

# Carbon Capture, Usage and Storage in the UK

an update to CSLF on the UK's support for CCUS

28<sup>th</sup> April 2021

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## Objective for this session:

- To provide a high-level overview of UK government's support for CCUS activities and outline proposed next steps.

# Agenda

No	Topic
1	Introduction
2	Transport and Storage Regulatory Investment Model (TRI Model)
3	Power
4	Industrial Carbon Capture
5	Hydrogen
6	Next steps

# 1.1 Introduction - UK's ambition

## The Sixth Carbon Budget:

- On 20th April 2021, UK government announced its commitment to the Sixth Carbon Budget by setting in law a world leading climate change target, cutting emissions by **78%** by 2035 compared to 1990 levels.

## UK's CCUS Ambition:

The government has recently published [The Ten Point Plan for a Green Industrial Revolution](#) (November 2020) and [Energy White Paper](#) (December 2020), setting out:

- Our ambition to capture **10Mt** of carbon dioxide per year by 2030.
- Our commitment to invest **£1 billion** up to **2025** to facilitate the deployment of CCUS in **two industrial clusters** by the **mid-2020s**, and a **further two clusters** by **2030**, in areas such as the North East, the Humber, North West, Scotland and Wales.
- A new **£240 million** Net Zero Hydrogen Fund and an ambition of **5GW** of low carbon hydrogen production capacity by 2030.

## CCUS Programme Objectives:

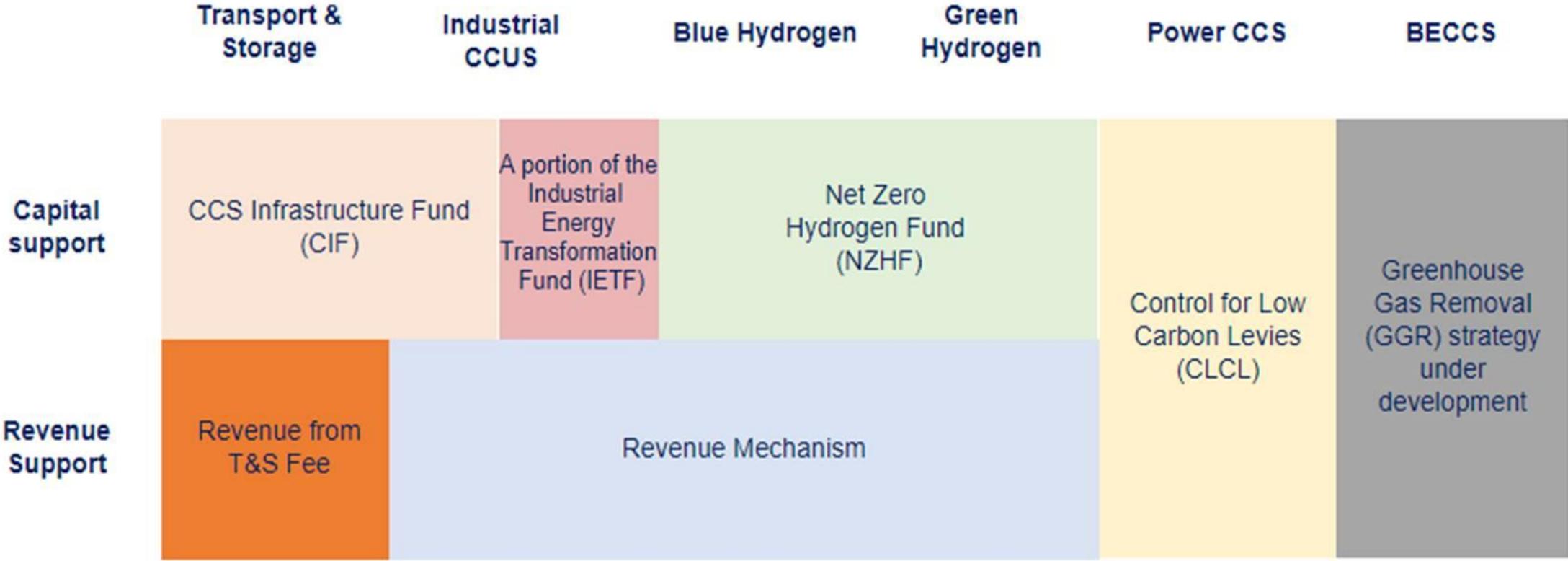
1) Establishing a new CCUS sector

2) Enabling low cost decarbonisation in multiple sectors

3) Developing a market for carbon capture

# 1.2 Introduction – support mechanisms

Overview of funding streams and support mechanisms for CCUS in the UK:



## 1.3 Introduction – CCUS FEED Support

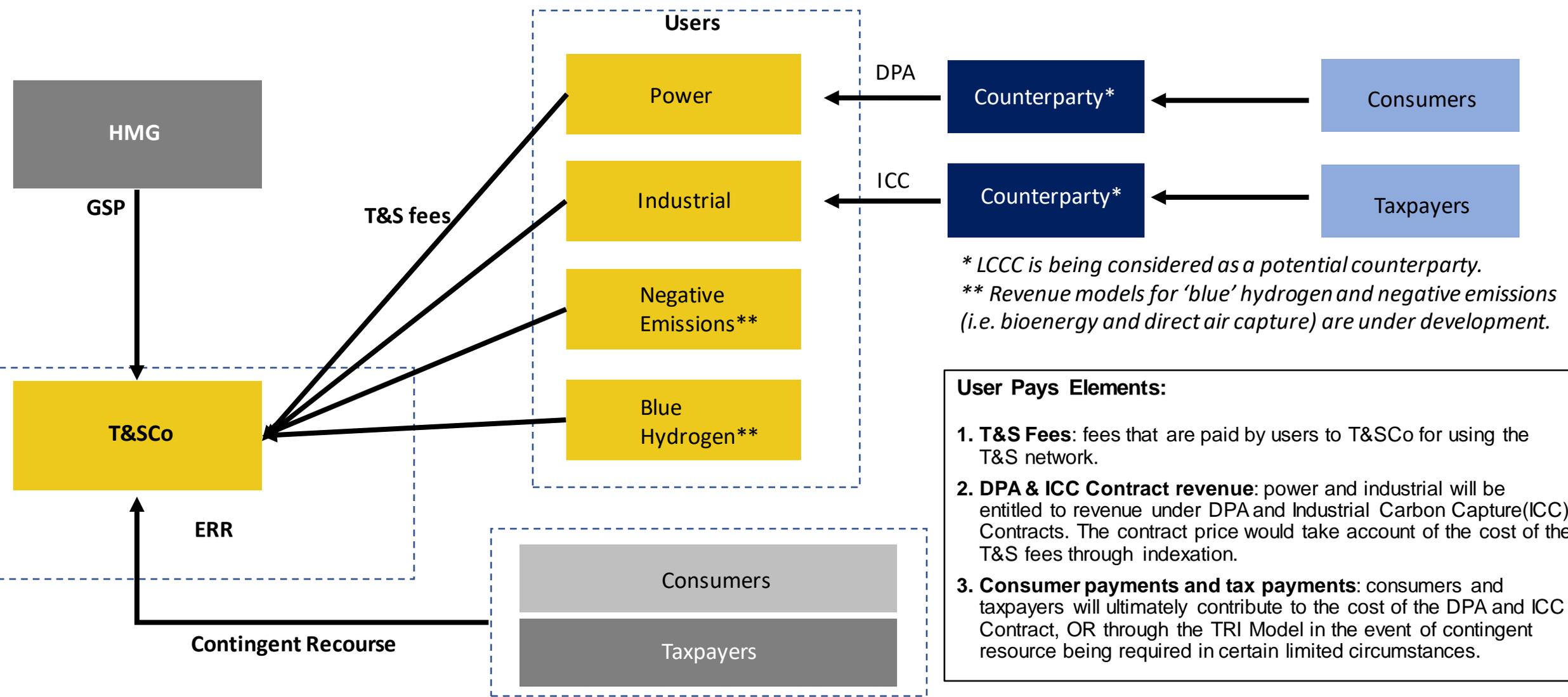
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### UK support for FEED studies:

- In March 2021, UK government announced **£171m** of funding across nine projects as part of the **Industrial Decarbonisation Challenge**, to support the development of low-carbon technologies that will increase the competitiveness of industry and contribute to the UK's drive for clean growth.
- The projects include:
  - three offshore storage sites for CO<sub>2</sub> (in the north-west, north-east and Scotland)
  - CO<sub>2</sub> capture and/or hydrogen production projects in the north-west, Scotland, Teesside, Humberside (two projects) and south Wales.
- The **Industrial Decarbonisation programme** is part of the **Industrial Strategy Challenge Fund (ISCF)** aiming to reduce the carbon footprint of heavy and energy intensive industries in the UK, such as:
  - iron and steel
  - cement
  - refining and chemicals

# T&S Regulatory Investment (TRI) Model

# 2.1 TRI Revenue Model: User Pays model- a stable and predictable revenue stream



## 2.2 TRI Model: Government Support Package (GSP) - to offer protection for high impact low probability risks

- We are proposing a GSP to address market failure for investing in the T&S network due to high impact low probability risks that the private sector would not be able to bear at an efficient price or indeed any price.

### 1) Remote leakage events

- T&SCo's responsibility for leakage costs would remain until the liability is transferred to the government
- T&SCo should use the private insurance market where possible to mitigate this exposure
- Where private insurance is not available, GSP would potentially provide insurance of last resort
- However, before this, the government is considering measures to reduce taxpayer exposure, including:
  - Careful selection of storage sites
  - Effective incentive regime
  - Use of commercial insurance

### 2) Stranded Assets

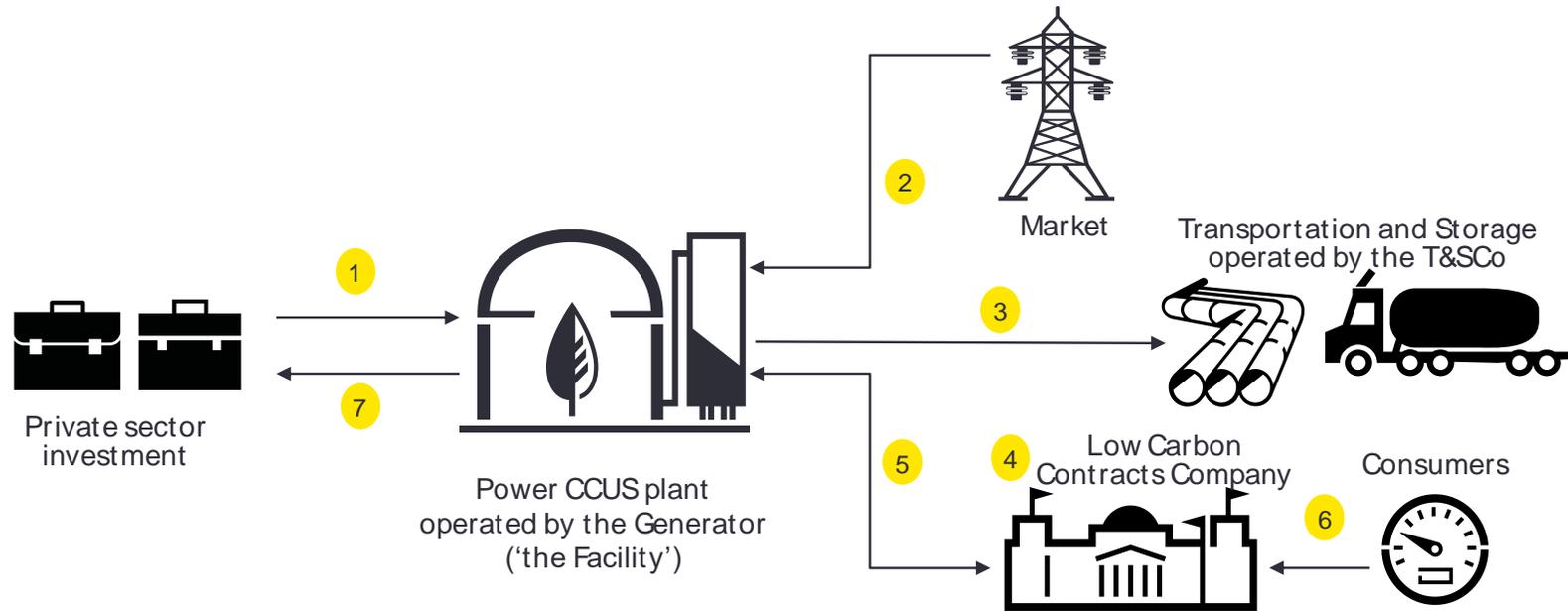
- Risk that there is a complete and permanent loss of demand for the T&S network such that the T&S network assets become redundant or deemed uneconomic
- We are considering how the GSP might act as an 'insurer of last resort'. The below conditions should be exhausted prior to usage:
  - Commercial insurance is unavailable
  - Risk proactivity minimised through new connections
  - Regulatory involvement is inadequate
  - Further revenue options are exhausted
  - Cost profiles are adapted
  - Offset by T&S asset sale and reduced spend

# Power CCUS

# 3.1 Power: Dispatchable Power Agreement (DPA) Overview

Our objective is to develop a business model which enables power CCUS to play a valuable **mid-merit role** in our generation mix. We are currently considering a DPA which could be established between the power CCUS project company and the Low Carbon Contracts Company (LCCC), a government company.

- 1. Private sector investment and construction of facility with carbon capture technology
- 2. The Power CCUS Plant provides dispatchable, low carbon power at the market price in the wholesale and balancing markets and provides ancillary services to the Electricity System Operator
- 3. The Generator pays T&SCo T&S fees for captured carbon
- 4. LCCC acts as counterparty to the DPA
- 5. DPA provides the Generator with payments comprising of an **availability** and **variable payment**
- 6. **Consumer subsidy** funds availability and variable payment
- 7. Return on investment back to private sector



## 3.2 Power: Payment Mechanism

### Variable Payment:

The Variable Payment (VP) is designed to ensure the power CCUS plant dispatches ahead of an unabated equivalent plant.

The VP will be calculated by considering the difference between the power CCUS plant as agreed in the DPA and a theoretical reference unabated plant (referred to as the 'Reference Plant' in Annex D).

- It would include the following: Gas Cost Differential; Carbon Cost Differential; T&S Volumetric Fee; and Other Extra Variable Costs.

$$VP = \sum(VPR_i \times MWh_i)$$

$VPR_i$  = Variable Payment Rate for day  $i$  in the billing period (£/MWh),

$MWh_i$  = Metered Day Electricity Output for day  $i$  of the billing period (MWh)

### Availability Payment:

The AP is intended to provide investors with a regular payment based on the availability of low carbon generation capacity.

The AP should be reduced in the case of outages of generation or capture equipment, or poor performance against the expected capture rate.

$$AP = (\text{Availability of Generation} \times \text{Availability of Capture} \times \text{Net Dependable Capacity} \times \text{Availability Payment Rate}) + \text{T\&S Capacity Fee in the AP Billing Period (£)}$$

# Industrial Carbon Capture



# 4.1 Industrial Carbon Capture: Commercial Proposition

Our objective for developing a business model is to incentivise:

- (i) Existing industrial facilities who have a viable future in the UK to invest in carbon capture to decarbonise, whilst maintaining their international competitiveness and delivering value for money for the taxpayer.
- (ii) Investment in new industrial facilities in the UK, supporting our ambition to level up the economy.

### Capital co-funding Grant

- Available to support construction costs for initial projects only.
- A portion of capital co-funding grant support available.
- Remainder funded through private investment and/or industrial facility's owner balance sheet.

### Operating Revenue Support

- The ICC contract will have an overall duration of up to 15 years and will be negotiated bilaterally.
- Provides predictability for both investors and government for the lifetime of the contract.
- Subsidy reduces over the lifetime of the contract as carbon prices increases and low carbon products market develops.

# 4.2 Industrial Carbon Capture: Key Commercial Components

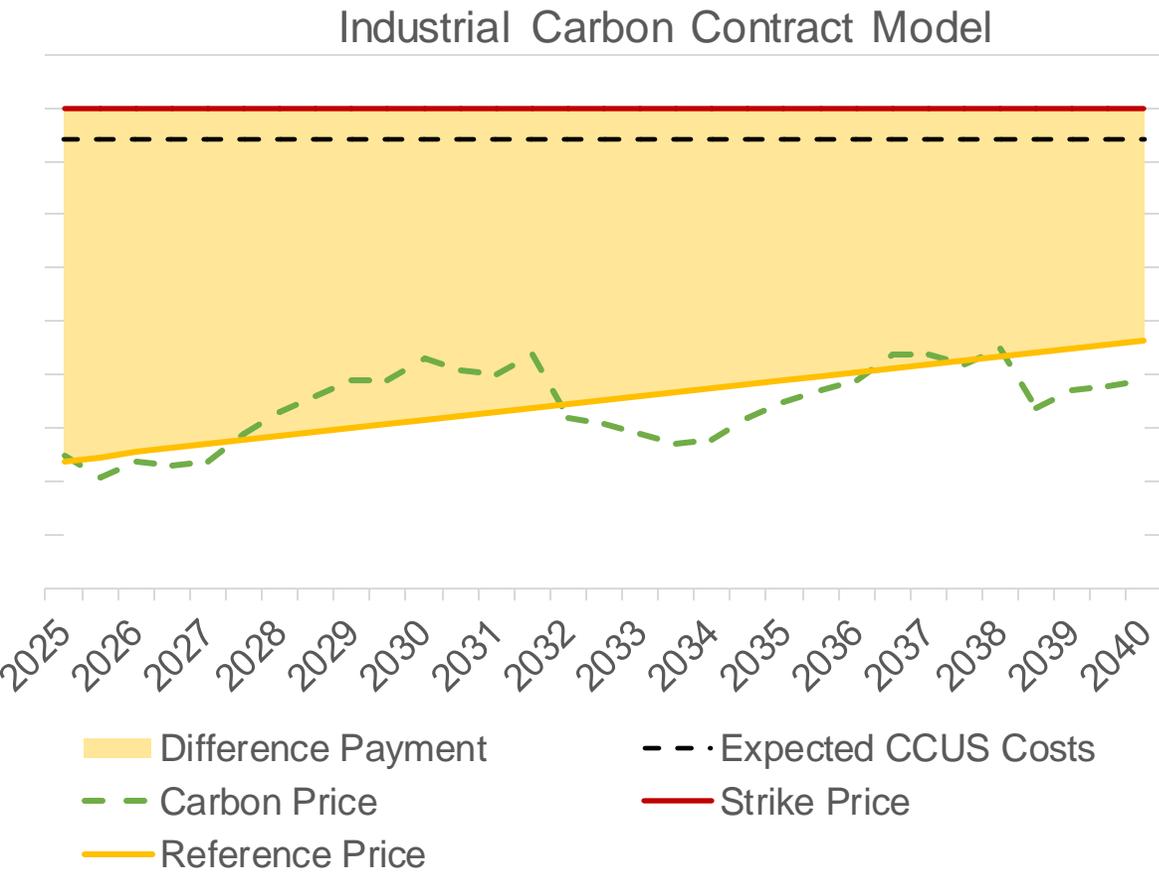
The model is reflective of both the initial investment nature of ICC projects and the current immaturity of the low carbon industrial market in the UK, the proposed commercial components are for initial ICC projects:

## Reference Price

- A fixed trajectory that will provide a stable analogue to the carbon market price.
- The agreement will see ETS free allowance certificates forfeited in line with capture volumes and monetised against reference price, while residual emissions will remain subject to the ETS.
- As carbon capture is established, it is intended that the reference price would evolve to market-driven carbon price.

## Strike Price

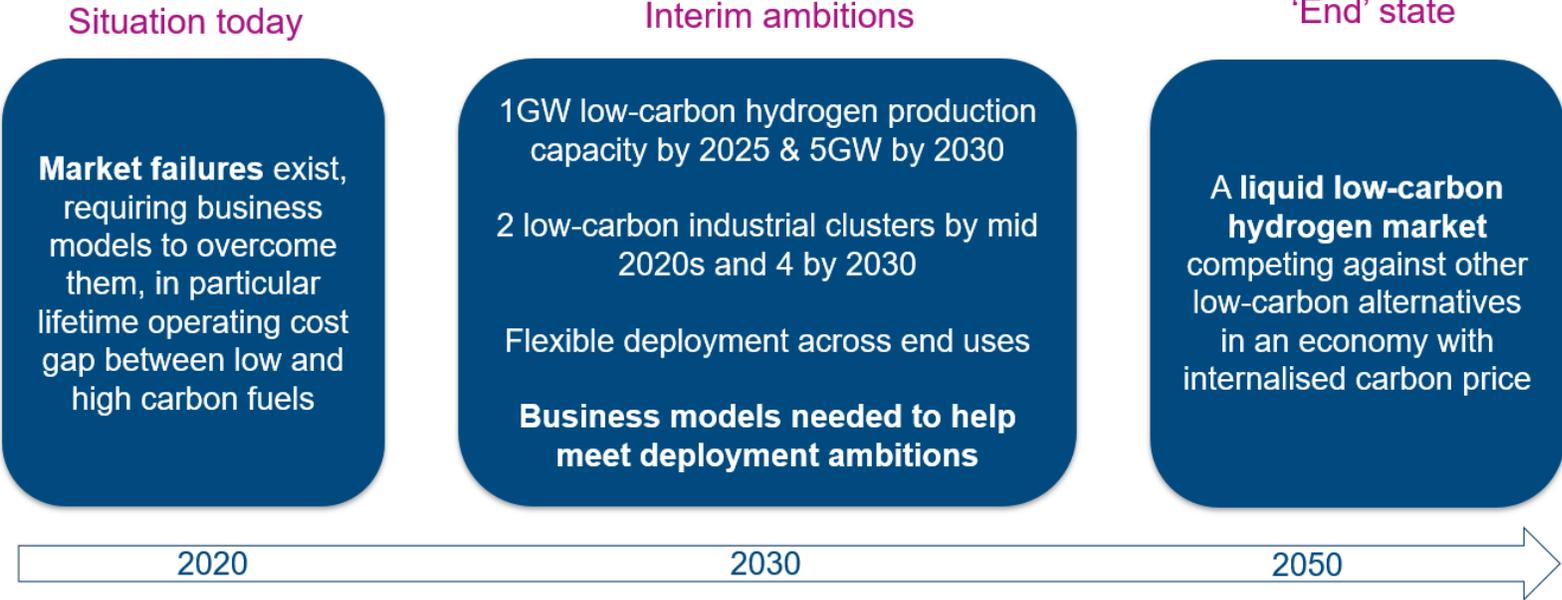
- Will be negotiated bilaterally for initial projects.
- The process will move to competitive allocation as the technology matures, when more CCUS clusters are operational and project bids are sufficiently large to allow competition



# Hydrogen

# 5 Hydrogen

- Low-carbon hydrogen will be vital for meeting our legally binding commitment to achieving net zero by 2050.
- Revenue support is needed to make hydrogen an investible proposition and close the cost gap between low-carbon hydrogen and higher carbon alternatives.



Following principles are guiding the design of revenue support interventions to kickstart the creation of a hydrogen economy:

- Quickly scale up** to meet sector deployment ambitions
- Support deployment of **CCS-enabled and electrolytic** production technologies
- Support **large and small scale** projects
- Unlock pipeline of projects** – including high-capex projects
- Support and enable hydrogen to be competitive in **different end user markets**
- Ensure value for **money and affordability**
- Fit within **broader policy framework** to support hydrogen and develop supply chain

## 6 Next steps:

No	CCUS and related policies	Indicative date
1	Cluster Sequencing Launch	Q2 2021
2	TRI Model update (including revenue model, ERR and GSP)	Q2 2021
3	DPA Model update	Q2 2021
4	Industrial Carbon Capture business model update	Q2 2021
5	Supply chain plan	Q2 2021
6	Hydrogen Business Model consultation	Q2 2021
7	T&S decommissioning consultation	Q3 2021
8	Biomass Strategy Position Paper	Q3 2021