Department for
Business, Energy
& Industrial Strategy

Carbon Capture, Usage and Storage

An update on the business model for Industrial Carbon Capture: adaptations for the waste sector

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Contents

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): specifically, facilities in the waste management sector. 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 2022 including since publication of the last Industrial Carbon Capture (ICC) Business Model update in April 2022 (which included an update on the adapted Contract for the waste management sector). This includes engagement with the Waste 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.

The proposed terms in this business model update and accompanying draft Waste ICC Contract riders will be reviewed in light of the consultation on the draft 'generic' ICC Contract that closed on 10 June. These positions remain subject to further development by the government in consultation with relevant regulators and the devolved administrations as well as subject to Parliamentary approval of any necessary legislative amendments and to ensure consistency with subsidy control principles.

The draft Waste ICC Contract riders do not constitute definitive drafting of the Waste ICC Contract's terms. A number of the provisions and terms which require particular consideration and development have been square bracketed (with footnotes) in the draft Waste ICC Contract riders. BEIS reserves the right to review and amend these square bracketed provisions, and all other provisions set out in the draft Waste ICC Contract riders.

The draft Waste ICC Contract riders do not indicate any willingness or agreement on the part of BEIS to enter into, or arrange entry into, the Waste ICC Contract. The draft Waste ICC Contract riders do not constitute an offer and are not capable of acceptance.

Section 1: Introduction

Background

The UK government has set in law a target to cut emissions by 78% by 2035, compared to 1990 levels. Developing carbon capture usage and storage (CCUS) is important for delivering this target. The Net Zero Strategy[1] aims to create four clusters by 2030, capturing and storing 20-30 megatonnes of carbon dioxide ($MtCO_2$) per year by 2030 and up to 50 $MtCO_2$ per year by 2035. It also raised the government's ambition to deliver 6 $MtCO_2$ per year of industrial CCUS by 2030 and 9 $MtCO_2$ per year by 2035. The Industrial Decarbonisation Strategy[2] (published in March 2021) explains that, without CCUS, emissions from current industrial processes could not be reduced to levels consistent with net zero.

In October 2021, it was announced that the HyNet and East Coast Clusters would be Track-1 clusters for the mid-2020s and that the Scottish Cluster would be the reserve[3]. The government continues to be committed to Track-2 enabling at least 10 $MtCO_2$ per year of capture and storage capacity to be operational by 2030.

To help deliver our ambitions and unlock private sector capital investment, we have designed the Industrial Carbon Capture (ICC) business model, which will incentivise the deployment of carbon capture technology by industrial users who often have no viable alternative to achieve deep decarbonisation. Through the business model, we intend to provide support to industrial emitters to decarbonise efficiently and sustainably and drive world-leading innovation in carbon capture technologies, supporting UK-wide decarbonisation. The ICC business model comprises a capital grant (for initial projects) which will be funded by the £1 billion CCS Infrastructure Fund (CIF), and/or ongoing revenue support which will be funded by the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme.

We have been engaging closely with the industrial sector throughout the development of the ICC business model, with key milestones including the publication of business model updates in December 2020[4] and May[5], October[6] and November 2021[7].

[1] https://www.gov.uk/government/publications/net-zero-strategy
[2] https://www.gov.uk/government/publications/industrial-decarbonisation-strategy
[3] https://www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-1-expressions-of-interest/october-2021-update-track-1-clusters-confirmed
[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946561/ccus-business-models-commercial-update.pdf
[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/984119/industrial-carbon-capture-icc.pdf
[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1023095/icc-business-model-october-2021.pdf
[7] https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-business-models/november-2021-updates-on-the-industrial-carbon-capture-and-dispatchable-power-agreement-business-models

In April 2022 we provided a further update on the proposed ICC business model[8] ('the April update'). Section 4 included an update on the proposed adapted contract for emitters in the waste management sector. Alongside the update, we also published a draft of the ICC Contract for initial projects in April 2022[9], accompanied by a document summarising the ICC business model including a consultation on the proposed business model[10]. This consultation closed on 10 June 2022, and we are now analysing responses.

The Cluster Sequencing for CCUS deployment Phase-2 guidance document was published in November 2021[11], alongside the indicative Heads of Terms for the ICC grant funding agreement[12], and the window for Phase-2 submissions closed on 21 January 2022. Eligible projects were announced in March 2022: several waste management CCUS projects were included in this list[13].

Purpose of this document

The final adapted contract for waste emitters will be referred to as the "Waste ICC Contract". This document's purpose is to provide an update on key developments expected for the Waste ICC Contract following on from the update in April 2022.

A consultation on the ICC business model, entitled 'Carbon Capture, Usage and Storage: Industrial Carbon Capture business model summary and consultation' closed on 10 June 2022. As the Waste ICC Contract will be an adaptation of the 'generic' ICC Contract and is expected to retain many of the provisions in the 'generic' ICC Contract, government sought views on the draft ICC Contract from all relevant stakeholders, including waste management stakeholders. We are analysing these responses and intend to publish a response to this consultation later in the year. These responses will be considered ahead of the publication of the final 'generic' ICC Contract and final Waste ICC Contract but have not been reflected in this update on the Waste ICC business model and Contract.

We will continue to engage with waste management stakeholders upon the publication of this update and take into account these views as we develop the final Waste ICC Contract, including through Waste Expert Groups held over the summer. If you wish to be involved in

8 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1068423/Industrial_Carbon_Capture_Business_Model_April_2022_Update-AMENDED_08042022.pdf

9 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1068434/Industrial_Carbon_Capture_Standard_Terms_and_Conditions__Annex_A__April_2022.pdf

10 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1068432/Industrial_Carbon_Capture_Business_Model_April_2022_Summary_and_Consultation.pdf

11 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043088/ccus-cluster-sequencing-phase-2-guidance.pdf

12 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1031898/indicative-heads-of-terms-ccus-grant-funding-agreement-icc.pdf

13 https://www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc

any future stakeholder events in connection with the Waste ICC business model, please contact us via email at ICCbusinessmodels@beis.gov.uk.

This document focuses on updates to the minded-to positions on the areas of the 'generic' ICC business model that will be adapted for emitters in the waste management sector: the commercial framework including the payment mechanism (reference price, symmetric payments, treatment of biogenic CO_2, capex repayment period) and the legal contractual framework including requirements to maintain Recovery Operation (R1) efficiency status.

This document also contains further detail around the approach to the potential for monetisation of negative emissions outside the contract and the monitoring requirements required for biogenic CO_2. These provisions are also planned to apply to 'generic' ICC Contract holders.

Alongside this document, we have published draft riders of the Waste ICC Contract for initial projects, highlighting key changes we are proposing to make to the draft 'generic' ICC Contract (as published in April 2022) for waste management CCUS projects.

The final Waste ICC Contract will represent a generic contract applicable to all projects in the waste management sector.

Section 2: Summary of adaptations to the ICC business model for waste management CCS projects

Grant funding

The ICC business model is comprised of capital grant co-funding (for initial projects) and ongoing revenue support. For projects in the waste management sector, government is considering the role that the capital grant co-funding can play in reducing the overall costs of business model support. We are considering whether government would wish to award a Waste ICC Contract for revenue support without capital grant co-funding in place. We are continuing to develop our position on this.

Waste ICC Contract

The differences between the waste management sector and other industrial sectors supported under the ICC business model has led to the development of a separate contract for waste management CCS projects. Alongside this document, we have published draft riders of the Waste ICC Contract for initial projects. Many of the provisions contained in the draft 'generic' ICC Contract published in April 2022 will be retained, with the draft riders of the Waste ICC Contract highlighting where deviations have been made. Additional deviations will be required as the final Waste ICC Contract is developed.

The sections below outline the key changes that have been made to the ICC business model to ensure the Waste ICC Contract is appropriate for waste management CCS projects.

Reference price

Assessment of reference price options

Waste management processes in scope for ICC business model support as part of Phase-2 of the CCUS Cluster Sequencing Process are not currently subject to the UK Emissions Trading Scheme (UK ETS) or any other carbon pricing mechanism. On 25 March 2022, government published proposals on the development of the UK ETS, including a call for evidence on expanding the UK ETS to waste incineration, Energy from Waste (EfW) and Advanced Thermal Treatment (ATT)/Advanced Conversion Technology (ACT) by the mid-late 2020s[14].

Given the long-term nature of ICC Contracts, it is important that the Waste ICC Contract is flexible enough to be appropriate if carbon pricing were to be applied to a contract holder in the waste management sector ('Waste Emitter') in the future. If a Waste Emitter becomes subject to a form of carbon pricing in the future, it is expected that a significant proportion of carbon

[14] https://www.gov.uk/government/consultations/developing-the-uk-emissions-trading-scheme-uk-ets

costs would be recoverable from its customers/suppliers. We consider that the Waste ICC Contract needs to reflect this to ensure value for money for taxpayers.

Section 4 of the April update presented three reference price options for the Waste ICC Contract:

- **Option 1:** A fixed reference price trajectory is applied to all captured and stored CO_2. This is because the business model is intended to cover the costs of CCS deployment, which remain the same regardless of whether any future carbon price applies to an Emitter within the waste management sector.
- **Option 2:** A fixed reference price trajectory is applied to all captured and stored CO_2, in alignment with the 'generic' ICC Contract. In addition, if the waste management CCS project becomes subject to any future carbon pricing, a further deduction to payments in line with any future carbon price exposure would be applied to the payment calculation.
- **Option 3:** The reference price will be explicitly linked to the waste management plant's carbon price exposure.

Conclusions

These three options were assessed against the business model design principles alongside both written feedback and feedback from the expert groups.

Minded-to position (Option 3): We consider that the reference price for the Waste ICC Contract should be based on Option 3, where the reference price is explicitly linked to the waste management plant's carbon price exposure throughout the term of each Waste ICC Contract. This means that the reference price represents the carbon price exposure that the Emitter would have faced for those emissions without CCS. Government considers that a waste management plant with CCS will, in many circumstances, be able to pass through CCS costs to customers in line with any carbon pricing costs it would have been able to pass through to customers if it were running unabated (i.e. without CCS) via increased gate fees. Therefore, Option 3 is considered to have the lowest impact on the waste sector and create limited competitive distortions.

Option 1, the application of a fixed reference price trajectory, is not considered appropriate for the waste sector given an Emitter's expected ability to pass through CCS costs in line with any carbon pricing costs. Supported projects may have a competitive advantage relative to unabated plants if carbon pricing were to be applied to the sector in future, depending on a plant's potential ability to recover CCS costs in line with carbon pricing costs as a result of the fixed trajectory reference price not being linked to the actual carbon price.

Option 2 was also not considered appropriate as it could create two reference deductions from the subsidy (the fixed trajectory and then the carbon price, if applicable). This could lead to higher initial strike prices and would add significant complexity to the model.

Calculation of carbon reference price

Therefore, the Waste ICC Contract will use an applicable carbon reference price that is linked to the applicable prevailing carbon price (i.e., the carbon price that the Emitter is subject to, and therefore zero if the Emitter is not subject to carbon pricing). Our minded-to position is to draw this from publicly available Exchange Delivery Settlement Prices from the daily reports published by ICE[15]. In the possible absence of this price in the future, a suitable alternative would be used.

We are considering the frequency with which to apply changes to this price, either daily or monthly. Within the April consultation there was a question on this (Q12), and responses received to that question will inform the final policy position.

Whilst allowances are traded on a daily basis, daily prices may be too granular for consumers to match and for businesses to plan their business decisions. We set out in the April consultation that we consider a monthly average carbon reference price most likely to achieve this objective, whilst also averaging out volatility, which may be preferable for both Waste Emitters and government.

If a monthly price is applied, we expect that the "monthly average carbon price" for any month would be calculated by dividing the sum of the Exchange Delivery Settlement Prices of the December futures contract as traded on the relevant carbon market exchange for each relevant day in the month by the number of relevant days in the month.

Reference price for biogenic CO_2

Biogenic CO_2 emissions under the UK ETS are zero rated and therefore have no associated carbon pricing cost, subject to the biogenic fuel meeting specific sustainability criteria.

Considering that the cost of emitting biogenic CO_2 whilst running unabated is zero, we consider that it is appropriate for the biogenic CO_2 captured to be subject to a zero reference price, to mirror these counterfactual costs. Applying a zero reference price to captured biogenic CO_2 in the Waste ICC Contract should limit distortions within the waste market, as we expect projects will not be able to pass through costs of biogenic CO_2 capture in line with the carbon price. By aligning with the costs of an unabated plant emitting biogenic CO_2, a zero reference price on biogenic CO_2 should reduce Waste Emitters' carbon price risk exposure which may otherwise increase strike prices and therefore taxpayer costs.

Applicable carbon reference price

The application of the reference price should be flexible to the current absence of a carbon price on the sector and the potential for carbon pricing to apply to the sector in the future. The application of the reference price must also take into account that CO_2 captured could be either biogenic or fossil CO_2, noting that the split between biogenic and fossil CO_2 will vary as waste

[15] ICE runs a secondary market exchange where UKA-based contracts can be traded. The most liquid (and therefore likely to be most representative of 'the carbon price') of these is the futures contract expiring in December of a given year. Further information available at: https://www.theice.com/products/80216150/UKA-Futures

compositions are heterogeneous. To take both of these variables into account, our minded to position is to apply the reference price as follows.

The carbon reference price is applied only to those emissions that, if not captured, would otherwise have been subject to the carbon price. This is known as the “applicable carbon reference price”.

*Applicable carbon reference price = Prevailing carbon price * percentage of CO_2 captured subject to the carbon price*

If carbon pricing does not apply to the sector, the percentage of CO_2 subject to the carbon price would be 0, as none of the CO_2 captured would have otherwise incurred carbon pricing costs if the plant were running unabated.

If carbon pricing does apply to the sector, and if the carbon price is applied to fossil CO_2 emissions only (in alignment with current UK ETS rules), the “applicable carbon reference price” would ensure that the carbon reference price is applied to captured fossil CO_2 only, as only these emissions would have otherwise incurred a carbon pricing cost if the plant were running unabated.

Free allowance treatment

In the ‘generic’ ICC Contract, revenue from Free Allowances (FAs) that no longer need to be surrendered under the UK ETS form a potential revenue stream for industrials deploying CCUS will need to be taken into account when determining what is an appropriate level of support. However, this revenue stream is not fixed as there is uncertainty over the price and volume of an industrial’s FAs over the course of the ICC Contract. The ‘generic’ ICC business model seeks to reduce the risk of price volatility of FAs by providing the industrial emitters with predictability on the value of its FAs, with respect to captured emissions, for initial contracts. The ‘generic’ ICC Contract requires Emitters to forfeit their FAs to the government and in return these FAs will be compensated at the value of the reference price for that year. This removes uncertainty for both emitters and government in respect of the price at which FAs can be monetised.

It is unknown whether an Emitter within the waste management sector will receive any FAs if it becomes subject to carbon pricing in the future. However, given that the Waste ICC Contract will link payments to the carbon price, the price risk for Emitters and government is reduced because the price for which any potential future surplus FAs could be monetised will also be linked to the carbon price. Therefore, no mechanism for managing FA price risk is proposed within the Waste ICC Contract. Further, as the waste management sector is not currently subject to carbon pricing and any potential future FA allocation is unknown, we do not consider it necessary to provide volume assurance for FA for Waste Emitters under a Waste ICC Contract (unlike the 'generic' ICC Contract).

We intend to keep this position under review as development of the UK ETS continues.

Symmetric payments

In general, Contracts for Difference operate on the basis of 'two-way' or 'symmetric' payments. The Waste ICC Contract is more similar to a Contract for Difference than the 'generic' ICC Contract, as a result of the applicable carbon price (i.e., the carbon price that the Emitter is subject to (as described above)).

Symmetric payments are proposed to apply throughout the Contract Term, i.e., from the Start Date. As the reference price applies to the opex strike price:

- if the opex strike price is above the reference price, the opex component of the payment calculation (the opex strike price minus the reference price) will be positive. The Emitter is paid the sum of the opex, capex and T&S fee components of the payment calculation (see section - Payment equations) by the Waste ICC Contract Counterparty;
- if the reference price is above the opex strike price, the opex component of the payment calculation (the opex strike price minus the reference price) will be negative. If the sum of the opex, capex and T&S fee components of the payment calculation is negative (see section - Payment equations), the Emitter pays the difference to the Waste ICC Contract Counterparty.

This aligns with the approach for the extension period of the 'generic' ICC Contract.

As also outlined for the 'generic' ICC Contract, if Contract holders are permitted at any point to generate negative emissions credits or monetise negative emissions generated from the project, the subsidy payment would be adjusted, potentially by deducting these revenues from the subsidy. Any such deductions would also be subject to payment symmetry, i.e., the Emitter may be obliged to make a net payment to the Contract Counterparty if the negative emissions deduction is greater than the sum of the capex, opex and T&S fee components.

Capture of biogenic CO_2, or 'Negative emissions'

Waste ICC projects utilising municipal waste feedstocks produce biogenic CO_2. The Waste ICC Contract will make payments for both fossil CO_2 and biogenic CO_2 captured. Our minded to position is that the applicable carbon reference price will apply a carbon reference price to payments for fossil CO_2 captured and a zero reference price to payments for biogenic CO_2 captured (see section above). This will mirror the carbon price exposure that the Emitter would have faced for those emissions without CCS.

However, when biogenic CO_2 is captured and permanently stored via CCS, it can result in a CO_2 removal, or a 'negative emission'. This can also occur for industrial Emitters that are contracted under the 'generic' ICC Contract if they use biogenic feedstocks. It is expected that negative emissions could be monetised in the future, and this may create an opportunity to help stimulate negative emissions markets and reduce support costs.

A **regulated market** for the sale of negative emissions does not currently exist. If a regulated market for negative emissions is established, and if contracted projects have market participation access as set out by government policy at the time, projects will be expected to

participate. In these circumstances, it is anticipated that the relevant negative emissions market price would be deducted from payments made under the Waste ICC Contract and the 'generic' ICC Contract for each tonne of biogenic CO_2 captured and stored.

Whilst engineered negative emissions credits under **voluntary carbon markets** are emerging, we are considering the role that they should play in the ICC business models, as well as other business models being developed to support technologies that can realise negative emissions. Government published a consultation on business models for Greenhouse Gas Removals on 5 July 2022: this document sets out further thinking on voluntary carbon markets in the context of the GGR business model[16]. We are still considering the implications of enabling first of a kind CCUS projects in the industrial and waste sectors to use voluntary carbon markets or bilateral agreements to monetise negative emissions. If it is determined that projects will be able to participate in voluntary carbon markets/bilateral arrangements for negative emissions generated via the capture equipment, subject to any specific conditions, the ICC payment may be adjusted to take these revenues into account.

Given the ongoing work across government in relation to both regulated and voluntary markets for negative emissions, we intend to do further work throughout the year to inform the details of how negative emissions will be treated under initial ICC contracts, including for Waste projects.

Capex payment period

Our minded to position is that capex repayments and the return component under the Waste ICC Contract will be based on a target ten-year repayment period. This differs from the 'generic' ICC Contract where this is based on a five-year period. Given the different commercial structures present in the waste sector and the lower exposure to international competition compared to other industrial sectors we believe this to be appropriate for the Waste ICC Contract. In addition, as government is still considering when, or if, carbon pricing should be introduced for the waste incineration and EfW sectors, a longer capex payback period lowers year on year peak spend under the Industrial Decarbonisation and Hydrogen Revenue Support[17] spend for government, particularly in a scenario where carbon pricing has not been introduced when a project becomes operational.

In order to recover their total capex payments, the contracted waste project would need to achieve its estimated CO_2 output to the T&S network in each contract year. As the capex payback period matches the initial contract payment term, we are proposing there would not be an opportunity to make up any missed capex payments if CO_2 captured volumes are lower than expected in any year.

Waste Emitters (like Emitters under the 'generic' ICC Contract) will have an annual cap on capex payments, which will be set by reference to an estimated maximum quantity of CO_2 delivered by the Capture Plant to the CO_2 T&S Network Delivery Point during the relevant

16 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1087918/greenhouse-gas-removals-business-models-consultation.pdf

17 The Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme is the funding pot through which the Waste ICC Contract and ICC Contract will be funded.

year. This cap may vary each year, depending on expected changes in production over the Capex Payment Period, and the cap for each year is intended to be agreed during negotiations.

Payment equations

This section sets out the proposed payment equations that have been developed for the Waste ICC Contract. Table 1 lists the symbols required for the payment equations. This section does not provide the full list of equations but highlights those equations which deviate from the 'generic' ICC Contract. In addition, we are further considering how to structure any deductions that apply to negative emissions. These have not been included in this section given the ongoing work on this.

Table 1: Payment equation symbols

Symbol	Description	Units
C	Metered CO_2 Output to T&S Estimate for Capex Payment Years 1-10	t
$CO2_{out\_T\&S,i}$	Metered CO_2 Output to T&S during the relevant settlement unit *i*	t
$AMCRP$	Average monthly carbon reference price	£/t
AE_i	Applicable Emissions percentage for each settlement unit: percentage of emissions captured that would be subject to the carbon price if the capture plant were running unabated, i.e. 0 if Waste Emitter is not subject to carbon pricing	%
CP_i	Capex payment for each settlement unit *i*	£
CP_m	Monthly capex payment	£
CP_{Total}	Sum of the capex payments for each settlement unit since the Start Date	£
CPR	Capex Payment Rate	£/t
CP_m	Monthly capex payment	£
OP_i	Opex payment for each settlement unit *i*	£
OP_m	Monthly opex payment	£

r	Total return component	£
S_i	Strike price that applies during the relevant settlement unit *i*	£/t
$T\&S_i$	T&S Payment for each settlement unit i	£/t
$T\&S_m$	Monthly T&S payment combining capacity, volumetric and residual components[18]	£/t
TCP	Total capex payment without rate of return (excluding capital grant)	£
$YCCM_{Cn}$	Yearly capex cap multiplier for the relevant Capex Payment Year C*n*. This is the CO_2 capture quantity estimate for year C*n* as a proportion of the CO_2 capture quantity estimate over Contract Payment Term Years 1-10	-

Settlement and billing

A settlement unit of one day (starting at 0:00 and ending at the end of 23:59 of the same day) is the minimum period used to calculate payments that are to be made to or from the Emitter under the ICC Contract. A Billing Period, which is the frequency with which payments to/from the Emitter are made, will include the amount which is calculated for every settlement unit in a calendar month.

Payment mechanics

The payment mechanics for the waste ICC business model contract can be broken down into three component parts:

1. Opex payment
2. Capex payment
3. T&S fee payment

As all three payments will be paid over the initial 10-year contractual term of the Contract, they can all be considered together, noting that:

$$Monthly\ Payment = OP_m + CP_m + T\&S_m$$

In any extension period, capex payments would effectively be 0, whereas opex payments and T&S payments would continue to be paid.

[18] The period over which this will change will be determined in a future update on the T&S business model

Due to symmetric payments, it is possible for the OP_m payment term (and ultimately the monthly payment) to become negative.

Opex payments

Opex payments throughout the contract will be calculated daily using the following equation:

$$OP_m = \sum OP_i$$

Where:

$$OP_i = CO2_{out\_T\&S,i}(S_i - (AMCRP * AE_i)$$

AE_i are the emissions that, if not captured, would have been subject to the carbon price as a percentage of emissions that enter the capture plant. If the sector does not have carbon pricing, then the AE_i will equal 0%.

Frequency of AE_i calculation is still under consideration; we are considering whether this will be monthly or daily depending on which methodology for measuring biogenic emissions is required under the Contract (see section below).

Capex payments

Capex payments paid during operations (not the capital grant) will be paid monthly as the sum of capex payments for each settlement unit in a calendar month:

$$CP_m = \sum CP_i$$

They will be calculated for each daily settlement unit according to the following equation:

$$CP_i = CPR \times CO2_{out\_T\&S,i}$$

Where:

$$CPR = \frac{TCP + r}{C}$$

Capex payments are subject to an agreed annual cap so that, in any capex payment year Cn, if $\sum CP_{i,Cn} \geq (TCP + r) \times YCCM_{Cn}$, no further capex payments are made for that year.

Capex payments will cease on the earlier of either (i) once total capex payments are complete, which is when $CP_{Total} \geq TCP + r$ or (ii) at the end of Capex Payment Year 10.

T&S fees

The composition of T&S fees is set out in Section 2 of the April update. The T&S fee payment will be paid monthly, where:

$$T\&S_m = \sum T\&S_i$$

Technical requirements

R1 status

Government intends to support facilities that maximise the energy value of waste, aligning with the Resources and Waste Strategy for England, as well as the respective waste strategies for Scotland, Wales, and Northern Ireland. Therefore, an R1 efficiency rating was required as a condition of eligibility for certain waste management technologies. To ensure we continue to support only more efficient waste management plants, the Waste ICC Contract will include R1 efficiency requirements (using the definitions of R1 set out in the relevant legislation at the outset of the Contract) where R1 efficiency rating was required as a condition of eligibility under Phase 2 (see Table 2). Confirmation of the R1 efficiency rating (as applicable at the outset of the Contract) from the relevant competent authority will need to be provided to the Waste ICC Contract counterparty to fulfil the following conditions:

- An R1 efficiency rating will be required as an additional Operational Condition Precedent (OCP). Note that a Waste Emitter will need to satisfy all OCPs by the end of the Target Commissioning Window (TCW) for payments in respect of captured and stored CO_2 under the Waste ICC Contract to commence at the start of Contract Payment Term Year 1. The Waste ICC Contract Counterparty will then have the right to terminate the Waste ICC Contract if the OCPs are not satisfied or waived by the end of the 12-month Longstop Period.
- An R1 efficiency rating will also be required as a condition of payments throughout the course of the contractual term (as an additional Emitter Undertaking). If an applicable plant loses its R1 efficiency rating (as confirmed by the relevant authority), then payments under the Waste ICC Contract will be ceased until the R1 efficiency rating is regained. It is important to note that once R1 efficiency rating is regained, the Waste Emitter will not be entitled to receive any payments for CO_2 captured that were ceased from the date on which the R1 efficiency rating was lost.
- An R1 efficiency rating will also be required as an additional performance condition of an extension period. (More information on the extension provisions is set out below.)

Table 2: Efficiency requirements for waste management technologies[19][20]

	EfW (Incineration/combustion of MSW and/or CW with energy recovery)	ATT/ACT			HWI
		Gasification to energy (electricity and/or heat) only	Gasification to molecule (chemicals or fuels)	Pyrolysis	
Efficiency Rating	R1	R1	Not applicable		

Monitoring fossil and biogenic CO_2

Monitoring of the relative fossil and biogenic CO_2 captured is required under the Waste ICC Contract, including to determine the application of the carbon reference price. This may also be required for the application of the reference price in the extension period of the generic ICC Contract (as set out in the April update) and in relation to any sales of negative emissions.

The Waste ICC Contract will therefore require measurement, reporting and verification of the relative biogenic and fossil CO_2 captured to ensure payment calculations are accurate and timely.

The Waste ICC Contract will outline a procedure for Waste Emitters to monitor the proportion of biogenic and fossil CO_2 that is captured, including permitted methodologies and a mechanism to report this data to the Waste ICC Contract Counterparty. An Emitter will be required to report this information if it is subject to carbon pricing, or in relation to any negative emissions sales.

At this stage, government considers that, as a minimum, continuous flue gas monitoring is likely to be required to ensure a robust and accurate measurement of the biogenic/fossil CO_2 split is reflected in the monthly payment system. Given the heterogeneity of waste feedstocks, we consider that monitoring the flue gas (rather than the composition of the waste feedstock itself) should provide a more accurate assessment of the biogenic/fossil CO_2 split. We are assessing the methodologies available and considering how these could be integrated into the payment mechanism. We will set out these requirements in the final Waste ICC Contract and ICC Contract.

Contract extension

Extension conditions

The ICC Contract and Waste ICC Contract will provide ongoing revenue support for 10 years, with an offer of support for up to 5 additional years (assessed on an annual basis) if certain

19 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043088/ccus-cluster-sequencing-phase-2-guidance.pdf

20 Terms used in the table are defined as the following: Energy from Waste (EfW); Municipal Solid Waste (MSW); Clinical Waste (CW); Advances Thermal Treatment (ATT); Advanced Conversion Technologies (ACT); and Hazardous Waste Incinerators (HWI).

conditions are met. A Waste Emitter will be entitled to request one year extensions each time, up to a total of 5 one-year extensions, in the same way as the ‘generic’ ICC Contract. To receive a contract extension offer both performance conditions and market conditions will need to be satisfied by the Waste Emitter. These are set out in section 2 of the April update.

The Waste Emitter is intended to be reviewed and assessed using the same market conditions and assessment criteria as the generic ICC business model.

In addition to the performance conditions under the generic ICC Contract, Emitters under the Waste ICC Contract that required an R1 efficiency rating as a condition of eligibility (see section on Technical Requirements) for ICC business model support will be required to continue to hold an R1 efficiency rating to be granted an extension term.

Note that, as in the ICC business model, the Emitter will need to demonstrate that it remains connected to the T&S network when it makes its request for an extension term.

Extension period payment mechanics

In the ‘generic’ ICC Contract, if a project continues into the extension period the ICC business model transitions from a fixed reference price trajectory to a market-based UK ETS reference price. Considering that the Waste ICC Contract is a market-based model from the start, the payment mechanisms applicable in the first 10 years of the Waste ICC Contract will continue into the extension period.

Section 3: Next steps

Government will engage with waste management stakeholders on the contents of this update document and the development of the Waste ICC Contract, including through meetings of the Waste Expert Group held over the summer. If you wish to be involved in any future stakeholder events in connection with the Waste ICC business model, please contact us via email at ICCbusinessmodels@beis.gov.uk.

We will take into account views expressed through these forums in developing the final Waste ICC Contract, alongside views expressed through the consultation on the ICC business model which closed on 10 June 2022.

We are seeking to publish the final Waste ICC Contract later in the year, to align with meaningful negotiations commencing with shortlisted projects. The planned timetable for negotiations is to be confirmed following the phase 2 shortlisting announcement.

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

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