a hydrogen economy. Approving the ECC FBC will enable the first steps towards CCUS' essential contribution to: energy security and the mission for clean power by 2030, UK trade, and lowest cost pathway to Carbon Budgets.

1.3 Approval Sought

Previous approval	Date complete
Strategic Outline Business Case (SOBC) PIC approval	29th April 2021
Cluster Selection Phase 1 outcome	19th October 2022
Outline Business Case (OBC) PIC approval	31st March 2022
Ministerial announcement of Negotiation Funding Envelope (NFE) & selected projects	March 2023

ECC is one of the initial clusters, alongside HyNet, and is located in the Northeast of England.

Through this FBC, we are only seeking approval for the T&SCo and the one (power) capture project that's sufficiently mature to take Final Investment Decision (FID) – the 'anchor' scope. The remaining two projects will be approved via individual FBCs once they are sufficiently mature; in this business case, we refer to these projects as the 'build-out'.

The '**anchor' configuration** for ECC is comprised of the following projects:

- **Northern Endurance Partnership (NEP)** – The T&S network, which will use new constructed on-shore and off-shore pipes to transport captured CO2 into a saline aquifer under the North Sea.
- **Net Zero Teesside (NZT)** – Newbuild gas fired CCS enabled power plant. It will be the first such full-scale plant in the world, and will dispatch when required, e.g. to balance intermittent renewables.

The '**build-out' projects** for ECC, which we anticipate will take FIDs, are as follows:

- **BOC** – An industrial capture plant which will be retrofitted to one of the UK's largest existing hydrogen Steam Methane Reforming (SMR) plants.
- **H2Teesside (H2T)** – New build CCUS-enabled hydrogen production plant, which would be the largest in the UK and one of the largest globally.

[4] CCUS Seeking a bankable business model, Deloitte White Paper – Nov 2023

This incremental approach, to deploy and build the initial 'anchor' infrastructure first and then fill the remaining available T&S capacity via the 'build-out' and network expansion processes, introduces greater risk of network underutilisation and revenue support exposure, but is the most effective way to deploy CCUS. It:

- Allows HMG to reduce costs by avoiding unnecessary delays to coordinate FIDs, and projects needing to down tools (which may risk stopping development altogether).
- Allows effective construction supply chain management, avoiding unnecessary costs and delays.
- Achieves the earliest date for network operation (including expansion) and therefore optimises benefits, including CO2 captured.

We are also seeking approval of funding for early appraisal activity to enable build out to the Humber region and additional CO2 stores. This early investment in Track-1 expansion would enable its timely and cost-effective delivery, avoiding a delay that could be 6 months or more and saving ~£100m. The funding requirement and budget impacts are reflected in the financial case.

1.4 Value for Money

Within this business case, we have assessed three potential options to deploy CCUS:

- **Option 0: Business as usual** outlines the impact of no HMG intervention in CCUS.
- **Option 1 (preferred): Anchor Project Scope** asks for the approval of the 'anchor' configuration and would seek further approval for the build-out projects later.
- **Option 2: Full T1PNL Scope** presents an alternative option where approval is obtained for the T&S network and all four 'anchor' and build-out projects (NEP, NZT, H2T, BOC).

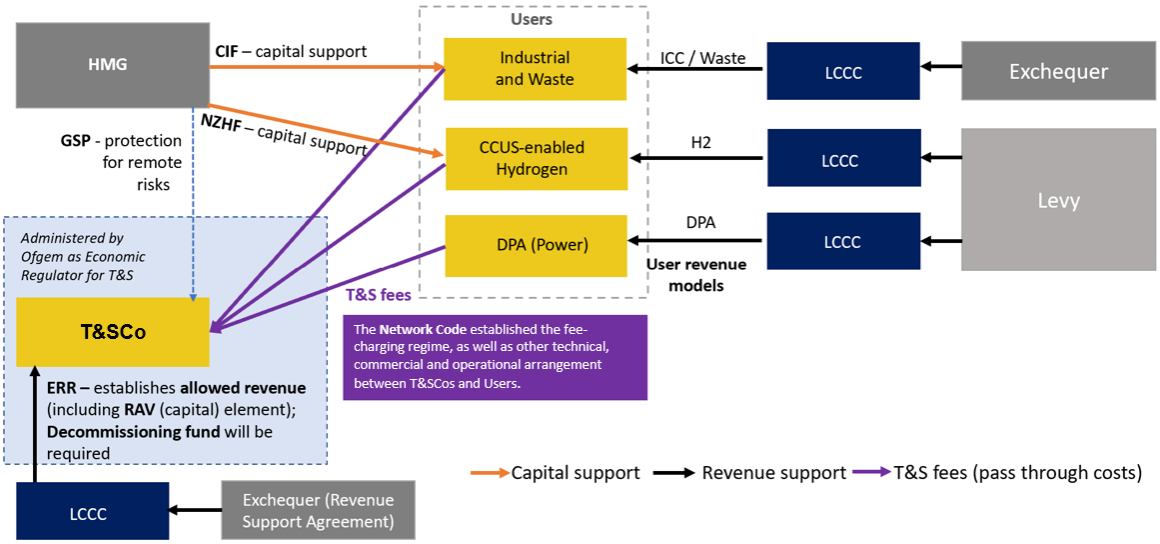
We recommend pursuing **Option 1: Anchor Project Scope.** Analysis suggests that both Option 1 and Option 2 provide good value for money (VfM) – which indicates that to remain on the pathway to net zero, investment into ECC presents better investment than alternative forms of abatement.

We recommend pursuing Option 1 because it allows us to manage the uncertainty of build-out projects, enabling us to take FIDs individually and seek funding for them once projects reach their required maturity and we are reassured they present a VfM proposition. This approach also enables more mature projects to become operational earlier compared to waiting for the slowest projects in a cluster to be ready before any CO2 is captured, and thus offers the potential (with successful delivery) of a more credible deployment pathway to CCUS' contribution to Carbon Budgets. The initial 'anchor' configuration has positive quantified VfM against a Net Zero Consistent Counterfactual (NPV of £1bn). As build-out and expansion projects join the ECC network, more economic benefit is realised and NPV improves to £2.5bn and £11bn respectively.

ECC will also deliver benefits and costs that have not been monetised. Benefits include safeguarding the security of the UK's electricity supply, positive environmental impacts, productivity, and innovation benefits, as well as supporting economic activity in the Northeast of England. Costs include the potential for CO2 leakage and environmental and air quality impacts.

1.5 Financial Summary

ECC will add significant pressure to CCUS delegated budgets in 2024/25 but is potentially affordable following agreement from the Chancellor for the cluster to proceed to FID in this financial year. Subject to approval from MPRG, the Chancellor is expected to provide their approval of the Final Funding Envelope. This will provide the department with sufficient confidence that additional budget will be secured through the Supplementary Estimate process, which will be sought from HMT at the Supplementary Estimate in 2024/25.



1.6 Deliverability and Risks

Whilst the benefits are substantial, the approach proposed carries significant risks. We believe that through our assurance, negotiations and delivery work we have reached investible deals, where we have:

- Designed a suite of business model agreements and a Network Code which are suitable for the delivery of commercial-scale CCUS, whilst also providing VfM for the taxpayer and energy bill-payer.
- Agreed commercial terms with ECC 'anchor' projects via a well-structured negotiation strategy.
- Tested the data, assumptions, delivery schedules, costs and risks put forward by delivery partners via best-practice internal and external assurance.
- Established an initial operating model for the delivery phase, working across Whitehall, with the relevant partner organisations (Ofgem, LCCC, DESNZ Central Grants and Loans Team) and industry. Our Delivery Phase operating model includes governance and assurance arrangements, monitoring and evaluation mechanisms, and risk management processes, to ensure we have a robust oversight structure to provide delivery confidence.

However, investing in CCUS still carries significant risks. The major risks and mitigations are below:

- **Benefit realisation:** CCUS is still a modest scale industry globally, and there are significant operational risks (well failure, leakages, cross-chain coordination issues) which are untested at this stage and could result in slower deployment and / or lower effectiveness. However, the business model contracts provide significant protection against underperformance and the risk is mostly borne by the private sector. In addition, our assurance teams have scrutinised the technical details and construction schedules of our delivery partners.
- **Cost escalation:** Costs for build-out projects could increase, as their engineering design and procurement continue to mature. 'Anchor' project cost increases impact HMG through cost sharing agreements (e.g. a 60/40 cost-sharing agreement with T&SCos). However, exposures for 'anchor' projects are understood and assured, and sensitivity analysis has been carried out.
- **Contingent liabilities and cross chain risks:** HMG is reducing investor risk in CCUS technologies by bearing some of the initial risk inherent in developing a CCUS market, as well as the cross-chain risk existing across multiple parties. The business models and negotiations have ensured that risks are borne by the party most suited to bear them, and that parties are incentivised not to cause cross-chain risks. A core function of the DESNZ Cluster Sponsor Function will be the management of these cross-chain risks through proactive collaboration and coordination with partner organisations such as Ofgem and LCCC.
- **Operational and delivery risks:** In addition to the significant operational risks noted above, multiple parties are involved in delivery; increasing complexity and risk of delays. However, the delivery partners have mature technical designs and integrated, risk-assured construction schedules, scrutinised by DESNZ assurance teams. The operating model for the delivery phase has been developed and will continue to mature and evolve.
- **Future funding certainty & expansion:** At Cluster FID, DESNZ will be entering a 25-year contract with NEP and a 15-year Dispatchable Power Agreement (DPA) with NZT. Funding for BOC and H2T under the ICC and LCHA contracts respectively, will be agreed through subsequent FBCs aligned to their FIDs. Under the terms of the ICC contract, BOC could exit the contract after 10 years if they do not seek or are not awarded a 5-year extension, which may lower exchequer funding requirements

- **Self-sustaining system and carbon price:** HMG aims to create a self-sustaining CCUS sector by increasing competition, driving down costs and stimulating private sector investment. However, whether ECC becomes subsidy-free depends on CCUS costs and carbon markets developing as expected. Business models and wider enabling policies are under review for future tracks to ensure CCUS is deployed in the most effective way.

1.7 Why Now?

Whilst the proposed approach is novel and carries risk, the benefits of investing in ECC and kick-starting CCUS deployment in the UK are substantial. Investing now in CCUS will allow us to:

- **Decarbonise UK industrial base:** Industrial CCUS is essential for hard-to-abate industrial sectors such as cement and refineries. Without it, we will leave our industrial base exposed to high carbon prices and the risk of becoming increasingly uncompetitive. Furthermore, our commitment to hydrogen as an energy source will bolster the decarbonisation efforts of UK industries, which cannot rely solely on electrification.
- **Position the UK as a global leader in CCUS:** The global market for CCUS is growing exponentially, and the UK is well placed to take advantage of it. The Cluster Model is world-leading, and many of the capture projects are pioneers in their sector (e.g. blue hydrogen, gas-fired power CCS, low carbon cement). Delay risks the UK being left behind by competitors (the USA, Norway, the Netherlands, Denmark, Canada, etc.) who are also investing in CCUS and will seek to crowd-in significant private sector investment and resources.

In addition, these deals are time-sensitive, and any delays would introduce significant risk:

- **Investor Confidence:** Given the historic failed attempts at establishing CCUS in the UK, delays would significantly erode confidence at all levels - suppliers, lenders, and sponsors. Counterparties have already invested substantial capital, conservatively estimated by the industry association to exceed £1bn, and continued investment relies heavily on maintaining confidence in the deployment timeline. Failure to meet deadlines could prompt the private sector to withdraw, redirecting capital to more reliable markets. This would not only delay CCUS deployment in the UK but also likely result in higher overall costs in the future.
- **Non-linear delay:** A delay risks missing key project milestones and causing non-linear delays e.g. if the project extends beyond the validity window of commercial bids or finance commitments, it may necessitate lengthy retendering and finance processes. Delays would also introduce uncertainty in the sequencing of the delivery phase and risk missing important construction weather windows, potentially extending construction timelines. Such delays would challenge the feasibility of having ECC operational in the 2020s.
- **Increased costs:** Delays will also lead to significantly higher costs due to retendering, loss of competitive tension at the supplier level, and additional risk premia due to perceived wavering HMG commitment.

Hence, in this business case, we are recommending that we invest in the 'anchor' configuration for ECC now. This will enable the UK to achieve its net zero, energy security and growth objectives, including clean power by 2030, and to avoid the significant negative strategic and delivery impacts that delays would cause.

1.8 High Level Milestones

Milestone	Date
Approvals & Assurance	
IPA Gateway 3 Review	w/c 29th April 2024
PIC Review	11th July 2024
MPRG Review	2nd August 2024
SoS Approval	8th August 2024
Gateway 4 Review	Q3 2028
HMG Fiscal Events	
Spring Budgets	March 2024
Autumn Budgets	TBC 2024
M&E Key Dates	
Process Evaluations	2024-2026
Interim Impact Evaluations	2028-2030
Final Impact Evaluation	Post 2030

2. Strategic Case

2.1 Strategic Assessment

2.1.1 Background

CCUS (carbon capture, usage and storage) is the process of capturing carbon dioxide (CO2) and storing it safely underground. CO2 can be captured from industrial plants (e.g. cement, chemicals, energy from waste), hydrogen producers (blue H2) and power stations, henceforth referred to as 'capture projects'. CO2 is then transported via pipelines, compressed and stored in deep geological formations such as depleted oil and gas fields or saline aquifers underground.

For many hard-to-abate sectors, CCUS presents the only feasible method for decarbonisation (e.g. chemicals, cement, waste) and is currently the most cost-effective method of decarbonisation across other sectors (e.g. power).

CCUS can enable low-carbon flexible electricity generation through deployment of power CCUS, supporting the mission for clean power by 2030. In a decarbonising energy system, long-duration flexibility will be critical to ensuring security of electricity supply, providing dispatchable power when demand is very high. Power CCUS can support security of supply directly through providing dispatchable power, and indirectly by providing a strong signal to investors that there is a future decarbonisation route for gas produced power.

CCUS also enables at-scale deployment of hydrogen (H2), by allowing the production of 'Blue H2', H2 which is generated via natural gas and CO2 is stored. Blue H2 is significantly more cost competitive (up to three times cheaper) and scalable than electrolytic hydrogen,[5] which is being supported via Hydrogen Allocation Rounds.

CCUS has been operational globally since the 1970s; the Sleipner project in Norway was the first carbon capture and storage project to deploy at commercial scale in the 1990s and carbon capture has been used since the 1970s in the USA. Successful projects are also in operation in Canada and Brazil and deployment in Europe is moving forward at pace with national subsidy schemes and legislation proposed or in place to incentivise CCUS.

2.1.2 Current Position

For the UK to meet its NDC and CB6, total UK emissions need to be reduced by 68% and 77% from 1990 levels respectively. To reach these targets, the UK needs to enable widespread decarbonisation of its hard-to-abate sectors. This is not achievable without CCUS, electrification (which is only feasible for some industrial processes) or alternative low-carbon fuels such as low-carbon hydrogen (via blue H2 generated through CCUS).

In the absence of viable decarbonisation options, manufacturers of critical industrial materials may relocate to more favourable jurisdictions due to the escalating costs of emissions; otherwise known as 'carbon leakage'. As a sector, industry contributes £200 billion of GVA to the UK and supports 2.4 million direct jobs.[10]

This is why through the Net Zero Strategy,[6] and more recently the Carbon Budget Delivery Plan,[7] we set the ambition to deliver four industrial CCUS clusters by 2030, with at least two clusters delivered (now 'supported') by the mid-2020s including up to 6Mt of CO2 from industrial carbon capture sources by 2030, and one CCUS power plant by the mid-2020s. In addition, the Hydrogen Production Delivery Roadmap set the ambition to deliver 4GW of low-carbon 'blue' hydrogen by 2030.[8]

These initial clusters are the first phase in CCUS deployment in the UK (the market creation phase), as articulated in the CCUS Vision, which aims to make the UK a global leader in CCUS and create a self-sustaining CCUS market from 2035.[9] The UK has made substantial progress in the market creation phase, having developed our legislative and economic regulatory regime and CCUS business models and announced the first four CCUS clusters. This approach will de-risk CCUS, stimulate private sector investment and enable the emergence of a commercial and competitive private sector-led CCUS market. There is substantial appetite among investors across the world to back carbon capture, as evidenced by 21 countries signing up to the Carbon Management Challenge to deploy CCUS.[10]

Learning lessons from past attempts of deploying CCUS in the UK (2011 and 2016) as well as international examples, we chose to deploy CCUS via a cluster approach. In October 2021, we announced that the first UK

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[5] https://publications.parliament.uk/pa/cm5803/cmselect/cmsctech/99/summary.html
[7] https://www.gov.uk/government/publications/net-zero-strategy
[8] https://www.gov.uk/government/publications/carbon-budget-delivery-plan
[9] https://www.gov.uk/government/publications/hydrogen-production-delivery-roadmap
[10] https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-a-vision-to-establish-a-competitive-market

clusters would be the East Coast Cluster and the HyNet Cluster. In March 2023, we announced the successful projects that were being progressed to the Track-1 negotiations phase for these two initial clusters. Since then, we have been negotiating investible deals with ECC's T&SCo (NEP) and ECC's three capture projects: Net Zero Teesside (NZT), Teesside Hydrogen CO2 Capture (BOC) and H2Teesside (H2T).

We have now reached a deliverable and investible position with ECC and the commissioning capture project, NZT, and are ready to take an investment decision on both projects (the 'anchor' cluster). Our commercial positions with both projects carefully balance benefits and the investment risk profile, where HMG only assumes cross-chain risk that is necessary for an investible and cost-effective proposition (see Section 4.7).

2.2 Rationale for Intervention

2.2.1 Justification

Deploying CCUS at scale in the UK is essential to deliver on the UK's net zero ambitions, to achieve climate, energy, consumer and economic security, and to enable hard-to-abate sectors to decarbonise. By enabling the net zero transition of industry, CCUS will protect jobs and skills that are vital to a thriving UK economy and improve the long-term resilience of UK industrial capacity.

ECC is also essential to meet our hydrogen ambition; H2T will deliver CCUS-enabled 'blue' hydrogen production capacity to Teesside[9]. H2T is a critical component in our twin-track approach[11] to meet the needs of the hydrogen economy. We expect the latter to become a core production technology long-term, as cost reductions are enabled through complementary policy (e.g. HAR). In addition, the scale up of low-carbon hydrogen is a critical dependency of H2P. H2T will therefore play a significant role in supporting our electricity security with further potential through ECC expansion.[12]

ECC will also provide low carbon flexible electricity generation, supporting the UK's electricity and consumer security in a decarbonising energy system, and our mission for clean power by 2030. The UK is at risk of a flexible generation capacity shortage from the late 2020s. NZT will demonstrate the investability of power CCUS and the Dispatchable Power Agreement, encouraging a pipeline of projects to come forward to help meet demand.[13]

However, whilst CCUS is a necessity to meet our net zero and electricity security ambitions, the private sector is not sufficiently incentivised to deploy CCUS technology at the pace and scale needed to do so. There are a number of market barriers which inhibit this – for example, it is currently cheaper for companies to emit CO2 than to capture and store it, due to a low UK Emissions Trading Scheme (ETS) market price for carbon; project developers for the first CCUS projects will bear higher start-up costs to those who join the market later; there are substantial investment risks which the market is not willing to bear; and significant coordination failures.

Hence, government intervention is needed for an interim period to overcome these barriers. The business model interventions, set out in Section 4.1.3 in the commercial case, support the deployment of CCUS at pace and at scale by making CCUS an investible proposition, via a commercial framework that the private sector can invest in long-term. In comparison to other international examples, the UK approach is unique in its bankability and scalability globally,[4] and addresses the failures of past attempts[14] by providing regulatory certainty, economic incentives and coverage of key cross-chain risks.

By overcoming these barriers ECC will create an enabling environment for long-term CCUS deployment, securing a pathway to a self-sustaining CCUS market from 2035. This will crowd in billions of pounds of investment to our industrial regions, and could support up to 50,000 jobs in 2030[10]. This will strengthen UK CCUS and hydrogen supply chain capability, which will position UK companies well to export CCUS and hydrogen expertise to support

[4] CCUS Seeking a bankable business model, Deloitte White Paper – Nov 2023

[9] https://www.gov.uk/government/publications/hydrogen-production-delivery-roadmap

[10] https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-a-vision-to-establish-a-competitive-market

[11] https://www.carbonmanagementchallenge.org/cmc/

[12] https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-a-vision-to-establish-a-competitive-market

[13] £1.5bn reflects the total expected value of Capacity Market payments that would be made for the equivalent capacity of power CCUS deployment.

[14] https://www.nao.org.uk/reports/carbon-capture-and-storage-lessons-from-the-competition-for-the-first-uk-demonstration/

the international decarbonisation effort. There is a potential for £4 billion to £5 billion in Gross Value Added from UK CCUS industry per year in 2050, which includes exporting our expertise and storage services to other countries.[3]

Our approach will create substantial economic opportunities for the UK and support the government's long-term plan for growth[15]. Moreover, it will protect industry and jobs, stimulate innovation and growth across the country, all whilst enabling the UK to achieve its legislated target of net zero by 2050 and meet CB6.

2.2.2 Strategic Fit (Departmental)

ECC is a critical component of our broader departmental strategy to prioritise climate security, energy security, consumer security and economic security. As outlined in the sections above, CCUS:

- Supports multiple pathways to net zero in 2050 and emissions savings required to meet CB6.
- Supports the UK's electricity security (see section 2.2.1) and mission for clean power by 2030.
- Provides a pathway to establish a UK H2 mass market and kick-start the hydrogen economy.
- Backs long-term growth and economic security by stimulating private sector investment within industrial areas, 'Levelling Up' the Teesside industrial region and Humber regions.

2.2.3 Wider Government Priorities

Delivery of ECC will make significant contributions toward wider government priorities. Our Project Outcome Profile (POP) shows how ECC and CCUS Track-1 cluster outputs will directly support departmental outcomes across DESNZ, HMT, DFT, DBT, and DLUHC, as well as the metrics we are using to measure this.

[3] Internal DESNZ analysis based on the Energy Innovation Needs Assessment (2019) Available at: https://assets.publishing.service.gov.uk/media/5dc5872be5274a4f2286fc76/energy-innovation-needs-assessment-ccus.pdf

[15] https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth

2.2.4 Strengthening the UK Union

CCUS policies encompass a range of policy areas, both reserved and devolved. A UK-wide approach is being taken to the identification of CCUS projects for HMG financial support, and projects in England, Scotland and Wales will be supported through the process of selecting Track-1 and Track-2 projects.

The Energy Act 2023 establishes a UK-wide financing and regulatory framework for CCUS, and a ministerial forum on CCUS is being established to support the development and deployment of CCUS across the UK. This ministerial forum met for the first time in December 2023.

As outlined in previous sections, ECC will play a vital role in Levelling Up and driving growth across industrial heartlands in the UK. Regional economic impacts are further considered in Section 3.6.

2.3 Aims and Outcomes

2.3.1 Scope

The scope of this FBC is for approval of the 'anchor' Cluster with NEP (T&SCo) and NZT.

The '**anchor' configuration** for ECC is comprised of the following projects:

- **Northern Endurance Partnership (NEP)** – The T&S network, which will use new constructed on-shore and off-shore pipes to transport captured CO2 into a saline aquifer under the North Sea.
- **Net Zero Teesside (NZT)** – Newbuild gas fired CCS enabled power plant. It would be the first such full-scale plant in the world, and will dispatch when required, e.g. when the wind does not blow.

The 'build-out' projects – H2T and BOC – are not within the scope of this FBC. Approval for these projects will be sought via separate FBCs once they reach the required maturity to inform an investment decision

The scope of this FBC includes funding to develop a T&S network and onshore infrastructure sized to enable the 'build-out' projects to connect. (See *Section 4.2.2* for an assessment of the commercial risk of this approach).

This FBC also includes funding for the early appraisal activity to enable 'build-out' to the Humber region and additional CO2 stores. Early investment in Track-1 expansion would enable timely and cost-effective delivery, avoiding a delay that could be 6 months or more and saving ~£100m. This expansion development expenditure is included in Phase 3 of the Approved Project Development Plan (APDP), which sets out 5 tranches of work. The pre-FID and Tranche-1 elements of this expenditure are already committed, but SoS DESNZ approval is required for the subsequent tranches.

This staggered deployment approach, where the T&S network is built alongside 'anchor' projects, and future 'build-out' projects join as they reach required levels of maturity, allows us to de-risk and expedite delivery, and accounts for the relative complexity of individual projects. Aligning FIDs would have resulted in delays of +15 months to operational dates, as well as increased costs and risks of projects walking away due to them needing to down tools and retender. Whilst this approach increases the risk of network underutilisation, we have assessed that risk to be low.

T&S Network

The T&S network will be constructed in phases as defined in the APDP. The phases have been scheduled in a way that allows the T&SCo to demonstrate network performance whilst minimising costs to users, using a deterministic approach to align commissioning with the first available user. Flexibility in the schedule has been enabled to allow for timing uncertainty on when users will commission. Phase 1 sets out the works and activities that need to be completed to achieve System Acceptance (COD) whereas Phase 2 activities are anticipated to be completed post COD with Phase 3 setting out activities relating to the expansion of the T&S network to support Track 1 Expansion (T1x). The entire T&S network will be fully constructed as part of Phase 1 for ECC, this includes the onshore 'trunk' pipeline on Teesside, metering equipment and compressors as well as all offshore infrastructure such as the subsea pipelines, 5 injection wells and 1 monitoring well. It is anticipated one of the injection wells will not be tested / commissioned as part of Phase 1 to meet the System Acceptance criteria. All parts of the system will be commissioned in Phase 1 with the exception of the onshore 'trunk' pipeline, the H2T spurline, the BOC spurline and 1 injection well.

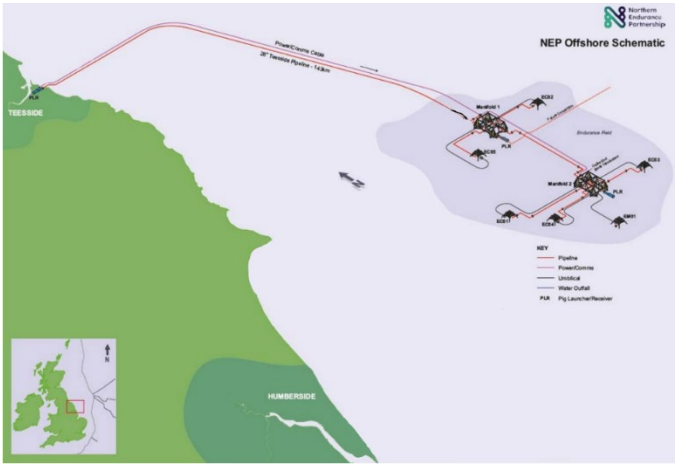
Phase 2 of the APDP includes commissioning remaining infrastructure not commissioned during Phase 1. This includes the commissioning of the 'spur' pipelines to H2T and BOC as well as the onshore 'trunk' pipeline which can only occur once H2T and BOC connect to the network and start flowing CO2. The remaining injection well will be

commissioned by NEP once the T&S network starts to achieve and maintain a sufficient level of flow from the users i.e. NEP will commission the once it's needed to maintain T&S availability.

Phase 3 includes appraisal activities for the Humber onshore pipeline and pumping station, offshore subsea pipeline that will connect to the manifold at Endurance, and additional CO2 stores (Bunter Closures). These additional stores will increase network capacity to up to 10Mtpa.

Subject to store expansion, appraisal, and development there is a possibility that the network could expand even further, with the project developers suggesting there could ultimately be up to 20Mtpa capacity.

ECC Offshore network map



ECC Onshore network map

2.3.2 Objectives

In line with previous business cases, we have chosen to show a tiered approach for objectives. The key objectives for this Full Business Case (FBC) – Track-1 SMART objectives – are shown in the lowest tier. Whilst the guidance documents for Track-1 Phase 1 and Phase 2 set out objectives, we have refined these to be SMART objectives below.

CCUS Track-1 Objectives and Metrics
1. Two CCUS clusters supported by the mid-2020s (with combined peak storage capacity of 8.5Mtpa CO2) and 4.7Mtpa averaged captured CO2 by 2030, measured by: o Combined peak storage capacity of the two clusters (Mtpa) by 2030 o Average volumes of CO2 captured (Mpta) by 2030 **2. Stimulate the deployment of first of a kind (FOAK) CCUS projects by supporting 2 CO2 T&S networks, 1 gas CCUS power plant (MW), up to 3Mt/year of ICC (inc. waste) and at least 1GW of CCUS-enabled hydrogen, measured by:** o Capacity/capture in operation with government support: CO2 T&S capacity (Mtpa) from 2028, gas CCUS power capacity (MW) from 2028, industrial and waste carbon capture (Mt/year) from 2028, CCUS-enabled hydrogen capacity from 2028 **3. Stimulate CCUS supply chain, jobs, and skills, over the support contracts' lifespans, through the deployment of FOAK projects to establish a competitive CCUS industry which supports and safeguards essential UK industrial sectors, measured by:** o Number of jobs created and supported directly by project by COD o Value of spend on supply chains o Skills level increases, and salary uplift resulting from upskilling of staff working in CCUS projects o Qualitative evidence from industry on safeguarding the sector **4. Establish a commercial framework to stimulate private sector investment in CCUS projects by reducing investor risk and overcoming first mover market barriers, enabling a pathway to a fully self-sustaining and competitive CCS industry, measured by:** o Number of investors committed to CCUS projects and value of private investment o Capital and operating (excluding fuel costs where appropriate) unit costs of CCUS projects o Strike prices during Track-1 and Track-2 support windows o Number of projects applying to subsequent stages of CCUS deployment o Volume of unutilised network capacity (Mtpa) across the clusters by 2030

2.3.3 Benefits being sought

We have developed a set of Track-1 **core benefits** that can be mapped against the SMART objectives above and the Track-1 Theory of Change (ToC). We have also considered **wider benefits,** which are defined as having more strategic or long-term impacts. Our ToC maps out how Track-1 resources and inputs are channelled through a set of specific activities (e.g. policy/market development, Cluster Sequencing process) to achieve the anticipated outputs (e.g. barriers overcome, contracts signed, FID taken, projects delivered), outcomes (e.g. contribution to 2030 capture

targets, contribution to jobs, increased confidence, lessons learnt), and overall impacts (e.g. contribution to reducing carbon emissions, optimised energy system, decreasing costs, wider economic benefits).

Each core and wider benefit has been assigned indicators from the indicator framework in the Track-1 M&E Plan to facilitate monitoring of benefits realisation. All benefits relate and contribute to the Department's strategic and DESNZ Priority Outcomes (energy security, climate security, consumer security and economic security). Practical elements of benefits realisation are discussed further within the management case.

2.3.4 Inter-Dependencies, Assumptions & Constraints

Interdependencies	Importance
Wider policy implementation - The use of carbon pricing through UK ETS to drive private sector action and to increase the cost of counterfactual fuels and confidence that the carbon price will rise sufficiently to put us on a net zero trajectory.	Critical
Build-out projects - Delivery of key project benefits are dependent on later projects successfully joining the network. If they fail to do so, this will impact volumes captured/stored and thus impact strategic objectives.	Critical
Net zero priorities - The government's commitment to CCUS must remain a long-term priority for the UK's net zero transition. This is a fundamental driver for enduring private sector investment and achieving a self-sustaining CCUS market as well as the significant economic benefits this will bring to the UK.	High
Assumptions	**Importance**
Projects costs will increase if intervention is delayed - The longer it takes to make this intervention in ECC, the more time and resources are required to maintain the project's readiness, which can result in higher costs. Additionally, the longer the delay, the greater the risk that the market conditions, technology, and regulatory environment may change, which could also result in higher costs.	High
The cost of emitting carbon will continue to incentivise demand for CCUS - Carbon pricing will incentivise investors to enter the UK market as development costs reduce, supporting the development of a competitive CCUS market and ensuring investors remain committed to CCUS.	High
Electricity demand will continue to increase - As demand for electricity increases, there will be a greater need for low-carbon electricity generation to meet this demand while also reducing greenhouse gas emissions. CCUS technology will play a key role in this by enabling the deployment of flexible, low-carbon electricity generation, which can help to balance the intermittency of renewable energy sources and meet the growing demand for electricity.	Medium
Increased CCUS demand - International demand and investor interest into CCUS continues to increase.	Medium
CO2 capture - Projects will be able to capture and dispatch sufficient CO2 to the network to meet their agreed capture volumes, which in turn will allow the programme to meet the CB6 targets.	Critical
T&S network and capture projects will be built - Projects must be commissioned, and the network utilised in order for many of the other benefits and assumptions to hold true.	Critical
Delays will increase costs and impact investor confidence – This necessitates a timely intervention by HMG - the longer the delay, the greater the risk that the market conditions, technology, and regulatory environment may change, which will likely result in higher costs and impact investor confidence.	Critical
Exit strategy - While government support is an essential first step, we assume that the government exit strategy will be implemented in order to reduce government support over time.	High

Constraints	Description
Timing	CCUS programme is committed to delivering four industrial CCUS clusters by 2030, with at least two clusters supported by the mid-2020s.
Private sector delivery capability	Ability of private sector partners to deliver on time and to budget.
Supply chain capacity	Projects are dependent on supply chain capacity to complete construction and have flagged a number of specific challenges.
DESNZ resourcing	Resourcing will need to be adequate to fulfil Cluster Sponsor Function up to and beyond FID and into supporting initial commercial operation.

2.4 Public Sector Equalities Duties

Public Sector Equality Duty analysis was conducted for both Track-1 Clusters. We judged that analysing impacts at a Track-1 level rather than an individual cluster level was more appropriate, as the evidence sources were not significantly different or granular enough to differentiate. Our analysis considered indirect impacts across the UK workforce, potential geographic impacts and impacts of levies on consumer bills. As Track-1 seeks to stimulate the strategic deployment of an operational CCUS market, it does not directly discriminate between any protected groups. However, it does have the potential to have indirect impacts through employment opportunities and consumer bills.

2.5 Identify High Level Potential Risks

The most critical high level risks are those associated with deliverability and affordability. Our strategic risks are outlined below.

Strategic Risk	Rating	Current and Planned Mitigation

T1SR1 There is a risk that outturn cost for Track-1 is different to forecast.
 	
If it is higher, government is exposed to increased subsidy, which could be unaffordable within delegated budgets.
 	
If it is lower, government exposure could be reduced, alleviating pressure on budgets.
	High/Possible	• Arrangements are in place to closely monitor cost performance:
		  ○ Governance mechanisms are in place to monitor costs and provide early warning if these are likely to under/over-run.
		  ○ Accurate monitoring of contingent liability exposure.
		• Contractual mechanisms ensure that HMG is only taking on specific risks, where it is appropriate to do so, and that our liability is limited/counterparties are incentivised to keep costs down.
		• Contractual mechanisms are in place to ensure HMG/bill-payers recoup a proportion of any underspend.

T1SR3 There is a risk that the programme does not realise the intended benefits for Track-1.	High/Possible	• Projects have undergone detailed technical assurance and financial due diligence. • Projects are required to meet Initial Conditions Precedent (ICPs) prior to contracts taking effect. • In general, the contractual mechanisms allocate performance-related risks to the private sector to incentivise projects to deliver the expected benefits. • Projects are required to meet Operational CPs, if they do not, LCCC has the right to terminate the contract and avoid paying for a project unlikely to deliver benefits. • Continue to work with part of global Carbon Management Challenge to expand use of CCUS globally, to deliver the UK trade benefits.
T1SR4 There is a risk that the post-FID operating model across public and private sector parties will not operate successfully.	Medium/Possible	• Progress of the ALBs' capacity (funding, resource) & capability (knowledge, skills) to operate successfully post-FID is monitored through the Delivery Board. • Between FID to COD, DESNZ Cluster Sponsor Function to be set up to mitigate risks to cluster delivery and system integration. • Mechanisms in place to undertake readiness testing ahead of FID. • Sufficient funding for FY24/25 has been secured for the ALBs to fulfil their roles at the expected time.
T1SR5 There is a risk of an unclear exit path for HMG.	High/Possible	• Key developments required will be amendments to the process for granting economic licences; the move towards a competitive allocation process for capture contracts; the evolution of T&S business models to reflect an increased role for the private sector in managing cross-chain risks. • Using a number of cost reduction levers including ETS pricing and CBAMs will help cultivate a self-sustaining industry and enable an HMG exit path.

3. Economic Case

3.1 Economic Rationale for Intervention

The economic case underpinning ECC centres around overcoming market failures. Due to these, without government intervention the UK market will fail to allocate resources in a way which delivers the societally optimal level of CCUS. Without resolution, market failures would prevent carbon emissions from being reduced in line with the rate and scale of decarbonisation required to achieve net zero by 2050.

Several market failures have been identified which, without government intervention, would inhibit the deployment of CCUS in the UK market. These include: negative externality of carbon and the UK Emissions Trading Scheme (ETS) market price for carbon providing an insufficient market signal to incentivise CCUS deployment; investment coordination failure preventing the development of a fully functioning CCUS network and a fully functioning low-carbon hydrogen market; a first mover disadvantage due to high start-up costs; and the failure of firms to factor positive societal spill-over effects from CCUS into their decision-making framework (positive externalities). In addition to market failures, there are commercial barriers which will also prevent a CCUS sector from developing without government support, including CCUS specific risks, investor uncertainty and regulatory risk, commercial risk and offtaker technology risk.

ECC is one of the two Track-1 clusters in the CCUS programme which aim to address the market failures outlined. Government investment will support the market in developing a functioning T&S network; this would not be possible without intervention due to private sector investment coordination failure and the first mover disadvantage. The CCUS programme also supports projects across capture applications – including industry, power, and hydrogen production – to develop a commercial CCUS framework which facilitates investment across several applications, aiding decarbonising multiple areas of the UK economy.

3.2 Policy Options for Appraisal

This section provides an overview of the steps taken to develop the policy options for appraisal.

3.2.1 Critical Success Factors

Critical Success Factors for CCUS were developed at SOBC stage, based on CCUS programme objectives, market failures and barriers to delivery. Success factors include strategic fit, value for money, benefits optimisation, supplier capacity and capability, affordability, achievability, timelines, and developing a self-sustaining CCUS industry.

3.2.2 Long-listed Options

At SOBC, a long list of options was considered against the Critical Success Factors, from which four viable options were considered on a short list. From this, analysis identified for the first stage of deployment, the preferred option was to deploy four clusters, financed by both public and private funds.

3.2.3 Short-listed Options

Based on the SOBC, agreement was reached to launch the Cluster Sequencing process. Phase 1 of this process invited applications from potential cluster organisations, which were assessed against various evaluation criteria including deliverability, economic benefits and cost. As a result of this, ECC was announced as one of the first clusters for the 2020s, along with HyNet.

At OBC stage, options appraisal considered whether the government should continue to deliver Track-1 clusters. The binary options of 'option 0: do nothing' and 'option 1: deliver Track-1 ambition' were appraised; these options were chosen to avoid overriding the cluster sequencing process. Within Option 1 we presented a range of scenarios to reflect variables at play at that stage of policy development, for instance the scenarios reflected different combinations of capture projects given uncertainty at that stage over the final shortlist.

Between OBC and FBC stage, the department ran a competitive selection process for capture projects. This process produced the Track-1 Project Negotiation List (T1PNL), which were the projects that would progress to negotiations as part of Track-1: H2T, NZT and BOC. See **Section 4.2.1** for more detail of the selection process and analysis produced to inform selection decisions.

Following the selection of ECC capture projects, and in response to greater maturity and understanding of the expected costs and benefits associated with capture projects and the cluster, several cluster variations were analysed. Options tested the inclusion and exclusion of capture projects in the cluster, and variations of FID and COD dates. The culmination of this analysis, at Cluster Touchpoint 2 (CTP2) determined the options for appraisal to be analysed at FBC stage.

3.2.4 Options for Appraisal

Between OBC and FBC stage, extensive optionality regarding the configuration of ECC was considered and appraised. The options considered at CTP2 were designed to test cluster configurations which met certain policy, logistic, and affordability constraints. The cross-Whitehall CTP2 process concluded with an agreement to seek approval of an 'anchor' project scope. In this section we appraise this preferred option against a full project scope:

- Option 1 (preferred): Anchor Project Scope asks for the approval of the 'anchor' configuration (NEP and NZT) and would seek further approval for the 'build-out' projects later.
- Option 2: Full T1PNL Scope presents an alternative option where approval is obtained for the T&S network and all four 'anchor' and 'build-out' projects (NEP, NZT, H2T, BOC).

See section 2.3.1. for a full description of the scope of Option 1.

By sizing the T&S network to 4Mt but not including the 'build-out' projects in scope, Option 1 provides more optionality for the capture projects supported in the 'build-out' phase. Whether the 'build-out' projects are BOC and H2T or alternative projects, approval would be sought via separate FBCs at a later point. Both BOC and H2T project schedules have slipped and therefore seeking funding approval later aligns better with their project maturity.

3.3 Appraisal Framework

This section provides an overview of cross-cutting elements of the appraisal framework used to monetise ECC impacts.

3.3.1 Identification of Impacts

This economic case appraises the economic costs and benefits expected from ECC. Where possible, impacts have been monetised to estimate net present value (NPV). Impacts which have not been monetised are assessed qualitatively. All monetised and unmonetised benefits can be aligned to the core and wider benefits set out in the Benefits Realisation Strategy.

Monetised impacts are analysed by capture project or T&S network and aggregated to provide a cluster level assessment. Their treatment as an economic cost differs depending on which counterfactual we are assessing the options against, however we can categorize the costs by the cost to build new infrastructure, including the T&S network, or the costs to retrofit infrastructure with carbon capture (CapEx), financing costs, operating cost (OpEx), fuel costs, development costs (DevEx) and decommissioning costs. The nature of these costs also varies by project; the cost of NZT and H2T is driven by building new power and hydrogen plants, whilst the cost of BOC is driven by retrofitting an existing industrial plant. Benefits for capture projects are primarily driven by the volume of carbon abated relative to the counterfactual – either from the carbon capture directly or from the use of low-carbon hydrogen as a substitute for fossil fuels.

For the T&S network, however, no monetised benefits are directly attributed to the T&S network; the network, and the infrastructure investment required to build and operate the network, can be seen as an enabler which allows carbon captured by capture projects to be transported and permanently stored, therefore abated. Transfers include the flow from government to capture projects as support for CapEx investment and revenue support, and from government and capture projects to the T&SCo through user fees and the Revenue Support Agreement (RSA).

3.3.2 Counterfactual

Impacts are appraised relative to a Net Zero Compliant (NZC) counterfactual. This counterfactual defines a state of the world where ECC is not invested in, but *business-as-usual* dictates the UK economy continues to abate in line with a cost-effective pathway to net zero. This implies a NZC counterfactual includes the cost and benefits of alternative abatement for the capture projects assessed in options 1 and 2 in order to maintain a net zero consistent trajectory (option 0).

For each capture project, we have sought to identify the most plausible alternative abatement options and value the costs and benefits associated with these. For NZT, alternative low carbon electricity generation replaces CCUS-enabled gas power; for H2T, hydrogen offtakers in industry substitute CCS-enabled hydrogen for electrolytic hydrogen and power sector offtakers substitute hydrogen for biomethane; for BOC, the offtaker substitutes hydrogen from BOC with electrolytic hydrogen.

As explained in section 2.2.1 of the Strategic Case, CCUS is required for the UK to meet its 2050 net zero commitment, CB6 and NDC objectives. This is because to reach these targets, the UK needs widespread decarbonisation of its hard-to-abate sectors (e.g. chemicals, cement and waste industry). This is not achievable without CCUS (via storing these emissions directly), or without transitioning these industries into alternative low-carbon fuels such as low-carbon hydrogen (via blue H2 generated through CCUS).

We therefore assume that in a Net Zero Compliant counterfactual CCUS will still be needed in the future, even if it is not built now. Specifically, ECC T&S cost would likely be required, due to the dependency of ECC network expansion on Track-1 NEP investment, and the lack of immediate substitutes for ECC given its strategic location close to industry and well-characterised geological carbon stores.

We therefore assume the T&S costs of building NEP will still be required in the future. Although there are potentially some discounting benefits from delaying expenditure, this should be offset against likely cost increases if we were to come back to these clusters down the line. Therefore, for simplicity, we assume the same T&S costs would be incurred in the policy scenarios and the NZCC. This assumption has been tested through sensitivity analysis.

A secondary Known Policy (KP) counterfactual is also presented; this allows analysis in this FBC to be compared to previous analyses where a KP counterfactual was primarily used. In a KP counterfactual, there is assumed to be zero economic impact, thus all impacts attributed to ECC are considered additional.

3.3.3 Uncertainty and Sensitivities

Several assumptions made in the analysis are subject to uncertainty. Two sets of sensitivities are presented here. The first shows how the results are sensitive to our assumption that the T&S costs of building NEP will still be required at some point in the future and how the scale of these costs might impact the NPV. This sensitivity is only relevant to the impacts measured against the NZC counterfactual. In addition, to account for uncertainty in costs, high and low value for money scenarios have been created using high and low sensitivities around central cost assumptions. This sensitivity is relevant to the impacts measured relative to both the NZC counterfactual and the KP counterfactual.

3.4 Monetised Impacts – Net Zero Compliant Counterfactual

This section assesses the monetised impacts for ECC. Impacts are modelled separately for capture projects and the T&S network and then aggregated to form cluster-level metrics.

This section presents the quantitative cost benefit analysis (CBA) which assesses the monetised costs and benefits of ECC against a Net Zero Compliant counterfactual. Impacts of capture projects have been appraised from 2021 until 2053, the end of the T&S network's 25-year lifespan. The appraisal period of the T&S network is extended by an additional 4 years, until 2057, to capture decommissioning costs. The Green Book social discount rate of 3.5% has been used to allow for a comparison of impacts on a present value basis. Net present value (NPV) is the primary value for money metric presented in this economic case. Benefit cost ratios (BCR) are not presented as negative costs and benefits are estimated against a NZC counterfactual which results in counterintuitive and hard to interpret BCRs. All monetised figures in the following section are presented in real (2021 prices), discounted terms. Totals may not sum due to rounding.

Critically, the quantitative cost benefit analysis does not capture the full range of impacts of ECC. Several impacts, both benefits and costs, have not been monetised due to no suitable appraisal method or a lack of evidence; this is not uncommon for appraisal of a first of a kind project. The NPVs of Option 1 and Option 2 also do not include the additional benefits from Track-1 expansion and the option value of ECC and the CCUS programme more widely. CCUS is also a crucial component required for the UK economy to achieve CB6 and net zero. Therefore, any judgement made on the value for money assessment of ECC should take a holistic view, considering both quantitative and qualitative analysis of direct and indirect impacts.

3.4.1 Central Results – Net Zero Compliant Counterfactual

Table 1 shows the NPV of ECC, the T&S network, and each capture project against a NZC counterfactual. The table shows monetised social benefits of ECC are greater than a net zero compliant alternative for both options. Social costs are greater than the NZC counterfactual in Option 1, but lower in Option 2. This results in a positive NPV of £1.0bn for Option 1 and a larger NPV of £2.5bn for Option 2. The larger NPV of Option 2 is driven by the inclusion of build-out projects.

Table 1: CBA Central Results (NZCC, 2021 prices, 2021 present value)

		ECC
Option 1	Net Present Value (£bn)	1.0
Option 2	Net Present Value (£bn)	2.5

3.4.2 Sensitivity Analysis – Net Zero Compliant Counterfactual

Table 2 shows the NPV of ECC when underlying cost assumptions are tested. The figures show that, against a NZC counterfactual, ECC Option 1 is likely to maintain a positive NPV within the range of uncertainty expected, whilst Option 2 is more sensitive to cost such that uncertainty of assumptions allows for both a positive and negative NPV. Indeed, in a low-cost scenario, Option 1 NPV increases to £1.1bn, whilst in a high-cost scenario decreases to a NPV of £0.7bn. And for Option 2, NPV increases to £7.1bn with low-cost assumptions, and decreases to -£2.8bn with high-cost assumptions.

Table 2: High and Low VfM Sensitivities (NZCC, 2021 prices, 2021 present value)

ECC NPV (£bn)	Low	Central	High

Option 1	0.7	1.0	1.1
Option 2	-2.8	2.5	7.1

3.4.3 Track-1 Expansion and Build-Out Project Analysis – Net Zero Compliant Counterfactual

Further analysis considers the indicative monetised impacts of Track-1 expansion (T1x). This considers the value for money of ECC once expansion of the network has been undertaken, resulting in increased capacity of the T&S network and several additional capture projects being added to the cluster.

It is also intended to demonstrate that there are high upfront fixed costs in establishing a T&S network but, all else equal, the marginal costs of expanding the network should be lower, leading to improvements in the NPVs over time. This analysis does not explicitly model the impacts of capture projects which could be included in T1x, but instead uses proxies of NPV per tonne of carbon captured by type of capture project.

The scope of the network under T1 involves the initial creation of the onshore Teesside network, offshore pipeline connecting Teesside to the Endurance store and injection infrastructure at Endurance. Endurance is expected to yield a capacity of 4Mtpa - equal to the peak injection of the T1 capture projects. However, there is expected to be spare capacity in the non-storage parts of T1 network.

Two expansion scenarios beyond this initial network have been considered as part of the expansion analysis.

- **Teesside and Humber expansion** involves the creation of onshore and offshore T&S infrastructure at the Humber as well as build-out of the Bunter Closures stores (increasing storage capacity from 4Mtpa at Endurance to total of 10Mtpa, as required to accommodate new network users).
- **Teesside only expansion** assumes that the network is only expanded from the Teesside cluster, taking advantage of the spare capacity in the Teesside onshore and offshore network (established as part of T1) even after T1 projects have been added to the network. Expansion here would involve extending the existing Teesside onshore network to new users and build-out to the Bunter Closures stores, as set out above.

The purpose of including a Teesside only expansion scenario is to help demonstrate the economies of scale associated with expanding the T&S network, which is diluted under the Humber and Teesside scenario by the creation of a new network at Humber as part of the expansion.

Table 3 shows the progression of NPVs for Option 1 and 2 once 'build-out' project and expansion impacts are included. Including 'build-out' projects increases the NPV from £1.0bn to £2.5bn. Against a NZC counterfactual, it is again assumed that there is no additional T&S cost from ECC expansion, thus the addition of capture projects drives an increased ECC NPV. With expansion, the NPV of ECC is expected to increase to £11.0bn regardless of whether a Teesside only expansion or expansion to Humber is modelled.

Table 3: ECC Expansion (NZCC, 2021 prices, 2021 present value)

	ECC w/ 'Anchor' Project Only (NEP, NZT)	ECC w/ 'Build-Out' Projects (NEP, NZT, H2T, BOC)	ECC w/ T1x (Humber and Teesside)	ECC w/ T1x (Teesside Only)
NPV (£bn)	1.0	2.5	11.0	11.0

Table 4 shows a variant on the Net Zero Compliant counterfactual where the T&S costs are included, to help demonstrate their impact, and the role of economies of scale. It shows that NPVs improve with expansion, even with T&S costs included.

Table 4 demonstrates, however, that expansion to Humber reduces the improvement in NPV. This is because, as discussed above, this scenario involves the establishment of an entirely new network at the Humber cluster, diluting the economies of scale we would otherwise expect to see. The Teesside only scenario, while not part of the proposed 'build-out' plan, intends to show the impacts if this complicating factor is removed.

It should not be interpreted that expanding to Humber, however, represents worse value for money, only that, as the Humber network is only first established as part of the expansion, it's only with *further* expansion of the network economies of scale would be realised, similar to those that we see with Teesside only expansion (which was established as part of T1 and extended as part of the expansion).

Like Teesside, however, the proposed onshore and offshore infrastructure capacity at the Humber is expected to exceed the requirements of the initial network users – hence expansion at the Humber would avoid the duplication of the onshore and offshore infrastructure costs – only the costs of extending the existing network to new users, and buildout to new stores would be incurred. Thus, the marginal costs of network expansion are expected to be lower with further network expansion, and we would therefore expect that after accounting for additional expansion at the Humber over and above the 3.3Mtpa peak injection which we have assumed here, the NPVs would improve further.

Table 4: ECC Expansion (NZCC Sensitivity, 2021 prices, 2021 present value)

	ECC w/ 'Anchor' Project Only (NEP, NZT)	ECC w/ 'Build-Out' Projects (NEP, NZT, H2T, BOC)	ECC w/ T1x (Humber and Teesside)	ECC w/ T1x (Teesside Only)
NPV (£bn)	-4.3	-2.9	-0.0	1.5

3.5 Monetised Results – Known Policy Counterfactual

This section produces the analysis outlined in the previous section using a **Known Policy counterfactual** rather than a Net Zero Compliant counterfactual. Using the NZC counterfactual better captures the relevant impacts in a monetised assessment since it involves assessing the social cost of the East Coast Cluster to alternative abatement measures required to keep the UK on a pathway to net zero, indicating whether the cluster is part of a cost-effective route to decarbonisation. For completeness however, we have also appraised the East Coast Cluster against a Known Policy counterfactual. Appraising the East Coast Cluster against a Known Policy counterfactual involves comparing the social costs of the proposed investment to the social value of the carbon abatement it would enable. The social value of carbon is intended to reveal the average social cost - £/tonne - of delivering carbon abatement over time, consistent with meeting the UK's share of abatement required to limit global warming to a 1.5°C increase in global average temperatures. The results reveal a negative Net Present Value (NPV) for the Cluster. One way to interpret this result is that it reveals the likely £ value of non-carbon abatement related social benefit (i.e. wider economic benefits such as improved productivity) that ECC would need to deliver in order for it to be socially beneficial in a non-net zero compliant world.

3.5.1 Central Results – Known Policy Counterfactual

Table 5 shows the NPV of ECC against a KP counterfactual. The figures show that the monetised social benefits are low relative to the monetised social costs for ECC. This results in a negative NPV of -£5.7bn for Option 1, and a NPV of -£6.4bn for Option 2.

Table 5 CBA Central Results (KPC, 2021 prices, 2021 present value)

		ECC
Option 1	**Net Present Value (£bn)**	**-5.7**
Option 2	**Net Present Value (£bn)**	**-6.4**

In the KP counterfactual, there is no cost associated with the business-as-usual outcome; this contrasts to the NZC counterfactual whereby significant cost are required to maintain trajectory towards net zero and energy security targets. The notional cost of developing ECC is high in any successful investment outcome, however the net impact varies depending on the counterfactual used. This is the main driver explaining the difference of a large negative NPV against a KP counterfactual, but a positive NPV against a NZC counterfactual.

3.5.2 Sensitivity Analysis – Known Policy Counterfactual

Table 6 shows the NPV of ECC when underlying cost assumptions are tested. The figures show that, against a KP counterfactual, ECC Option 1 and 2 both have a negative NPV relative to the 'do nothing' intervention, primarily driven by the inclusion of the T&S costs.

Table 6: High and Low VfM Sensitivities (KP counterfactual, 2021 prices, 2021 present value)

ECC NPV (£bn)	Low	Central	High
Option 1	-8.3	-5.7	-5.0
Option 2	-10.3	-6.4	-5.0

3.5.3 *Track-1 Expansion and Build-Out Project Analysis – Known Policy Counterfactual*

Table 7 shows the progression of NPV and BCR for ECC Option 1 once build-out project and expansion impacts are included (definitions for the expansion are outlined in section 3.4.3 above). With build-out projects, the NPV decreases to -£6.4bn. Following expansion the NPV changes to -£6.5bn under the Humber and Teesside expansion and -£5.0bn with the Teesside only expansion.

The T&S costs presented in the table below are similar to those presented in section 3.4.3 above, meaning the deterioration in NPV is driven by lower assumed NPV benefits from new capture projects.

Table 7: ECC Expansion (KPC, 2021 prices, 2021 present value)

	ECC w/ 'Anchor' Project Only (NEP, NZT)	ECC w/ 'Build-Out' Projects (NEP, NZT, H2T, BOC)	ECC w/ T1x (Humber and Teesside)	ECC w/ T1x (Teesside Only)
NPV (£bn)	-5.7	-6.4	-6.5	-5.0

As with the NZC counterfactual, in Option 2, ECC is identical to Option 1 once 'build-out' projects are included. This implies ECC with expansion impacts included is also identical in both options.

3.6 Expansion Devex

In addition to ECC 'anchor' scope, this FBC is asking approval for £0.3bn (2021 prices, excluding contingency) of additional DevEx required for ECC expansion. It is assumed this DevEx would largely be spent even if ECC expansion were not to materialise. The NPV figures for non-expansion scenarios presented in this economic case (see Tables 1, 2, 5 and 6) do not include the additional £0.3bn of DevEx; expansion DevEx is included in the expansion analysis presented (see *ECC w/ T1x* columns in Tables 3, 4 and 7). Against a NZCC, additional DevEx will have no impact on NPV; T&S cost is assumed to exist in both policy options and counterfactual (see section 3.3.2). Against a KPC, expansion DevEx is estimated to decrease central ECC NPV by ~£0.5bn once optimism bias uplifts, financing costs and discounting are considered. As expansion DevEx is included in the expansion scenarios, the NPV of expansion is expected to be unchanged.

3.7 Non-Monetised Impacts

Several identified impacts of ECC have not been monetised nor incorporated into the quantified cost benefit analysis. Judgements on the value for money of ECC should also consider a qualitative assessment of non-monetised impacts identified. Non-monetised impacts are considered relative the Net Zero Compliant counterfactual and the Known Policy counterfactual.

3.7.1 *Wider Impacts and Place Based Analysis*

Further analysis has been completed to assess the wider and place-based impacts of ECC.

- **Place-based impacts** – the local authorities ECC spans have lower median wages and higher unemployment than the national and regional averages. ECC will stimulate investment and economic activity in the Teesside Combined Authority area, supporting regional employment, and potentially introducing higher value CCUS jobs as the industry develops.
- **Sustainability impacts** – establishing first-of-a-kind clusters with 'anchor' projects represents commitment to the long-term goal of net zero. ECC will help create a sustainable market for CCUS, aiding the environmental sustainability of the industries using CCUS to progress to net zero.
- **Competition impacts** – ECC is part of the market creation phase for CCUS during which there is limited or no competition for CCUS services. Once the initial market failures and barriers to deployment have been overcome, the market transition phase may see an increase in capture projects and T&S services, therefore increasing competition for CCUS services.
- **Regulatory impacts** – ECC is a natural regional monopoly for CCUS in Teesside and will likely remain so until further clusters are rolled out. A robust regulatory framework that ensures T&S companies do not exploit their monopoly position is required to prevent market inefficiencies from arising.

3.8 Risk Appraisal

The cross chain and cross cutting risks assessed in the commercial and financial cases of this FBC have been appraised to evaluate their impact on value for money. We have not appraised the upside risks and opportunities,

which include, for example: lower than expected T&S construction cost, higher than expected T&S availability, lower than expected T&S decommissioning cost, or high-power prices resulting in LCCC clawing back payment from NZT.

We have assessed the impact of the risks maturing on the costs and benefits of Option 1 relative to the Known Policy counterfactual to illustrate the impact on NPVs when also accounting for the T&S network costs. Table 9 and Table 10 summarise the impact of each risk, and present a qualitative assessment of the impact on value for money.

Table 9: Cross Chain Risk Appraisal (£bn, KPC, 2021 prices, 2021 present values)

Cross Chain Risk	Impact on Value for Money
T&S Construction Delay [2-year delay]	**Negative** - NZT operates unabated so reduced benefits from carbon captured
User Construction Delay [2-year delay]	**Negative** – NZT operates in later years (at lower load factors) and for fewer years so reduced benefits from carbon captured
User Underperformance [70% capture rate]	**Negative** – NZT operates less efficiently so reduced benefits from carbon captured
T&S Availability [80% across all periods]	**Negative** - NZT operates partially unabated so reduced benefits from carbon captured

Table 10: Cross Cutting Risk Appraisal (£bn, KPC, 2021 prices, 2021 present values)

Cross Cutting Risk	Impact on Value for Money
Inflation [+1pp from 2029 onwards]	**Neutral** – analysis completed in 2021 prices
Commodity Price [high commodity e.g. high gas Price]	**Negative** – increased costs for both NZT and NEP
Traded Carbon Price [low carbon price]	**Neutral –** VfM not based on traded carbon price**
T&S CapEx Overrun [30% increase]	**Negative** – increase in costs
T&S OpEx Overrun [30% increase]	**Negative** – increase in costs

**The VfM modelling uses carbon appraisal values rather than ETS values. ETS price determines who pays for the carbon (the market or the government in this scenario). This has no impact on the economic value of the intervention.

3.9 Preferred Option

Both Option 1 (NPV of £1.0bn) and Option 2 (NPV of £2.5bn) provide good value for money when considering monetised and non-monetised impacts and when assessed against a NZC counterfactual. The analysis shows that as more capture projects are added to the network, more societal value is realised. Option 1 is preferred because it maintains optionality and is more aligned with 'build-out' project maturity, as set out in section 1.3.

4. Commercial Case

4. Purpose

The purpose of this case is to set out and justify the overall commercial proposition for ECC as an effective means of delivering our objectives. This includes justifying that an effective process has been followed to reach agreed terms with industry, that the deals in aggregate represent an efficient allocation of risk and reward between the public and private sectors and are compliant with the relevant statutory requirements, that the projects are deliverable by the private sector, and that agreements will be managed effectively.

4.1 Overall Approach and Background

4.1.1 Overall Process Outline

As set out in the OBC, a clearly specified competitive process has been followed in determining the allocation and level of subsidy for Track-1 CCUS projects. The key steps in this process are defined as follows:

Delivery Component	Key Activities	Delivered By

Market Engagement	Workshops, forums and consultations to understand market requirements Promote and explain business model and fund support Respond to enquiries	BEIS cluster sequencing and business model policy teams
Application	Publish application guidance Publish application portal Publish template terms and conditions	BEIS cluster sequencing and business model policy teams
Assessment and Shortlisting	Confirmation of application eligibility Assessment of applications against assessment criteria Technical and commercial due diligence Affordability assessment in line with overall funding envelope Cross-cluster 'integration checks' to ensure a unified approach to network design Supplier notification and debriefing unsuccessful applicants	Range of expertise managed by the CCUS programme. Includes skills such as project management, financial, business models, technical policy teams, analytical, legal teams, commercial, HMT, IPA including external technical, legal and commercial support.
Negotiation	Negotiate the contracts and upfront capital support (where relevant) with T&SCos and capture projects Review agreed terms and finalise business case for investment across preferred projects	Negotiation teams – multi-disciplined teams (policy, commercial, technical, legal) from both internal and external resources.
Contract Award	Final decision on funding Sign business model contracts and other capital support agreements as applicable Payment and administration of subsidy instalments	Final decision to select projects and sign contracts – SROs and other senior officials; DESNZ SoS; CX Payment and admin – business model counterparty as applicable
Monitoring and Ongoing Management	Monitoring project performance, benefits, cost controls and compliance Monitoring subsidy payment instalments Evaluation of policy design and delivery	DESNZ CCUS Programme

Since the approval of the OBC, the following steps in this process have been executed:

- Further shortlisting: the original 20-project shortlist published in August 2022 was narrowed down to an eight-project negotiation shortlist in March 2023. This process ensured that the projects entering detailed negotiations could represent an affordable, operable and VfM cluster configuration.
- Negotiation: following the announcement of the Project Negotiation List, we have engaged in detailed commercial negotiations with each of the shortlisted capture projects, as well as the T&SCo in each cluster. We are now finalising price-setting negotiations with the proposed 'anchor' projects (see Section 4.2.1); the process and outputs of these negotiations are described in more detail in this case.

We are now seeking to enter the contract award phase, subject to the satisfactory conclusion of negotiations and FBC approval; the programme's approach to monitoring and ongoing management is described in section 4.4 and in the management case.

4.1.2 Key Commercial Principles

As set out in the OBC, we have designed and negotiated a suite of business model agreements which are suitable for the delivery of commercial-scale CCUS, whilst also providing value for money for the taxpayer and energy bill-payer. Specifically, these business models have been designed to recognise that ECC and HyNet will represent the UK's first commercial-scale CCUS projects, and that there is therefore a need for the public sector to provide funding and bear risk in order to overcome the market barriers facing the sector and ensure that the Track-1 clusters are investible to the private sector.

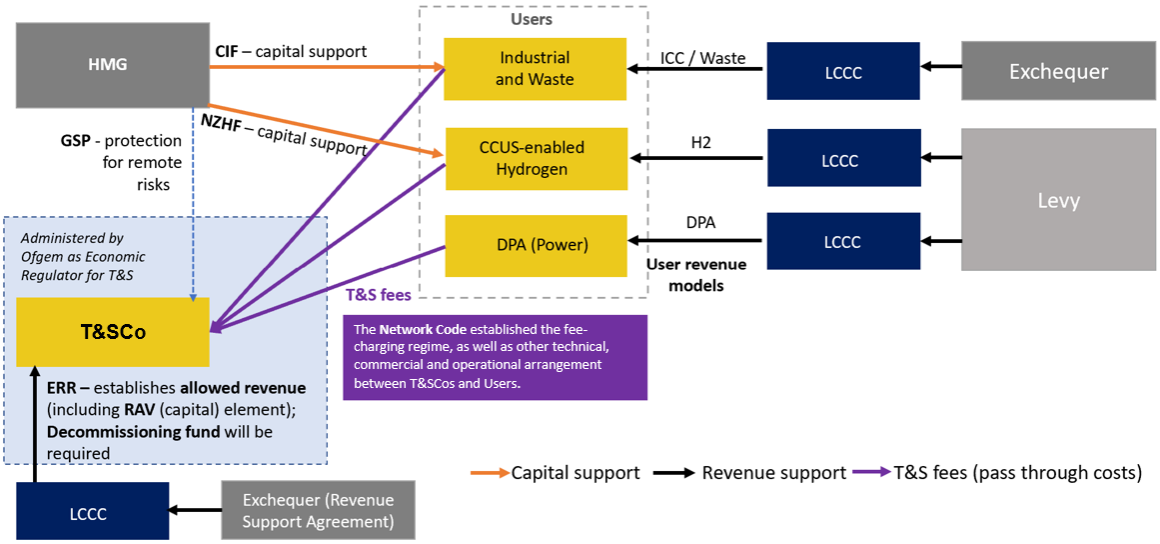
In particular, learnings from the unsuccessful second CCUS competition in 2015 showed that private sector developers and insurers are not yet ready to bear the 'cross-chain' risks which arise at the interface between T&SCos and capture projects. The business models have been designed to address this specific challenge (as well as other sector-specific challenges), with government largely underwriting cross-chain risks in the network in order to achieve an acceptable cost of finance. This principle is also reflected in the fact that key cross-chain risks will not be directly addressed in the initial CCUS Network Code, although there is an expectation that this position will evolve as the market develops and appropriate insurance products become available.

Whilst this level of government intervention is necessary to enable first-of-a-kind Track-1 projects to proceed to operations, our long-term ambition is to create a self-sustaining CCUS industry in the UK, with government subsidy being phased out over time through competitive allocation rounds. The CCUS Vision[10], published in December 2023, sets out a pathway to establishing a competitive industry by 2035. The pathway toward commercialisation is covered in more detail in the strategic case.

[10] https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-a-vision-to-establish-a-competitive-market

4.1.3 Commercial Model

The T&S Regulatory Investment (TRI) model has been structured as a Regulated Asset Base (RAB) model, to be administered by Ofgem as the economic regulator. This model will entitle the T&SCo to receive an Allowed Revenue, compensating ongoing operating expenses whilst repaying its initial capital outlay over the asset's life (plus an agreed rate of return, reviewed periodically by Ofgem). Government has agreed an allowance for the T&SCos capital expenditures at the point of Cluster FID, with any overruns against this allowance subject to a cost sharing factor; the T&SCo will only recoup 40% of any costs in excess of the agreed level. This principle will also apply to OpEx, with allowances to be reviewed by the regulator on an ongoing basis. The T&SCo will collect its allowed revenue principally through fees charged to the network's Users for the service of transporting and storing CO_2, with fees being administered under the terms of the CCS Network Code.



In the event that there is a shortfall in demand for the network and aggregate user fees do not meet the T&SCos allowed revenue, government will 'top up' these fees through the exchequer-funded Revenue Support Agreement (RSA). Additionally, government will underwrite several key high-impact, low-probably risks – principally relating to CO_2 leakage – via the Supplementary Compensation Agreement (SCA). The T&SCo will also be subject to an Availability Incentive, whereby its effective rate of return on capital can be either increased or decreased based on the level of network availability for users that it is able to achieve.

The proposed business models for Industrial, Waste and Hydrogen users are each structured similarly to a Contract for Difference (CfD). Revenue support will be paid to cover the difference between an agreed 'strike price' (i.e. the level of revenue required to cover the ongoing cost of capture – including T&S fees – and provide a reasonable rate of return on initial capital investment), and a 'reference price'. Input costs for the strike price (other than T&S fees) will be treated as fixed, with overrun risk sitting solely with the project developers. For Industrial and Waste projects the reference price will be the carbon price under the UK ETS (or, for Industrial projects, a pre-agreed projection thereof); for hydrogen projects, the reference price will be the higher of either the market natural gas price, or the price at which the project sells the hydrogen it produces. Industrial, Waste and Hydrogen users have also had the opportunity to negotiate for up-front capital support from the CCS Infrastructure Fund (CIF) and Net Zero Hydrogen Fund (NZHF), which aims to displace more expensive sources of finance and off-set a portion of HMG's ongoing revenue support obligations.

The Dispatchable Power Agreement (DPA) is composed of an Availability and Variable payment, which together aim to address the market barriers to the deployment of power CCUS, and to allow projects to operate in a mid-merit role in the UK power market (i.e. dispatching ahead of unabated fossil fuel generation, but behind renewables and nuclear). The availability payment will provide the generator with a baseline level of revenue certainty, while the variable payment aims to cover the differential costs associated with deploying CCUS in order to achieve an appropriate position in the merit order. As with the other User business models, cost overrun risk under the DPA will sit solely with the developer.

Collectively, the business models were designed to address the key market barriers which would otherwise restrict the deployment of CCUS in the UK – including the lack of a sufficient incentive from the carbon price, the high initial costs of deployment, and lack of cost-effective private insurance products for the sector.

4.1.4 Negotiation Strategy

The programme has followed a well-structured negotiation strategy and detailed plan, involving:

- Negotiation teams engaging with delivery partners at project level to develop the business model contracts and negotiate the level of support needed;
- Supporting negotiation teams internally through robust technical assurance and financial due diligence;
- Putting in place appropriate cluster-level project management, assurance and governance.

Negotiations delivery has been underpinned by the Track-1 Negotiations Mandate (T1M) which set out a governance framework for the negotiations as well as the delegated authority provided to negotiations teams. This mandate has been designed to address the various negotiation risks.

Individual teams were set up within DESNZ to negotiate business model agreements with the T&SCo and T1PNL capture projects, with clear responsibilities and scope of delegated authority for each of these teams established under the T1M. This delegated approach has allowed for a high degree of specialisation, with each negotiating team developing deep expertise in its relevant business model and in the characteristics of its preferred projects.

This approach has also allowed for a clear strategic allocation of resources between the various negotiation streams, ensuring that negotiation leads have had sufficient resources and the correct expertise to successfully execute negotiations. Resource and expertise have been sourced both internally and from specialist external advisors.

A key tool in negotiations with hydrogen and industrial capture projects is capital co-funding from the CCS Infrastructure Fund (CIF) and Net Zero Hydrogen Fund (NZHF). Capital co-funding plays a key role in the financing of these projects, by displacing more expensive sources of finance (thus reducing the overall cost of capital) and allowing HMG to offset some of its longer-term revenue support obligations.

CIF funding was also available in principle to T&SCos if a financing gap was identified which could not be filled by private investors on reasonable terms, however it was ultimately determined that this was not the case.

4.1.4.1 Technical Assurance and Financial Due Diligence

Technical assurance has been used in a targeted manner to test the data, assumptions, costs and risks put forward by delivery partners and ensure that decisions made are based on sound technical understanding. Assurance teams have also focussed on assessing underlying cost and procurement evidence from each of the negotiation counterparties, seeking to ensure that all agreed cost items satisfy the 'Three Es': Economy, Efficiency and Effectiveness. This approach aims to maximise the VfM of government's investment in CCUS.

Cost assurance processes have been integrated with the wider negotiations timeline, allowing DESNZ to consider updated cost data at key negotiation review points, including the Cluster Touchpoints. Additionally, financial due diligence has been applied to ensure the financial health of projects (and parental undertakings where relevant), particularly where grant funding has been offered. Further detail on these assurance processes is set out in Section 4.3.

4.1.4.2 Negotiation Management, Assurance and Governance

Supporting the negotiation approach outlined above, appropriate commercial assurance and governance has been put in place to manage negotiation risks and deliver the best possible cluster-level deal. Key functions have included:

- **Cluster Lead teams:** responsible for monitoring cross-cluster schedule, scope and benefits, holding individual negotiation teams to account to ensure effective delivery. Leading on coordination of key cluster-level decision points, including Cluster Touchpoints and Gateway Reviews.
- **Commercial Integration Team (CIT):** responsible for the monitoring and management of key commercial and cross-cutting issues which sit either between or across multiple negotiation streams. Close focus on ensuring a robust and coordinated approach to the management of cross-chain risk, supporting the NLT at key decision points (see below), and ensuring adherence to the T1M.

Additionally, key decision points in the negotiations process have been subject to a bespoke governance structure, allowing for expert oversight and collective decision-making around commercial negotiations. Key governance forums have included: **Negotiations Leadership Team (NLT):** a fortnightly board to consider strategic decisions in individual negotiations and monitor progress against the T1M; **Track-1 Board (T1B):** a DD-level board to consider cross-cutting policy decisions; **Programme Board (PB):** an SRO-level board to consider strategic policy decisions

which carry a material impact at the programme level; **CCUS Senior Board:** a cross-government, Perm Sec-level board, bringing together senior leaders from key stakeholder organisations (including DESNZ, HMT and IPA) to consider key strategic decisions.

4.2 Outcome of Negotiations

4.2.1 Agreed Terms for 'Anchor' Projects

As outlined in the section 2.3.1, we are seeking approval to enter into agreement with the following 'anchor' projects: **Northern Endurance Partnership (NEP – T&SCo)** and **Net Zero Teesside (NZT – power CCUS)**.

Taken in the round, we are confident that the commercial terms which have been negotiated to date are consistent with the guiding principles set out in the T1M, and have been appropriately managed by the processes described throughout Section 4.1.4. The allocation of commercial risk has been set out throughout the development of the relevant business models, and narrowed through our ongoing commercial negotiations as set out above. In parallel, robust technical and cost assurance processes have given us confidence in the projects' deliverability and underlying cost profiles.

While there has been significant cost escalation since the OBC, this has largely been driven by changes in underlying costs, resulting from a combination of scope development at the project level, supply chain cost increases and an unwinding of optimism bias. Significant effort has been carried out to assure project costs and procurement processes (see section 4.3) and we are satisfied that the costs are a reasonable estimate of the true cost of delivering the project.

4.2.2 Interim Terms and Approach for 'Build-out' Projects

This section describes the approach that has been taken to progress commercial negotiations with the 'build-out' projects, which do not fall within the scope of this FBC, and which will seek to take FIDs after the 'anchor' projects. Please see Section 2.3.1 for a full description of cluster scope.

The ECC T&S network has been scoped to cater for both the proposed 'anchor' and 'build-out' capture projects. This approach was agreed at the second Cluster Integration Check (see 4.1.1), with the aim of providing the T&SCo with the certainty needed to finalise its technical design and procure supply chain contracts. As discussed throughout this FBC, the 'build-out' projects remain important to the long-term strategic and economic value of the cluster.

Therefore, there is a risk that if one or more of the 'build-out' projects in ECC fails to take FID, the network as a whole is likely to be underutilised until alternative users are able to join – the consequences of this for the VfM of the cluster are considered as part of the different scenarios within the economic case. In addition, there is a risk that some elements of the network may become stranded assets. In the unlikely event that a section is later deemed to be unnecessary it is possible to vary the scope of the network post-FID, although not without incurring costs associated with varying or exiting supply chain contracts.

We have made substantial progress in both commercial negotiations and technical and cost due diligence workstreams, building confidence that negotiations can be concluded on acceptable terms, and that 'build-out' projects can be delivered on an appropriate timeline and cost profile. While our strategy in negotiations is aimed at avoiding any backsliding on the positions which have been provisionally agreed with 'build-out' projects, it should be noted that any terms agreed in negotiations to date are not legally binding.

4.2.3 CCS Network Code

The CCS Network Code ('the Code') is the contractual interface between T&SCos and capture projects ('Users'). It sets out the commercial, technical, operational and governance arrangements between Code parties[16], creating legally binding obligations. The Code forms an important component of the safe operation of CO2 transport and storage networks. It also underpins the regulatory framework and subsidy support for not just CO2 transport and storage, but also capture projects. It is a key connection point between the various aspects of this framework, interfacing with the support contracts of diverse Code parties. Three themes have been central to Code development; collaboration, simplicity and consistency across networks.

- Collaborative approach – Whilst in most instances cross-chain risks are addressed and remedied through T&SCos' and Users' respective business models, the Code's importance in respect of risk allocation, standards

[16] A 'party' means a T&SCo or User who has acceded to the Code.

and service levels requires many trade-offs to have been identified and balanced. Working collaboratively with advisors, regulators and industry, we have sought to integrate diverse perspectives, managing friction between stakeholders with varied interests to ensure the Code meets the needs of both T&SCos and Users, whilst supporting wider policy goals and value for public money.

- Minimum viable product – Government has targeted simplicity where possible as the immediate intention is to produce a form of Code sufficient to support the deployment of the Track-1 clusters (the 'Initial Code'). Where appropriate, architecture has been included anticipating future policy and operational needs.
- Single Network Code - A single Code will apply across different T&S Networks, rather than each network having its own code with different terms.

Once the Code 'goes live' at the Code Implementation Date,[17] it will be owned and administered by industry. T&SCos and Users who are party to the Code, Ofgem and Third-Party Participants designated by Ofgem, will be able to raise modifications through defined processes outlined in the Code. Although government will not be a party to the Code, provisions also allow for the SoS to propose modifications on an enduring basis and to directly implement modifications for a limited period.

4.2.4 Cluster-level Commercial Risk Assessment

As noted in Section 4.1, a key focus of the department's negotiation governance processes has been ensuring effective integration between the various negotiation streams across the cluster, particularly in relation to the allocation of cross-chain and cross-cutting risks.

We have assessed the key cross-chain and cross-cutting risks specific to ECC. This assessment shows that the risks assumed by government are significant, and could result in material exposure to post-FID cost escalation and/or reduction in benefits realised (as noted in Section 2.5, under risk T1SR1 and T1SR3 respectively). In relation to financial exposure, the most significant risks are high T&S OpEx and – with a nominal impact only – high inflation. These risks are inherently uncertain and it is necessary to bear them in order to gain access to appropriate cost finance. A key responsibility of the DESNZ Cluster Sponsor Function will be to monitor and manage these affordability risks post-FID. In relation to benefit realisation, discontinuation of the T&S network due to either lack of user demand or a CO2 leakage event at the store is the most significant risk, although it is considered to be highly unlikely and will become increasingly unlikely as new projects join the network. Underperformance or construction delays could have smaller impacts on benefit realisation, but are also considered unlikely given the strong commercial incentives placed on the T&SCo and users and in light of our technical assurance of projects.

Overall, we are confident that HMG has only assumed cross-chain risk to the extent that is necessary in order to deliver an investible and cost-effective commercial proposition, and that appropriate measures have been put in place to limit HMG's potential liability to a tolerable level. In addition, the over-arching principle of our approach – that risks should be allocated to the party best-positioned to manage them – has been applied evenly across the constituent projects of ECC.

4.2.5 Subsidy Controls and Other Legal Requirements

The Track-1 CCUS Cluster Sequencing Process has been developed to align with the UK subsidy control regime under the Subsidy Control Act 2022. This has been embedded throughout the process, including the eligibility and assessment criteria for the two competitive phases that selected the T&S networks and capture projects. The commercial design of the Business Models and competitive allocation process for all schemes have been designed to aid compliance with the 7 principles under the Act, including that support awarded to projects is proportionate, additional and minimises domestic or international market distortions. The schemes have also been designed to meet the relevant Energy and Environment principles, notably that the subsidies do not to relieve the beneficiary from liabilities as a polluter.

A programme-wide approach has been taken to design the schemes in a way which is consistent with the Act and the principles under it, both as individual subsidy schemes and as an interlinked programme of support designed to assist the creation of CCUS clusters. Government policy advisors and analysts designed the Business Models along with a range of technical, commercial, legal and financial advisors. The schemes have also been designed to align with relevant existing environmental support and obligations such as the UK Emissions Trading Scheme (UK ETS).

[17] The Code will go live when the first T&SCo(s) and User(s) to reach Financial Investment Decision (FID) sign the Code Agreement, giving legal effect to the Code and becoming bound by it.

An assessment of each subsidy scheme has been (or will be) submitted by DESNZ to the Subsidy Advice Unit (SAU) for their non-binding advice on whether that assessment, and the analysis underpinning it, evidences compliance with the subsidy control principles. At the point of FBC submission the SAU has not yet published their formal reports on those assessments.

4.3 Cluster and Project Deliverability

The commercial strategy has been designed to incentivise cluster delivery by largely placing delivery and performance risk on the private sector. However, recognising the potential exposure of HMG to cross-chain risks brought about by project-level delivery issues, this has been supplemented by thorough programmes of technical and cost assurance, and financial due diligence.

Technical and cost assurance has been carried out on all projects contained within the cluster, to confirm that the projects are able to deliver within their cost, schedule and benefit envelopes, with an acceptable level of risk. Where there is residual divergence in views of the suitability of costs, these have been folded into the final stages of negotiations and will be weighed up against other negotiables like the rates of return.

In relation to technical assurance, these processes have examined the projects' technical details, schedules and risk registers and found it reasonable that the projects could achieve their stated commissioning dates and benefits. In particular, the penalties faced by projects caused by underperformance (i.e. low availability or capture rate) are likely to be sufficient incentives to undertake remediation. Our technical advisors have also considered the risks introduced by operating the T&S system with only NZT given the regularity of zero-flow periods, and concluded that this is technically feasible and should not require material additional OpEx above that already included.

4.4 Contract Management

The suite of agreements we are seeking to enter into to deliver ECC include the economic licence and other agreements for T&S, a suite of sector-specific CfD-type contracts, and grants. No single party is suitable to manage all of these agreements, and so contract management responsibilities are dispersed across multiple organisations. Nonetheless, it is important that suitable oversight and coordination is maintained by DESNZ to ensure that the programme delivers its intended benefits and to manage the risks being taken on. Key delivery partners have been included in extensive process mapping and testing exercises led by DESNZ, with the aim of building confidence in their capability and capacity to execute their responsibilities post-FID. The roles and capabilities of key individual organisations are summarised below.

4.4.1 DESNZ Cluster Sponsor Function

The CCUS Programme is establishing the DESNZ Cluster Sponsor Function to execute DESNZ's delivery phase responsibilities, as well as proactive management of government-owned cross-chain risks, coordination and integration of key decision-makers within the CCUS system, and the removal of barriers to successful delivery. Further detail on the Cluster Sponsor Function and related governance is outlined in the management case. The DESNZ Cluster Sponsor Function will also perform contract management functions for the GSP contracts, SoS Direct Agreement and Decommissioning Shortfall Agreement.

4.4.2 Economic Regulator – Ofgem

Part 1 of the Energy Act 2023 establishes Ofgem as the independent Economic Regulator of the CO2 T&S networks, with responsibilities for protecting the interests of current and future users and promoting the efficient and economic development and operation of the T&S networks, whilst allowing T&SCos to make an economic return. Ofgem will assume their regulatory role at FID upon the issue of the Economic Licence, and will be responsible for conducting periodic reviews of the commercial terms, costs and rate of return embedded in the ERR. The first of these review points will take place at the conclusion of the first regulatory period, three to four years following COD. They will also be responsible for the granting and, in extremis, the revoking of economic licences for T&SCo.

Government will maintain a close working relationship with Ofgem during the delivery and operations phases. Directly, government will signal its intention to provide Ofgem with a Strategy & Policy Statement on CCUS and agree ways of working to differentiate and coordinate responsibilities related to areas of overlap such as finance and Track-1 Expansion. Ofgem will also be invited to represent its views in relevant meetings of the Liaison Committee. Government and Ofgem will regularly discuss and coordinate mitigations for cross-chain and system risks in the Sponsor Function Board and Inter-Regulator Forum, providing Ofgem with essential cluster-wide context to influence decision-making whilst respecting their regulatory independence. Ofgem will own specific risks related to the Economic Regulatory Regime.

4.4.3 *Contract Counterparty – Low Carbon Contracts Company (LCCC)*

LCCC implement and develop electricity market schemes by providing independent expertise, insight and leadership. Post-FID, they will be the designated counterparty to the T&S Revenue Support Agreements (RSA) and capture project support contracts (ICC Contract, LCHA and DPA). Business models such as ICC are based on the Contracts for Difference (CfD) scheme for renewables which has been managed by LCCC since 2014. As such, LCCC plays a key role in the mitigation of the cross-chain risks described above. For the RSA and ICCC contracts, which are exchequer-funded, government will offer those projects a Secretary of State Direct Agreement (SoSDA): a contract between the Secretary of State, the LCCC and the project/T&SCo, which enables projects to seek payments under their contracts directly from the Secretary of State, if the counterparty does not have the funds required to make payments under the contracts.

4.4.4 *DESNZ Central Grants & Loans Team*

The DESNZ Central Grants and Loans (CGL) Team will be the delivery partner for all grants awarded. They will ensure that grant contracts are managed in compliance with the Grant Funding Agreement, especially in respect to the review and payment of grant claims. CGL has a long history of grant delivery within DESNZ, and has been working alongside the CCUS team throughout the assessment and negotiations phase.

5 Financial Case

5.1 Purpose

In this FBC, we are seeking approval to enter into the Dispatchable Power Agreement (DPA) with NZT and award the T&S licence and enter into the necessary support package with NEP. The purpose of this section is to: a) assess affordability by comparing the subsidy levels in these contracts to the affordability constraints agreed with HMT (section 5.2); b) set out the funding requirements and budget implications of these contracts in line with appropriate accounting standards (sections 5.3 to 5.5); c) explain the basis of the spending powers and the budget management principles (section 5.4); and d) set out and quantify the financial risks in these contracts (section 5.7).

The revenue support business model through which we are proposing to support NZT sets payment rates *ex ante*, and so there is a high degree of accuracy in the financial information below. The RAB model through which we are supporting NEP has CapEx allowances set with cost sharing factors to under- and over-spend applied and some cost reopeners, leading to a higher degree of estimation, with the ultimate financial implication being dependent on outturn costs, as elaborated in Section 5.8.11.

5.2 Affordability

At Spring Budget 2023, the Chancellor announced a Negotiation Funding Envelope (NFE) of 'up to £20bn' in Real 2021 prices. This NFE included the CIF, the NZHF, the IDHRS scheme and Levy funding.

The total subsidy cost for ECC in Real 2021 prices is £12.6bn. The estimated subsidy for the initial projects across the two clusters is £21.7bn including the ECC expansion DevEx.

The Final Funding Envelope (FFE) will be based upon the funding requirements for projects at cluster FID, as set out in the HyNet and ECC FBCs. These funding requirements are set to ensure that they are taut and realistic, whilst also ensuring that they can absorb limited increases in exogenous factors which may cause funding requirements to change before FID. This announcement will be made after FBC approval.

5.3 Funding Required (Nominal)

We are seeking approval for Capital Departmental Expenditure Limit (CDEL), Capital Annually Managed Expenditure (CAME), and Resource DEL (RDEL) nominal budgets.

Table 11: Budget requirements during construction phase (nominal)
All costs are in nominal terms and presented in £million.

	2024-25	2025-26	2026-27	2027-28	Total
Total	**522**	**1,158**	**1,574**	**1,121**	**4,375**

Table 12: Budget requirements during operational phase (nominal)
All costs are in nominal terms and presented in £million.

Budget classification	28/29 - 30/31	31/32 - 33/34	34/35 - 36/37	37/38 - 39/40	40/41 - 42/43	43/44 - 45/46	46/47 - 48/49	49/50 - 51/52	52/53 - 54/55	Total
Total	1,366	835	777	772	790	789	849	807	(286)	6,699

5.4 Resource Budgets

LCCC will make payments to NZT through the Dispatchable Power Agreement (DPA). These payments are made up of two elements:

- The Availability Payment, alongside merchant revenue, ensures that there is repayment and return on the carbon capture investment and also covers the T&S Capacity Charge and T&S Network Charge (2 of the 3 components of the T&S charges).
- The Variable Payment ensures merit order positioning (so that the power plant dispatches in line with the price signal) and also covers the T&S Flow Charge (the third component of the T&S charges)

The accounting treatment for the Availability Payment has been assessed as being an amortised cost financial liability, and the Variable Payment has been assessed as being a fair value through profit and loss financial liability. LCCC will require a 'netting off agreement' approved by the Chief Secretary to the Treasury in order to retain the levy income to fund the subsidy. The programme will seek approval for this netting off agreement before FID.

HMT has updated the Financial Reporting Manual (FReM) and Consolidated Budgeting Guidance (CBG) to require departments which issue CfD-like contracts to recognise the 'day one loss' associated with those contracts immediately, rather than deferring them off-balance sheet as previously allowed. The Variable Payment is likely to meet the definition of a CfD-like contract. CBG requires departments to recognise these 'losses' in RDEL from the point the contract has been entered into, which would be in 2024/25.

As RDEL spend for NZT from LCCC begins in FY2028/29, funding will be formally allocated at the next Spending Review and through subsequent Spending Reviews.

NEP receives three sources of RDEL income to cover its operating costs. These include user charges from NZT, T&S user charges in years 16-25 when it is assumed that government support will not be required, and RSA. The RSA income will be paid to NEP by LCCC and LCCC will therefore require RDEL budget cover for this expenditure. HMT have confirmed that as this is an intragroup transaction, these transactions will be eliminated at a group level.

Similar to LCCC, NEP will require a 'netting off agreement' approved by the Chief Secretary to the Treasury in order to retain the income it receives in order to fund its operating expenditure. The programme will seek approval for this netting off agreement before FID.

5.5 Programme Funding and FTE Requirements

The programme will execute its responsibilities to proactively manage cross-chain and integration risks to government with partners and manage benefits delivery on an ongoing basis through a mix of civil servant FTE and external advisor resource. These requirements are set out in more detail in section 4.4 of the commercial case and section 6.1 of the management case. The estimated RDEL Programme costs of managing the cluster are provided in Table 13. Ofgem will separately need to bid for additional budget cover through its own Estimate (shown separately in Table 13 below).

Table 13: CCUS programme resource required for ongoing management of ECC in £mn

	2024-25	2025-26	2026-27	2027-28	Total
Staff costs	1.5	1.6	1.6	1.6	**6.3**
Monitoring and evaluation	0.1	-	0.0	-	**0.1**
Hedging & insurance support	-	-	-	-	**-**
External advisors	2.9	0.3	0.3	0.3	**3.6**
Total Core Department	**4.5**	**1.8**	**1.9**	**1.8**	**10.1**
Ofgem (DESNZ funded)	0.2	0.3	0.3	0.3	**1.2**
LCCC	0.9	1.8	1.9	1.9	**6.5**
Total ALB costs	**1.1**	**2.2**	**2.2**	**2.2**	**7.7**

Total ongoing sponsorship and OpEx requirements	**5.5**	**4.0**	**4.1**	**4.1**	**17.8**
Ofgem (through own Estimate)	**0.1**	**0.2**	**0.2**	**0.2**	**0.6**

	28/29 - 30/31	31/32 - 33/34	34/35 - 36/37	37/38 - 39/40	40/41 - 42/43	43/44 - 45/46	46/47 - 48/49	49/50 - 51/52	52/53 - 54/55	Total
Staff costs	3.9	3.2	3.5	3.8	4.2	4.6	5.0	5.4	3.9	**37.4**
Monitoring and evaluation	0.1	0.1	-	-	-	-	-	-	-	**0.2**
Hedging & insurance support	0.2	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.3	**3.5**
External advisors	0.5	-	-	-	-	-	-	-	-	**0.5**
Total Core Department	**4.8**	**3.6**	**3.9**	**4.2**	**4.6**	**5.0**	**5.4**	**5.9**	**4.3**	**41.7**
Ofgem (DESNZ funded)	0.4	-	-	-	-	-	-	-	-	**0.4**
LCCC	3.4	3.1	3.3	3.5	3.8	4.0	4.2	4.5	3.1	**33.0**
Total ALB costs	**3.8**	**3.1**	**3.3**	**3.5**	**3.8**	**4.0**	**4.2**	**4.5**	**3.1**	**33.4**
Total ongoing sponsorship and OpEx requirements	**8.6**	**6.8**	**7.2**	**7.7**	**8.3**	**9.0**	**9.7**	**10.4**	**7.4**	**75.1**
Ofgem (through own Estimate)	0.2	-	-	-	-	-	-	-	-	**0.2**

5.6 Spending Powers and Budget Management

5.6.1 Spending powers and application in devolved administrations

The Energy Act 2023 contains a spending power to help to facilitate the government's CCUS and hydrogen ambitions (see section 4.4.2). This power extends to England and Wales, Scotland, and Northern Ireland to support the deployment of CCUS and low carbon hydrogen across the UK. The UK Government has engaged with the devolved administrations throughout the process of developing the design of the business models and considered their views expressed.

Funding under the DPA will come from electricity suppliers through regulations made under section 9 of the Energy Act 2013. Amendments to the Contracts for Difference (Electricity Supplier Obligation) Regulations 2014 are to be made to accommodate the DPA.

As noted in section 5.5, LCCC and NEP will require netting off agreements from the CST to allow both entities to retain the income they receive to cover their expenses rather than returning income to the Consolidated Fund through a Consolidated Fund Extra Receipt (CFER). The timing of when netting off agreements will be sought from the CST is being confirmed with HMT

5.7 Financial Risks

Beyond the whole-life costs noted above in section 5.3, the programme is exposed to several risks which have been assessed on the basis of their timing, likelihood and quantum in light of *International Accounting Standard 37: Provisions, Contingent Liabilities and Contingent Assets* (IAS 37) and MPM. These risks would be classified as contingent liabilities and would therefore be 'off balance sheet' and excluded from the funding requirement provided in Table 2 and 3. Where contingent liabilities require Parliamentary approval, these approvals will be sought after the summer recess and before agreements signed at FID 'go live'.

5.7.1 Revenue Support Agreement (RSA)

HMT have indicated that MPM might require the department to follow the standard Parliamentary notification process for RSA payments, as, despite not being a contingent liability at a group level, these is a contingent liability within the core department. We will complete HMT's contingent liability checklist and continue to engage HMT on this point to ensure that Parliament is appropriately notified.

5.7.2 Supplementary Compensation Agreement (SCA)

The SCA is a long-term mechanism within the GSP, which enables the management of leak risk at the geological store during operations and the post closure period. It will provide compensation to NEP if commercial insurance is unavailable (or not available on commercially viable terms, if for example costs are excessive) or has been exhausted, and a relevant liability on NEP arises.

The SCA will be accounted for as an insurance contract on the DESNZ core department balance sheet under *International Financial Reporting Standards 17: Insurance Contracts* (IFRS 17). We will complete HMT's contingent liability checklist and continue to engage HMT so that Parliament is appropriately notified.

5.7.3 Discontinuation Agreement

The Discontinuation Agreement allows for SoS in specified circumstances to have the right but not the obligation to trigger discontinuation of the contracts with NEP. This would entitle NEP to be compensated for its equity and debt investments up to the limit of the RAV and for defined breakage costs to be paid. The Discontinuation Agreement contains triggers relating to the SCA, the RSA (lack of demand leading to a stranded asset), insurance unavailability and mutual agreement.

This scenario is considered to be very unlikely and the potential for discontinuation meets the definition of a remote contingent liability under MPM. Parliamentary approval for the recognition of the remote contingent liability will be sought through the standard process prescribed in MPM.

5.7.4 Discontinuation under NZT business Model Contract

Discontinuation risk entails the potential for NZT to be unable to continue under the business model contract, due to the actions of another party or events outside of NZT's control. This could happen due to a large-scale, programme-wide issue (such as a well blowout or leakage), the insolvency of other projects in the cluster such as NEP, a prolonged T&S issue or due to external events such as QCiL, Qualifying Shutdown Events or Force Majeure.

The risk of having to make a discontinuation payment under the NZT DPA is judged to be a remote contingent liability. As for discontinuation of the T&S business model contract, Parliamentary approval for the recognition of the remote contingent liability will be sought through the standard process prescribed in MPM.

5.7.5 Decommissioning Fund Shortfall

There is a risk that, if any transport and storage assets require decommissioning before the end of the asset's life, then the decommissioning fund may be insufficient to cover the costs of decommissioning, as the fund has not had the full asset life in which to accrue sufficient funds. DESNZ intends to cover decommissioning shortfall fund risk through a *Decommissioning Shortfall Agreement.* This will be signed by DESNZ SoS and NEP, and will establish a requirement for DESNZ SoS to pay into the fund to cover any shortfall, subject to the specified insolvency-related scenarios set out in the contract having materialised.

We will complete HMT's contingent liability checklist and continue to engage HMT to ensure that Parliament is appropriately notified.

5.7.6 Exchequer Funding Secretary of State Direct Agreement (SoSDA)

The Secretary of State will sign a direct agreement between LCCC and NEP to fund payments directly where LCCC fails to pay. This agreement does not increase the liabilities of DESNZ overall and does not give rise to a contingent liability as it is an intragroup transaction.

5.7.7 NSTA and Opred Requirements for Financial Security

The NSTA, as the independent regulator responsible for granting the carbon storage permit, is also considering the potential need to communicate to you a remote risk arising out of the financial position under its Regulations from the realisation of very unlikely scenarios at a permitted carbon store. Depending on financial security taken – which is subject to the ongoing negotiations and development of commercial insurance arrangements – such extreme scenarios may result in liabilities, above those identified in relation to the GSP, for the public purse.

5.7.8 Fraud

The programme has developed a fraud risk assessment for the programme with the Counter Fraud team in the Integrated Corporate Services function.

5.7.9 Financial Sensitivities

Whilst a significant number of contractual terms will be 'locked in' at FID, several elements of the financial impact of NZT and NEP will continue to move post-FID. The most material sensitivity for NZT is the potential for the availability of the capture plant to vary compared to the base case availability of 89%.

The most material sensitivity for NEP is if there was a 1% change in the Cost of Debt in the second regulatory period. This movement would arise if Ofgem agreed to a different Cost of Debt following the first three years of operations.

5.7.10 Cross-chain and Cross-Cutting Risks

Cross-chain risks are those risks which the private sector is exposed to through the network, but which they cannot mitigate against. These risks include a T&S construction delay, a first User construction delay, User drop-off, User underperformance, T&S availability and the provisions in case of discontinuation. Discontinuation, because it gives rise to a remote contingent liability, is separately highlighted in sections 5.8.3 and 5.8.4 above.

Cross-cutting risks, which are those risks which are challenging for the private sector to price or they relate to events outside their control, include inflation risk, energy price risk, carbon price risk, CapEx overrun risk, and OpEx overrun risk. The overall assessment of these risks is included in section 4.2.4.

5.7.11 NEP T&S Network Construction Overruns

The commercial model in the commercial case (section 4.1.3) describes the sharing of construction cost overruns between the owners of NEP and what can be added to the RAV. From an accounting perspective, however, the department will need CDEL budget cover for 100% of any cost overruns over and above any contractually agreed contingency (see section 4.3 for more on the commercial approach taken to contingency).

Where construction costs do overrun, 40% of these would be recovered through allowed revenue, therefore there would be an increase in RDEL income as well as RDEL (non-cash) associated with the depreciation of the asset. The likelihood of this degree of cost overrun materialising is considered to be unlikely (10 - 35%) as the agreement with NEP already includes a level of contingency.

6 Management Case

The CCUS programme operates within the following phases. **Assessment Phase:** The assessment of clusters and projects to determine which are shortlisted to receive government support in Track-1. Projects proceeding to negotiation phase were announced in March 2023. **Negotiation Phase:** Negotiations with sequenced clusters and shortlisted projects to reach financial close ending with FBC approval and FID. **Delivery Phase:** Construction of infrastructure and related activity to deploy CCUS. DESNZ transition to a monitoring and control role, with Ofgem, LCCC and CGL taking on regulatory, contract and grant management. **Operational Phase:** Clusters are operational, and benefits are realised. Assurance activity is completed, and the track is formally closed.

ECC is moving from the **negotiation phase** to the **delivery phase** for the 'anchor' projects. This section sets out the structures and governance for the current negotiations phase and requirements for the delivery phase, and the mitigating controls for the strategic risk on Post-FID Operating Model failure. The legislative and commercial structures for the cluster set out specific responsibilities for DESNZ, Ofgem, LCCC and CGL, including allocation of risks to those most appropriate to manage them. To manage DESNZ specific obligations, cross-chain and operating model integration risks allocated to government (see commercial case), drive co-ordination and communication across key stakeholders and increase likelihood of successful cluster delivery, the department will establish a Cluster Sponsor Function, this is expanded on further below.

6.1 Team structure

This section provides an overview of the changes in roles and accountability pre- and post-FID. This section covers the roles and responsibilities of the organisations who play a key role in the ongoing oversight of cluster delivery. The overall stakeholder engagement and communication approach is set out in section 6.2.

6.1.1 Pre-FID Roles and Responsibilities

The DESNZ CCUS programme is working closely with cross-Whitehall, industry, and partner organisations, who play an essential role in achieving FID, and these roles can be summarised as follows:

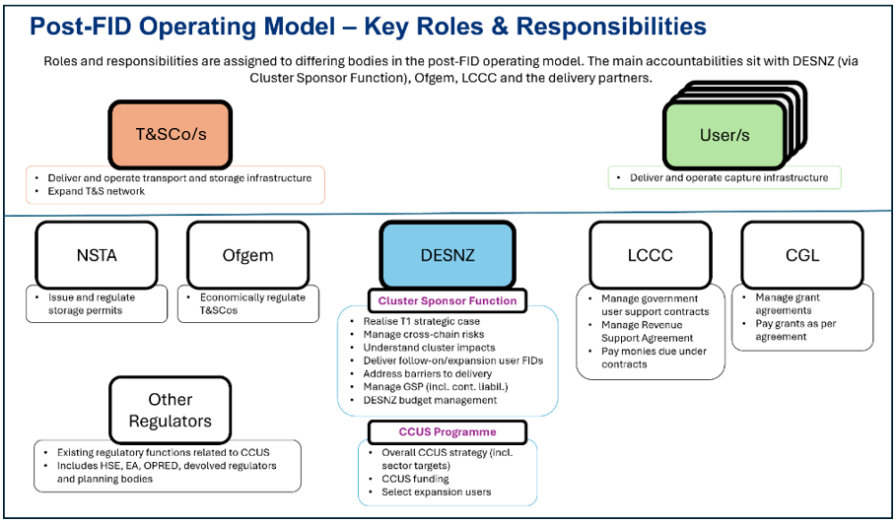
- **Cross-Whitehall** organisations at the centre of government, such as HMT and the IPA, provide strategic policy coordination and alignment, decision making in relation to funding, affordability, and value for money.
- **DESNZ** is the delivery body to FID, and via the **DESNZ CCUS programme**, provides the design and delivery of the CCUS system. This includes the policy and the design of the business and operating models, cluster delivery management, assurance of the design and cost of the physical network, the translation of the design of the system into contracts, the underpinning legislative framework and programme governance and assurance. Post-FID, the DESNZ role transitions into the **Cluster Sponsor Function** as outlined below.
- **Partner organisations** (regulators and ALBs) provide guidance on CCUS development and deployment, and capacity of themselves to deliver FID requirements and take on their obligations at FID. They also provide clarity on requirements and processes relating to the issue of permits and licences. Post-FID roles are outlined below.

- **Industry** work with the programme, its supply chain, and investors, to design and cost the network. They also conduct negotiations, collaborate on the Network Code and the proposed business and operating models, resulting in a CCUS system that industry is confident to invest in, construct, and operate sustainably.

Post-FID the roles of industry partners will continue as is, however, oversight of their delivery will move from the current DESNZ teams to Ofgem, LCCC, and the DESNZ Cluster Sponsor Function.

6.1.2 Post-FID Roles and Responsibilities

Roles and responsibilities in the post-FID operating model are determined by the Economic Regulatory Regime, government support (via contracts or grant funding), and other regulations applicable to DESNZ. Roles and responsibilities, and management/ownership of risk is allocated to the party deemed best able to manage it. Where the government is taking on/owning risk, additional structures have been put in place to support this. Under the economic licence, the projects are defined as users in relation to the T&SCo. See section 4.2.3 above. The key roles in the post-FID operating model are summarised in the figure below.



DESNZ's current role will transition into the **DESNZ Cluster Sponsor Function** (also covered in Section 4.4) in the delivery phase as defined at the start of this case. Its role in the operations phase will be defined prior to COD. The core functions of the Function during the delivery phase will include:

- Management of government-owned cross-chain delivery risks and operating model integration risks, including integrated planning, alignment of T1 and T1x, and stakeholder management.
- Oversight of cluster construction schedule, agreement & monitoring of DESNZ budget and business planning.
- Provide recommendations/advice to DESNZ SoS on key decisions, such as variation requests under the GSP, remediation activities, and commissioning of new user selections etc.
- Manage business cases and oversee negotiations for 'build-out' & expansion users, including setting negotiation mandates, conducting VfM analysis, and determining the overall assurance approach.
- Support partners to take regulatory and contractual decisions informed of the full cluster impact, including re-openers, cost variations etc.
- Coordinate the removal of barriers to successful delivery, including the resolution of regulatory, Network Code, and business model issues.
- Represent DESNZ SoS on the Liaison Committee as required.
- Develop a data management strategy, including reviewing relevant data sharing arrangements.

Integrated Processes: The commercial roles of key organisations have been set out in the commercial case (Section 4.4). In collaboration with these organisations, we have developed a number of Integrated Processes. These set out the interface and boundaries between organisations, aligned to each organisation's accountabilities, roles and responsibilities. We have tested our Integrated Processes to achieve confidence in the integration and outcomes of the Post-FID Operating Model, in the method and priority order.

Partner organisations' capacity and capability: To assess capacity and capability of key partner organisations to deliver their roles at FID, the CCUS programme commissioned partner organisations with significant responsibility to complete Organisational Readiness Statements. Partner organisations have provided an interim readiness statement (submitted in March 2024), signed by appropriate responsible individuals, where they have self-assessed that they understand their requirements and either have, or have a plan in place to have, the capability and capacity

in place to operate at FID. They have also identified the actions that are required to improve their assessment ratings and are working to do so in advance of the pre-FID readiness checkpoint. Appropriate responsible individuals within partner organisations self-assessed that they understand their requirements and either have, or have a plan in place to have, the capability and capacity in place to operate at FID. Partner organisations have identified the actions that are required to improve their assessment ratings and are working to do so in advance of the pre-FID readiness checkpoint.

6.1.3 Resources

Following the IPA Gateway 0 recommendation, the CCUS programme:

- Developed a Resourcing Strategy based on supply and demand data, and monitored advisor spend against programme milestones and contract spend ceilings. Advisor use is closely monitored to align with the activities where specialist resource is required and for defined periods and work packages. We are mitigating resourcing risk by utilising additional advisor resource and reprioritisation of existing resource within the programme.
- Recruited a Programme Director and an additional Programme Deputy Director.

Budget for the current FY 23/24 is in place, with budget allocation from the SR for next year. Business planning is underway for FY 24/25, the purpose of this exercise is to confirm the allocated budgets for financial year 24/25 which includes advisor spend and ALB GIA payments.

Advisory support: To supplement CCUS capability, additional support has been brought in through the advisory contracts. Key advisory support includes:

- PMO contract in procurement progress to bolster the programme functions.
- The financial advisor contract with the purpose to provide financial advice on major capital infrastructure projects, some of the work involves advising on business models and government subsidies and understanding of the debt and equity investor market in UK infrastructure.
- Legal advisor contract, supporting the ongoing design of work within CCUS and advisory support on legal considerations for the programme.
- Technical advisor support.

CCUS is creating a more strategic overview of required contract support and are currently assessing options for how the advisor contracts can best support the future programme.

6.2 Stakeholder Management and Communications

This section covers at a high-level the stakeholder engagement and communications approach. Full details on roles and responsibilities have already been covered in the above section.

The CCUS programme undertook a mapping exercise of all key stakeholders as part of the OBC submission and set out the categories of identification and prioritisation used to group stakeholders.

Testing has shown awareness of CCUS is growing but with many still undecided of their view. The programme is using the key stakeholders identified in the strategy to therefore secure early backing from the public. This is being done through sharing best practice for community engagement at advisory boards such as the CCUS Council, encouraging cluster partners to demonstrate local benefits. Simultaneously we are working with ALBs to demonstrate safety. Finally, we are using external communications to set narratives on CCUS in the press and media, outlining benefits of the technology to meeting our climate commitments and delivering jobs and economic growth.

Data and information flows: The DESNZ Cluster Sponsor Function will, post-FID, define a longer-term data management strategy for CCUS to govern data flow definition, amendment, and data storage/access during the operation phase of the project.

6.3 Project Governance

This section sets out the current and post-FID operating model governance structure as well as the project accountabilities to enable decision making. The programme needs to refresh its post-FID governance to align with the changes in roles and responsibilities as set out above.

6.3.1 Project Accountability

The DESNZ Permanent Secretary fulfils Accounting Officer (AO) responsibilities for the programme. The appointed SROs have ultimate accountability for the successful delivery of CCUS. A joint SRO arrangement remains in place, allowing greater visibility across directorate boundaries, more efficient interface to other teams, encouraging

constructive challenge from dependent projects and enabling the transparent management of shared project/ programme Management Information. The Cluster Sponsor Function is proposed to have a single SRO lead for T1 delivery, and a sub-programme director, to enable it to have the necessary oversight and influence for the scope of its function.

6.3.2 Project Governance

ECC governance is contained within the wider CCUS programme governance structure. The governance structure has been designed in accordance with DESNZ's governance framework and best practices to ensure the right level of accountability, decision making and risk escalation. Recognising the challenges that the programme's evolutionary nature adds to the governance, following the IPA Gateway 0, the CCUS programme commissioned an independent review on governance. Its recommendations have now been implemented.

6.3.3 Budget Monitoring & Control

For proposed budget monitoring and control in light of NEP being on the government balance sheet, please see section 5.7.2 of the financial case. We have established monitoring and reporting processes to ensure that budgets and forecasts are monitored appropriately, and leverage the standard monthly DESNZ budget management and forecasting processes. To ensure effective budgetary control, regular reports are presented to each SRO. Post-FID, there are integrated processes in place to manage cost variations and additional HMG draw down of funding. The related governance required is being developed.

6.4 Milestones

An integrated schedule, containing key milestones for all the projects within the cluster, has been developed to provide a clear view of cluster readiness to COD. The integrated schedule is made up of several workstreams delivered across a number of stakeholders, and the Cluster Sponsor Function role in schedule oversight during the delivery phase is set out below. The below also sets out the schedule overview including the roles and responsibilities for schedule management and management of related schedule risks, and the schedule assurance undertaken to ensure that the programme has schedule delivery confidence.

6.4.1 Schedule Overview

Schedule content: The high-level milestones are contained in the table within the Executive Summary (section 1.10). A number of activities are still ongoing to achieve FID including stage 3 negotiations (concluding in June 2024), FID-critical secondary legislation, activities to reach financial close, and Post-FID Operating Model implementation.

The overarching schedule risk is ensuring the delivery of a timely cluster COD (and users with a later COD date) to avoid any unnecessary draw down on HMG finances (as set out in the financial case section 5.10) and delays to benefit realisation. The schedule also contains the relevant milestones from the IAAP and the M&E Plan. The agreed delivery milestones for the T&SCo will be set out in the Technical Details Schedule (TDS) and will form part of the economic licence, and for the projects these will form part of the contract milestone requirements. These will all be formally agreed and signed off by the programme as part of the issuing of economic licences for the T&SCo and the contract agreements with the projects. The interdependencies, assumptions and constraints are set out in the strategic case in section 2.3.4.

Legislation overview: The programme has prioritised secondary legislation that is FID-critical. This has been assessed by the team and the relevant milestones have been captured in the integrated schedule. In addition, consensus on the full form CCS Network Code ('the Code', as described in the commercial case section 4.3.6) is expected by the end of June 24.

Transition planning: The integrated schedule provides high-level milestones for transition planning. The changes to roles and responsibilities are covered in the Team Structure section 6.1. An integrated transition & engagement plan will be implemented prior to FID, ensuring that post-FID processes can be executed effectively and minimising the loss of institutional knowledge and relationships built throughout the assessment and negotiation phases.

6.4.2 Schedule Delivery Confidence

The **schedule assurance approach up to FID** follows a PERT and QSRA assurance approach. To enable confidence in the **post-FID** schedule, a **schedule assurance approach** has been agreed. Post-FID, the continued schedule assurance for T&SCos moves to Ofgem and for users moves to LCCC. The Cluster Sponsor Function will oversee the integrated schedule and will work closely with these parties.

6.4.3 Schedule Management

For **delivery up to FID**, the CCUS programme has developed standards for the development of project schedules, including a change control process. The Track-1 PMO is responsible for creating and tracking the integrated ECC schedule and have developed the schedule in alignment with this guidance. **Post-FID**, **Ofgem** will monitor the progress of construction for T&SCos as part of their regulatory oversight and will monitor the milestones against the TDS. **LCCC** will monitor progress of project construction schedules against the contract's milestone dates. The **Cluster Sponsor Function** will maintain the integrated schedule, identifying opportunities to remove barriers to on-time delivery and monitoring cross-chain risks.

Schedule resourcing: At FID, multiple stakeholders will either take on new responsibilities or expand existing responsibilities. Each organisation will own their delivery milestones, with each organisation confirming they have the capacity (budget, resource, IT) and capability (knowledge, skills) to successfully operate their responsibilities at FID via an Organisational Readiness Statement. This is outlined in section 6.1.2 above.

6.5 Assurance & Approvals

CCUS joined the IPA's Government Major Project Portfolio (GMPP) in Q2 2021 and is subject to IPA led assurance at each stage gate review point. This section sets out the additional assurance approach taken by the programme during the negotiations phase. An Integrated Assurance and Approvals Plan (IAAP) has been agreed with the IPA and incorporates internal and external assurance and approval points relative to the business case. A Risk Potential Assessment has been developed to support the assurance activities defined in the IAAP. This document will continue to be reviewed and provides a critical assessment of the strategic risks of the project to support good risk management practices and delivery assurance activities. GMPP reporting arrangements are covered in the risk section below.

6.5.1 Assurance Arrangements

The programme has developed the following CCUS programme Assurance Approach. It adopts the three lines of defence model and has been designed to manage risk, ensure quality, and build confidence that the cluster is deliverable, and that it can affordably achieve the desired outcomes.

- **Delivery up to FID**: The controls, systems, and assurance approaches placed to ensure effective delivery up to FID. We will still be maturing up to the point we take FID, a programme readiness checkpoint will take place in August 2024.
- **Assurance approach pre-FID that achieves the desired outcomes in the delivery stage**: The approach that the programme has taken to test and assure the way in which the CCUS system will operate, including; the physical network; the way organisations operate; achieving the desired outcome; reaching a deal with industry; overarching approach to clusters; and strategic risk.
- **Delivery and assurance from FID to COD:** The three lines of defence are: **1st line** – Within the post-FID operating model each stakeholder has assigned roles and responsibilities and owns the oversight and required delivery or risk management at this level. As part of this line, the CCUS programme has undertaken assurance and testing to drive confidence in organisational readiness to operate in the delivery phase. **2nd line** – Independent advisors to the CCUS programme provide independent view on the appropriateness and completeness of the work undertaken by the programme and on any material risks which may impact on the successful delivery and operation of ECC. Final reports will be submitted pre-FID. Post-FID, the DESNZ Cluster Sponsor Function will perform 2nd line functions. **3rd line** – The assurance required at this level will be provided through IPA assurance points (Gateway 4 pre-COD), GMPP annual reviews and ministerial engagement.

6.5.2 Programme Assurance Activities

All conditions from OBC stage have now been discharged, including recommended actions from previous IPA Gateway Reviews. The next IPA assurance activity is expected to be Gateway 4 prior to the commencement of operations for ECC in Q3 2028. To note, the CCUS programme will continue to engage IPA and HMT via the governance structure outlined above.

6.5.3 FBC Approvals Sought

The approvals sought for this FBC are covered in the Executive Summary. Reaching FID requires DESNZ Secretary of State and the Chancellor of the Exchequer approval, including final sign-off of the FFE. We are seeking to get approval from MPRG of the business cases and propose that we then immediately seek final approvals from DESNZ Secretary of State and the Chancellor of the Exchequer to go to FID.

We propose that MPRG approval allows for a degree of flexibility on the precise timing of FID, so long as the delay a) does not materially impact the funding requirement (as per cost tolerance); and b) does not materially diminish the

benefits expected from the investment. SROs would manage any schedule changes through change control procedures to assess the impact on the likely Commercial Operating Date (COD). We propose SROs have a tolerance of 6 months delay to COD.

It should be noted that uncertainty still exists around key parameters surrounding risks and costs. We are seeking approval subject to the key parameters outlined in this FBC and should these be materially altered, will seek to obtain the relevant governance sign-off.

The agreements that we have negotiated are time limited. If the approval of the FFE is delayed, we would need to postpone FID and developers may need to re-negotiate supplier bids. This would be a dynamic scenario, and its impact cannot be easily forecast. Given the limited supplier market capability, and loss of confidence in the UK CCUS vision, underlying costs are expected to increase. In addition, there is a risk that supplier bids cannot be re-negotiated and contracts collapse, requiring retendering, significant delays (+7 months) and cost increases.

Therefore, we recommend that MPRG considers progressing to FID ahead of the SR. This would avoid the risk of the above funding requirement increases, and limit impacts on benefits and tax or bill payers. Alternatively, if it is the view of MPRG that the FFE cannot be decoupled from the Spending Review, we would ask our delivery partners to engage their supply chains to negotiate the required extensions, and propose returning to MPRG and PIC via correspondence to agree the revised terms and updated figures.

6.5.4 Exceptions

- **Commercial Assurance Board** - It has been agreed with the head of commercial assurance and commercial keyholder that this FBC is not in scope of CAB. Commercial keyholder and business partner reviews, board member discussions and critical friend reviews from the HICC and IDH directorates will provide steers and challenge throughout the commercial case.
- Approval from the **Industrial Development Advisory Board** (IDAB) is not required, as the programme is not using the Industrial Development Act (IDA) for its spending powers.
- No specific **Cabinet Office (CO) approvals** are required, any CO oversight required will form part of MPRG.

6.6 Monitoring and Evaluation of Benefits

We have developed an **M&E Framework for the CCUS Programme as a whole** and within that a specific **M&E Plan** for Track-1, covering both ECC and HyNet, with the support of Ipsos.

The key objective of the Track-1 M&E Plan is to assess the effectiveness of Track-1 policy support utilising evidence produced from process, impact, and value for money (VfM) evaluations. The plan sets out the evaluation **data collection plan** (including relevant monitoring data) and includes an **indicator framework** that sets out the indicators that we will use to track progress against our core and wider benefits, including data sources, collection frequencies and options for baseline data. It also describes our intended approach to **evaluation** and determines appropriate evaluation timings. Core suggested evaluation questions and sub-questions are provided but will need to be further developed by a future evaluation supplier. Process evaluations are planned for early 2024 (Part 1, up to negotiation stage), early 2025 (Part 2, following FID) and mid-2026 (Part 3, during construction). Impact and VfM evaluations are planned for late 2028 (interim, pre-operations), 2030 (interim, including operations) and 2032/33 (final).

The Track-1 M&E Plan focuses on early evaluation, feedback and learning to improve delivery in the near term, while the wider CCUS Programme M&E Framework considers longer term and programme wide evaluation. Evaluation findings are and will be used to inform the design of future tracks and phases.

An evaluation data collection plan includes primary data collection and use of secondary data, including monitoring data collected via the counterparties/delivery bodies and wider secondary data sources. The CCUS Programme M&E Framework also discusses the potential importance of ‘in-flight monitoring’ to have the ability to make in-flight changes. Work is underway within DESNZ to map out the Post-FID Operating Model and the Delivery Sponsor Function covering monitoring requirements (incl. the need for in-flight monitoring), governance, reporting cycles and integrated planning. The processes outlined are consistent with relevant HMG and DESNZ best practice guidance and take on board recommendations from a National Audit Office (NAO) review of the then BEIS (DESNZ) business support policies in January 2020.

6.6.1 Monitoring and Evaluation Resource

As set out above, early evaluation, feedback and learning will be crucial for Track-1 due to its FOAK nature. Some of the planned evaluations will also cover early Track-1 expansion and Track-2 processes and impacts (where available at the time), rather than undertaking these studies separately. The M&E Framework sets out the full schedule of planned cross-cutting evaluation activities. Track-1 evaluation work will be led by a dedicated workstream.

6.7 Risk management

CCUS' treatment of risk is aligned with DESNZ Risk Guidance and Programme Risk Management Framework (April 2021), based upon M_o_R™ and HMT's Orange Book. Project level risks are recorded in the CCUS project level risk registers and are escalated to the CCUS Programme RAID, in accordance with the DESNZ Risk Guidance and DESNZ Risk Appetite Statement. CCUS escalation processes are established in current reporting structures and direct engagement with Senior Project Staff and the SROs.

6.7.1 Risk and Issue Management

Pre-FID risk and issue management is undertaken via regular project delivery meetings to identify, monitor, and define risks to a successful outcome. A CCUS Programme Risk and Issues Management Strategy, including an internal monthly RAID review cycle, is in place. Regular risk updates are provided from industry and partnership organisations that feed into the monthly Track-1 dashboard. These are presented monthly to the T1 Board, with any escalations set out in the agenda for the board to review.

Post-FID relevant cross chain and cross cutting risk and issue management will be overseen by the Cluster Sponsor Function, in collaboration with partner organisations. Specific roles and responsibilities, including escalation of risks and issues, are set out in the Post-FID Operating Model and Integrated Processes. The cross-chain risks are outlined in the commercial case. The Cluster Sponsor Function, along with the CCUS programme, will maintain RAID oversight for strategic cluster cross-chain risks and anything that impacts DESNZ responsibilities. The risk management approach will evolve as the Cluster Sponsor Function matures. As outlined above, a number of de-risking activities have been undertaken including transition planning, integrated process testing and operational readiness statements.

6.7.2 Performance Management & Reporting

Effective performance data management and reporting will be essential to cluster delivery to COD. Current reporting used to support the monitoring and decision making includes: **GMPP reporting** – As a GMPP programme the regular GMPP reporting cycles are adhered to and will continue to do so post-FID. **Online Reporting in BEIS (ORB) Report** – Per departmental guidance, the programme submits a monthly report, signed off by the SROs, and provides a high-level performance snapshot to the portfolio. Post-FID it is expected that this reporting will continue. **Track-1 Dashboard** is a monthly snapshot of cluster performance and risks, compiled by the Track-1 PMO in collaboration with the relevant DESNZ, industry and partnership organisations and cleared by the Project Delivery Deputy Director, submitted to the T1 Board and Programme Board to communicate progress, plans, raise risks and key challenges to the Senior Leadership Team and the SROs.

Post-FID, the Cluster Sponsor Function will facilitate communication of data between partner organisations and DESNZ, and coordinate information sharing with the CCUS Programme Board. DESNZ, Ofgem, LCCC, and CGL will circulate regular reporting from the T&SCo and Users at a working-level, for discussion at the Cluster Sponsor Function Board and associated governance. The frequency and the reporting data points, including for benefits reporting, are being developed in collaboration with relevant partner organisations and will enable the Cluster Sponsor Function to fulfil its role of monitoring the integrated schedule and the DESNZ cost envelope.

Data management: Post-FID contracts and relationships contain multiple data flows from T&SCos and Users, with overlapping data. There are benefits from taking a holistic, cross-body approach to data management, and a data strategy is being developed for the Post-FID Operating Model, including the required data needs across DESNZ and the necessary data sharing arrangements to support this.