Department for
Business, Energy
& Industrial Strategy

Carbon Capture, Usage and Storage

An update on the business model for Transport and Storage

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Disclaimer

This update sets out further details on the government's current proposals on potential business models for carbon capture, usage and storage ('CCUS'). The proposals, as set out in the document, 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 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, 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 during 2021 since publication of the Carbon Capture, Usage and Storage Business Models update in the December 2020 document. This includes engagement with industry and relevant regulators.

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.

Section 1: Introduction

In December 2020, we published a Transport and Storage ('T&S') business model ('T&S Regulatory Investment (TRI) Model'). The purpose of this document is to set out further details about the TRI Model, reflecting work undertaken since December 2020 and feedback we have received to date.

The business model update is focused on development of the deployment ambition as set out in the Prime Minister's Ten Point Plan, the importance of which has been further highlighted by the recent announcement that government has set in law the world's most ambitious climate change target, cutting emissions by 78% by 2035 compared to 1990 levels. In line with the recommendation from the independent Climate Change Committee, this sixth Carbon Budget limits the volume of greenhouse gases emitted over a 5-year period from 2033 to 2037, taking the UK more than three-quarters of the way to reaching net zero by 2050. Successful implementation of the TRI Model is needed to facilitate the level of transport and storage capacity required to deliver on these commitments.

The key objectives for the TRI Model and their implications for the design of the TRI Model were set out in the December 2020 document and are summarised below.

- *Attracting investment in the T&S network to establish a new CCUS sector*

To establish a commercial framework that enables and supports stable investment in CO_2 T&S projects that are likely to have long operating lives and provides investors with a clear sight of the long-term revenue model to ensure they can earn a reasonable regulated return on their investment.

- *Enabling low cost decarbonisation in multiple sectors*

Balancing the need for anticipatory investment to address future demand on the T&S network with the economic attractiveness of the network to near term users. Each T&S network must be able to accommodate multiple and different types of users with varying demand profiles and be sufficiently flexible to implement various potential network designs and growth profiles.

- *Developing a market for carbon capture – a long-term vision*

An Economic Regulatory Regime (ERR) that provides sufficient flexibility to allow for future CO_2 market expansion (potentially including non-pipeline transported CO_2) whilst ensuring affordability and VfM for the users.

A common theme of the feedback we have received as part of our engagement with industry since December has been that the model described a TRI Model operating in an established market. The engagement suggested that this update should reflect how the model would take account of the initial deployment of T&S in the first phase of deployment. This update looks to reflect that feedback by seeking to explain how we contemplate the establishment of an initial T&S asset, from a final investment decision (FID) being taken, through construction and into the first regulatory period of operation of the T&S asset.

We will continue to extensively engage with prospective developers and wider stakeholders in 2021 to test and further develop the business model designs outlined in this document. Our objective is to create frameworks which deliver on our deployment ambitions and create a sustainable market for CCUS infrastructure and capture services.

This document is being published alongside the Cluster Sequencing for Carbon Capture Usage and Storage Deployment: Phase 1 document, the updates to the Business Models for power and industrial carbon capture and an update on the design of the CCS Infrastructure Fund.

Section 2: The Role of T&SCo

The TRI Model set out in our December 2020 document envisaged that T&SCo would have the following responsibilities:

- development, construction, financing, operation, maintenance, expansion, and decommissioning of the T&S network;
- ownership of the onshore and offshore transportation network, and obtaining the licence and permit for the storage site, under the Energy Act 2008;
- operation of the T&S network to ensure the operational parameters are within specified limits, manage network access, perform network planning, and administrate sector specific tasks;
- review of the CO_2 metering and compositional analysis equipment installed by the users at the point of connection[1]; and
- ensuring that the transportation and long-term storage of CO_2 is safe, efficient, and compliant with defined requirements.

Further consideration has been given to a number of aspects of the TRI overarching framework following the December 2020 document, including on:

- delivery model;
- asset ownership;
- network planning; and
- system operation.

This section sets out further detail on the current position on the above issues as well as where further work is required to enable a detailed decision.

Delivery model

We remain of the view that a private sector delivery model is the preferred approach for the delivery of T&S assets. We believe that this will enable CCUS to be delivered taking advantage of the greater speed of development and cost efficiency that comes with projects developed in the private sector, and the work already undertaken by the promoters of clusters. We believe that it is preferable to develop a regulatory system and a contractual framework to allow the private sector to develop CCUS. Such a model has been effective in driving investment volumes and efficiency in networked industries in the UK over the last 30 years, and we anticipate costs and risks to reduce in the CCUS sector as it matures.

[1] We are minded to adopt a similar approach to that used in other regulated networks. Given this, we consider that the T&S network user will be responsible for ensuring the CO_2 entering the transportation system meets the required quality specification.

We anticipate that knowledge and expertise from the UK's well-developed Oil & Gas sector and considerable experience developing and operating economic regulatory arrangements will be leveraged in the development of the UK's CCUS infrastructure. At an early stage of development government recognises that funding from the CCS Infrastructure Fund (CIF) is a component of bringing forward clusters to completion. Government also recognises that as well as funding requirements there may be a need for targeted public-sector support for financing T&SCo (including either debt or equity) that may arise at certain points in T&SCo's lifetime.

The UK Infrastructure Bank (UKIB) also has a potential role in supporting CCUS. As a component of the government's broader infrastructure strategy, UKIB can co-invest with the private sector to enable and accelerate the delivery of UK projects that are consistent with its mission to tackle climate change and support regional and local economic growth. Individual investment decision will be made independently by UKIB in line with its objectives.

Asset ownership

The December 2020 document envisaged T&SCo owning the onshore and offshore network and obtaining the permit for the storage site.

Since December, we have received feedback that alternatives to an integrated model of transport and storage could have advantages in some circumstances: for example, transport-only models or storage-only models may be required to facilitate the movement of CO_2 from dispersed sites and expand transportation and storage capacity.

It has also been suggested to us that there may be advantages to enabling separation of onshore and offshore transportation ownership within a cluster to provide greater flexibility around ownership models.

We continue to consider T&SCo owning both the onshore and offshore networks/systems to be the most appropriate model of ownership, particularly in the early phase of the development of this market (i.e. for initial decisions made around cluster sequencing and allocation of support to T&S network users – e.g. Industrial Carbon Capture (ICC) contracts, Low Carbon Hydrogen (LCH) contracts, Dispatchable Power Agreements (DPA), and Bio-Energy with CCS (BECCS) contracts).

This is because it is currently thought that T&SCo is best placed to negotiate and develop solutions for resolving the commercial and operational interface risks between the transport and storage elements of the infrastructure. Further, we consider that this integrated ownership model should make it easier for both government and potential network users to engage with the infrastructure owner(s) and therefore reduce delivery lead times and commercial complexity for the user and for government.

However, we recognise the importance of providing sufficient flexibility in the development of the business model to accommodate the potential future separation of segments of the value chain (such as onshore and offshore transport ownership), where it is appropriate to do so.

Further work will be undertaken to consider how design arrangements do not foreclose separation in future. This may include through:

- continuing to indicate functional separation within licence conditions; and
- seeking to better understand the implications of separate cost allocation for onshore transport, offshore transport and storage – e.g. through separate tariffs set for each element of the T&S value chain (i.e. onshore transportation, offshore transportation and storage elements of the infrastructure) and a requirement for T&SCo to report separately on costs in each.

Accommodating dispersed sites and non-pipeline transportation of CO_2

We consider that the capacity for T&S networks to be able to accept CO_2 from dispersed sites and international sources, either transported by ship, road or rail (non-pipeline transportation), will be vital for our long-term objectives of achieving our Carbon Budgets and net zero.

As set out above, we intend to develop the licence conditions and business model arrangements so that non-piped sources of CO_2 can be accommodated by the TRI model.

Facilitating a role for non-pipeline transportation within the UK carbon network is an area that will require ongoing consideration and we will publish more on this issue later this year.

Network planning

It is envisaged that UK transport and storage capacity will initially be developed at separate clusters, though with the potential for future expansion of clusters into a UK carbon network.

We continue to expect T&SCo to be responsible for developing economically efficient plans for new connections to the T&S network. However, we also recognise that delivery against such plans will be highly dependent on decisions made by government on the timing and award of support to the proposed T&S network users (e.g. ICC, LCH and BECCS contracts and DPAs).

Over the longer term, we expect a decline in the dependency of network planning decisions on government decisions to award funding to proposed network users. This is because we expect CCUS to become commercially viable without subsidy as the price for CO_2 increases and as technology costs and risks fall across the sector.

Government is looking at system operation and network planning across the energy sector and this work may shape our long-term vision for network planning.

System operation

It is envisaged that T&SCo will initially have responsibility for system operation, including developing the relevant standards for the T&S network (taking account of applicable external standards and design codes) that reflect the technical requirements of the individual clusters (for instance on gas composition limits). It is also envisaged that T&SCo will develop guidelines, operating procedures and management systems to allow it to operate the cluster in an efficient and safe manner and in a way that meets regulatory requirements.

It is recognised that it may be beneficial to have a level of consistency between the technical standards and network codes of each cluster. Consistency could facilitate network growth (for instance promoting greater choice of networks for dispersed sites to which they can send their CO_2) and remove barriers to the potential integration of onshore CO_2 transport networks over time as well as facilitating international import and export opportunities. However, it is also recognised that having a uniform CO_2 specification could reduce opportunities for clusters to compete on cost.

The process for developing and governing network codes, including the role of BEIS and the independent economic regulator (Regulator), will require further work, including due consideration of the outcomes of the government's planned consultations on system operation and code governance[2].

We will continue to develop and refine our views on the roles of system operator, including how the role may need to evolve in future.

[2] We intend to publish a second consultation on Future System Governance including Code Reform in 2021 following further policy development and consideration of responses to the 2019 consultation found here: https://www.gov.uk/government/consultations/reforming-the-energy-industry-codes.

Section 3: Business Model Evolution

For T&SCo to attract investment, the TRI Model needs to recognise that the investment proposition will evolve as a particular T&S network is developed and moves through the phases of expansion as the CCUS market develops.

We have sought to demonstrate this by showing the development of a notional base case cluster and how a T&S network might be regulated over time, taking into account the initial phase of development; from FID through to steady state operations. In doing so we have assumed the following:

- **Development period**: the period from the cluster sequencing process to FID, during which time it is anticipated that the prospective T&SCo will settle with BEIS all conditions precedent to the FID for the initial phase of development, such as reaching an initial settlement on costs, returns and risk allocation (including any ex-ante assessment of costs), agreeing all contractual delivery and support documentation (including economic licence and Government Support Package (GSP) terms)[3].
- **FID**: upon FID T&SCo will be granted an economic licence which reflects the initial settlement and BEIS will issue the GSP.
- **First Regulatory Period**: this is the period from economic licence award (upon FID) until a specified period following completion of construction of the first phase of cluster development, to allow for commissioning and an early operational phase – during this first regulatory period the Regulator would be responsible for administering the settlement.
- **Early Operational Phase**: will start once the initial construction of the CCUS network has been completed and will run until at least the end of the first regulatory period, but potentially longer depending on market conditions and the levels of demand and system utilisation. The Regulator will be responsible for determining when a CCUS cluster has moved out of the early operational phase.
- **Second Regulatory Period**: a specified period running from expiry of the first regulatory period (for example, 5 years) in which the Regulator has set and then administers the price control(s). As part of administering the price control(s) the Regulator could set allowed capex, allowed operating expenditure (“opex”) and the allowed rate of return, as well as performance targets and associated incentives, similar to the way in which price controls are set for regulated gas and electricity networks.

[3] Projects within the clusters sequenced onto Track-1 will have the first opportunity to be considered to receive any necessary support under the government’s CCUS Programme. Being sequenced onto Track 1 does not mean that support will be awarded. Any decision to award support would only be made subject to government satisfaction that subsidy control requirements have been met, government is comfortable with any implications, all relevant statutory consents have been completed, and government is comfortable that the project represents value for money for the consumer and the taxpayer.

- **Enduring regime**: being the second regulatory period onwards where the Regulator sets and administers price controls on an enduring basis pursuant to its statutory duties.

This work has been developed from our discussions with parties with an interest in developing CCUS assets in the UK and represents our current understanding of how possible CCUS clusters may develop and evolve over time. Note that timelines are illustrative only and non-binding in respect of future decisions to be made with regards to Regulator roles and functions and legislative provisions which will require Parliamentary approval.

We have developed the TRI Model to unlock investment in T&S networks and deliver our objectives for the CCUS programme. In order to establish a new CCUS sector we need a commercial framework that enables and supports stable investment in projects that are likely to have long operating lives. The TRI Model will be underpinned by a regulatory framework to provide investors with clear sight of the long-term revenue model to ensure they can earn a reasonable regulated return on their investment. The Regulator will operate and exercise its functions within a defined regulatory framework and regulatory guidance may be provided to clarify how the Regulator intends to approach any regulatory decision-making providing greater visibility to investors.

Section 4: Economic Regulatory Regime (ERR)

As set out in the Disclaimer, the proposals described below for the Regulator's role and establishment of the regulatory regime are non-binding, not final and are subject to further development by 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 legislative requirements, and completion of necessary contractual documentation.

As noted in the 'Business Model Evolution' section above, T&SCos will agree a settlement with BEIS on conditions precedent to the FID for their initial phase of development. This will include reaching an initial settlement on costs, returns and risk allocation (including any ex-ante assessment of costs). These conditions will apply for an initial period ("first regulatory period"). Determining the ERR will require establishment of a number of key parameters for T&SCo including:

- allowed revenues;
- outputs and incentives;
- uncertainty mechanisms; and
- duration of the first regulatory period.

This section sets out our latest thinking on these issues, focusing on the first regulatory period.

BEIS will determine the ERR for the first regulatory period, with the Regulator having a more limited role than in it will in the second and subsequent regulatory periods. The Regulator will, however, still have some responsibilities during this first regulatory period and these are set out in more detail below.

After our current position on the ERR for the first regulatory period, we outline our position on the ERR for the second and subsequent regulatory periods.

We focus the discussion on areas where our thinking has changed since the December 2020 document.

First Regulatory Period

Allowed revenues

- As outlined in the December 2020 document, T&SCo's allowed revenues will be determined based on several building blocks:

$$Allowed\ revenue = (WACC\ x\ RAV) + Depreciation + Opex + Decom + Tax + Adjustments$$

- Each of these building blocks of allowed revenues is discussed in more detail below.

WACC

The return which T&SCo will be expected to make during the first regulatory period will be equal to the allowed weighted average cost of capital (WACC) multiplied by the Regulatory Asset Value (RAV).[4] The RAV is discussed further below. T&SCo's actual return may be higher or lower than the expected return as it will depend on T&SCo's actual expenditures (and how they compare to capex and opex allowances) and T&SCo's actual performance (and how that compares to its performance targets). The capex and opex allowances and the performance targets and financial incentives are all discussed in more detail below.

We are proposing to maintain our previous position that the initial allowed WACC in the first regulatory period will be determined by BEIS in dialogue with the T&SCo. When setting the allowed WACC we will take into account the expected costs of financing T&SCo and the risks borne by T&SCo, including any cluster-specific risks when this information is made available[5]. We will also take into account risks borne by T&SCo's such as construction risk[6], development risk[7], First of a Kind ('FOAK') technology risk[8] and operational risk[9]. This WACC determination will also be subject to risk allocation and mitigation measures incorporated into the ERR and wider T&SCo business model.

We are considering further whether it may be appropriate to include a refinancing gainshare mechanism and other mechanisms to adjust the allowed WACC should the cost of financing T&SCo change materially during the first regulatory period.

RAV

The RAV is a regulatory construct that reflects T&SCo investment. It is the efficiently incurred capital investment into the project including devex, construction, asset expansion and a 'rolled up' cost of capital (i.e. WACC during the construction period), less depreciation.

[4] In our December 2020 document, we considered BWACC (the WACC during the construction phase) and RWACC (the regulated WACC during operations). We are now considering a separate allowed WACC for each regulatory period and these could be a blended rate that reflects the differing risk profile of construction and operations.
[5] For example, whether one cluster contains more or fewer offshore pipelines will impact the level of construction risk present.
[6] Considering each element of the T&S network (onshore pipeline, offshore pipeline, storage assets etc.) as well as the risk of commissioning.
[7] Covering aspects such as obtaining necessary permits, licences and completing the Development Consent Order (DCO) process.
[8] Capturing technological design factors specific to CCUS, including the difficulties to build and operate an efficient compressor system.
[9] Concerning the likelihood of system issues across the initial cluster of CCUS projects during their operational lifetime.

The RAV would be calculated as we set out in the December 2020 document. Capex and depreciation are discussed in more detail below.

Depreciation

In December 2020, we suggested that revenue would be collected from users to cover asset depreciation over the operational period and that this may be profiled to reduce payments in the early operational period to support the initial stages of the project.

Consistent with the discussion in the section on Revenue Models, we are now considering the use of straight-line or backloaded depreciation of the RAV as part of the allowed revenue calculations in the first regulatory period. Backloaded depreciation would mean that depreciation increases in line with expected growth in utilisation, so that allowed revenue can be reduced in early years and increased in later years. We will continue to consider the impact of the two depreciation profiles on the efficient financing of T&SCo.

Capex[10]

In the December 2020 document, we outlined that we were considering the feasibility of a combined ex-ante and ex-post assessment of the construction costs incurred by T&SCo. This would be alongside an ex-post assessment of the cost of transferred existing assets for CCUS application ('re-use costs').

Our current position is still to adopt a combined ex-ante and ex-post assessment of construction and re-use costs, but we have refined some details of our position.

As part of determining the ERR applied to the first regulatory period, BEIS would perform an ex-ante assessment of T&SCo's proposed costs for the transport assets and set a base case cost allowance. We would expect capex estimates at this stage to be robust and, for example, be subject to an independent technical assessment. T&SCo would bear the risk of construction costs turning out to be higher or lower than the base case, except in limited pre-defined circumstances where adjustments could be made to the allowed construction costs (e.g. change in law).

We continue to believe that a different approach is needed in relation to the costs of storage facilities, which could have a higher degree of uncertainty over costs. For these costs, if a capex allowance was set in advance then T&SCo could either face significant risk exposure if the allowance is too low (i.e. a windfall loss for T&SCo), or users may end up paying too high of a price for T&SCo if significant risk contingency is built into capex allowances but not

[10] We are continuing to develop our position on the transfer of re-use assets to the RAV and will provide a further update on our proposed methodology in 2021. As set out in the 2020 Document, assets previously deployed in the oil and gas industry may be utilised/transferred as part of setting up the CCUS T&S network to save costs from building a new T&S network. As the asset is already largely constructed, the capital expenditure-based methodology for determining RAV would not be suitable to be applied directly on the transferred assets.

ultimately needed (i.e. a windfall gain for T&SCo). We therefore propose to determine the allowed costs associated with T&SCo's spend on storage facilities on an ex-post basis.

We are also considering whether an ex-post assessment of offshore transport assets is more appropriate than ex-ante, noting the risks associated with expenditure on these assets may differ to the risks associated with expenditure on onshore transport assets.

An ex-post approach will not be used to re-assess expenditure decisions made by T&SCo that were considered efficient at the time, and we would expect there to be a dialogue throughout the construction period to allow developers to test their spending plans with the Regulator in order to reduce the risk of expenditures being assessed to be inefficient on an ex-post basis.

Opex

As part of determining the ERR for the first regulatory period, BEIS would determine an ex-ante allowance for efficient opex during the early operational phase. This opex allowance would be determined taking into account submissions made by T&SCo. The opex allowance will also include an allowance for expected bad debt costs, as discussed in more detail under the Revenue Model section of this document, and one for connections, which is discussed later in this section.

T&SCo will bear the risks that opex turns out higher or lower than the allowance.

Decommissioning

Allowed revenue will include an allowance to cover the decommissioning cost of the T&S network at the end asset life. We are continuing to develop our approach to decommissioning and associated treatment of decommissioning costs and our consultation on decommissioning is to be published in Q3 2021.

Tax

Allowed revenue will include tax liability allowances to take account of, for example, existing and announced corporation tax rates.

Adjustments

Allowed revenue will be subject to some adjustments for pass-through costs (e.g. insurance costs) and any required true-ups and incentives as discussed further under the Outputs and Incentives section below.

Leakage fund

In the December 2020 document we said that it may be appropriate to accrue a financial reserve from allowed revenues during the operational phase which T&SCo could draw on to fund part of the costs associated with leaks from the storage site if the cost was above a certain threshold.

Our current position remains that an accrued financial reserve to fund costs associated with storage site leaks in future could be a useful tool, but we intend to consider this issue further.

Treatment of non-regulated revenues

Since December 2020, we have also explored options for the treatment of non-regulated revenues that T&SCo may earn. These could include revenues associated with the sale of CO_2 for re-use and the import of CO_2 from markets outside of the licence area for subsequent storage.

Two options that could be considered, and draw on precedent in other regulated industries, are a 'single till' approach, which would see the revenues from non-regulated activities used to cross-subsidise regulated activities and bringing down the cost of user charges, or a 'dual till' approach that would see the revenues and costs of non-regulated services treated separately with any profit retained by T&SCo. Our current position is that a hybrid approach would be appropriate, sharing the benefits of non-regulated activities between T&SCo and users. We will undertake further work on the details of how this hybrid approach should operate e.g. whether it is based on non-regulated revenues or profits from non-regulated activities, as well as the proportion of profits or revenues retained by T&SCo.

Outputs and incentives

Availability incentive

In our December 2020 document, we considered that it may be appropriate for T&SCo to be subject to an availability incentive that rewards higher levels of T&S network availability during operations but penalises worse performance relative to a pre-set target. In turn, these penalties could be applied in-year, across multiple-years and/or be subject to a penalty floor. If the T&S network was unavailable, users in the power and industrial sectors that are signatories to a DPA and ICC contract respectively would receive protection via their respective business models[11].

We have explored this incentive further and recognise that the design of the incentive and any network availability target will need to account for the impact of planned outages that are required for ongoing maintenance, as well as unplanned outages that are outside of T&SCo's control. These are both features of other regulated networks that have incentives on availability and, as such, we believe that a well-designed scheme will address these challenges. We will also consider whether a small allowance is appropriate to manage unplanned outages. T&SCo would still be expected to bear risk for unplanned outages that are attributable to factors that lie within its control.

Further analysis is planned to determine how the availability target and incentive rates would be set for T&S networks.

[11] Arrangements for LCH and BECCS will be considered in the development of the respective business models.

Leakage incentive

In the December 2020 document we indicated that we intended to incentivise T&SCo to maintain the leakage rate within a set range with a zero limit at one end of the range. We are still considering how this might work, how it might relate to the initial design standards and permits required, and how it would align with wider environmental requirements. As part of considering this issue further, we intend to undertake more work, in collaboration with the Oil and Gas Authority (OGA) and other specialists, to understand the ramifications for the management of both transport and storage assets.

Connections incentive

In December 2020 we stated that T&SCo would be responsible for any expansion of the T&S network and be required to connect new users. Efficient asset expansion would be funded by the users as part of regulatory allowances and the expectation was that T&SCo would be incentivised to deliver this efficiently. We also stated that these costs would be distributed across users (and between current and new users) through T&S charges.

Our updated position is that during the first regulatory period the timely connection of new users should be incentivised through bilateral agreements between T&SCo and users, with no need for an explicit connections incentive. However, we believe that there would be merit in a use-it-or-lose-it allowance that T&SCo could use to support outreach to find additional users for the network. We would also expect to set minimum standards to ensure that the users have some recourse should contractual arrangements be inadequate.

Construction delay

Previously we set out how a delay in starting the operations of T&SCo could delay users from beginning to inject captured CO_2 into the T&S network[12]. As such, we previously considered a penalty which would reduce the starting RAV if construction of the T&S network was delayed. Users would receive some protection through their funding model, such as a DPA and ICC Contract (where applicable), if the T&S network were not yet operational within the anchor users TCW[13].

We now consider that withholding allowed revenues until operations commence to be a sufficiently strong incentive on T&SCo to manage its construction programme in a timely way, and to meet agreed expectations with anchor users. We are not currently considering further penalties such as a reduced RAV. Unless reopeners are triggered (see below), we expect T&SCo to manage the construction costs and timings itself. Our expectation is that construction delays would be managed in a similar way in the second and subsequent

[12] A delay in starting operations of the T&S network could impact an anchor user's Target Commissioning Window ("TCW"). Under the Dispatchable Power Agreement (DPA) model, it is being proposed that the contract term will commence on the earlier to occur of the "Start Date" (i.e. when the project is commissioned) and the last day of a specified "Target Commissioning Window" of 12 months which will be adjusted day-for-day for any delays that occur due to "Force Majeure". A similar concept is under consideration for Industrial Carbon Capture Contracts.
[13] Arrangements for LCH and BECCS will be considered in the development of the respective business models.

regulatory periods, although we note that the Regulator may explore the use of other measures to incentivise timely construction.

Uncertainty mechanisms

Reopeners are a form of uncertainty mechanism that the Regulator could use to adjust allowed revenue in response to un-forecastable risk or material changes in circumstance. We consider these mechanisms to be fail-safes to use in exceptional circumstances, with the aim to balance risk between T&SCo and users. In December 2020, we considered the use of reopeners in the discrete case of sharing the benefits of T&SCo refinancing with users and managing opex, but we now consider there may be merit in using reopeners to address specific uncertainties under the ERR.

Our assessment is that, in the first regulatory period, reopeners may be appropriate for one-off, material changes in expenditure that relate to events outside of the control of T&SCo. These reopeners could potentially be triggered by T&SCo or other parties within defined windows. For example, if there is uncertainty over whether a large-scale investment is required at the time the ERR applied to the first period is determined, it may not be efficient to include the required expenditure within the allowance that BEIS sets initially. There may be scope in using reopeners to manage uncertainty attributable to scenarios potentially including, but not limited to:

- Requirement for additional storage sites, e.g. if capacity lower than anticipated, that leads to additional expenditure;
- Unexpected need to connect new users to the T&S system during the relevant regulatory period; and
- Changes in regulation, such as new and enhanced safety or environmental protection measures.

How the reopener will adjust allowed revenues will be determined on a case-by-case basis.

Further analysis will be undertaken to determine the materiality thresholds (e.g. additional costs exceed some threshold), timing (e.g. as soon as possible after the event, at the end of the year or at the end of the regulatory period), the principle that users will be protected from changes to T&S fees outside of their control and the triggers under which reopeners would be expected to apply. The expectation is that reopeners will not be used frequently, but more as a contingency for unforeseen events that are outside of T&SCo's control and to manage discrete cases like T&SCo refinancing. We will also continue to work through the interactions with the user business models.

Role of the Regulator

The determinations by BEIS of allowed revenue and other key features of the ERR described above for the first regulatory period would be incorporated into the economic licence awarded to each T&SCo. These determinations would be fixed for the whole of the first regulatory period except for limited, pre-determined circumstances (e.g. where there is a significant

change in events that would warrant an adjustment to the allowed costs and revenues of T&SCo). These pre-determined circumstances, where aspects of the first regulatory period could be re-opened or adjusted, would be set out in the economic licence as well. These would include some of the uncertainty mechanisms specified above.

In the situations where some aspect of the first regulatory period needs to be re-determined or adjusted, the Regulator will be responsible for making this re-determination or adjustment. The Regulator would need to consult with T&SCo and other stakeholders before making a decision and it would need to make decisions consistent with its legal obligations and duties. The Regulator's potential duties could include protecting the interests of current and future users of the T&S network, as well as enabling an economic and efficient T&SCo to finance its activities and to support the deployment of CCUS to meet the government's net zero target. BEIS intends to consult in future on the appropriate form and balance of the Regulator's duties, and we are confident that they will help to facilitate investment whilst delivering value for money. The decisions made by the Regulator could potentially be appealable to an appropriate body.

The Regulator would also be responsible for administering the economic licence. This would include monitoring of the performance of T&SCo against agreed outputs, as well as the tools (e.g. incentives and uncertainty mechanisms) to adapt allowed revenue and other parameters in response to performance or to protect both T&SCo and users from the impact of unforeseen events as appropriate.

Length of the first regulatory period

The length of the first regulatory period for each cluster will be determined by BEIS in dialogue with each cluster. Our current thinking is that this period will commence with the award of the economic licence and conclude at the end of 3 years after commissioning of the T&S network[14]. This means that if the construction period is 3 years, then the first regulatory period would be six years in total. We consider that a period of 3 years after construction may be appropriate to provide certainty to T&SCo on its initial operating period. We expect to conduct any necessary ex-post assessments of capex towards the end of the construction period.

Clusters are of different sizes and shapes. Some clusters may have a single phase of construction work to connect up all of their initial expected users. Others may expect users to connect to the T&S network over multiple phases. In some cases, it is possible that construction work to connect up a second phase of users could follow on more or less immediately after construction work to connect up the first phase of users. In these cases, providing appropriate certainty about the ERR to bring forward investment in T&SCo may require the first regulatory period to apply to not only the first phase of construction, but also the second and even third phase of construction. So, for example, if T&SCo expected to connect up its first two users following an initial of construction of 3 years and to connect up its third and fourth users following another period of construction spanning years 4 and 5, then it

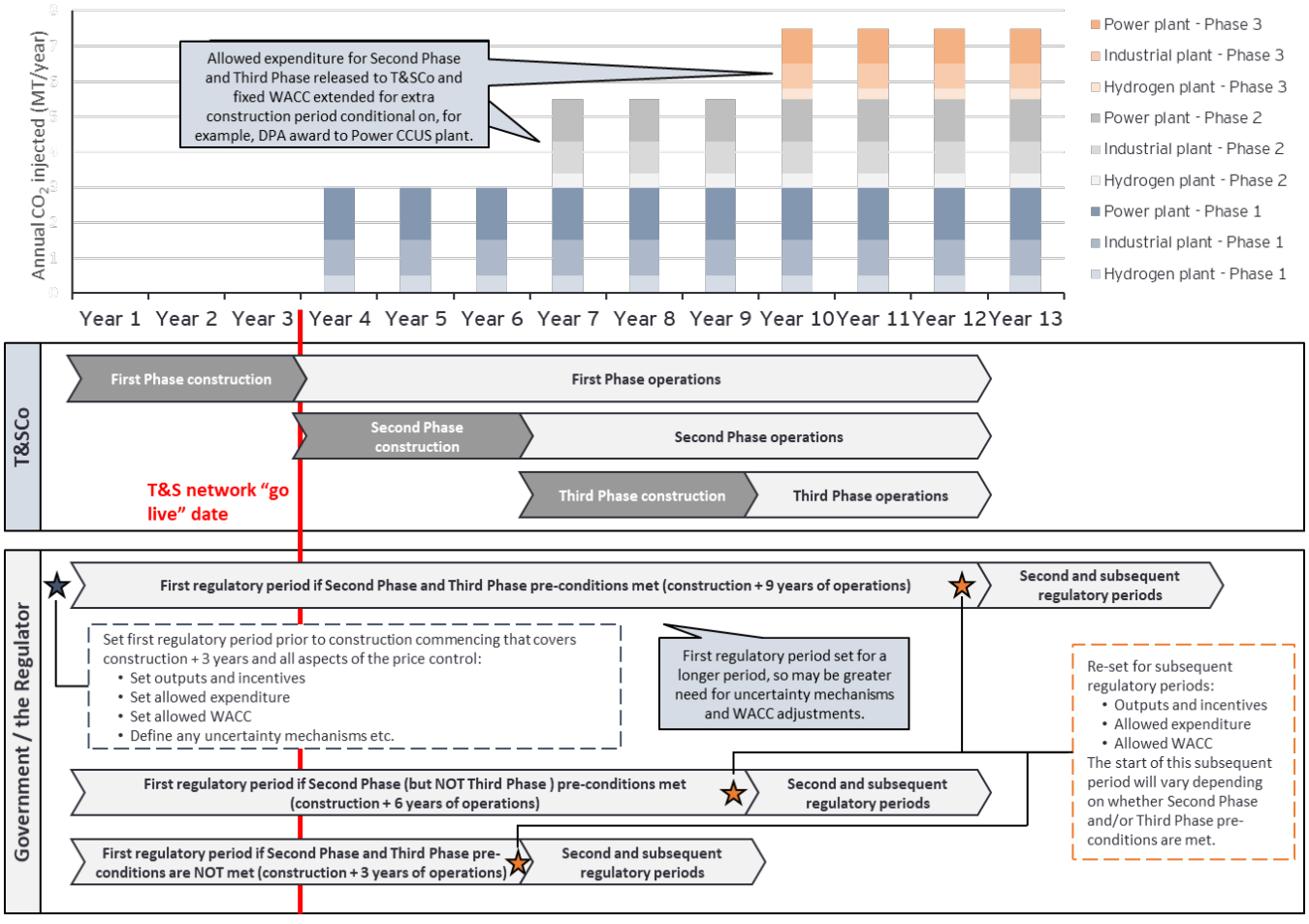
[14] We are still considering the most appropriate starting point for the first regulatory period, but this is likely to linked to commissioning of the T&S network, the start of commercial operations or some other key milestone.

might be appropriate for the first regulatory period to apply for 8 years i.e. 5 years of construction plus 3 years.

We note that determining the first regulatory period for long periods of time has some risks and challenges for both BEIS and T&SCos. BEIS and T&SCos would both need to be confident that the rate of return offered was commensurate with the risks borne by T&SCo. If T&SCo is able to provide sufficient confidence about their cost projections, and the risks they will bear, BEIS could consider setting the first regulatory period over a longer period. For example, BEIS could determine the allowed costs and WACC that will be applied to the second and third phases of construction work prior to the award of the economic licence, but would only apply if pre-conditions are met towards the end of the first phase of construction e.g. whether BEIS awards support to users that intend to connect to T&SCo during the second phase of construction. In the event that the pre-conditions were not met, then the first regulatory period would not be extended and the Regulator would design and calibrate the ERR applied to T&SCo for the second regulatory period, as explained in more detail in the 'Second and Subsequent Regulatory Periods' sub-section below.

Below we illustrate how this approach could work for a cluster with three phases of construction.

Figure 1: illustration of a cluster with three phases of construction



Second and Subsequent Regulatory Periods

In the second regulatory period the Regulator would be responsible for designing and calibrating the ERR applied to T&SCo. This means that the Regulator would determine T&SCo's allowed revenues based on an assessment of capex, opex, allowed WACC and other components of allowed revenues such as decommissioning costs and taxes. The Regulator would also determine the appropriate performance targets and associated financial rewards and penalties (incentives) for T&SCo, as well as any uncertainty mechanisms to include to address risks faced by T&SCo and other stakeholders.

The Regulator would also be responsible for determining the appropriate duration of the second and subsequent regulatory periods. Noting that the first regulatory period would finish at different points in time for each cluster's T&SCo (because construction would finish at different points in time for each of the clusters), the Regulator may seek to set the length of future regulatory periods in a way that enables later regulatory periods to be concurrent for all of the T&SCos.

The Regulator would make these determinations subject to its statutory duties and obligations as determined by Parliament and the relevant legislation. Whilst these duties are yet to be determined they could include, for example, the Regulator having regard to T&SCo being able to finance its activities and meet its obligations to debt investors.

As a further safeguard for T&SCo's investors, the decisions made by the Regulator could potentially be appealable to an appropriate body or subject to Judicial Review.

This means that the role of the Regulator would be similar to what it is for sectors in the UK currently subject to independent economic regulation such as electricity, gas, water, telecoms and transport. These sectors have a long track record of independent economic regulation which has successfully supported substantial investment into these sectors by the private sector over many years.

The Regulator would also be involved in undertaking enforcement action and, as a final step, deciding whether to revoke the economic licence. We consider that licence revocation would only occur in extreme circumstances and these few limited, specific conditions would be set out in the economic licence prior to its award to T&SCo.

As the long track record of successfully supporting investment demonstrates, there are many advantages of independent economic regulation for investors. In the case of T&SCo, these advantages would include the ability to adapt the ERR to changing circumstances over time, for example as the CCUS industry grows.

We recognise that it is important to find the right balance between an independent economic regulator that is able to adapt the ERR to changing circumstances and one that can provide certainty and confidence to investors in T&SCo. We are continuing to consider whether it would be appropriate for additional guidance to be issued to the Regulator about the design

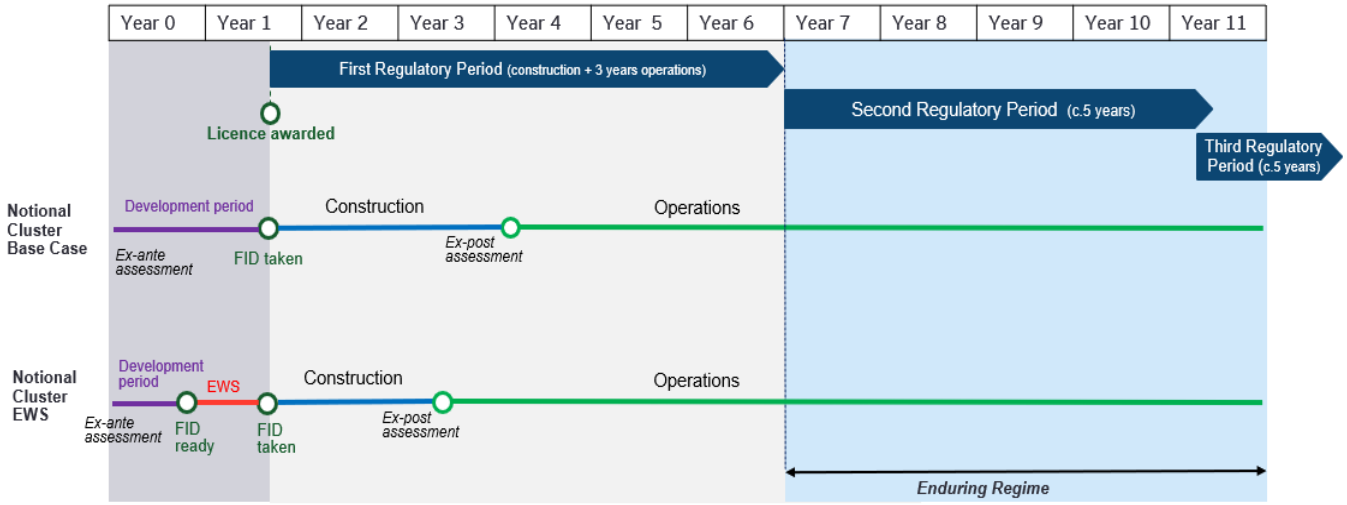
and calibration of the economic regulation regime during the second and subsequent regulatory periods and, if guidance was to be issued, on the contents of that guidance.

Early Works Support

To support the mid-2020s CCUS deployment objective, consideration has been given to ensuring there is no delay to cluster programmes. In particular, government is considering what might be needed in the form of possible interim contractual support for critical path activities in order to keep cluster programmes to schedule ('Early Works Support' or 'EWS') should a T&SCo be FID ready before the economic licence can be granted. We will be refining and developing this approach further and welcome engagement with key stakeholders including project developers and potential investors.

'FID ready' means that all conditions precedent to financial close in relation to the proposed T&SCo development plan have been achieved, including reaching an initial settlement on costs, returns and risk allocation and all contractual delivery and support documentation, including economic licence and GSP terms and other conditions precedent (save for those dependent on legislation that is not yet in place).

Figure 2: an illustration of the indicative regulatory periods



Section 5: Revenue model

In the December 2020 document, we proposed a User Pays revenue model for T&SCo. Under this model, T&SCo's revenue stream will be made up of payments of T&S fees by those who use the T&S network to have their captured CO_2 transported and stored. It is expected that each user will be charged T&S fees that reflect their use of the T&S network[15].

The User Pays revenue model will be a sustainable model for T&SCo once the CCUS cluster has matured. However, in the early operational phase[16] there may be structural revenue risks to T&SCo.

In the December 2020 document we presented mitigation measures to mitigate the risks associated with the revenue model:

- utilisation build-up during the early operational phase – users will join the network in phases and the T&S network will not be fully utilised for some time resulting in T&SCo collecting less than its allowed revenue, assuming users pay T&S fees that reflect their use of the network;
- timing mismatch of when capture projects connect – T&SCo will only start receiving user revenue when the first user joins the T&S network and so if the first user joins later than expected T&SCo will not be able to collect any revenue;
- underutilisation of the network – once the first user has connected to the T&S network T&SCo will collect less than its allowed revenue if further users don't connect on time, there are less users than expected or if there is less CO_2 injected into the network than expected; and
- bad debt of users – once the first user has connected to the T&S network T&SCo will collect less than its allowed revenue if there are unforeseen delays in payment of T&S fees or non-payment by users (e.g. insolvency of a user).

We have further considered how these revenue risks will be mitigated, and our update is set out below. If the initial proposals to mitigate the risks are not sufficient a contingent mechanism will be available to protect T&SCo.[17] In the event that the other mitigation measures are not sufficient to enable the recovery by T&SCo of its allowed revenue, a mechanism which provides for recourse to consumers or taxpayers (the "contingent mechanism", as referred to in the December 2020 document) is being structured.

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[15] For those users in receipt of business model support, we expect this will result in either the user paying T&S fees directly, funded by the business model, or T&S fees being directly paid to the T&SCo by the counterparty to the relevant T&S user contracts.

[16] The early operational phase will start once the initial construction of the CCUS network has been completed and will run until at least the end of the first regulatory period, but potentially longer depending on market conditions and the levels of demand and system utilisation. The Regulator will be responsible for determining when a CCUS cluster has moves out of the early operational phase.

[17] In the document we said that T&SCo would also have contingent recourse to consumers and/or taxpayer support to ensure the revenue stream from users is predictable and robust from a financing perspective.

Any decision on the mitigation measures to address risks related to the revenue model in the early operational phase does not preclude changes to these mitigation measures under the enduring regime.

Utilisation build-up during the early operational phase

In the December 2020 document we examined the following options to mitigate this risk:

- upfront capital contribution through the CIF – the provision of upfront capital funding could reduce the capital cost incurred by T&SCo which it has to finance, and in turn this would reduce T&SCo's allowed revenue required;
- TRI Model design – the allowed revenue profile could be shaped to match the expected utilisation profile of the T&S network, i.e. deferring revenue from the early operational phase to later in the operational phase. This could be achieved by adopting a non-straight-line depreciation of the Regulated Asset Value (RAV);
- T&SCo's utilisation incentive – T&SCo would be encouraged to increase use of the T&S network through rewards and/or penalties for higher than or lower than expected use of the T&S network, respectively; and
- contingent mechanism – if other proposed mechanisms fail to adequately mitigate the revenue risk to T&SCo then revenue could be recovered from taxpayers or consumers.

Updated position

Since December, we have further considered how to protect T&SCo from impact of utilisation build-up. We are minded to close the "revenue gap" between T&SCo's total allowed revenue and the revenue it collects from users as utilisation is built up by providing an upfront capital contribution through the CIF. The CIF will only provide an upfront capital contribution towards the initial build-up of network capacity and will not be available for expansion of capacity in later phases.

We will also continue to explore the TRI Model design by considering the use of straight-line or backloaded depreciation of the RAV as part of the allowed revenue calculations for the first users. Backloaded depreciation would mean that depreciation increases in line with expected growth in utilisation, so that allowed revenue can be reduced in early years and increased in later years. We will consider the impact of the two depreciation profiles on the efficient financing of T&SCo further.

We consider it appropriate that a contingent mechanism is available to protect T&SCo if the proposals described above were not sufficient to enable recovery of allowed revenue over time.

We recognise that through the cluster sequencing process, T&SCo may initially have limited influence over utilisation in the early operational phase as BEIS will ultimately select the users

following a process for awarding support to T&S network users. Therefore, we consider that a target-based utilisation incentive with rewards and/or penalties is inappropriate for this phase.

Timing mismatch of when capture projects connect

In the December 2020 document we examined the following options to mitigate this risk:

- Rolled Up Interest (RUI) – the return and depreciation that T&SCo would have been able to collect as part of its allowed revenue if the first user had joined the T&S network on time could be deferred and "rolled up" into the allowed revenue that T&SCo can recover across the remaining operational life of the T&S network;
- recovery of operating expenditure – T&SCo's opex within its allowed revenue will be paid for each year, potentially by consumers or taxpayers, until a user joins the T&S network;
- incentivising T&SCo to present a robust cluster plan – T&SCo's allowed revenue could be reduced until the proposed anchor users join the T&S network; and
- contingent mechanism – if other proposed mechanisms fail to adequately mitigate the revenue risk to T&SCo then revenue could be recovered from taxpayers or consumers.

Updated position

In order to protect T&SCo from the timing mismatch risk we are minded to allow RUI if the first user does not join the network on time (i.e. the anchor user fails to be operational within their Target Commissioning Window (TCW)). This will ensure that T&SCo will be able to collect return and depreciation that is forgone due to timing mismatch once users have started to use the network.

We are also minded to include recovery of opex if the first user does not join the network on time so that T&SCo's payments to its suppliers will not be negatively impacted by the first user not joining on time.

We consider that it is appropriate that a contingent mechanism is available to protect T&SCo if the proposals described above were not sufficient to enable recovery of allowed revenue over time.

Similarly to our latest thinking on utilisation build-up, we are minded to not include a financial incentive on T&SCo to present a robust cluster plan in the early operational phase as BEIS will select the users following a process for awarding support to T&S Network users.

Underutilisation of the network

In the December 2020 document we examined the following options to mitigate this risk:

- building a financial reserve – a financial reserve would be included as part of the allowed revenue and could be used to recover any allowed revenue T&SCo has not collected for users due to underutilisation;
- mutualisation over the remaining user base – T&S fees for remaining users of the T&S network would be increased in order to close the revenue gap from underutilisation;
- T&SCo's utilisation incentive – T&SCo would be encouraged to increase use of the T&S network through rewards or penalties for higher than or lower than expected use of the T&S network, respectively; and
- contingent mechanism – if other proposed mechanisms fail to adequately mitigate the revenue risk to T&SCo then revenue could be recovered from taxpayers or consumers.

Updated position

We are minded to mutualise under recovery of allowed revenue due to underutilisation, in whole or in part, across users. We will continue to work through the interactions with the user business models.

We also consider that it is appropriate that a contingent mechanism is available to protect T&SCo in the early operational phase if the proposals described above were not sufficient to enable full recovery of allowed revenue.

In the early operational phase we are minded to not include a financial reserve as a mechanism that can be drawn down to cover any revenue gap from underutilisation as it will take time to build up a sufficient reserve to address the revenue risk adequately. However, a financial reserve could be built up to be used to mitigate the risk of underutilisation when the CCUS clusters have matured.

Again, we are minded to not include a utilisation incentive for T&SCo in the early operational phase as we consider that a target-based utilisation incentive with rewards and/or penalties is inappropriate for this phase. Not only will BEIS select the users following a process for awarding support to T&S Network users, there will also be high degree of uncertainty over these users' utilisation rates in the early operational phase due to the nascent stage of the CCUS sector creating a challenge for T&SCo to forecast. While this is our minded to position in the early operational phase, a utilisation incentive could be introduced at a later stage when the market-driven carbon price is sufficient to promote permanent CO_2 abatement and there is a potentially more mature user market.

Bad debt of users

In the December 2020 document we examined the following options to mitigate this risk:

- collateral – users of the T&S network could be required to post collateral equal to a certain percentage of their expected annual T&S fees or users could buy insurance (if available) against not being able to pay T&S fees;

- bad debt allowance – a “use it or lose it” bad debt allowance in the calculation for T&SCo’s allowed revenue;
- mutualisation over the remaining userbase – T&S fees for remaining users of the T&S network would be increased in order to close the revenue gap from underutilisation; and
- contingent mechanism – if other proposed mechanisms fail to adequately mitigate the revenue risk to T&SCo then revenue could be recovered from taxpayers or consumers.

Updated position

We are minded to include collateral and a bad debt allowance as mitigation measures to protect T&SCo from the impact of non-payment of T&S fees by users in in the early operation phase.

We are minded not to use mutualisation or include a contingent mechanism. The mitigation measures we are minded to include for this risk –collateral and bad debt allowance – should be able to adequately mitigate the revenue risks caused by bad debt. Bad debt is also likely to be accompanied by underutilisation therefore the mitigation measures for underutilisation risk will also be activated to mitigate against revenue risk.

Section 6: T&S tariff arrangements

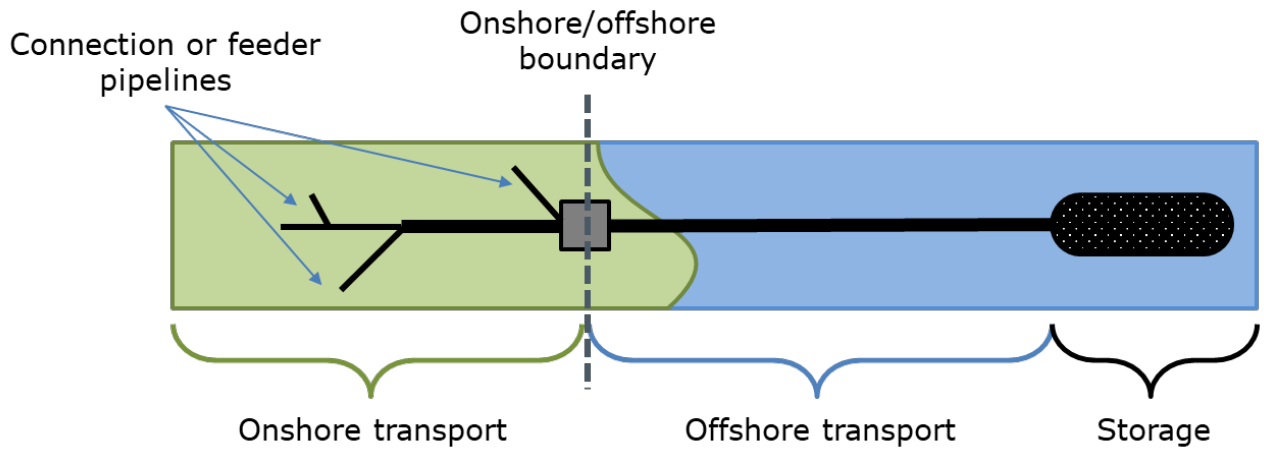
T&SCo will collect its revenue through T&S fees paid by users of the T&S network. We expect the T&S fees will be determined using a methodology initially developed by the government, informed by a set of guiding principles and in consultation with industry.

If the charging methodology needs to be adjusted after it has been implemented, the Regulator will be responsible for making this adjustment. The Regulator would need to consult with T&SCo and other stakeholders before making a decision and it would need to make decisions consistent with its legal obligations and duties.

Charging principles for the initial CCUS clusters will need to balance providing signals to users about the cost that their use of the network impose and the need to encourage efficient use of the system against the need for with sufficient simplicity to ensure that charges can be easily implemented and encourage users to join the network. Other principles that will be considered in the design of T&S charges include non-discrimination, transparency of methodology and ease of implementation.

The T&S network will be made up of the main onshore pipeline ("the trunk"), an offshore pipeline and a storage site. Some users will be directly connected to the trunk via connection or feeder pipelines[18] and their CO_2 will be transported via the trunk of the onshore pipeline to the offshore pipeline. These different types of pipelines could attract different types of charges. Other users will transport their CO_2 via non-pipeline transportation to either the onshore or offshore pipelines. We have not yet taken a decision on appropriate charging arrangements for non-pipeline transportation of CO_2.

Figure 3: illustration of a notional CCUS cluster



[18] Connection or feeder pipelines could be sole use or multiuse.

In the CCUS Business Models update published in December 2020 Document we said that T&S fees could be structured similarly to gas network charges and include: a connection fee; a capacity fee; and a volumetric fee.

This section below presents our latest thinking on:

- T&S connection charges for connector or feeder pipelines; and
- use of system charges for the T&S network (the trunk of the onshore pipeline, an offshore pipeline and a storage site).

Connection charges

T&SCo will incur costs for connecting users to the trunk of the CCUS onshore pipeline, and the costs will increase with the length and size of the connection, i.e. the cost of connecting a large user located far away from the onshore pipeline will be higher than the cost of connecting a smaller user located near the onshore pipeline.

The exact design of the CCUS clusters and the location of the users in comparison to the trunk of the onshore pipeline is yet to be determined. Many users in the early operational phase of the T&S network could be situated close to the trunk of the onshore pipeline meaning that the cost of connecting those users could be relatively low.

Users that are located further away from the onshore pipeline in the early operational phase may be connected via oversized connections to be shared with other users that are connecting at the same time or are expected to in the future. This approach would be more cost efficient than constructing multiple smaller connections with similar routes.

Connection charges levied on users recover at least a proportion of the cost of connecting the user to the network, and signal to users where best to locate and connect to the network. However, it is expected that in the early operational phase users will have limited choice over their location, therefore limiting the effective signal that a connection charge could provide.

Our minded to position is that no connection charges will be levied on users in the early operational phase of the T&S network, instead the cost of connections will be included in the use of system charges discussed below. This position will be considered further as more information becomes available on the design of the CCUS clusters and the location of the users in the early operational phase to assess the required connections and their costs.

Any decision to not introduce connection charges in the early operational phase does not preclude the introduction of connection charges for users that connect to the onshore pipeline in later years. Charges for any connections to the offshore pipeline or injection at the wellhead of the storage site from ships could also be considered in the future if such connections became a feature of the CCUS clusters.

Use of system charges for the T&S network

T&SCo will incur costs driven by the length and the capacity of the onshore and offshore pipelines[19], the volume and distance of the CO_2 transported, and the volume of CO_2 stored[20]. Use of system charges will be levied on users to reflect the costs their use of the network imposes on T&SCo.

Based on our current understanding of plans for the first CCUS clusters, it's expected that all CO_2 that is stored will need to be injected into the T&S network before the onshore/offshore pipeline boundary, i.e. all CO_2 will travel the length of the offshore pipeline. However, not all of the CO_2 will necessarily be transported via the onshore pipeline; some users may bypass the onshore pipeline by using non-pipeline transportation to transport their CO_2 to the onshore/offshore pipeline boundary, even in the early operational phase.

In order to reflect that not all users will be connected to, or use, the onshore pipeline, we are minded to create two T&S use of system charges:

- onshore pipeline use of system charge; and
- offshore pipeline + storage use of system charge.

A user that is directly connected to the onshore pipeline would be subject to the onshore pipeline charge and the offshore pipeline + storage charge[21], whereas a user that transports its CO_2 to the onshore/offshore pipeline boundary via non-pipeline transportation would not have to pay the onshore pipeline use of system charge.

We acknowledge that injection of CO_2 at the storage site wellheads from ships may become a feature of CCUS clusters in the future. If this materialises, we anticipate that the design of the system usage charges will be revisited to appropriately support this use-case.

Onshore pipeline use of system charge

We have considered whether the design of the onshore pipeline use of system charge should take account of the cost of the distance of CO_2 transported, i.e. users would be charged more for transporting CO_2 over longer distances of the onshore pipeline compared to shorter distances[22].

As noted previously, it is expected that in the early operational phase users will have limited choice over their location. Some users may also have less choice over their location than others, for example existing industrial facilities that may be geographically dispersed. Charging for use of the length of the network may financially penalise users that are further from the

[19] This will include connection pipelines if no connection charges are to be levied on users.
[20] We are considering whether costs associated with conditioning and compression of a user's CO_2 will be paid by that user or included in the use of system charge and therefore mutualised across all users.
[21] The onshore pipeline charge and the offshore pipeline + storage charge could be included on a single charging statement.
[22] This design issue is only relevant to the onshore pipeline as it is assumed that all CO_2 will travel the length of the offshore pipeline.

onshore/offshore boundary, and this may hinder the pace of development of the CCUS sector and connecting the most sustainable users. Hence, our minded to position is that onshore pipeline charges should not vary by the distance over which the CO_2 is transported in the early operational phase. This would result in a level playing field for users regardless of how far away they were located from the onshore/offshore boundary. However, T&SCo would still incur higher costs to transport CO_2 for users located further away from the onshore/offshore boundary; these costs would be mutualised across all users connected to the onshore pipeline through the onshore pipeline use of system charge. This position will be considered further as more information becomes available on the design of the CCUS clusters and the location of the users in the early operational phase.

Offshore pipeline + storage use of system charge

It is expected that CO_2 that will be stored will travel the full length of the offshore pipeline in the early operational phase. This indicates that the offshore pipeline + storage use of system charge should not include an element to take account of use of the length of the network as users do not have control over the length of the offshore pipeline and their use of the length of the offshore pipeline will not vary.

Any decision on the design of use of system charges in the early operational phase does not preclude changes to the charges in later years, subject to consultation.

Section 7: Government Support Package (GSP)

Within the December 2020 document we published an initial perspective on a possible GSP. It was envisaged that this would be a contractual arrangement that would offer protection to investors against specified remote high impact low probability risks, and provide a finite, limited response for these events. A summary of these risks is below:

- **asset stranding –** defined as the risk of a complete and permanent loss of demand for the T&S network, such that the T&S network assets become redundant or are deemed uneconomic. Government will ensure that these conditions are sufficiently remote, for example by using the below conditions before the GSP could be triggered:
    - where commercial insurance is unavailable or inadequate;
    - where the risk has been proactively minimised through T&SCo encouraging new connections (with regulatory approval);
    - where revenues do not match the allowed revenue that enables T&SCo to remain viable;
    - where further revenue options are exhausted;
    - where cost profiles have been adapted to reduce the likelihood of asset stranding; and
    - where GSP exposure is offset by asset sale and reduced spend.
- **defined leakage events of CO_2 from storage facilities –** specifically the GSP would provide last resort protection where private insurance is not available, and providing appropriate mitigation measures had been put in place, including but not limited to:
    - careful selection of storage sites;
    - effective incentive regime to minimise CO_2 leakage; and
    - use of commercial insurances where available at an efficient cost.

Since December we have been further developing the conditions under which the GSP would be triggered and maintain the position that the GSP should act as last resort protection for the two limited scenarios described above. We recognise that appropriate management of the CO_2 leakage and stranded asset risks is essential to support efficient private investment into the emergent CCUS sector. Consequently, we have developed a view of the operation of a GSP in the context of T&SCo's business model (e.g. its interactions with ERR and revenue support as referred to under the contingent mechanism of the revenue model) over the course of T&SCo's lifetime, and refined the definitions above to incorporate the latest thinking on leakage and asset stranding.

Updated Definition – Stranded Asset Risk

An asset is usually considered to be stranded when the demand for it falls to such an extent that it is redundant and is no longer worth maintaining in use. For a CCUS T&S network this would arise when the volumes injected into the network were too low to justify its continuing cost.

The GSP is expected to come into effect when the economic licence is granted. Where in the early years government considers there is likely to be sufficient demand to make the asset economically viable at a later date, the mitigation measures outlined in the 'Revenue Model' section will apply. For instance, where emissions plants have not yet come on-line and are not paying fees it is anticipated that for the early years of the existence of the asset, these mitigation measures would maintain its economic viability.

In later periods, if the timing mismatch or underutilisation were to persist or re-emerge, there is likely to be more emphasis on mitigation measures such as the mutualisation of costs among a remaining pool of users. However, other mitigation measures, including the contingent mechanism, may still apply, particularly if it is anticipated that demand, having fallen, could return in the future, rather than triggering the GSP.

The impact on T&SCo of the withdrawal of support through the revenue model would be the loss of remaining investment in T&SCo, which would be lost if there would not be a sufficient return on the RAV. This would occur if revenues from users fell and the contingent and mitigation mechanisms support (as described in the ‘Revenue Model’ section) did not bridge the gap. In this situation business-as-usual operating expenditure ends. Government is minded that the GSP covers the remaining investment up to the RAV as well as the possibility of further operating expenditure to preserve the asset for future use, or to prepare it for accelerated decommissioning depending on decisions made about the future of the asset. Further work will be done on valuation of agreed protection, but it is expected that this will cover both debt and equity.

For the purposes of the GSP, we are currently contemplating that T&SCo’s assets would be considered stranded and that there would be a right to trigger the GSP if each of the following criteria were met for reasons outside the control of T&SCo:

- injected volume over a given rolling period falls materially below the planned utilisation;
- support from contingent support measures under the ERR (which would provide certainty that allowed revenues could be recovered) is no longer available;
- other mitigation measures undertaken through the ERR (e.g. mutualisation of costs) are insufficient.

Based on the above, an asset will be considered stranded through a process of review built into the key mitigation measures, including the contingent mechanism, set out in the Revenue Model section, leading to the potential triggering of the GSP itself. The standard that would be

used to judge the viability of T&SCo given its then current revenues would be one of financiability in line with regulatory standards.

Repeated failure to meet any availability measures that may be set out in the ERR by T&SCo will erode the value of any compensation to T&SCo investors under the GSP through a reduction in allowed revenue; additional GSP-specific penalties may also be specified.

Updated Definition – Risk of defined CO_2 Leakage from storage facilities

For the purposes of the GSP, leakage is to be defined as uninsured loss of volume of CO_2 of at the injection site, or uninsured losses of CO_2 post-injection of CO_2 (or other stored gasses and fluids such as natural gas and crude oil) per month, such that the loss of revenue from users and/or the cost of carbon meant that T&SCo was no longer financeable.

Where private insurance is not available, for leakage of CO_2 from storage facilities, the GSP would act as a provider of last resort support. Similar to the situation for a stranded asset, a significant leakage from the store would remove user payments as users could no longer send CO_2 to the store. This may not be triggered by a defined single event but emerge over time that further storage is not feasible.

As set out in December, T&SCo would be expected to ensure taxpayer exposure is sufficiently remote, through the careful selection storage sites and the full exploration and use (where relevant) of commercial insurance. The conditions for the granting of a permit by the OGA would include assurance that the possibility of leakage was remote. T&SCo would also bear the risk of CO_2 leakage to the financeability threshold and would hence be incentivised to maximise returns by taking all possible precautions; a leak that could not be resolved through further allowed investment, and which therefore led to the triggering of the GSP, would effectively end the business.

There may be course of action on leakage – such as acting on leaks or expanding or moving to a new store that would require further expenditure. Whether this further expenditure would be reasonable to undertake would be a regulatory decision, given that it would increase the RAV. If there were an interruption in user payments for a period, we anticipate this would be covered by the mitigation measures, including the contingent mechanism, set out in the Revenue Model section, so that T&SCo would be able to continue.

The GSP would be triggered if the leakage from the store would mean that:

- carbon could no longer be stored;
- revenue could no longer be taken from users; and
- the Regulator decided that there was no prospect of appropriate further investment remediating the problem (taking advice from OGA).

Conditions for availability of the GSP

As stated in the December 2020 document, and in the above definitions, T&SCo will be expected to take appropriate mitigating measures and maintain appropriate insurance coverage to secure eligibility for the GSP. The appropriateness of the cost of such cover would be a regulatory decision insofar as it becomes part of allowed revenue, and as such would be subject to an efficiency assessment. Government will also consider whether and how to encourage T&SCo to obtain private insurance, and whether any charge should be made for the GSP.

Options for implementation of the GSP

The GSP will be a contractual mechanism between T&SCo and government. The GSP, if triggered, would provide agreed protection investors from uninsured losses caused by leakage or stranded asset as described above. It is anticipated that government could effect a transfer of control of T&SCo, and T&SCo's assets would be either decommissioned (using T&SCo's decommissioning fund) or mothballed for a later re-start. Under most scenarios, it is anticipated that the T&SCo entity would remain in existence, while its scale would reduce, and that the investor base may change. T&SCo would be expected to undertake decommissioning or mothballing activity; if it did not then responsibility would likely rest with OGA and funding for any such activity would need to flow to them.

GSP – Timing of implementation

As the GSP will provide compensation for agreed losses, and the RAV of T&SCo is expected to be depreciated over a period of time, we anticipate that the profile of the potential compensation provided by GSP for an asset stranding scenario would increase during construction (post-FID), and decline to a very low level at the time of final injection and decommissioning. In the leakage case, we acknowledge that the level of compensation provided by the GSP would be dependent on the materiality of remediation costs for the leak.

It is anticipated that T&SCo's accumulated decommissioning fund would provide some coverage for the costs of remediation and decommissioning for any leakage occurring near the end of T&SCo's lifetime.

Conclusions

Any GSP would effectively act as last resort protection to cover two remote low probability, high impact risks – leakage and stranded asset. Lower impact/higher frequency risks are expected to be covered as part of the ERR and supporting business-as-usual mechanisms.

We will continue to provide updates on the GSP and review its place alongside the overall CCUS business model.

Section 8: Next Steps

This document reflects the work we have done to date to progress the TRI business model design following publication of the December 2020 document. We will continue to develop the detailed structures and mechanisms of the TRI Model in 2021 with the objective of having completed the business model in place in 2022.

In relation to the TRI business model further updates planned for 2021 include:

Update	Indicative date
Decommissioning regime	Q3
CCUS Regulatory framework – Update on the Economic Regulator	Q3
T&S Business Model Update (including connections arrangements)	Q4

Glossary

Terms	Description
BECCS	Bio-Energy with Carbon Capture and Storage
Capex	Capital expenditure
CCUS	Carbon Capture, Usage and Storage
CCS	Carbon Capture and Storage
Cluster	Transportation and storage network (incorporating the onshore and offshore network and offshore storage facility) and an associated first phase of carbon capture projects.
CfD	Contract for Difference
CIF	CCS Infrastructure Fund
DPA	Dispatchable Power Agreement
December 2020 document	The Carbon Capture, Usage and Storage Business Models update published in December 2020: https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-business-models
Economic licence	The economic licence expected to be granted by the Regulator to a company licensed to provide transport and storage services (T&SCo) under HMG's CCUS programme
ERR	Economic Regulatory Regime
EWS	Early Works Support
FEED	Front End Engineering Design

FID	Final Investment Decision
FOAK	First-Of-A-Kind
GSP	Government Support Package
HMG	Her Majesty's Government.
ICC	Industrial Carbon Capture
ICC Contract	Industrial Carbon Capture Contract
LCH	Low Carbon Hydrogen
Offshore	The offshore element of the CO_2 transportation network up to the point where CO_2 enters the geological Storage. *Note: This excludes shipping transportation.*
Onshore	The onshore element of the CO_2 transportation network which may include intermediate CO_2 storage for T&S operational purposes. *Note: This excludes road and rail transportation.*
Opex	Operating Expenditure
Regulator	The independent economic regulator of the Economic Regulatory Regime
RAV	Regulated Asset Value
RUI	Rolled Up Interest
Storage	Geological store for the captured CO_2 from the end of the injection well.
TCW	Target Commissioning Window
T&S	Transport and Storage

T&SCo	A company licensed to provide transport and storage services
TRI	T&S Regulatory Investment
UKIB	UK Infrastructure Bank
VfM	Value for Money
WACC	Weighted Average Cost of Capital

Appendices

1. Consideration of risks

In the December 2020 document we identified types of cross chain risks, assessed their impact on different parties, identified mitigations and made recommendations for their treatment. We continue to work with CCUS Expert Groups and our technical, commercial and legal advisers, as well as other stakeholders and an update on this analysis is set out below:

Risk	Description	December Position	May Position
T&S construction delay	Risk that the T&S network is not completed to schedule as per the terms of the licence. Delay to completion could lead to users having no facility to transport and store CO_2 (i.e. T&S timing mismatch risk).	There would be a delay in T&SCo beginning to receive revenue. The Regulator may also impose penalties on T&SCo through an adjustment to the opening RAV. Users would be protected from T&S timing mismatch risk through the corresponding business model.	A delay in T&SCo receiving its revenues is considered sufficient incentive and we are not currently considering further penalties such as a reduced RAV. Unless reopeners are triggered, we expect T&SCo to manage the construction timings itself. The Regulator may include construction penalties in the future.

Risk	Description	December Position	May Position
Construction cost overruns	Risk that outturn construction costs are higher than base case or inefficient construction cost incurred.	T&SCo would bear the construction cost overruns risks. Overrun above base case in an ex-ante assessment for transport facilities, or inefficient cost incurred in an ex-post assessment for storage facilities would not be logged onto the opening RAV.	Previously we were considering an ex-ante assessment of the construction of transport facilities, alongside an ex-post assessment of the construction of storage facilities and the transfer of existing assets for CCUS application. Whilst an ex-ante allowance may provide more certainty, there is also greater risk that the allowance could be set either too high or too low. An ex-post assessment allows the initial agreement to provide protection to T&SCo (from significant uncontrollable risks during construction) and to Users. We will therefore consider the robustness and risks in the negotiation period and consider which elements are better assessed ex-ante and ex-post.
T&S construction incompletion	Risk that the construction of the T&S network is not completed. Incompletion of T&S network could lead to users' capture	T&SCo would not be receiving any revenue or compensation for capital investment if T&S network is not completed, with the exception of Force Majeure events. Users would be protected from stranded asset risk through the corresponding business model.	No change from December position

Risk	Description	December Position	May Position
	plants becoming stranded.		
T&S unplanned outage	T&S network is unavailable to transport and store CO_2 from users. T&S unplanned outage could result in a knock-on impact on users including unable to inject CO_2 into the T&S network and users were forced to emit CO_2 or shutdown the entire plant.	T&SCo would bear the majority of unplanned outage risk. An availability incentive would reduce allowed revenues in-year and across multiple years to incentivise T&SCo to maintain the availability within the set target. The reduction in allowed revenue would be limited to ensure financeability of the T&SCo through provision of a penalty floor. Users would be protected from unplanned outage through their corresponding business model.	We have explored this incentive further and recognise that the design of the incentive and any network availability target will need to account for the impact of planned outages that are required for ongoing maintenance, as well as unplanned outages that are outside of T&SCo's control. T&SCo would still be expected to bear risk for unplanned outages that are attributable to factors that lie within its control and users would be protected from unplanned outage through their corresponding business model.
T&S capacity constraint	Lower than expected level of capacity (injection/offtake rate or storage	T&SCo would bear the majority of capacity constraint risk if within T&SCo's reasonable control. A capacity incentive would reduce	No substantive change from December position. The value for money of further investment to increase the injection rate and / or extend the

Risk	Description	December Position	May Position
	volume) available in the transport and/or storage facility. This could result in a knock-on impact on users including injecting less CO_2 into the T&S network and users could be forced to emit CO_2.	allowed revenues for T&SCo if the outturn capacity is less the set target. Users would be protected from T&S capacity constraint risk through their corresponding business model. If users were causing the constraint (over injection compared to the injection rate agreed with T&SCo), users would be subject to a penalty.	storage capacity would be a regulatory decision. Support would be available to ensure financeability if further investment was deemed worthwhile.
User timing mismatch	Timing mismatch risk will arise if the first users are connected to the T&S network later than planned.	T&SCo would bear a small degree of user timing mismatch risk. T&SCo's return would be reduced and deferred until a user connects to the T&S network. T&SCo would be protected from cashflow shortfall impacts for opex through compensation from the delayed user or recourse from consumers and/or taxpayers.	We are minded to allow RUI and recovery of operating expenditure if the first user does not join the network on time. We consider that it is appropriate that a contingent mechanism is available to protect T&SCo if the proposals described above were not sufficient to enable recovery of allowed revenue overtime. We are minded to not include a financial incentive on T&SCo to present a robust

Risk	Description	December Position	May Position
			cluster plan in the first regulatory period as BEIS will select the users following a process for awarding support to T&S network users (e.g. DPAs and IC, LCH and BECCS contracts). Incentives could exist in the future e.g. submission of a viable business plan to support expansion.
Underutilisation risk	Risk that T&S network utilisation is lower than expected, leading to a shortfall in revenue from users to T&SCo.	T&SCo allowed revenue would be subject to a small degree of reduction if utilisation is reduced. However, underutilisation risk would be shared with users and government through potential government capital contributions to T&SCo, provision of a financial reserve, mutualisation mechanism (only triggers when there is a large user base) and contingent recourse to consumers and/or taxpayers. There are various causes that could lead to underutilisation risk including user unplanned outage, user construction delay or user construction incompletion. Users would bear the majority of these risks.	We are minded to mutualise under recovery of allowed revenue due to underutilisation, in whole or in part, across users. We will continue to work through the interactions with the user business models. We also consider that it is appropriate that a contingent mechanism is available to protect T&SCo if the proposals described above were not sufficient to enable recovery of allowed revenue. We are minded to not include a financial reserve as a mechanism nor a financial incentive relating to utilisation of users on T&SCo. Incentives could exist in the future and a financial reserve could be used to mitigate

Risk	Description	December Position	May Position
			the risk of underutilisation when the CCUS clusters have matured. See also T&S Stranded Asset Risk below.
T&S stranded asset risk	Complete and permanent loss of demand for the T&S network as a result of events outside the control of T&SCo (e.g. change of regulation or government policy) such that the T&S network assets become economically redundant.	T&SCo would be protected from stranded asset risk in certain circumstances. GSP would act as 'provider of last resort protection' and compensate T&SCo up to the remaining RAV, and/or any remaining critical opex associated with mothballing or early decommissioning.	Where, in the early years, government considers there is likely to be sufficient demand to make the asset economically viable at a later date, the mitigation measures outlined in the Revenue Model section would apply. In later periods, the mitigation measures may still apply, particularly if it is anticipated that demand, having fallen, could return in the future. An asset will be considered stranded through a process of review leading to the potential triggering of the GSP itself. The standard that would be used to judge the viability of T&SCo given its then current revenues would be one of financiability in line with regulatory standards.
CO_2 leakage from T&S network	Risk of CO_2 leakage from the transport or storage facilities.	T&SCo would bear the leakage risks from transport facilities. For leakage from storage facilities, T&SCo would bear the leakage risks up to a very remote threshold. T&SCo would be	As set out in December, T&SCo would be expected to ensure taxpayer exposure is sufficiently remote, through the careful selection of storage sites and the full

Risk	Description	December Position	May Position
	This could result in a knock-on impact on users similar to T&S unplanned outage risk.	expected to seek commercial insurance products in the market. GSP would provide last resort protection to T&SCo above the remote threshold. Users would be protected from unplanned outages caused by CO_2 leakage from T&S network through their corresponding business model.	exploration and use (where relevant) of commercial insurance. T&SCo would also bear the risk of CO_2 leakage to the financiability threshold and would hence be incentivised to maximise returns by taking all possible precautions.
General risks			
Regulatory and political risk	General change in government policy or change of Law during construction and operation that has a material impact on the T&S network.	These risks are outside the control of T&SCo and if materialise, the Regulator may consider adjustment to agreed base case. Further consideration would be required to establish the definition and scope of regulatory and political risk. In the event that stranded asset risk arises from change in regulation or change in government policy, then T&SCo may be supported by the GSP.	There may be scope in using reopeners to manage regulatory or political uncertainty. Further analysis will be undertaken to determine the materiality thresholds, windows and the triggers under which reopeners would be expected to come into effect.

Risk	Description	December Position	May Position
Development period risk	Investor risk of investing in the development of the project without the certainty of regulatory approval.	Investment would only be recoverable if the prospective licensee receives an economic licence and spend is deemed efficient by the Regulator. Development cost risk may be shared to the extent of any government support such as Industrial Decarbonisation Challenge fund.	The government is considering what might be needed in the form of possible interim contractual support for critical path activities in order to keep cluster programmes to schedule ('Early Works Support' or 'EWS') should a T&SCo be FID ready before the economic licence can be granted. We will be refining and developing this approach further.
Force Majeure	Extraordinary and unforeseeable risks that are beyond reasonable control by T&SCo.	Regulatory adjustments to the revenue, provided appropriate mitigation measures were in place.	There may be scope in using reopeners to manage specified force majeure events. Further analysis will be undertaken to determine the materiality thresholds, windows and the triggers under which reopeners would be expected to come into effect.
Inflation	Risk that costs inflate more than anticipated by the price control, impacting expected returns.	T&SCo allowed revenue building blocks would be linked to mitigate the risk of inflation.	No change from December position

Risk	Description	December Position	May Position
Bad debt	Risk that users default on T&S fees payments to T&SCo.	T&SCo would be protected from bad debt risk above a threshold. T&SCo would have access the following measures: • users' collateral; • the bad debt allowances; • mutualisation over the remaining user base once sufficient users established; and • potential contingent recourse to consumers and/or taxpayers.	We are minded to include collateral and a bad debt allowance as a mitigation measure to protect T&SCo from the impact of non-payment of T&S fees by users in in the early operation phase. We are minded not to include mutualisation or a contingent mechanism of revenue recovery from either taxpayers or energy consumers in the revenue model in the early phase. Bad debt is also likely to be accompanied by underutilisation, therefore the mitigation measures for underutilisation risk will also be activated to mitigate against that revenue risk.
Decommissioning shortfall risk	There is a risk where the decommissioning reserve is not accrued sufficiently to cover the	T&SCo would bear the decommissioning shortfall risk. We are considering how this can be implemented as part of the wider CCUS decommissioning regime. In a remote scenario where shortfall remains after exhausting all T&SCo measures and mitigations. We would consider the role of government as a 'decommissioner of last resort'.	No change from December position

Risk	Description	December Position	May Position
	decommissioning cost.		

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