

Net zero week : Overview of the UK's CCUS and Hydrogen landscape



Logistics

Recording

Session will be recorded. Slides and recording will be circulated shortly

Mute and cameras

We will keep all participants on mute with cameras off



Questions welcomed throughout, we will answer them all at the end

Duration: 60 mins

With plenty of time for questions.



Topics we'll cover



- 01 Our role and overview of what we've delivered
- CCUS & H2 02
- **GGR & BECCS** 03

04 Questions and discussion



An Introduction to the Low Carbon Contracts Company

Adam Catchpole

Why are we here?

Our mission is...

"...to shape and **implement schemes** which enable lowcarbon investment at least cost to the consumer"

Our vision is...

"...to accelerate the delivery of net zero"

Accelerating Net Zero

LCCC and the schemes we deliver will be directly responsible for **approx. one-fifth of all the emission reductions required between now and the end of the sixth Carbon Budget (2033-2037).**

Also, the roll-out of electrification to heat and transport, with Contracts for Difference delivering a lower-carbon mix, means that the indirect impact will be even larger.

- **Mission Zero:** Net zero is the economic opportunity of the 21st century
- The UK enjoys a comparative advantage in several key areas – offshore wind, carbon capture and storage, and green finance



LCCC has delivered...



Contracts for Difference (CfD)

Designed to:

- Provide efficient and cost-effective price stabilization by reducing exposure to the volatile wholesale electricity price
- 2. De-risk investment and provide price certainty for generators over the contract length (15 years)

- Scheme in operation since 2015
- Intention was to **facilitate private investment** in low carbon electricity generation



Outcome:

Renewables now account for over 40% of all UK electricity generation, up from 7% in 2010 – due to government policy interventions i.e. CfD to drive investment

Offshore wind	Solar	Advanced Conversion Technologies
Onshore wind	Biomass Conversion	Nuclear
Remote Island wind	Dedicated Biomass with CHP	Tidal
Floating Offshore wind	Energy from Waste with CHP	Geothermal

The Success of the CfD





LCCC is the counterparty to 239 projects managed under CfDs.

Once all contracted assets are operational, they will total 29.4GW.

38.8% of the UK's current total generating capacity of ~76.5GW

The CfD works as designed and has paid back over £300m to suppliers in the last four quarters.

Current/future work

Preparing & Implementing

- Hydrogen Production (LCHA)
- Industrial/Waste Carbon Capture
- Dispatchable Power Agreement
- Regulated Asset Base for New
 - Nuclear
- Revenue Support Agreement for
 - Carbon Capture

Scheme Design and Business Model Support

- Hydrogen Certification
- Hydrogen Levy
- Hydrogen Storage
- Hydrogen Transport
- Hydrogen Competitive Allocation
- Engineered Greenhouse Gas Removals
- Power bio-energy with Carbon Capture (power BECCS)
- Sustainable Aviation Fuels
- Northern Ireland Renewables

Government energy and decarbonization targets LCCC shaping of policy of policy DLCCC designing business models DLCCC formally assigned roles DLCCC delivery body

Other opportunities

- Nuclear small/advanced reactors
- Long duration electricity storage
- Hydrogen to power
- Competitive allocation
- Industrial/Waste Carbon Capture competitive allocation
 - Supporting design of business models

Implementation & Operations

• <u>ICC</u>

- Waste
- <u>DPA</u>
- H2 Production

Scheme Design & Contract Development New Schemes Team & the transition to Net Zero

Transitional Support for Large Scale Biomass

GGRs

Non-Pipeline Transport

Hydrogen to Power

Hydrogen Storage

Sustainable Aviation Fuel

BECCS





CCUS & H2

Megha Shah Dan Hulbert

CCUS and H2 business landscape



Carbon Capture Usage and Storage

CCS will also enable the realisation of negative emissions through either direct capture of carbon tandem with bioenergy generation.

Transport and Storage

Captured carbon will be compressed and transported via a shared, distributed network. The carbon will be stored geologically in undersea sites.



Blue Hydrogen Production

Blue Hydrogen will be produced by breaking down natural gas via a reformation reaction. The carbon emitted in this process will be captured and stored through the CCS system.

Hydrogen Users

Generated hydrogen could be used in a multitude of sectors including the decarbonisation of industry, domestic heating and transport.

Hydrogen



Green Hydrogen Production Green Hydrogen will be produced directly from water via electrolysis. This process requires renewable or low carbon electricity.



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Journey so far

Track 1 (CCUS)

- HyNet (north-west England) and East Coast Cluster (Teesside and the Humber) confirmed as Track-1, with Scottish Cluster as reserve.
- Track-1 Project Negotiation List was published in March 2023, featuring 8 projects (3 industrial, 2 waste, 2 blue hydrogen, 1 power).

Track 1 Expansion (CCUS)

- The Track-1 expansion process will look to fill additional storage capacity anticipated to be available in and around 2030 across the Track-1 clusters.
- Application window for Track-1 expansion HyNet is now closed.

Track 2 (CCUS)

• Government has launched Track-2 of the Cluster Sequencing process. HMG will commence engagement, assessment of delivery plans and due diligence with Acorn & Viking T&S systems.

Hydrogen allocation round (HAR)

- 11 successful projects, total of 125MW capacity were announced in December 2023
- HAR 2 EOI window closed in April 2024

How successful CfD mechanism has driven costs down in eCfD area



Generators receive (or pay back) a £ per Megawatt-hour (MWh) value based on the difference between a wholesale market reference price and the strike price

Strike price = pre-agreed price for production of low carbon electricity

Market reference price = traded wholesale market electricity price used as a reference for any top-up value to the generator

• Funded through a supplier obligation on electricity suppliers mandated by UK Government regulation

Renewables now account for over 40% of all UK electricity generation, up from 7% in 2010 – due to government policy interventions i.e. CfD to drive investment. The SP Offshore wind energy has decreased from c £150/MWh to c 37.35/MWh, while Onshore has decreased from £82.5/MWh to £52.29/MWh (compared to 2012 prices).

Building blocks of the CCUS and H2 business models based on CfD



INVESTABLE

Attract private finance



RELIABLE

Reliable and proven mechanism of CfDs



FLEXIBLE

Remove market barriers to investment – equitable risk sharing



REVENUE CERTAINTY

Provide long-term revenue certainty to establish and scale up these industries across the UK

Enabling investments for delivery of decarbonisation affordably and sustainably

Brief overview of the Dispatchable Power Agreement (DPA)

To help deliver emissions reduction and achieve the Carbon Budget 6 targets, government will implement the Dispatchable Power Agreement (DPA), a private law contract of up to 15-years funded by the Supplier Obligation.

The Dispatchable Power Agreement (a type of CFD, pursuant to the Energy Act 2013) is comprised of two components:

- an availability payment paid to provide the 'missing money' and enable the plant to be built;
- a variable payment paid to ensure that the abated generator dispatches ahead of unabated alternatives, and behind renewable sources such as wind & solar.





Brief overview of Industrial Carbon Capture contract

There are two types of Industrial Carbon Capture (ICC) business models:

- the ICC business model (for the industrial sector) and;
- the Waste ICC business model (for the waste management sector).

The ICC business models incorporate:

- A private law contract of up to 15-years (the 'ICC Contract') between emitter and counterparty:
 - Pays emitter per tonne of captured CO₂, to cover the additional costs of deploying carbon capture;
 - Based on Contract for Difference model;
 - Offers risk protections in specific circumstances (e.g., T&S outages, legal changes) if obligations are met.
- Capital grant co-funding for a portion of the capital cost of capture projects is available for initial projects to help mitigate against certain risks associated with these projects.





Brief overview of Revenue Support Agreement

Co2 transport and storage (T&S) is a **"user pays" economic regulation model,** emitters pay for the transport and geological storage of the CO₂ that they produce.

- The economic licence will grant a licensed T&Sco the right to an "Allowed Revenue" (costs and a reasonable return on its capital investment)
- Allowed Revenue is the annual amount that a T&Sco is entitled to recover during a price control period.

If T&Sco earns less revenue than the Allowed Revenue for a charging year from user fees, then it will be expose a 'revenue gap'.

Revenue support is provided for, as a last resort mechanism, to enable a licensed operator to recover any short in Allowed Revenue they are entitled to under the licence through the Revenue Support Agreement (RSA)

Revenue Support Agreement (RSA) is a financial mechanism which will trigger in the event of:

- A shortfall in the Allowed Revenues (where the Actual Revenues falls short) e.g. due to delayed construction commissioning of any CCUS or merchant users; or
- If the first user is delayed in joining the T&S network which creates further expenditure and debt



Brief overview of Low Carbon Hydrogen Agreement

The HPBM provides revenue support to

- incentivise investment in new low carbon hydrogen production and;
- encourage users to switch to low carbon hydrogen by making it a price competitive.

The first LCHAs will be allocated through:

- Track-1 Phase-2 for CCUS-enabled hydrogen projects
- Hydrogen Allocation Round 1 (HAR1) for electrolytic hydrogen projects.

The HPBM is delivered through the Low Carbon Hydrogen Agreement (LCHA), which is a 15-year private law contract between a hydrogen producer and a government counterparty; Low Carbon Contracts Company (LCCC).



Key features of LCHA are :

- The subsidy is paid for each qualifying unit of hydrogen produced and sold.
- The hydrogen produced must meet the Low Carbon Hydrogen Standard to be qualifying.
- The main cashflow is a Difference Amount (variable premium).
- The LCHA expires when the producer reaches the agreed sales cap (MWh).

Understanding H2 Payment mechanism

Difference Amount



- 1. Achieved Sales Price (ASP) is higher than the Natural Gas Month-Ahead Price (NBP), but below the Strike Price (SP). ASP becomes the reference price therefore and producer receives support from the ASP up to the Strike Price.
- 2. The NBP goes above the ASP but remains below the Strike Price. The Producer now receives support from the NBP to the SP.
- 3. For this short period, the scenario is the same as scenario 1.
- 4. For this period of time, the ASP climbs higher than the Strike Price, whilst the NBP remains below the Strike Price. The Producer pays back the difference between the ASP and the SP.
- 5. The floor price when the SP is below the reference prices is the lower of the SP or NBP, in this case, it's the SP. However as the ASP is above the SP, the producer pays the difference between the ASP and the SP.
- 6. The NBP is above the ASP, however as the NBP is also above the SP, the floor price remains the SP. The reference price in this instance is the higher of the ASP and the floor price (SP). The producer pays the difference between the ASP and the SP.
- 7. The NBP remains above the SP, so the floor price is the SP. The ASP has dipped below the SP, so the reference price is the floor price, which is the SP. No payment is due by either party.
- Reference Price (Achieved Sales Price ASP)

Simplified payment mechanism for H2 business model



Stakeholder network in managing these contracts



Compliance body (LCHS), laboratory

How does LCCC work with our counterparties?



ACHIEVEING MILESTONE REQUIREMENT (or OCPs or other key milestones)

Early engagement (12 months prior) to decide which route, how and what is required? Progressive submission of drafts, Supporting information for feedback

Communication both ways to ensure that deliverables / timelines are on track

Proactive trouble shooting of any issues leading to achieving Milestones





Greenhouse Gas Removals and Bioenergy with Carbon Capture

5.75

Gabriela Duque

The Importance of GGR Credits in Achieving Net Zero



<u>Net Zero - The UK's contribution to stopping global warming - Climate Change Committee (theccc.org.uk)</u> <u>Global Warming of 1.5 °C — (ipcc.ch)</u>

Summary of CCUS/GGR Milestones



Track-1 Expansion Application Guidance

Process to expand the HyNet CCUS Cluster in the North West, enabling projects to apply for access to CCUS infrastructure under the GGR Business Model



GGR Publication

Policy update on the design of the GGR and power BECCS business models and the GGR Indicative Heads of Terms

GGR Business Model

Greenhouse Gas Removals (GGRs) is an umbrella term that falls broadly into two categories; nature-based solutions (e.g., afforestation and soil carbon sequestration), and engineering-based approaches (e.g., BECCS and DACCS). The current business model focuses on engineering-based solutions.

GGR business model is a contractual subsidy mechanism targeting a technology-agnostic approach to supporting engineered GGRs and the creation of negative emissions/greenhouse gas removals in the UK.



Overview of the GGR Business Model



GGR Standards and Methodologies

GGR Methodologies

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Requirements and procedures to accurately quantify the amount of CO2 removed from the atmosphere and permanently stored.

e.g., project life-cycle assessment boundaries, identify the baseline, assess additionality, monitoring and reporting parameters. Research

The government commissioned ERM (Environmental Resources Management) to conduct an independent review of existing GGR standards and methodologies for engineered GGRs and understand their potential applicability to the UK context.



Based on this report, consultation feedback as well as wider policy assessment, the Government <u>intends to develop</u> <u>methodologies</u> supporting the business model rather than endorse one, or multiple, thirdparty methodologies.

The Government will only support GGR credits delivered using the Government-defined methodological approach.

BECCS Business Model

BECCS business model is a contractual subsidy mechanism that supports the creation of negative emissions/greenhouse gas removals and low-carbon power to the electricity system in the UK. This Business Model support is for Projects capable of generating and exporting a minimum of 100MWh (Megawatts electricity) to the electricity grid.

The CfDc side of the BECCS business model has been developed in tandem with the GGR business model to ensure alignment wherever possible.



BECCS Business Model

"Process of generating electricity using sustainable biomass feedstocks and capturing and permanently storing the CO2 generated in the process (...) it is one of a suite of engineered GGR technologies that government believes can play a significant role in meeting the level of engineered GGRs required by the Net Zero Strategy"

Dual CfD

Dual payment mechanism of a 'CfDe + CfDc' for large-scale power BECCS

Follow the precedent and structure in the CfD scheme and CCUS business models (e.g., Initial Condition Precedent, Milestone Requirement, Operational Condition Precedent, Start Date, Target Commissioning Window, T&S Commissioning Delays)

CfDc Reference Price

Generator's achieved sales price for GGR credits as a CfDc reference price, including PDI and volume support mechanisms



Ongoing work to define clear supply chain emissions thresholds and sustainability requirements that feedstocks will need to meet

Season-ahead reference price which reflects the weighted average of forward sales from the previous season of the wholesale electricity market

Any questions...



Thank you





Have further questions?

Drop us a question at info@lowcarboncontracts.uk

- © Low Carbon Contracts Company Ltd
- 10 South Colonnade, Canary Wharf
- London E14 4PU
- 0208 187 9308