Department for
Business, Energy
& Industrial Strategy

Carbon Capture, Usage and Storage

An update on the business model for Industrial Carbon Capture

October 2021

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Disclaimer

This update sets out further details on the government's current proposals on the potential business model for industrial facilities with carbon capture usage and storage (CCUS). The proposals, as set out in the document and its Annexes, in whatever form they are expressed, are indicative only and do not constitute an offer by government and do not create a basis for any form of expectation or reliance.

The proposals, including those within the Annexes, are not final and are subject to further development by the government, and approval by Ministers, in consultation with relevant regulators and the devolved administrations, as well as the development and Parliamentary approval of any necessary legislation, and completion of necessary contractual documentation. We reserve the right to review and amend all provisions within the document and its Annexes, for any reason and in particular to ensure that proposals provide value for money (VfM) and are consistent with the current subsidy control regime.

This update takes into account engagement that has taken place throughout 2021 including since publication of the last Industrial Carbon Capture (ICC) Business Model update in May 2021. This includes engagement with the ICC Expert Group, project developers, and other interested parties.

BEIS will continue such engagement as it works to refine its proposals, including engagement with the devolved administrations, to ensure that the proposed policies take account of devolved responsibilities and policies across the UK.

Introduction

Background

The UK government has set in law a target to cut emissions by 78% by 2035, compared to 1990 levels. The Industrial Decarbonisation Strategy[1], published in March 2021, sets out that, without carbon capture usage and storage (CCUS), emissions from current industrial processes cannot be reduced to levels consistent with net zero. Therefore, it is critical to not only demonstrate this technology in the UK, but to do so in the 2020s in order to capture and store 3 megatonnes of carbon dioxide ($MtCO_2$) of industrial emissions per year by 2030, consistent with the ambitions set out in the Industrial Decarbonisation Strategy[2].

The proposed Industrial Carbon Capture (ICC) business model has been designed to incentivise the deployment of carbon capture technology for industrial users who often have no viable alternatives available to achieve deep decarbonisation. Through the business model, we intend to support industries to decarbonise efficiently and sustainably and drive world-leading innovation in carbon capture technologies, supporting UK decarbonisation.

In May 2021, a suite of documents was published, including updates on the Carbon Capture and Storage (CCS) Infrastructure Fund[3], business models for transport and storage (T&S), power and ICC[4], the CCUS Supply Chain roadmap[5] and the launch document for Phase-1 of the Cluster Sequencing process[6]. In the ICC business model update – 'Carbon Capture, Usage and Storage: an update on the business model for Industrial Carbon Capture' – we set out our minded-to positions on the commercial framework of the business model including reference price trajectory, treatment of free allowances, recovery of and return on capital investment, in addition to eligibility criteria and consideration of the applicability of 'capture-as-a-service' delivery models. Since then, a hydrogen package has been published (August 2021), containing the UK Hydrogen Strategy[7], the Net Zero Hydrogen Fund (NZHF)

[1] The Industrial Decarbonisation Strategy (March 2021) can be found at: https://www.gov.uk/government/publications/industrial-decarbonisation-strategy
[2] See footnote 1 above.
[3] The update on the CCS Infrastructure Fund can be found at: https://www.gov.uk/government/publications/design-of-the-carbon-capture-and-storage-ccs-infrastructure-fund
[4] Updates on the business models for T&S, power and ICC can be found at: https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-business-models
[5] The CCUS Supply Chain roadmap can be found at: https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-supply-chains-a-roadmap-to-maximise-the-uks-potential
[6] The Cluster Sequencing: Phase-1 Launch can be found at: https://www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-1-expressions-of-interest
[7] The UK Hydrogen Strategy can be found at: https://www.gov.uk/government/publications/uk-hydrogen-strategy

consultation[8], the Low Carbon Hydrogen Standard consultation[9], and the Low Carbon Hydrogen Business Model consultation[10].

Purpose of this document

This document follows the May 2021 publication and focusses on the following areas of the ICC business model: eligibility criteria updates, capital grant support, and the commercial and contractual framework, including further elements of the payment structure and risk allocation. It includes an update on Capture-as-a-Service (CaaS) and sets out the legal and contractual framework. We also set out the next milestones for the ICC business model. It should be read in conjunction with the December 2020 and May 2021 business model updates.

Alongside the document, the provisional Front-End Agreement and Heads of Terms for the ICC Contract have been published as annexes to this publication (Annex A and B respectively).

This document is being published alongside an update on the Dispatchable Power Agreement (DPA), which is the business model for power CCUS, and an updated DPA Heads of Terms.

[8] The consultation on the Net Zero Hydrogen Fund can be found at: https://www.gov.uk/government/consultations/designing-the-net-zero-hydrogen-fund
[9] The consultation on a Low Carbon Hydrogen Standard can be found at: https://www.gov.uk/government/consultations/designing-a-uk-low-carbon-hydrogen-standard
[10] The consultation on a Low Carbon Hydrogen Business Model can be found at: https://www.gov.uk/government/consultations/design-of-a-business-model-for-low-carbon-hydrogen

Update on Eligibility Criteria

This document sets out our current minded-to position on eligibility criteria that may apply to those ICC projects wishing to enter the Phase-2 CCUS Cluster Sequencing process. We are minded to require projects to meet the full eligibility criteria, alongside the technical eligibility criteria set out for specific sectors below. We will continue to review eligibility criteria ahead of future ICC allocation rounds.

For Phase-2 industrial project selection, applicants will be considered eligible if they meet the following criteria:

- The project must be located in the UK.
- The project must have access to a carbon transport solution and storage site.
- The project must be operational no later than the end of December 2027.
- The project must have commenced preliminary-Front End Engineering Design (pre-FEED) studies or be ready to commence pre-FEED no later than the end of December 2022.
- The project must meet the definition of an industrial facility.
- The project must deploy an eligible CCUS technology[11].
- The project must be able to sufficiently demonstrate the ability to meet high CO_2 capture rates of at least 85% [12].
- For Combined Heat and Power (CHP) projects, the project must meet specific technical eligibility criteria.

Below, we give a further update on eligibility criteria, including on CO_2 Capture Rate (applicable to all projects), for CHP and waste management projects, and for Carbon Capture and Usage (CCU).

Combined heat and power

The sector-specific eligibility criteria for a current or proposed industrial CHP facility are as follows: the CHP facility must meet the general eligibility criteria for the ICC business model set out above, and it must also:

- For projects looking to apply CCUS solely to the CHP facility, provide at least 70% of its energy output[13] to industrial facilities; and

[11] Eligible CCUS technologies can be found in the May 2021 ICC business model update.
[12] We define CO_2 capture rate as the percentage of CO_2 emissions captured from the specific emissions stream that the capture technology is applied to.
[13] Energy output refers to the heat and electricity output. We do not require that the heat and electricity output must both individually meet the 70% threshold, only that at least 70% of the energy output of the CHP plant must be directed to industrial facilities.

- Be certified under the CHP Quality Assurance (CHPQA) scheme[14] or show plans to be certified at the time of CCUS operations (with an appropriate time period to be allowed for the certification process).

Further details on these criteria are provided below.

Similar to other industrial CCUS projects, both existing CHP facilities retrofitting carbon capture and new CHP facilities that are built with carbon capture are eligible for support under the ICC business model[15]. The intention is for the ICC business model to only provide support for cases where the CHP facility (including where the CHP facility is owned by a different entity (i.e. a standalone CHP)) is primarily used by an industrial site.

Provide at least 70% of energy output to industrial facilities

This criterion only applies to cases where CCUS is applied solely to the CHP and not cases where the flue gas stream from the CHP is combined with other industrial processes. In cases where a CHP's flue gas stream is combined with other industrial process(es)' streams directed to the capture plant, the CHP project is eligible for support, but the project would not be subject to this criterion.

Otherwise, in order for an industrial CHP facility to be eligible for support, it will need to supply a minimum threshold of 70% of its energy output to industrial facilities. For CHP output only, we define an 'industrial facility'[16] as a facility or part of a facility that is classified under Standard Industry Classification (SIC) codes 5 to 33 (excluding 24.46), including the capture plant itself. This is to ensure that support is only provided to CHP facilities which primarily supply industrial facilities with heat and/or electricity. This rule is aligned with the approach taken under other government schemes to support industrial decarbonisation, such as the Industrial Energy Transformation Fund (IETF), which focusses on industrial processes.

In cases where a CHP plant does not provide at least 70% of its energy output to industrial facilities, there may be other government subsidy/revenue support schemes that are more suitable forms of support.

Applicants will be asked to provide evidence that at least 70% of the energy output of the CHP facility is, or will be (for new build or otherwise), utilised by industrial facilities. Such evidence could include the capacity of the CHP facility, identifying end user(s), information on the type of industrial activity taking place at the site of the end user(s), details of the amount of heat and electricity used by the identified end users in relation to the total output of the CHP facility and contracts, provisional agreements or invoices for energy use.

In the event that an emitter operating or proposing to develop and operate a CHP plant enters into an ICC Contract and its energy output falls below the 70% energy output threshold during

[14] Further details on the CHPQA scheme can be found at: https://www.gov.uk/guidance/combined-heat-power-quality-assurance-programme

[15] Please note that only costs related to the capture element of a new CHP facility will be supported under the ICC business model.

[16] The 'industrial facility' definition provided here is for the purpose defining of the CHP energy output only. Please refer to previous publications for the full definition of industrial facility.

the contract term (for example, if offtakers change or are lost), we are still considering our approach in terms of how the provisions of the ICC Contract will operate. Payments could be reduced or ultimately suspended if the minimum threshold is not met for a duration of time that is to be determined, but we are mindful of the need to avoid a cliff-edge in support and the need for this duration to be sufficient to allow for the facility to seek replacement offtakers. Furthermore, we are still considering over what time period the 70% minimum threshold should be assessed during the contract (e.g. whether the CHP site's energy output to industrial processes should be, for example, a yearly average).

Be certified or show credible plans to be certified under the CHPQA scheme

For a CHP facility to be eligible for support, it must either be certified under the CHPQA scheme or show credible plans to be certified under the scheme by the time of CCUS operations (with an appropriate time period to be allowed for the certification process). The CHP facility must be fully certified to be eligible for support. The CHPQA scheme assesses CHP sites on the basis of their energy efficiency and environmental performance and is used to ensure that the associated fiscal benefits are in line with environmental performance. Therefore, this criterion ensures support will only be provided to the most energy-efficient CHP facilities.

Applicants will be asked to provide evidence that the CHP facility is, or has credible plans to become, certified under the CHPQA scheme. Where a CHP facility is not yet certified under the CHPQA scheme, it must become certified by the time of CCUS operations (with an appropriate time period to be allowed for the certification process). We are still considering whether a backstop date for becoming certified should be set and will provide further details in a future update.

It is essential that CHP facilities awarded an ICC Contract ensure they continue to follow appropriate CHPQA guidance, undertaking necessary requirements to ensure certification is maintained for the duration of the contract. We are still considering our approach in terms of how the provisions of the ICC Contract will operate if a CHP facility does not maintain its CHPQA full certification during the term of the ICC Contract.

Waste management facilities

In their Sixth Carbon Budget report, the Climate Change Committee (CCC) recommended that any new Energy from Waste (EfW) plants (within the waste management sector) should be built with Carbon Capture and Storage (CCS) or be CCS-ready[17]. One of the CCC's scenarios sees CCS being installed on existing EfW plants from the late 2020s, with their balanced pathway scenario showing retrofits starting from the early 2040s.

Given the importance of demonstrating CCS in the waste management sector, we have been exploring whether to provide support to waste management projects via the ICC model. In the

[17] The CCC's Sixth Carbon Budget report can be found at: https://www.theccc.org.uk/publication/sixth-carbon-budget/

previous update published in May 2021, we set out our minded-to position to provide support for the application of CCUS at EfW facilities via the ICC business model but noted that this was subject to change as we continue to develop our approach. This work is ongoing and we have not yet reached a final decision on eligibility of waste management projects. We plan to provide an update on eligibility by the launch of Phase-2 of the Cluster Sequencing process.

As part of this work, we are considering the key commercial differences between the waste management sector and the industrial facilities we have previously proposed support for under the business model, and whether the ICC business model is needed and appropriate for the sector, in particular, in light of VfM, and waste strategies set out by the Department for Environment, Food and Rural Affairs (Defra) as well as the respective waste strategies for Scotland, Wales and Northern Ireland.

Carbon capture and usage

Carbon capture and usage (CCU) technologies typically involve the capture of CO_2 from a point source, its transport and subsequent use, thereby offering an alternative to directing captured CO_2 to be permanently sequestered underground. It has a variety of potential applications across industrial sectors in the UK, including fertiliser production, cement, lime, and food and drink. In an industrial context, CO_2 is captured from the flue gases (or capture stream) in an industrial process and is then either utilised onsite as a feedstock or elsewhere within the manufacturing process or sold to the market (either voluntarily or where there is a legal obligation).

CCU has an emissions mitigation potential since captured CO_2 can be utilised to meet current demands, which are often otherwise sourced from fossil fuels, thereby reducing net emissions. The application of CCU may result in the temporary abatement of CO_2, where the carbon is temporarily stored but is ultimately emitted to the atmosphere (such as using captured CO_2 for synthetic fuels or in the food and drink sector), or the permanent abatement of CO_2, where the carbon is permanently stored in the product and not subsequently released (such as in the manufacture of building materials via mineralisation or carbon curing).

CCU technologies could be important for climate change mitigation and offer a complementary solution for net zero to CCS. CCU could also represent an alternative solution for dispersed sites that have limited T&S options, and it could have a role in aiding the development of a low carbon products market.

The Industrial Decarbonisation Strategy recognised the opportunities that CCU may represent in certain applications and committed to engage with industry to understand lifecycle emissions, consider what future innovation support might be required, and ensure that there is a stable and efficient regulatory framework that supports the development of carbon utilisation.

Business model support for CCU

In the May 2021 ICC business model update, we set out our minded-to position that the ICC business model is intended to be applicable to CCU when it results in the permanent abatement of CO_2 emissions, noting our decision was subject to change.

Following further work and engagement with the sector, we consider that more detailed work will need to be undertaken to determine whether ongoing revenue support from the ICC business model is the most suitable form of support for CCU. In particular, further evidence is needed on costs and market potential, consideration of the abatement potential, and the complexity arising from applying the business model to CCU. We will continue to work with the sector on these matters.

As a result, industrial CCU projects are not eligible for ICC business model support under Phase-2 Cluster Sequencing. This is on the basis of three overarching reasons set out below.

First, further evidence is needed on the market potential and costs of CCU to understand what barriers the market faces, the detailed technical application of CCU, the technological and commercial readiness, and the economic potential of CCU. The majority of CCU technologies are in the early stages of commercial demonstration in the UK and there have been insufficient techno-economic studies undertaken specific to CCU applications in the UK market. There is therefore uncertainty over what form of government support is the most suitable for CCU projects (e.g. business model, capital support only, regulatory frameworks, etc.) and whether long-term revenue support is needed for CCU projects in the same way as CCS projects given the potential economic value attached to the CO_2.

Second, the application of CCU could involve additional commercial and technical complexities to the business model that would need to be worked through in detail before support is provided. For example, the business model would need to take into account a number of considerations specific to CCU projects, including the revenues gained if the CO_2 captured is sold, additional metering of CO_2 used on-site or exported, and monitoring the end-use of CO_2 to ensure the captured carbon is permanently abated. Further work would also be needed to consider whether additional commercial protections would be needed to account for offtake risk and to understand the impact of offtakers changing or no longer buying the CO_2.

Third, we want to prioritise support for the deployment of CCS in the UK, with a focus on incentivising large-scale abatement of CO_2 and the establishment of T&S infrastructure essential for net zero. Although we recognise that every opportunity for emissions mitigation is important to reach net zero, CCU resulting in the permanent abatement of CO_2 potentially represents only a very small abatement potential when compared to CCS. Given the further work required to address the previous points, the inclusion of industrial CCU projects that result in permanent abatement in the Phase-2 Cluster Sequencing process could potentially cause delays to ICC policy development and the deployment of CCS.

We will keep this position under review for future ICC allocation rounds as the evidence base for CCU is developed. In the meantime, projects demonstrating or deploying CCU may be able

to apply for government funding under the IETF, CCUS Innovation 2.0 or future rounds of the BEIS Energy Entrepreneurs Fund (EEF).

Projects that are looking to implement a combination of CCS and CCU, can do so. However, these projects will only be eligible for support under the ICC business model in relation to the captured CO_2 emissions directed to the T&S network and will not be supported for captured CO_2 directed to utilisation.

CO_2 capture rate

To meet the government's ambitious decarbonisation targets we must drive innovation within CCUS and support the development of world-leading low carbon industries. Therefore, to ensure that we focus initial support on ambitious and innovative projects, which deploy CCUS efficiently, we have included the technology efficiency of the capture plant (i.e. CO_2 capture rate) as an eligibility criterion for business model support. We consider that this is an effective way to incentivise high capture rates and reduce residual emissions.

We expect a minimum CO_2 capture rate (technology efficiency) of at least 85% for both new build and retrofit facilities. We define CO_2 capture rate as the percentage of CO_2 emissions captured from the specific emissions stream that the capture technology is applied to[18],[19].

In the event that the emitter does not require a new build capture plant (i.e. pre-combustion capture is part of the process plant design), the CO_2 capture rate will still be defined as the technological efficiency of the capture plant and the relevant emitter will still need to demonstrate a minimum CO_2 capture rate of 85%.

The minimum 85% CO_2 capture rate refers to the minimum CO_2 capture rate which must be demonstrated in the project's application for support under the ICC business model. This will be evaluated initially as part of the eligibility and evaluation assessments.

Furthermore, this CO_2 capture rate must subsequently be demonstrated as part of the contractual Operational Conditions Precedent (OCPs) under the ICC Contract. OCPs are conditions that must be satisfied, or waived, in order for payments under the ICC Contract to commence (see the Legal and Contractual Framework section for more information). The OCPs under the ICC Contract will include demonstrating that the relevant capture plant has been constructed and commissioned with a CO_2 capture rate equal to or greater than the higher of i) 85% and ii) 5 percentage points less than the CO_2 capture rate included in the project's Phase-2 application. For example, if a project has applied for an ICC Contract in

[18] It does not refer to the percentage of captured emissions from the whole site, otherwise known as application rate, or the additional emissions created by providing heat and power to the capture plant; it only refers to the technology efficiency of the capture plant itself.
[19] This calculation will only take into consideration how effective the capture facility is at capturing CO_2, and not whether it is injected to the T&S network or used for other purposes i.e. legal obligations to supply the food and drink industry.

Phase-2 on the basis that it can achieve a CO_2 capture rate of 95%, this minimum CO_2 capture rate value would be 90%.

Business Model Design

Capital grant support

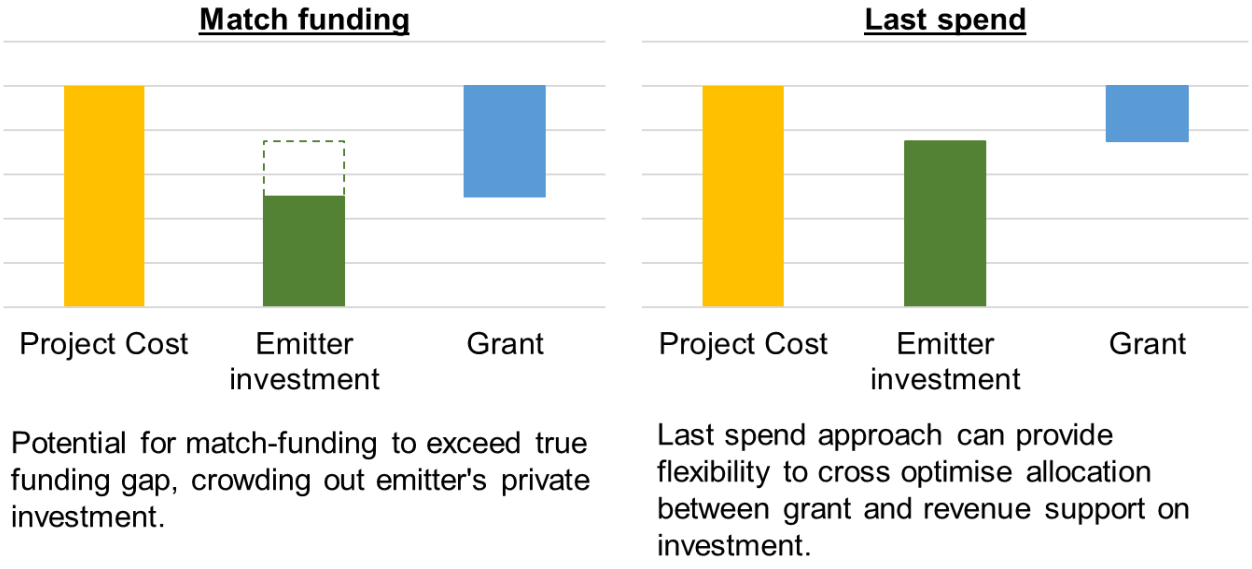
In December 2020 we outlined that capital grants would be available to co-fund capital investment for initial ICC projects. We set out our intention that we would provide this capital on a “last spend” basis, where industry would be incentivised to fully exploit other sources of capital first. This remains our intention, and further detail is set out below on how it is intended that such a grant would be awarded and sized.

Capital grants will be available for initial ICC projects that apply through Phase-2 of the Cluster Sequencing for CCUS deployment. We are offering capital grants because they serve a number of valuable functions:

- For the recipient, they address issues around liquidity and defray the upfront costs of making an investment for projects involving less mature technology;
- For the market, they serve as a demonstration of commitment to a policy;
- For the government, they assist in delivering policy that would otherwise be difficult to achieve without a grant. An added benefit is that they also reduce the magnitude of ongoing revenue support through the ICC Contract.

A key drawback of such grants is that they allocate a greater share of risk from industrial facilities to the taxpayer and so will be a transitional form of support which we are minded to provide for initial projects only, which are inherently more risky.

Figure 1: Graphs showing the difference between the match funding and last spend approaches.



Last spend approach

Our intention is to offer capital grants on a “last spend” approach, where industry is set the challenge of raising as much private sector capital as possible, and then indicating what remaining funding gap would need to be filled in order for the project to be fully financed. This is different to the prescriptive, “first spend”, match-funded approach, as illustrated in Figure 1.

This approach has a number of advantages when compared to the counterfactual of a first spend, match-funded approach:

- Avoids ex ante crowding out of private sector capital;
- Allows HMG to assess more clearly the capital grant need (as opposed to want) for individual projects, resulting in variance in grant intensity across projects (this would enable HMG to potentially fund more projects for the same total spend);
- Ensures that each project is subject to a greater level of private sector scrutiny;
- Allows allocation of CCS Infrastructure Fund (CIF) to be more finely optimised to best serve the overall objectives of the programme;
- Facilitates cross optimisation of calls on CIF and revenue support across a portfolio of projects to balance risk and overall cost to the taxpayer;
- Promotes the testing of market capacity for financing of industrial decarbonisation projects, which may spur innovation in that area;
- Potential to mitigate impact of increased operational gearing (fixed costs as a proportion of total costs) of investment.

The range of capital grant funding offered will be up to but not including 50% of total capital costs, and all capital grant funding will be subject to affordability, value for money and subsidy control considerations. It is proposed that financing information provided by applicants in Cluster Sequencing for Carbon Capture Usage and Storage Deployment: Phase-2, will be used to inform negotiations, during which any capital grant funding will be agreed. The level of capital grant funding offered to projects will also take into consideration the overall costs to taxpayers (considering both CIF and ongoing revenue support).

Terms and conditions

Details on the profile of support and the terms and conditions attached to any capital grant funding from the CIF are currently under development and will be shared with potential applicants in due course.

Ongoing revenue support

Strike price

In the December 2020 business model update, we stated that the strike price for ICC Contracts will be, for initial projects, negotiated bilaterally and should be based on, and reflective of, expected costs of carbon capture for the project.

In the May 2021 business model update, we provided details on our minded-to position for capital payments to the emitter and the period over which this would occur. This minimum 5-year repayment period implies at least two components of strike price, one for capital expenditure (capex) and one for operating expenditure (opex). Figure 2 shows the relationship of these components of the strike price with the base reference price. The capex component will apply from the start of operations to the point at which capex has been repaid (and will be subject to an annual cap as described in the May update) and the opex component will apply for the duration of the contract. Opex will be indexed to the Consumer Price Index but capex will not. The capex payment is a fixed £ amount per tonne of CO_2 captured whereas the opex payment is a difference payment (between the opex component of the strike price and the base reference price) per tonne of CO_2 captured. If the capex payment (which also includes a fixed quantum reflecting an agreed rate of return on capital investment over 5 years) has not been paid fully in the first 5 years due to lower than expected CO_2 capture volumes, the capex component of the strike price will continue to apply for up to a further 5 years until enough CO_2 has been captured for capex and the fixed quantum of return to be fully paid ('capex shortfall period' represented by the light-yellow shade).

Figure 2: Graph showing the ICC Contract payment components.

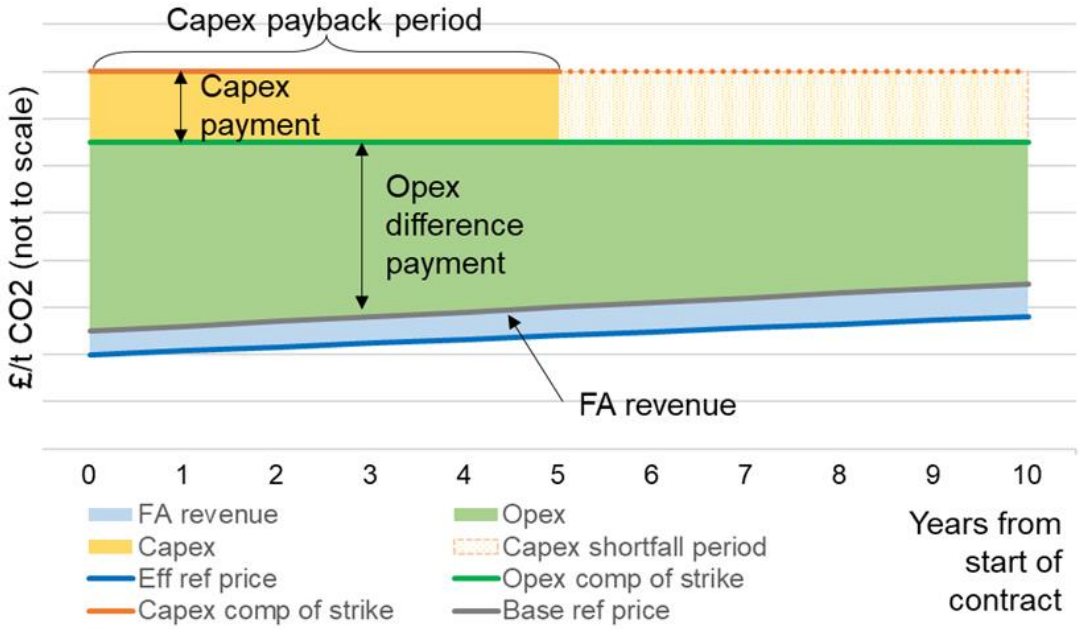


Figure 2 also shows the revenue generated from forfeited free allowances (FAs), under our minded-to position that a portion of FAs will be forfeited in proportion to captured volumes. This would be applied through a reduction of the base reference price to an effective reference price, as described in the May 2021 business model update. Therefore, as an example, in year 2, the payment to the emitter will be the difference between the capex strike and the effective reference price, which consists of capex payment, opex difference payment and forfeited FA revenue. In year 7, if capex has been fully paid, the payment will be the difference between the opex strike and the effective reference price, consisting of the opex difference payment and forfeited FA revenue.

Transport & Storage (T&S) fee treatment

In the May update we stated our expectation that our next update would include an update on how T&S fees would be treated in the ICC Contract. In particular, we stated that we expected either the emitter to pay the T&S fees (funded via the ICC business model), or T&S fees being directly paid to the T&SCo by the ICC Contract Counterparty. We are continuing to consider the relative merits of both options and will publish our finalised position in due course, ensuring that it is aligned with ongoing T&S policy development.

In the December 2020 update we stated that the ICC Contract could protect an industrial facility from increased T&S fees through a variety of measures. We are continuing to consider potential protective measures as the T&S fee structure is developed, however, the starting point is that T&S fees will be funded via the ICC business model for the duration of the ICC Contract, regardless of how they are actually paid (with the position relating to fees or penalties that an emitter incurs where it breaches the terms of its connection agreement with the relevant T&SCo, being subject to further consideration).

Opex cost early reopener

One year after the start of operations there will be a reopener on some of the elements of the opex payment. The purpose of this reopener is to align those elements that were estimated during the negotiations to their actual value, as we are aware that some of these costs will be more uncertain for initial projects. As part of the reopener process, the emitter will need to evidence any changes in cost, which will then be assessed and the opex component of the strike price will be amended accordingly. The elements that will be open for consideration at the reopener will be defined in due course.

The principles we are using to guide which elements are considered in the reopener are: (i) the relevant opex components must be a significant part of the emitter's overall opex; (ii) there must be considerable uncertainty in relation to the relevant opex components prior to operation and (iii) the relevant opex components must be baselined during negotiations and evidenced during operations. For example, applying these principles may mean that fuel and electricity volumes are included, but not labour or administration costs as these should be more easily forecastable by the emitter.

The opex reopener will have a cap where we will set out a maximum amount by which the opex can be changed. This will be set on a project-by-project basis with the size and nature of

the cap (e.g. a £ or % figure) agreed at the negotiation stage. We are also considering the benefits of a materiality threshold which would be a minimum amount below which costs would not be changed and would need to be managed by the emitter.

Contract duration

The contract will be comprised of a 10-year contractual payment term with the option for a 5-year extension for which the emitter will be eligible if certain predefined market and performance conditions, and access to suitable T&S for the duration of the extension, are met. This model provides government with the confidence to continue to back successful projects that need support and will also provide the emitter with certainty as to what it will have to achieve in order to be eligible for an additional 5 years of support.

Performance conditions

The emitter would have to achieve certain performance conditions during the initial 10 years of the contractual payment term to trigger the extension, which are:

- Average CO_2 Capture Rate (where, as per the eligibility criterion, CO_2 capture rate is defined as the percentage of CO_2 emissions captured from the specific emissions stream that the capture technology is applied to) over the last 5 years of the initial 10-year period is greater than or equal to the higher of i) 85% or ii) 5 percentage points less than the CO_2 capture rate achieved during OCPs. This will reduce the risk of granting extensions to projects where capture efficiency is declining significantly.
- Average volume of CO_2 captured over the last 5 years of the initial 10-year period is at least 90% of the CO_2 Capture Volume Estimate for the relevant period (as stated in the contract). This volume may be actual or, in circumstances of Force Majeure or Change in Law (CiL), an appropriate “deemed” capture volume. This would mean that we are only providing extensions to projects where CO_2 production (and product demand) is still high. Any energy efficiency improvements will be taken into account when evaluating average capture volumes.

If these conditions are not met, the ICC Contract Counterparty reserves the right to not offer an extension to the contract beyond the initial 10-year payment period. Projects that are offered an extension will need to continue to meet these performance conditions during the extension period, i.e. over a rolling 5-year period, assessed at the end of each year, otherwise the ICC Contract Counterparty reserves the right to end the extension to the ICC Contract on a no-liability basis.

The precise mechanics relating to the assessment of the performance conditions prior to and during any extension period (including the timing of each assessment) are subject to further consideration by BEIS.

Market conditions

In addition to the performance conditions described above, certain market conditions would also need to be satisfied to trigger the extension, primarily that the market carbon price (e.g. UK Emissions Trading Scheme (ETS) carbon price) should be less than the subsidy rate (opex

component of the strike price plus T&S fees, on a £ per tonne CO_2 basis) over a defined period of time. This period of time and any buffer between the market carbon price and the subsidy rate will be defined in due course. The purpose of any extension would be to continue to subsidise the operation of the capture plant if market conditions would not support operation without a subsidy. However, if market conditions change to enhance the economics of carbon capture operations, the ICC Contract may no longer be necessary. This market condition will be active throughout the course of the extension, so if it is no longer met, the ICC Contract Counterparty reserves the right to end the extension to the contract on a no-liability basis thereby lapsing it.

The precise mechanics relating to the assessment of the market conditions prior to and during any extension period (including the timing of each assessment) are also subject to further consideration by BEIS.

Access to suitable T&S

The industrial emitter must demonstrate that it has continued access to its nominated T&S solution for the duration of the extension.

Reference price

The reference price for the extension period will be set as the prevailing market carbon price (e.g. the UK ETS carbon price) rather than a continuation of the fixed trajectory from the initial 10-year period. This is because the UK carbon market will have developed by this time, there will be less uncertainty associated with the carbon price and this change will meet our ambition of transitioning towards a more market-based model.

Free allowances

Price and volume assurance on FAs will come to an end at the end of the initial 10-year period of the contract. This means that, in the extension, the emitter will no longer need to forfeit any FAs, it will no longer receive any compensation for FAs through the contract and will no longer receive protection on its volume of FAs. The emitter's FA allocation will be subject to any prevailing UK ETS policies at that time. As with the reference price, the development of the UK carbon market and our ambition to move towards a more market-based model are the reasons for the removal of price and volume assurance.

Risk allocation

Construction risk

Construction cost risk sharing

In December 2020, we outlined that we were minded to allow a degree of risk sharing with respect to construction costs through the capital grant.

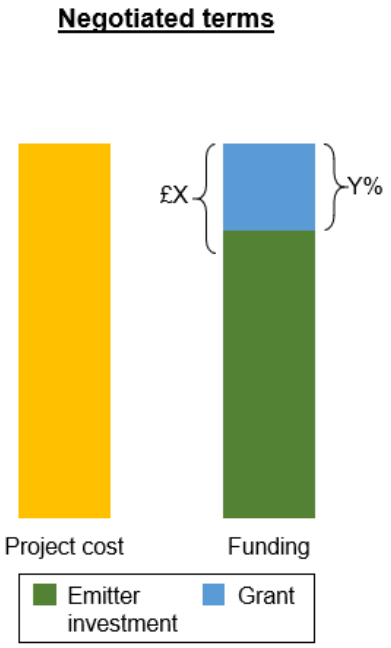
Subject to there being sufficient headroom within the CIF to allow it, we are minded to provide capital grants that would be the lesser of a monetary amount (£X) and a percentage (Y% but

below 50%) of actual construction costs, as illustrated below in Table 1 and Figure 3. This would allow the level of grant to vary to a limited degree with outturn spend, reducing some of the burden upon private sector capital providers of cost overruns, but also to achieve value for money for the taxpayer in the event that costs come in under budget.

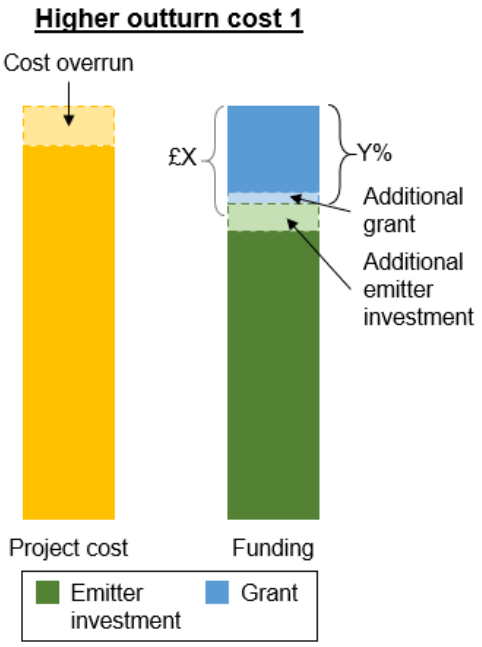
Table 1: Worked example demonstrating limited construction risk sharing, including the negotiated terms and scenarios of higher and lower outturn costs. Note, these numbers are fictitious and not representative. To see these numbers illustrated, please refer to Figure 3.

	Negotiated Terms	Higher Outturn Cost 1	Higher Outturn Cost 2	Lower Outturn Cost
Project cost	£200m (estimate)	£210m	£220m	£190m
Cost overrun	n/a	£10m	£20m	-£10m
Capital grant support	Y = 20% (£40m estimate) X = £43m	Y= £42m (because Y < X)	X = £43m (because X < Y)	Y = £38m
Total emitter investment required	£160m (estimate)	£168m	£177m	£152m
Cost overrun requiring emitter investment	n/a	£8m (80% of overrun)	£17m (85% of overrun)	-£8m (saving on emitter's estimated investment)
Capital revenue support to repay emitter investment (excluding return)	£160m	£160m	£160m	£152m minimum – treatment of remaining investment saving to be determined

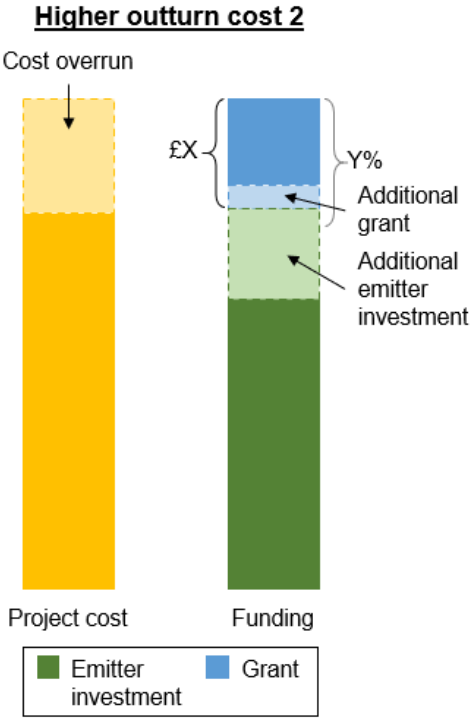
Figure 3: Illustrations of limited construction risk sharing, including the negotiated terms and scenarios of higher and lower outturn costs.



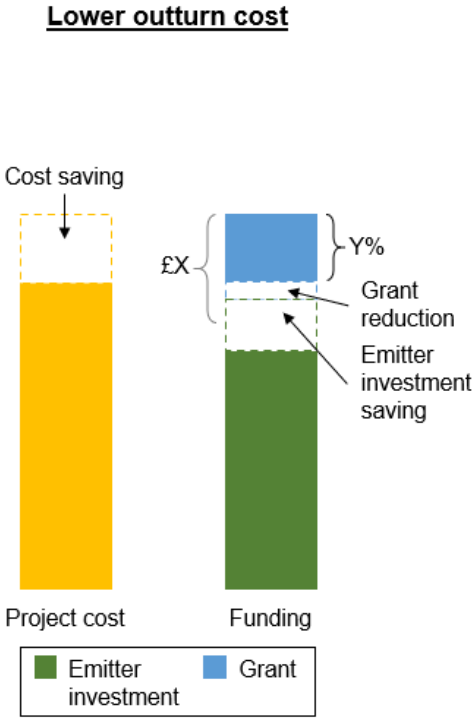
During negotiations, the emitter submits its estimated project capital cost and agrees grant funding of Y% of outturn project cost, up to a cap of £X. Emitter investment is repaid through revenue support.



Outturn cost is higher and grant increases to cover Y% of outturn (as it is still below the £X limit). The remaining cost overrun must be met through the emitter's own private funds and will not be reimbursed through revenue support.



Outturn cost is higher and grant increases to a total of £X (because Y% would push it over the limit). The remaining cost overrun must be met through the emitter's own private funds and will not be reimbursed through revenue support.



Outturn cost is lower and grant reduces to cover Y% of outturn. The emitter requires less private capital to complete construction; we are considering if, and to what extent, this investment saving is shared.

The scenarios in Figure 3 show three instances of cost overrun. In the 'higher outturn cost 1' scenario, the overrun is small such that Y% of the outturn cost would be below the £X cap, therefore the grant awarded is Y% of the total and, as a result, the grant covers Y% of the cost overrun, with the remaining overrun requiring additional emitter investment. In the worked example (Table 1), this means that, of the £10m overrun, the grant covers 20% (£2m) and additional emitter investment is required for 80% (£8m). The emitter will not be reimbursed this additional £8m through revenue support in the contract. In the 'higher outturn cost 2' scenario, the overrun is larger such that Y% of the outturn cost would be above the £X cap, therefore the grant awarded is £X (rather than Y% of the outturn total) and, as a result, the grant covers less than Y% of the cost overrun. In the worked example (Table 1), this means that, of the £20m overrun, the grant covers 15% (£3m) and additional emitter investment is required for 85% (£17m), which will not be reimbursed through revenue support in the contract. The final scenario shows a lower outturn cost, resulting in a net cost saving. The grant is proportionately reduced so that it is Y% of the outturn total (£38m in Table 1). There is also a saving on the emitter's investment (£8m in Table 1); we are considering how much, if any, of this cost saving will be shared with the emitter.

We recognise that linking construction risk sharing to the level of grant support may incentivise emitters to seek higher levels of grant funding, but this will be tempered by our last spend approach. It should also be noted that emitters will receive a rate of return on their private investment, which would be higher in absolute terms if a higher proportion is privately funded, and so provides an incentive not to seek excessively high levels of grant support.

To summarise:

Risk	December 2020 position	Current position
Construction cost overruns	Further analysis is ongoing, but our 'minded-to' position is, where HMG is providing capital co-funding, to provide it as "last spend" incentivising industry to fully exploit other sources of capital first, with the HMG grant filling any gap between that and actual construction costs up to a capped amount. If this cap has not been reached, the remaining portion of the grant would be available to repay other sources of capital, subject to the grant not exceeding a pre-agreed percentage of total capital spend.	Our position on providing capital co-funding on a "last spend" basis has not changed. The model provides limited risk sharing between HMG and emitters as the capital grant will cover the agreed percentage of the outturn construction costs or a capped absolute amount, whichever is smaller. The remainder of the overrun will need to be funded by the emitter and will not be reimbursed through the ICC Contract. This grant percentage and absolute amount will be determined during bilateral contract negotiations. More details are

Risk	December 2020 position	Current position
		provided in the section ‘Capital grant support’.

Other construction risks

In the December 2020 update we stated our initial position on other construction risks and potential mitigating actions. Based on work conducted in 2021, an updated minded-to position on these risks is provided below.

Risk	December 2020 position	Current position
Damage to process plant during construction; difficulty of delivering capture technology at the relevant site	The industrial facility will bear the risk if there is damage to the process plant during construction of the carbon capture plant or if the carbon capture technology cannot be delivered at the relevant site.	This position is unchanged. The emitter must satisfy the OCPs (which include demonstrating a CO_2 capture rate equal to or greater than the higher of i) 85% and ii) 5 percentage points less than the CO_2 capture rate included in the project’s Phase-2 application) in order for payments under the ICC Contract to commence and to avoid termination of the ICC Contract following the Longstop Date.
Timing delays	The Target Commissioning Window (see page 35) will be 12 months, which will give facilities some protection from timing delays, with the industrial facility bearing the risks for any delays beyond this. Delay to completion could lead to T&S having no utilisation if the delayed user is the anticipated first user (i.e. user timing mismatch risk). If there are qualifying delays as a result of unforeseeable circumstances, then a Force Majeure clause will allow	This position is unchanged. The Target Commissioning Window (and certain other key contractual milestones) will be capable of a day-for-day extension for i) Force Majeure (subject to satisfying certain Force Majeure extension conditions which are summarised in the ICC HoTs and which will be set out in full in the full-form ICC Contract) and ii) a failure by T&SCo to make the T&S network available in a timely manner. BEIS is still considering whether to include an ICC Contract

Risk	December 2020 position	Current position
	an extension day-for-day based on the delay period.	Counterparty right to terminate the ICC Contract where an emitter is significantly delayed in commissioning its capture plant due to a continuing, unresolved Force Majeure. The Longstop Date will be 12 months after the expiry of the Target Commissioning Window. If an emitter has not satisfied the OCPs by the Longstop Date, the ICC Contract Counterparty has the right (but not an obligation) to terminate the contract.
Incomplete construction	The industrial facility will bear construction completion risk. The payments will not commence if the carbon capture facility's construction is not completed.	This position is unchanged. To further clarify, revenue support payments under the contract will not commence unless construction and commissioning of the capture plant is complete and all OCPs have been satisfied. If construction and commissioning remain incomplete at the Longstop Date, the ICC Contract Counterparty has the right (but not an obligation) to terminate the contract, as discussed above.
Supply chain does not have the capability to construct the capture plant	Not included in December 2020 update.	The industrial facility is responsible for ensuring that contractors have the capability and capacity to construct and operate the facility.

Decommissioning risk

In the December 2020 update we stated our initial position on decommissioning risks. Based on work conducted in 2021, an updated minded-to position on these risks is provided below.

Risk	December 2020 position	Current position
Decommissioning risk	The industrial facility is responsible for decommissioning capture plant in line with relevant industry standards.	This position is unchanged. Decommissioning costs would be borne by the industrial facility.

Commercial risk

In the December 2020 update we stated our initial position on commercial risks. Based on work conducted in 2021, an updated minded-to position on these risks is provided below.

Risk	December 2020 position	Current position
Commercial risk	The industrial facility is responsible for obtaining finance and managing its cashflows.	This position is unchanged.

Operating risk

In the December 2020 update we stated our initial position on operating risks. Based on work conducted in 2021, an updated minded-to position on these risks is provided below.

Risk	December 2020 position	Current position
Operating risk: costs	Our 'minded-to' position is to provide a single operating expenditure reopener early on, once the project is in operation. This would incentivise management of this risk, whilst protecting against uncertainty in operating costs for FOAK ICC projects. The industrial facility will bear the risk of increased costs after the reopener, although consideration will be given to providing protection against inflation. Further work will be	There will be an operating cost reopener one year after the start of operations. This will include items for which a baseline cost can be determined and for which actual costs can be evidenced. The precise line items covered will be decided in negotiations. More details are provided in the section 'Opex cost early reopener'. Opex will be indexed to the Consumer Price Index.

Risk	December 2020 position	Current position
	undertaken to determine the timing and process for the reopener.	
Operating performance risk	The industrial facility would bear this risk. The industrial facility would be required to operate continuous quality monitoring and emergency venting system to ensure that no out-of-specification CO_2 enters the T&S network. The industrial facility would also be responsible for ensuring minimum defined capture rates are met.	This position is unchanged. 'Overperformance', i.e. the capture of more CO_2 than originally agreed, will receive the corresponding volumetric opex payments but will not receive additional capex payments. This CO_2 must be produced as part of efficient operations of the industrial and capture plants, on which we plan to provide further information in a future update.

Cross chain risk

In the December 2020 update we stated our initial position on risk allocation and potential mitigating actions. Based on work conducted in 2021, an updated minded-to position on risks which have interdependencies with the T&S network is provided below.

Risk	December 2020 position	Current position
User stranded asset	In the event that the T&S network is never completed, or completed to an unsatisfactory standard, the options are still being considered, but could include: • The industrial facility could be reimbursed for legitimate costs incurred, including the return of any carbon allowances forfeited.	Further work in 2021 has refined our position and support will include: • Qualifying costs; • Free allowances forfeited will be returned. We are considering what costs would be included within qualifying costs, based on the consequences of this risk arising. The industrial facility must justify incurred costs to the satisfaction of the ICC Contract Counterparty.

Risk	December 2020 position	Current position
		We are considering how alternative T&S options could mitigate this risk.
T&S unplanned outage	In the event of a T&S network outage, preventing the industrial facility from using the T&S network and causing captured CO_2 to be emitted to the atmosphere, the options are still being considered, but could include: • The industrial facility could continue to be paid for capturing carbon as agreed in the contract; • The industrial facility could be paid the capex return payment if the capture facility can be turned off; and • The contract payments could be extended by the period that the T&S network is out. T&SCo would bear the majority of unplanned outage risk.	Further work in 2021 has refined our position and support will include: • Qualifying costs; • The return of forfeited free allowances if the outage results in a reduction of sequestered CO_2 (i.e. less CO_2 is captured and stored per tonne of CO_2 entering the capture plant) because the additional CO_2 released would be exposed to ETS. We are considering what costs would be included within qualifying costs, based on the consequences of this risk arising, and how our approach will differ depending on the length of the T&S outage.
T&S timing mismatch	In the event that the T&S network is not completed in time for the completion of the capture plant, the approach is still under consideration, however, it could include: • The industrial facility could receive their payment for capturing carbon (post-commissioning and/or dependent on capture	If the T&SCo is not able to accept captured CO_2 then the Target Commissioning Window and Longstop Date of the ICC Contract (and therefore capex and variable opex payments) would be moved to match the T&S timelines. We understand that some costs might be incurred during this period and we are considering our position

Risk	December 2020 position	Current position
	technology), as agreed in the contract; • The Target Commissioning Window could be moved as agreed with the industrial facility in order to match commissioning T&S timelines. T&SCo would bear the majority of T&S construction overrun risk.	on providing compensation for these costs.
T&S capacity constraint	If industrial facilities are constrained by a fault in the T&S network, then industrial facilities could choose to either release CO_2 into the atmosphere (which would lead to a carbon cost) and/or have access to alternative injection route (e.g. onsite CO_2 storage vessels). The approach is still under consideration, but industrial facilities could be paid for the carbon captured in accordance with the contract. Industrial facilities will agree a capacity with the T&S network and a penalty will be applied to industrial facilities that cause a capacity constraint through over-injection. T&SCo allowed revenue would be reduced if capacity level is lower than set target.	If the industrial facility is constrained by a fault in the T&S network, then support will include: • Qualifying costs; • The return of forfeited free allowances if the capacity constraint results in a reduction of sequestered CO_2 (i.e. less CO_2 is captured and stored per tonne of CO_2 entering the capture plant) because the additional CO_2 released would be exposed to ETS. We are considering what costs would be included within qualifying costs, based on the consequences of this risk arising, and how our approach will differ depending on the length of the capacity constraint.

Capture-as-a-Service (CaaS)

In some situations, a company may arrange to capture the emissions of another as a service. This architecture has the scope to provide a number of possible advantages which may include:

- Enabling decarbonisation of smaller sites that might not be able to install CCS at their own sites. This could apply to sites that are both smaller (in terms of absolute emissions or overall revenues), and have geographic constraints which limit the addition of new facilities;
- Creating efficiencies based on aggregation and economies at scale, potentially improving VfM; and
- In some cases, creating a means of CaaS supporting the deployment of CCS to off-cluster sites or groups of industrial sites situated further away from clusters, where shipping or a T&S connection is unviable for single sites.

To adapt the ‘generic’ ICC model to allow for the implementation of CaaS projects, BEIS has settled on a number of principles:

- Where possible, the CaaS model should be consistent with the generic ICC model, reflecting the generic model in terms of the rights and obligations between parties;
- The greater number of parties (and contracts) involved in the CaaS structure necessitates that protections against certain cross-defaults are integrated into the model; and
- The CaaS model should be compatible with existing government balance sheet objectives for the whole (or as much as practicable) of the lifetime of the government subsidy support mechanisms.

Business model variations for CaaS

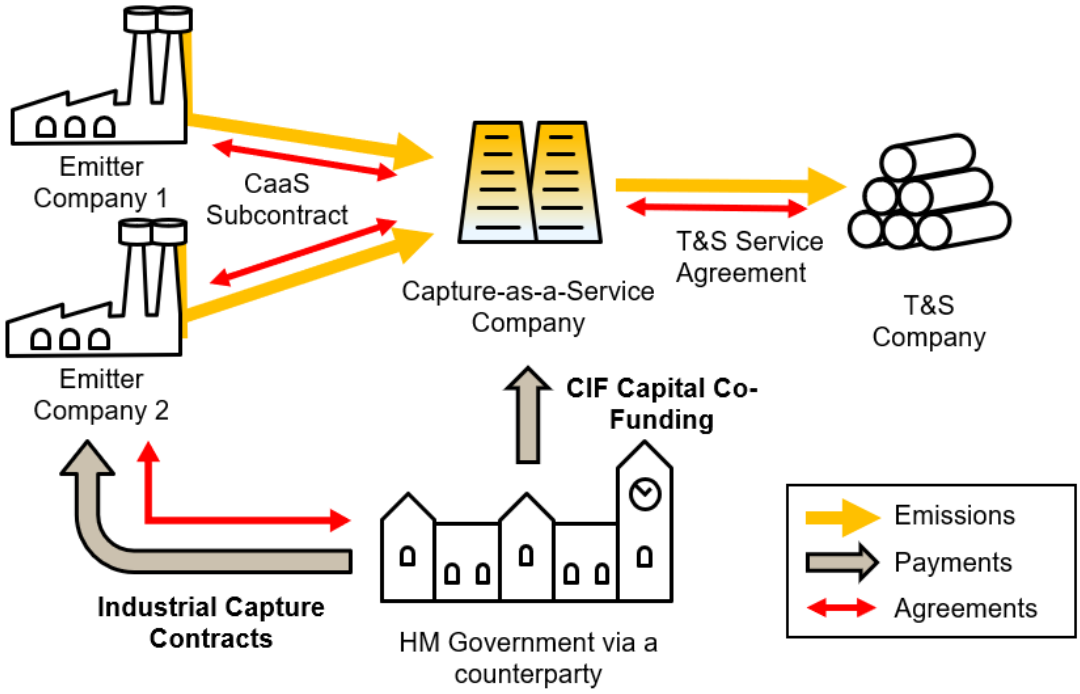
ICC Contracts will be agreed with and entered into by emitters. Emitters will then enter into subcontracts with the CaaSCo ('CaaSCo Subcontracts') to fulfil the relevant capture obligations. The ICC Contract is being drafted to accommodate CaaSCo arrangements and will be in the form of a single contract covering both the generic and CaaS models. The ICC Contract will include a front-end agreement which will provide project-specific variations including project administrative or technical details, negotiated variations or values, and provisions to ‘switch on/off’ or amend clauses in the ICC Contract to reflect the relevant CaaS arrangements. This front-end agreement will also define which ICC Contract terms and conditions will need to be passed down from the emitter to the CaaSCo through the 'CaaS Subcontract Checklist' (on the basis that the CaaSCo, rather that the emitter, will be better placed to comply with such terms and conditions). Where not explicitly stated in the front-end agreement, the unamended ICC Contract terms and conditions will apply to the relevant CaaSCo arrangements. BEIS' initial proposals on this front-end agreement – including the clauses and positions requiring variation for CaaS arrangements – are being published

alongside this update (although they are subject to change before the publication of the finalised ICC Contract).

The CaaS model will be developed in accordance with the same timeframes as the generic model, allowing CaaS projects and groups to participate in Phase-2 of the Cluster Sequencing Process.

Capital grant funding will be made available to the entity which is responsible for funding the development of the relevant capture plant which, in the case of CaaS models, is expected to be the CaaSCo. Any grant funding agreement will exist alongside the ICC Contract, so there will need to be interdependent provisions in both agreements including cross-default termination triggers and no double recovery provisions.

Figure 4: Illustration to demonstrate the payment flows, direction of emissions and agreements between various parties involved in a CaaS model.



Application and evaluation

Where CaaS structures are implemented, our expectation is that the capex and opex payments made to each Emitter under its ICC Contract (and any compensation payable to the Emitter under the ICC Contract, e.g. where there is a QCiL) will be based on the Emitter's pro-rata share of the total CO_2 that the CaaSCo capture plant captures and injects into the T&S Network (i.e. the payments made to one Emitter will not cover the total capex and opex of the relevant capture plant, unless that capture plant is dedicated entirely to that Emitter)

BEIS does not intend to provide suggested drafting for the CaaS Subcontract or participate in any negotiations between an Emitter and CaaSCo, but will publish a 'CaaS Subcontract Checklist' that will be annexed to the front-end agreement and will specify which provisions of the ICC Contract BEIS will need to see in the CaaS Subcontract for each CaaS proposal (with

the checklist tailored, as necessary, to reflect the relevant CaaS arrangements). The ICC Contract Counterparty will require authority to review the CaaS Subcontract to confirm compliance with the terms of the CaaS Subcontract Checklist. If the CaaS Subcontract does not comply with the requirements of the CaaS Subcontract Checklist, the ICC Contract Counterparty will not enter into the ICC Contract until the CaaS Subcontract has been amended accordingly. We also anticipate that the provision of a CaaS Subcontract which complies with the terms of the CaaS Subcontract Checklist will be included as one of several Initial Conditions Precedent within the ICC Contract, which will need to be fulfilled no later than 20 business days after the contract agreement date.

While the CaaS Subcontract Checklist is still under development, BEIS' anticipates that the main areas of the ICC Contract that the CaaS Subcontract Checklist will seek to ensure are passed down into the CaaS Subcontract (whether fully or partially, and with or without amendment) will include provisions relating to:

- the term and termination of the CaaS Subcontract (although BEIS acknowledges that emitters and CaaSCos may agree to certain deviations from the ICC Contract provisions, e.g. where a CaaSCo agrees to provide the capture service for a term which is longer than the term of the ICC Contract);
- the satisfaction of the Initial Conditions Precedent and Milestone Requirement (although some of these requirements will also need to be satisfied by emitters);
- the satisfaction of the Operational Conditions Precedent (i.e. those that relate to the construction and commissioning of the relevant Capture Plant);
- metering, reporting and the provision of information relating to the Capture Plant, particularly in the context of the payment mechanics of, and key emitter undertakings in, the ICC Contract;
- billing and payment, including provisions relating to the proposed opex reopener (subject to the specific commercial arrangements that are agreed between emitters and CaaSCos which may mean that there is not a full pass down of all payments made to emitters under the ICC Contract);
- representations, warranties and undertakings (many of which will also apply to emitters);
- protective provisions in the ICC Contract including those relating to Force Majeure and Qualifying Change in Law (QCiL) (with the QCiL compensation provisions being subject to any specific commercial arrangements that are agreed between emitters and CaaSCos);
- confidentiality, announcements, freedom of information and intellectual property (noting BEIS' expectation that the ICC Contract Counterparty will require certain rights relating to intellectual property held by CaaSCos); and
- dispute resolution, including provisions relating to the consolidation of connected disputes.

Legal and Contractual Framework

The ICC business model will be implemented through a private law contract between the emitter and ICC Contract Counterparty. We anticipate that the Low Carbon Contracts Company Ltd, who are the existing counterparty for CfDs and the planned counterparty for the DPA, will be the counterparty for the ICC Contracts, subject to successful completion of administrative and legislative arrangements. The ICC business model will provide ongoing revenue support, offered initially to industrial emitters following a submission to the Department, assessment, and bilateral negotiation (including due diligence process). Further details on this process will be set out the Phase-2 documentation when that phase is launched. Ahead of the launch of the Phase-2 process, a provisional set of Heads of Terms (HoTs) representing the current position of this ICC business model has been published as an annex to this publication (Annex A).

The ICC Contract HoTs have been drafted alongside the Power CCUS DPA HoTs which in turn is based on the Contracts for Difference (CfD) for renewables (incorporating both the Generic Agreement and the Standard Terms and Conditions) for Allocation Round 3 (which opened in May 2019). In some cases, clauses or sections of text from the proposed CfD Allocation Round 4 (AR4) (which is scheduled to open in December 2021) have been included, recognising the progress and development of the contract.

The ICC Contract HoTs set out a range of provisions that will be required to implement the ICC business model, including provisions relating to payment (which will be further developed), billing and metering, change in law, conditions precedent and milestones, term (including term extension) and termination, force majeure and various general and miscellaneous provisions. Some provisions may be absent due to the ongoing nature of policy development. We will continue to develop the ICC Contract over the coming months, and reserve the right to add, amend and remove provisions. Note that given the ongoing work to determine the adaptations to the ICC business model that are necessary when applied to the waste management sector, these HoTs may not be relevant in all places to those projects. A separate HoTs document (or equivalent) will be published at a later date to reflect any adaptations that are made to the ICC business model for waste management projects.

Many provisions of the existing CfD contracts have been included in the draft ICC Contract HoTs, subject to minor alterations (e.g. references to ‘generator’ have been changed to ‘emitter’). However, several areas of the draft ICC Contract HoTs have required substantial amendment to cater for the bespoke elements of the ICC business model.

Project Commissioning

Once the ICC Contract has been entered into, our minded-to position is that the emitter will have 18 months to fulfil either one of two milestone requirements set out in the contract. These requirements are (i) that the emitter and its direct shareholders have in aggregate spent ten

per cent or more of the project's pre-commissioning costs (which will be an amount determined by BEIS) on the project, or (ii) that specified project commitments (for example, delivery to the ICC Contract Counterparty of evidence that the Emitter has, or will have, sufficient financial resources to meet the total financial commitments required to commission the project) have been complied with or fulfilled. Further information about pre-commissioning costs and project commitments will be set out in due course. These requirements and the related timeline are consistent with the proposed milestone requirements for the DPA and the CfD Allocation Round 4 for renewables.

The Target Commissioning Window (TCW) is a 12-month period within which the emitter's target commissioning date falls. ICC Contract holders will have the flexibility to commission the capture plant any time within the TCW. The reason for this is that the technical challenges associated with constructing and commissioning projects can mean it is often not possible for developers to be confident that a project can be delivered by a specified delivery date, so a target window is more appropriate.

The Start Date triggers the start of payments under the ICC Contract and will occur once the OCPs have been satisfied by the emitter (or waived by the ICC Contract Counterparty). Satisfaction of the OCPs (before the Longstop Date) involves the emitter demonstrating that the capture plant has been commissioned and is working to the agreed specifications. OCPs could include the delivery of evidence relating to:

- CO_2 capture rate, equal to or greater than the higher of i) 85% and ii) 5 percentage points less than the CO_2 capture rate included in the project's Phase-2 application,
- the emitter's compliance with metering obligations,
- the captured CO_2 complying with specified standards,
- the connection to the T&S network,
- for CHP projects only, CHPQA certification and at least 70% overall energy output to industrial facilities.

If the emitter satisfies the relevant OCPs within the TCW, it will be eligible to receive payments under the ICC Contract for the full duration of the contract (subject to the provisions of the ICC Contract).

However, if there is a delay in the commissioning of the project and the satisfaction of the OCPs, beyond the TCW (which can be extended in certain circumstances e.g. force majeure), then the length of the term will be reduced accordingly.

This means that the 10-year initial payment term of the ICC Contract will commence and will start to be eroded but the emitter will not be eligible to receive payments. As a result, the length of the payment term will reduce by an amount commensurate with the length of the delay to commissioning up until the Longstop Date. This reduction of the term would not apply in situations where there are certain accepted delays (e.g. Force Majeure, in which case the TCW would be extended day-for-day to the FM delay). This is a proportionate mitigation for the

risk of late delivery of captured CO_2 to the T&S network and provides a financial incentive for the emitter to commission the capture plant as soon as reasonably practicable.

We have considered the merits of both a shorter and longer period for the TCW. Our view is that a period of 12 months is appropriate for initial contracts considering the potential level of construction schedule risk inherent in FOAK industrial CCUS projects whilst also ensuring that a project developer is incentivised to propose and agree a realistic estimate of the commercial operations date as part of the CCUS Cluster Sequencing process. A shorter period might place too great a risk of construction overrun onto the emitter, whilst a longer period would reduce the confidence of other parties in the estimate of commercial operational date provided, including for the operation of the CCUS cluster.

Longstop date

Failure to fulfil the relevant OCPs by a Longstop Date, which will be 12 months after the expiry of the TCW (subject to any extensions to the Longstop Period e.g due to force majeure), will give the ICC Contract Counterparty the right (but not the obligation) to terminate the ICC Contract. This right will be included in the ICC Contract to: i) prevent funding being committed to projects which secure ICC Contracts but which never fully commission; and ii) provide an incentive for emitters to develop plans and timelines as accurately as possible. The ability for the ICC Contract Counterparty to terminate in these circumstances will ensure that budget is made available for other, more viable projects, and will provide the government with more confidence that it can meet its decarbonisation targets.

As outlined above, the ICC Contract OCPs will require each emitter to demonstrate that the relevant capture plant has been constructed and commissioned with a CO_2 capture rate equal to or greater than the higher of i) 85% and ii) 5 percentage points less than the CO_2 capture rate included in the project's Phase-2 application, amongst other requirements. Unlike the proposals set out in the DPA update, an ICC emitter will not then be required to demonstrate a higher CO_2 capture rate before the Longstop Date as part of 'Longstop Date Acceptance Tests' (which are unlikely to be a feature of the ICC Contract).

Termination

As is standard for a contract of this type, there will be a range of material breaches or circumstances that could result in termination of the ICC Contract. These may include, for example:

- pre-start date breaches (e.g. failure to satisfy the conditions precedent by the relevant dates);
- prolonged force majeure;
- prolonged T&S unavailability events;
- default termination events (e.g. emitter insolvency or breach of key obligations); and

- qualifying change in law resulting in the permanent cessation of construction or operations.

The proposed termination events and consequences are outlined in the ICC Contract HoTs in Annex A and will be further developed as we continue to develop the ICC business model.

Change in law

The model aims to provide fair protection to emitters to prevent unforeseeable changes in law (CiL) from undermining the goals of the CCS programme and ensure that the business model is an investable proposition in which risks are appropriately allocated between the counterparties, while balancing against the risks of overcompensation for capture facilities.

In the case of defined categories of CiL ('Qualifying Changes in Law' or QCiL) that have an apparent discriminatory impact on the emitter, the emitter can submit a claim for compensation to the ICC Contract Counterparty, providing evidence of the relevant impact. The ICC Contract Counterparty will seek to agree with the emitter or (failing agreement) have an independent expert or an arbitrator decide if the CiL falls within one of the defined categories and therefore qualifies for compensation. If the parties agree, or it is determined through a dispute resolution procedure, that a CiL is a QCiL, compensation will be paid to the emitter in a manner determined by the ICC Contract Counterparty (e.g. a lump sum payment, staged payments, daily payments or an adjustment to the strike price), after consideration of what format is most compatible with the excess costs incurred by the emitter.

The compensation will be based on the general principle that the emitter impacted by the QCiL should be no better or worse off than before the QCiL. In accordance with this principle, the QCiL can take effect both ways – the HMG Counterparty can claim on the QCiL provisions if the change creates savings for the emitter. The precise level of compensation provided will need to be developed further by BEIS in line with the payment mechanics and policy drivers for the ICC business model.

Our minded-to position is to adopt the following three QCiL categories: 'discriminatory', 'specific' and 'other', in line with those categories already used in the renewables CfDs and proposed for the DPA.

- **'Discriminatory Change in Law':** defined as a CiL which specifically applies to the particular capture facility or emitter (and not to other capture facilities or emitters).
- **'Specific Change in Law':** defined as a CiL that specifically applies to industrial installations which deploy CO_2 Capture Technology (or their holding companies), and not to other industrial installations. In this case, CO_2 Capture Technology is defined to specifically cover technology (and preparatory and ancillary systems) that captures CO_2 and whose result is the storage or export for permanent storage.
- **'Other Change in Law':** defined as a CiL that does not specifically (i.e. on the face of the document introducing the CiL) apply to contracted ICC capture facilities, but which has an undue discriminatory effect on the costs incurred or saved by them. The

discriminatory effect is measured against specific comparator groups to determine whether the ICC project is incurring costs (or savings) materially different to these groups. The equivalent definition in the AR3 CfD also needed to be adapted for the ICC Contract HoTs to reflect the ICC business model and underlying CCS policy drivers.

The comparator groups have been defined as:

- all emitters which operate industrial installations deploying the same or similar industrial process as the Industrial Installation to produce the same or similar product or provide the same or similar service but which do not deploy CO_2 Capture Technology; or
- all emitters which operate industrial installations deploying CO_2 Capture Technology other than the Industrial Installation's CO_2 Capture Technology.

Ultimately decisions about the handling of CiL claims during the course of ICC Contracts will be a matter for the ICC Contract Counterparty, as an independent contract manager.

Qualifying Change in Law

In the December 2020 Update, we stated that the ICC Contract would contain change in law provisions, the form and scope of which remained to be determined, but which were anticipated to be similar to those in the standard CfD in the electricity market. Subsequently, we have developed our position on QCiL definitions and the compensation offered to Emitters for different categories of QCiL events.

Categories

Compensation will be payable to an Emitter or (where the savings arising from the QCiL exceed the costs) to the ICC Contract Counterparty, for a QCiL that:

- permanently prevents the construction of a Capture Plant;
- affects a Project's Capex;
- affects a Project's Opex;
- affects an Installation's CO_2 capture rate and CO_2 capture volume; or
- permanently prevents a Capture Plant from operating.

As discussed below, certain costs will be excluded from the compensation formulations while, generally speaking, any savings will be netted off any costs that arise as a result of the relevant QCiL (and vice versa). Typical no double recovery provisions will apply to ensure that an Emitter is not compensated twice for the same loss (e.g. where a QCiL affects both a Project's Capex and an Installation's CO_2 capture rate and CO_2 capture volume).

QCiL permanently preventing construction

Where a QCiL permanently prevents the completion of the construction of the Capture Plant by making the Capture Plant illegal, the ICC Contract will be automatically terminated and a "QCiL Construction Event Payment" will be payable either as a lump sum or staged payments by

the ICC Contract Counterparty to the Emitter. The Emitter will be entitled to recover all irrecoverable and unavoidable out-of-pocket costs (including tax liabilities) which have been or will be incurred by the Emitter in respect of the Project arising directly from the relevant QCiL Construction Event, if and to the extent that such costs comprise:

- development and pre-development costs in respect of the Capture Plant;
- decommissioning costs in respect of the Capture Plant;
- break costs; or
- construction costs in respect of the Capture Plant.

The amount the Emitter is entitled to recover will be reduced by the savings which have been or will be made by the Emitter in respect of the Project arising directly from the relevant QCiL Construction Event, including:

- avoided out-of-pocket costs;
- tax reliefs or reductions;
- insurance proceeds; and
- any other compensation.

QCiL affecting Capex

Where a QCiL results in net Capex costs or savings, the Emitter or the ICC Contract Counterparty will receive compensation in order to put the relevant party in the position it would have been in had the QCiL not occurred. Such compensation will be payable at the election of the ICC Contract Counterparty as a lump sum payment, staged payments or daily payments: i) by the ICC Contract Counterparty to the Emitter if there are net Capex costs, or ii) by the Emitter to the ICC Contract Counterparty if there are net Capex savings.

Net Capex costs or savings are defined for the purposes of this calculation as all out-of-pocket costs or all savings which have been, will be or are reasonably likely to be incurred or made in respect of the Project by the Emitter relating to the acquisition, modification, construction or disposal of any asset relating to the Project and arising directly as a result of or in anticipation of the relevant QCiL (including the costs of site preparation, initial delivery and handling costs, installation and assembly costs, testing costs and professional fees).

QCiL affecting Opex

Where a QCiL results in net Opex costs or savings, the Emitter or the ICC Contract Counterparty will receive compensation in order to put the relevant party in the position it would have been in had the QCiL not occurred. Such compensation will be payable at the election of the ICC Contract Counterparty as either: i) an adjustment to the Strike Price, which will be increased if there are net Opex costs and decreased if there are net Opex savings, or ii) as daily payments, which will be payable by the ICC Contract

Counterparty to the Emitter if there are net Opex costs or by the Emitter to the ICC Contract Counterparty if there are net Opex savings. Net Opex costs or savings are defined for the purposes of this calculation as all out-of-pocket costs or all savings which have been, will be or are reasonably likely to be incurred or made in respect of the Project by the Emitter, arising directly as a result of or in anticipation of the relevant QCiL, which are not QCiL Capex costs or savings.

QCiL affecting an Installation's CO_2 capture rate and CO_2 capture volume

Where a QCiL reduces or increases the CO_2 capture rate and CO_2 capture volume of an Installation (and therefore reduces or increases the Capex Payments and/or Opex Payments made to the Emitter), whether for a set period (e.g. while an Emitter is implementing the QCiL) or for the remaining term of the ICC Contract, compensation will be payable at the election of the ICC Contract Counterparty as a lump sum payment, staged payments, daily payments and/or an adjustment to the Strike Price: i) by the ICC Contract Counterparty to the Emitter if the relevant QCiL results in decreased Capex Payments and/or Opex Payments being made to the Emitter, or ii) by the Emitter to the ICC Contract Counterparty if the relevant QCiL results in increased Capex Payments and/or Opex Payments being made to the Emitter.

QCiL permanently preventing operations

Compensation will be payable under the ICC Contract if either of the following occurs: i) a QCiL which permanently prevents the Emitter from operating the whole of the Capture Plant by virtue of such operation becoming illegal, or ii) a CiL which the Emitter can demonstrate imposes a requirement that permanently prevents the whole of the Capture Plant from operating, or constitutes the refusal or failure to give approval to a request for consent to re-start the operation of the whole Capture Plant for a period which is likely to exceed twenty-four months (following the provisions of the renewables CfD).

In either case, a "QCiL Operations Cessation Event Payment" will be payable to the Emitter by the ICC Contract Counterparty as a lump sum payment or staged payments at the election of the ICC Contract Counterparty. Such compensation will comprise an amount equal to the remaining Capex Payments that the Emitter would have received but for the relevant QCiL or CiL and all irrecoverable and unavoidable out-of-pocket costs (including tax liabilities and break costs) which have been or will be incurred by the Emitter in respect of the Project arising directly from the relevant QCiL or CiL (but excluding certain costs).

Cap on QCiL compensation

If a QCiL affects: i) Capex or Opex, ii) an Installation's CO_2 capture rate and CO_2 capture volume, or iii) a combination of i) and ii), the total QCiL compensation due to the Emitter will be capped by reference to:

- the QCiL Construction Event Payment that would have been payable to the Emitter had a QCiL Construction Event occurred (pre-Start Date); or

- the QCiL Operations Cessation Event Payment that would have been payable to the Emitter had a QCiL Operations Cessation Event occurred (post-Start Date).

As discussed above in the termination section, where the ICC Contract Counterparty is required to pay QCiL compensation to an Emitter which is equivalent to either the QCiL Construction Event Payment or QCiL Operations Cessation Event Payment, the ICC Contract Counterparty may elect to terminate the ICC Contract, with no liability to pay the Emitter any additional compensation.

Next steps

This document reflects the work we have undertaken to date to progress the ICC business model design following publication of the May 2021 document. We will continue to develop further the detailed structures and mechanisms, with the objective of finalising the ICC business model in 2022 prior to negotiations commencing. This work will be undertaken in close coordination with the development of the business models for T&S, power, hydrogen, and any potential updates to the CIF.

In relation to the ICC business model and related documents, further updates planned for 2021 include:

Update	Indicative date
Phase-2 CCUS Cluster Sequencing Launch including publication of the full eligibility criteria, evaluation criteria and assessment process	Q4 2021 The launch of Phase-2 is planned to be in parallel with, or soon after, the Track-1 cluster announcement from w/c 25th October.[20]
ICC Business Model update(s) including further possible updates on: • Waste management • Cross chain risks and qualifying costs • Capture rates throughout the business model • Payment mechanics • Metering requirements • Reference price • Free allowances • Penalties and Termination • Publication of ICC Contract	We plan to provide an update on eligibility of waste management projects by the launch of Phase-2 of the Cluster Sequencing process. Other areas: Q1 2022

[20] More information can be found here: https://www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-1-expressions-of-interest/update-on-phase-1-eligible-clusters-and-phase-2-timeline

CCUS is integral to the UK's Green Industrial Revolution. 'CCUS Supply Chains: a roadmap to maximise the UK's potential[21]' published in May 2021 stated that "as we deliver on our ambitions, it is vital that our economy and, in particular, our UK CCUS supply chain companies realise the economic benefits of this large-scale infrastructure programme." It also noted government's intention "to provide a further update on our approach to UK CCUS supply chains by the end of 2021". We expect that any further business model supply chain updates may be developed with such future publications, as well as learnings from other sectors, in mind.

We also plan to develop and evolve the business model for future rounds of allocation, including moving towards a market-driven reference price with a competitive allocation process. This will include further consideration of the potential application of the model to CCU projects.

[21] The CCUS Supply Chain roadmap can be found at: https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-supply-chains-a-roadmap-to-maximise-the-uks-potential

Glossary

Term	Description
AR3	Allocation Round Three (referring to the third Contract for Difference allocation round for renewable technologies)
AR4	Allocation Round Four (referring to the fourth Contract for Difference allocation round for renewable technologies)
BECCS	Bioenergy with Carbon Capture and Storage
BEIS	Department for Business, Energy and Industrial Strategy
CaaS	Capture-as-a-Service
CaaSCo	Capture-as-a-Service Company
Capex	Capital expenditure
CCC	Climate Change Committee
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Usage
CCUS	Carbon Capture, Usage and Storage
CfD	Contract for Difference
CHP	Combined Heat and Power
CHPQA	Combined Heat and Power Quality Assurance
CIF	CCS Infrastructure Fund
CiL	Change in Law

Term	Description
CO_2	Carbon Dioxide
DPA	Dispatchable Power Agreement
BEIS EEF	BEIS Energy Entrepreneurs Fund
EfW	Energy from Waste
EIIs	Energy Intensive Industries
FAs	Free Allowances
FEED	Front End Engineering Design
FOAK	First-Of-A-Kind
HoTs	Heads of Terms
HMG	Her Majesty's Government
ICC	Industrial Carbon Capture
IETF	Industrial Energy Transformation Fund
IRR	Internal Rate of Return
NZHF	Net Zero Hydrogen Fund
$MtCO_2$	Megatonnes of carbon dioxide
OCPs	Operational Conditions Precedent
Opex	Operating expenditure
Pre-FEED	Preliminary-Front End Engineering Design

Term	Description
QCiL	Qualifying Change in Law
SIC	Standard Industry Classification
T&S	Transport and Storage
T&SCo	Transport and Storage Company
TCW	Target Commissioning Window
UK ETS	UK Emissions Trading Scheme
VfM	Value for Money

This publication is available from: https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-business-models.

If you need a version of this document in a more accessible format, please email enquiries@beis.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.