Department for
Business, Energy
& Industrial Strategy

CARBON CAPTURE, USAGE AND STORAGE

A Government Response on Re-use of Oil and Gas Assets for Carbon Capture and Storage Projects

Month 2020

Any enquiries regarding this publication should be sent to us at: ccusbusinessmodelsconsultation@beis.gov.uk

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Re-use of oil and gas assets for carbon capture and storage projects

There is potential for significant cost savings for some initial CCUS projects which can re-use existing oil and gas infrastructure. The re-use of strategic assets can also help meet the government's stated ambition to deploy CCUS in the UK across this decade, putting us on a firm pathway to our net zero ambitions.

Introduction

Carbon Capture Usage and Storage (CCUS) is likely to be essential in successfully tackling climate change and meeting the ambitions of the Paris Agreement. Domestically, CCUS is likely to play an essential role in meeting our net zero target. The deployment of CCUS will also be central to supporting the low carbon transformation of the UK's industrial base and to achieve the government's mission, announced in the Industrial Strategy, to establish the world's first net zero carbon industrial cluster by 2040, and at least one low carbon cluster by 2030.

Central to our ambition to deploy CCUS at scale in the UK is the development of a network of infrastructure to transport and permanently store Carbon Dioxide (CO_2) offshore.

The government has been working closely with industry to evaluate potential business models for CO_2 transport and storage. In 2019 we launched a consultation on CCUS business models alongside the consultation on the re-use of oil and gas assets for CCUS projects. The response to the CCUS Business Models consultation is published alongside this response and can be found at https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-business-models.

A CCUS transport and storage network will require the development and construction of a large amount of infrastructure, including onshore and offshore pipelines, compressor stations, injection wells and subsea manifolds. This will require relatively high upfront capital expenditure, but once built, the operating costs for a transport and storage network are expected to be relatively low.

The UK currently has an extensive network of offshore infrastructure, put in place to facilitate oil and gas extraction. This includes pipelines, wells, and depleted oil and gas reservoirs, a number of which are due to be decommissioned in the coming years. These are broadly similar assets to those which would be built as part of the transport and storage infrastructure of a CCUS project. Some of these assets could potentially therefore be re-used as part of a CCUS project once they have reached the end of their commercial life for oil and gas extraction. The potential value of re-using oil and gas assets for CCUS projects has recently been highlighted by the CCUS Cost Challenge Taskforce[1], and by both the Scottish Affairs[2] and Public

[1] Delivering Clean Growth: CCUS Cost Challenge Taskforce report https://www.gov.uk/government/groups/ccus-cost-challenge-taskforce#report

[2] Scottish Affairs Committee: The future of the oil and gas industry: https://publications.parliament.uk/pa/cm201719/cmselect/cmscotaf/996/99602.htm

Accounts[3] Committees, who have called on the UK government to develop a policy on re-use.

There is the potential for significant cost savings for some CCUS projects which can re-use appropriate existing oil and gas infrastructure. Whilst the exact value of these cost savings is uncertain, upfront capital costs savings for some projects could be in excess of £100 million compared to the costs to construct new pipeline infrastructure[4]. The re-use of strategic assets can also lower the carbon footprint associated with the construction of infrastructure. There are also potential benefits for oil and gas owners and operators that transfer suitable assets to CCUS projects, including opportunities to maximise the economic life of their assets, and to potentially reduce or transfer decommissioning costs.

Box 1: Case Studies

There are several CCUS projects being developed in the UK and internationally that are proposing to re-use a range of different types of infrastructure previously used for oil and gas operations:

Project Acorn[5] is a CCUS project in North East Scotland, planning to initially capture CO_2 emissions at the St Fergus Gas Terminal from the early 2020's. The proposals include the re-use of trunk pipelines to transport CO_2 from industrial sources to offshore storage sites, followed by the deployment of low carbon hydrogen production.

HyNet[6] is a CCUS project in North West England, planning to capture CO_2 from industrial sources in the early-to-mid 2020's (phase 1), followed by the production of hydrogen from natural gas (phase 2). The proposals include re-using a range of existing oil and gas infrastructure, including a trunk pipeline that connects the Point of Ayr terminal to a depleted oil and gas field in the Liverpool Bay.

Internationally, the **Porthos Project[7]** in the Netherlands is considering the re-use of existing oil and gas assets as part of their proposals to transport and store CO_2 that has been captured from several companies based in the Rotterdam port area.

Background to the consultation

In the 'CCUS Deployment Pathway: An Action Plan'[8] we committed to complete a process to identify existing oil and gas infrastructure that could be re-used to support the development of CCUS projects, and to develop a policy on this.

The aim of the consultation is to help facilitate the deployment of CCUS at scale by identifying the existing opportunities and barriers to the re-use of infrastructure for CO_2 transport and storage.

[3] Public Accounts Committee: Public cost of decommissioning oil and gas infrastructure: https://www.parliament.uk/business/committees/committees-a-z/commons-select/public-accounts-committee/inquiries/parliament-2017/inquiry114/
[4] Acorn Project Infrastructure Reuse and Decommissioning: https://actacorn.eu/sites/default/files/Infrastructure_Poster2.pdf
[5] Acorn Project https://actacorn.eu/
[6] HyNet https://hynet.co.uk/
[7] PORTHOS Project https://www.rotterdamccus.nl/en/
[8] The UK carbon capture, usage and storage (CCUS) deployment pathway: an action plan (November 2018)

Nothing in these policy proposals is intended to diminish the decommissioning obligations which may be imposed upon the owners or operators of carbon storage installations, sub-surface pipelines, or other infrastructure installed or maintained for the purposes of CO_2 storage activities (including in connection with section 30 of the Energy Act 2008).

What we asked

The consultation included 13 questions, under 3 main headings:

- Identification of the oil and gas infrastructure with re-use potential for CCUS projects
- Policy to help facilitate the re-use of oil and gas assets for CCUS projects
- Policy on the preservation of assets

This document is a summary of the evidence submitted and the actions and next steps the government and its partner organisations will take under each of the 3 headings.

Several respondents submitted evidence, letters, and emails that did not respond directly to the 13 questions asked in the consultation document. These submissions have been considered as part of this consultation exercise and used in the development of our response.

Overview of the responses

We received 35 responses to the consultation, submitted online or via email. Respondents are broadly characterised into the groups listed in the table below.

Table 1: Breakdown of the responses received

Total number of responses received	35
Oil and gas and industrial sectors	12
Trade bodies and industry associations	6
Academia (including individuals) and professional bodies	8
Consultancy groups	7
UK devolved administrations	2

This document does not contain a list of the respondents or contain any personal or organisational details. Respondents' views are summarised in the following sections of this report but are not attributed to any individual respondent or specific organisation. The figures in this document relate to those who responded to the consultation and should not be treated as statistically representative of the groups listed above at large. The government does not plan to publish any individual consultation responses it received; however, organisations may wish to publish their own responses independently.

Devolved Administrations

We are committed to working with the relevant devolved administrations to ensure that the proposed policies take account of devolved responsibilities and policies across the UK. We will continue to engage with those administrations further as we develop our policy proposals.

During the consultation period and in the formulation of this response we took steps to engage with the devolved administrations. The Scottish and Welsh Governments have provided views on the issues and questions raised in the consultation via letters to BEIS Ministers and during discussions with officials. We welcome and thank both Governments for these views.

Stakeholder engagement

In developing this response, we have carefully considered the evidence submitted to the consultation and have continued our close engagement with stakeholders in the oil and gas and CCUS sectors.

We have also continued to work in close partnership with the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), Oil and Gas Authority (OGA), the Crown Estate, the Crown Estate Scotland, the Health and Safety Executive (HSE), and the Marine Maritime Organisation, who have been vital to the development of this work.

Identification of oil and gas infrastructure with re-use potential

The UK has a substantial network of offshore oil and gas infrastructure in the North and Irish Seas, including over 300 platforms and 1,000 pipelines. An increasing amount of this infrastructure is being decommissioned as assets reach the end of their operational life for hydrocarbon production. The OGA estimate[9] that the total cost of decommissioning these assets between 2019-20 and 2064-65 is £51 billion (2018 prices). The projected Exchequer cost of tax relief from this expenditure is £16.8 billion. This is made up of £8.3 billion from tax repayments and a reduction in the Offshore Corporation Tax of £8.5 billion. Decommissioning expenditure reduces company profits and hence lowers the overall tax take.[10]

To provide clarity to the oil and gas and CCUS sectors we consulted on a provisional list of the types of infrastructure we identified as having the most re-use potential, the criteria to decide whether infrastructure is suitable for re-use, and a provisional list of trunk pipelines and CO_2 stores with re-use potential.

Type of infrastructure

We consulted on a list of types of infrastructure, identified through our stakeholder engagement as having the most re-use potential, depending on the individual project. These were:

- Depleted oil and gas reservoirs

[9] The OGA 2019 UKCS Decommissioning Cost Estimate Report https://www.ogauthority.co.uk/news-publications/publications/2019/ukcs-decommissioning-cost-estimate-2019-report/
[10] Statistics of Government revenues from UK Oil and Gas production https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/818296/Statistics_of_government_revenues_from_UK_oil_and_gas_production_July_2019.pdf

- Wells
- Trunk pipelines
- Platforms
- Other infrastructure

Have we identified the correct types of oil and gas infrastructure that are likely to be important for re-use in CCUS projects? (Question 1)

Of the 35 responses received, 25 responded directly to this question.

The majority of respondents agreed with the types of infrastructure identified, including our assessment that trunk pipelines and depleted oil and gas reservoirs are likely to have the most re-use potential. However, there was a consensus that the infrastructure listed should be considered as 'high-level' and not exhaustive.

It is possible that for certain projects there will be other types infrastructure with re-use potential. In these cases, there may be a need to adopt a case-by-case approach to evaluate the individual assets being proposed.

Depleted oil and gas reservoirs are likely to have been appraised and monitored extensively as part of previous oil and gas operations, meaning that the subsurface geology is well-characterised. Respondents agreed that this could be of benefit for certain CCUS projects by allowing for accurate modelling of CO_2 injection and storage performance. These potential benefits may need to be balanced against the number and condition of existing wells drilled into the store, which could be at risk of corrosion, particularly if they have not been plugged and abandoned in a way in which is suitable for the presence of CO_2.

Several respondents questioned the exclusion of saline aquifers from the infrastructure list. Saline aquifers are geological formations consisting of water-permeable rocks that are saturated with brine and, alongside depleted oil and gas reservoirs, are likely to be key resources for the geological storage of CO_2. As they have not been involved in oil and gas extraction activities, saline aquifers are not considered to be re-used or re-purposed. However, for completeness we included saline aquifers within the list of sites we have identified as having the most CO_2 storage potential in the annex published alongside the consultation document.

Wells include exploration, appraisal, and production wells drilled into the reservoir as part of the hydrocarbon extraction process, which could be re-used to inject CO_2. The potential to re-use a depleted oil and gas reservoir may be largely dependent on the integrity of wells present.

In the consultation we said that the re-use of wells is likely to be less common as they would need to be situated in the correct location and meet the required safety standards, including being capable of withstanding re-introduced pressure into the reservoir during CO_2 injection and corrosion from their contact with CO_2-bearing fluids.

Depleted oil and gas reservoirs may also contain historic wells that have not been decommissioned in a way that is suitable for re-use for CO_2 injection. In these instances, there may also be a lack of data and technical records on the condition of the well and the way in which it was plugged and abandoned. Respondents suggested that where this information exists it should be made available to CCUS projects, alongside sub-surface data.

Respondents largely agreed that in many cases the re-use of wells will not be possible without significant re-design and re-completion, leading to an increase in the cost of developing a CO_2 store.

Trunk pipelines are large pipelines that transport oil and gas from offshore facilities to the mainland. Trunk pipelines can often be hundreds of kilometres long and typically have a large diameter, capable of transporting large volumes of gas or fluid. In the consultation we said that, depending on their condition, there may be significant time and cost savings for projects able to re-use trunk pipelines. Several respondents highlighted that many of the trunk pipelines in the annex published alongside the consultation continue to be used for oil and gas extraction activities, and in some cases are not due to be decommissioned within the timescales set out in our CCUS Deployment Pathway[11].

One respondent suggested that where certain trunk pipelines may not be available within the required timeframe the re-use of inter-field pipelines should be considered, which could connect individual storage sites to trunk pipelines via adjacent fields or through a development hub. Inter-field pipelines are likely to become available for re-use at an earlier stage than trunk pipelines following the decommissioning of a field; however, they typically have a shorter design life, which may increase costs for a CCUS project.

Platforms are used to produce, process, and sometimes store oil and gas. In the consultation document we said that there may be potential for some CCUS projects to re-use platforms, but that this was likely to only be the case in some very specific circumstances.

The condition of platforms typically deteriorates quickly after oil and gas operations have ended and, of the 25 respondents to this question, only 4 recommended their re-use potential.

One respondent suggested that options to modify existing platforms for CCUS should be considered. They noted that a distinction should be made between the platform and jacket structures because it may be possible to remove the topside and retain the jacket structure, retrofitting a smaller, fit-for-purpose module.

Other infrastructure associated with oil and gas activities, such as that suggested in the consultation document, may have some re-use value for certain CCUS projects. In the consultation we said that we did not view there to be a strong case for government intervention to preserve these assets, either because they are likely to have low re-use value or because they could be transferred as part of a commercial transaction.

Respondents also suggested additional infrastructure not listed in the consultation document. These are shown in Figure 1, against the frequency raised. Whilst the focus of the consultation was on physical offshore infrastructure, 15 respondents suggested that the re-use potential of onshore infrastructure should be also evaluated, including gas terminals and processing, onshore pipelines and storage, shipping facilities, compressors, and injectors.

[11] The UK carbon capture, usage and storage (CCUS) deployment pathway: an action plan (November 2018)

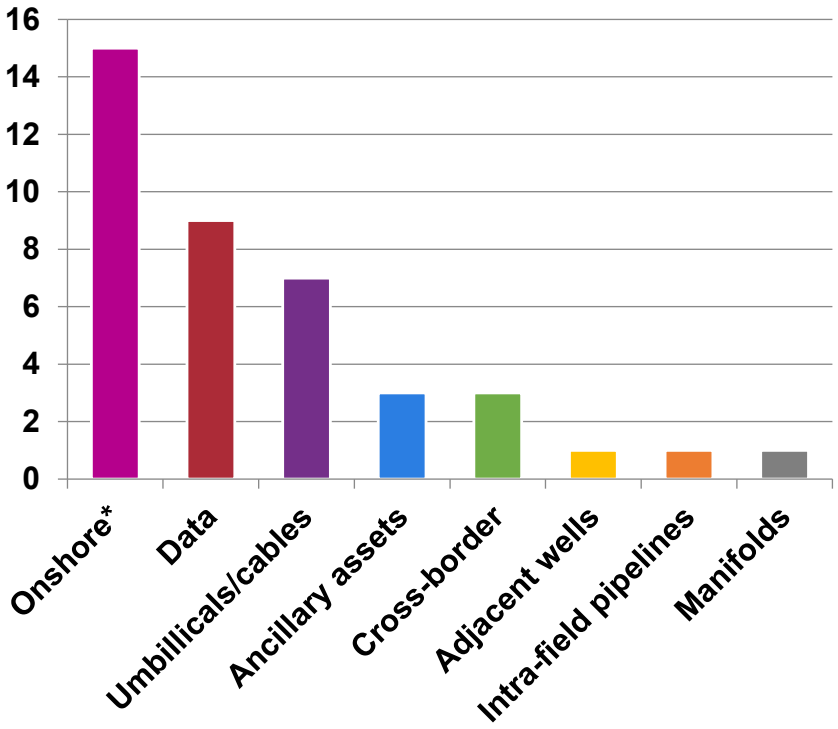

*Figure 1: Bar chart showing other infrastructure suggested by respondents (excluding depleted oil and gas reservoirs, wells, and trunk pipelines). * Onshore infrastructure includes gas terminals, shipping facilities, compressors, onshore storage, onshore pipelines, and injectors.*

- *Gas terminals and onshore processing facilities* are typically located at the landfall of existing oil and gas pipelines and often house much of the equipment required to operate the pipeline, for example corrosion inhibitor injectors and PIG launching facilities. Their proximity to both emissions hubs and offshore storage locations, and their high capacity connections to the national gas transmission system, may be an enabler for both CCUS projects and low carbon hydrogen production. Respondents generally viewed there to be limited opportunity to re-use much of the existing physical infrastructure at the facilities, but that both the existing footprint of the site, including the supporting infrastructure and utilities, and an existing skilled workforce to operate equipment, could significantly reduce the upfront investment costs required to develop a CO_2 transport and storage network.
- *Onshore pipelines,* part of the existing national transmission system, were suggested as having the potential for re-use, as well as to reduce the time, cost and environmental issues associated with the construction of new pipelines.
- *Shipping and port facilities* suggested included onshore facilities to combine and process CO_2 streams from different sources, temporary storage facilities, and port facilities for CO_2 loading and unloading.
- *Onshore storage*, including salt caverns were suggested as a potential low cost, short-term alternative to offshore storage.

- *Data and technical records* were raised by several respondents, with a commonly expressed view that sufficient importance had not been given to data availability and transfer in the consultation document. This was broadly divided into two categories: geological data, including modelling data and logs; and an asset's technical records, including information on the design, condition, integrity, and maintenance history. Most of this information is held digitally, rather than as physical records or samples. Some of the information that oil and gas operators provide to the OGA is commercially sensitive and not subject to disclosure without consent; however, several respondents viewed this data as vital in accelerating deployment of projects and reducing the risks associated with re-using an asset.
- *Umbilicals* are the composite flowlines used to transmit electrical power, communications, chemicals and hydraulic control fluids to subsea installations, from either a nearby platform or onshore. Umbilicals are usually trenched/buried and are often installed with, or alongside, subsea pipelines. There is the potential for umbilicals to become more important if power generation for platforms moves towards electrification and away from fossil fuels. The evidence submitted suggested that suitability for re-use would be highly dependent on the individual asset (for example, its condition and maintenance, capacity, and the remaining design life) and would likely require assessment on a case-by-case basis.

Criteria for assessing the suitability to re-use infrastructure for CCUS

Within the types of existing oil and gas infrastructure with potential value to CCUS projects only a limited number of assets may be suitable for re-use. We consulted on a list of criteria, which should be considered before deciding upon whether that asset could be re-used in a CCUS project:

- Location
- Size
- Age
- Condition
- Reservoir integrity and appropriateness
- Pressure
- Metallurgy and materials
- Pipeline integrity
- Data
- Costs

The list of criteria was not exhaustive and under each of the factors identified there are advanced technical considerations, beyond the scope of this high-level response, that will be vital in evaluating the potential of specific assets to be re-used for CCUS projects.

Are there additional or different criteria that would need to be considered when assessing whether a piece of offshore infrastructure is re-useable as part of a CCUS project? (Question 2)

Of the 35 responses received, 26 responded directly to this question.

Respondents were in broad agreement with the list of criteria proposed. However, there was a consensus that there should be some flexibility in the process to evaluate assets and that it should not be overly prescriptive. For example, there may be individual assets which do not fulfil all the criteria but that may have value to CCUS projects.

Of the criteria listed above additional evidence was provided on the following:

Location: Several respondents suggested that some assets may not be in close proximity to both a source of CO_2 and a viable storage site and that these assets should not be dismissed purely on the basis that they do not fulfil both conditions.

Size: In the consultation we stated that in principle larger infrastructure is likely to be more valuable for re-use due to the higher costs associated with part replacement or new construction. However, several respondents suggested that we should not be restrictive on dimensional parameters when selecting pipelines which may be suitable for re-use, and that for certain projects large-diameter pipelines may not be the most suitable option.

Reservoir integrity and appropriateness: Developing a CO_2 store requires extensive appraisal and detailed technical assessment beyond the high-level considerations outlined in this consultation exercise. This includes evaluation of reservoir pressure, the competency and integrity of the reservoir seal, and the geochemical compatibility of the reservoir formation and seal with CO_2.

Respondents highlighted the importance of assessing potential interactions with adjacent geological formations, including pressure interconnectivity between hydrocarbon fields or saline aquifers that may have implications for any abandoned wells in adjacent reservoirs designed for lower pressure regimes. One respondent suggested that interconnectivity between adjacent formations may be of potential benefit when developing a CO_2 store, for example through stacked storage potential where storage sites are vertically adjacent.

Pressure: It will be vital to ensure that any infrastructure that is re-used as part of a CCUS project can withstand the high pressures associated with CO_2 transport and injection into a store. The evidence received suggested that this should include consideration of dynamic pressure data, well annulus pressure measurements, and material behaviour in the event of an unintentional release of fluids.

One respondent highlighted that many existing pipelines designed to transport hydrocarbons operate at ambient or local ground temperatures. Under these conditions the physical properties of CO_2 differ from those of natural gas and this may have implications for the pressure conditions within the pipeline.

Data: The availability of data and documentation will be vital in assessing whether an asset is suitable for re-use against the criteria set out above. Several respondents suggested that, on suspension of an asset, information should be provided on whether the means to continue monitoring the asset have been retained.

Metallurgy and materials: Pipelines used for CO_2 transport must be dry and water-free before re-use to avoid corrosion. One respondent suggested that the interaction of CO_2 with elastomers and polymer seals, likely to be present throughout the system, should also be considered.

Additional criteria were proposed by several respondents, including:

- *Availability*: This should consider the remaining economic life of the asset, in addition to any potential future economic recovery of hydrocarbons (which is likely to be influenced by a range of external economic factors, including oil price). Information on cessation of production is often commercially sensitive and not publicly available.
- *Well integrity*: There was consensus that whilst this is closely linked to reservoir integrity issues, it warranted independent consideration and inclusion in the list of criteria.
- CO_2 *stream composition and impurities*: This may cause chemical reactions to take place within the pipeline, producing corrosive substances that might degrade the materials present. Respondents also highlighted how stream composition may create operating conditions which are not suitable for the design pressure of the pipeline. It is possible that re-using existing infrastructure may place tighter constraints on CO_2 stream specifications than would be required for new build infrastructure.
- *Potential for* CO_2*-Enhanced Oil Recovery:* This was raised by 2 respondents, who suggested that this could provide an additional revenue stream for projects.
- *Potential conflicts with other resources*: Including license overlaps with other UK continental shelf users, including the oil and gas, offshore wind, and aggregates sectors.
- *Planning considerations:* The chemical and physical properties of CO_2 are different to those of hydrocarbons, meaning that there are different risks related to its transmission. This may need to be reflected in planning considerations around re-used pipelines.
- *Likelihood of seismicity*: Including fault reactivation, seal integrity issues, and CO_2 leakage risk. The risks of CO_2 leakage and induced seismicity to the development of a transport and storage project are important considerations that would need to be assessed as part of an evaluation of both the reservoir and of associated wells.

Identification of specific infrastructure with re-use potential

Alongside the consultation document we published an annex listing the pipelines and CO_2 stores (depleted oil and gas reservoirs and saline aquifers) that we currently consider to have the most re-use potential. This was developed with stakeholders through an initial assessment of UK oil and gas infrastructure against the following high-level criteria:

- The 123 stores were selected in consultation with the British Geological Survey (BGS) and are refined from a list of over 500 in the CO_2Stored Atlas, based on their potential storage capacity (>20 million tonnes of CO_2).
- The 51 pipelines were selected in consultation with the OGA, based on dimensions (>16 inches in diameter) and whether they make landfall.

Do you agree with this preliminary assessment? Should any specific assets detailed in Table 1 or in Annex A be removed? Should any assets be added to these lists? Please provide justification using the referenced criterion for your answer. (Question 3)

Of the 35 responses received, 25 responded directly to this question.

Respondents were in broad agreement with the pipelines and stores included in the annex. Several additional pipelines and stores were suggested for consideration that did not meet the initial criteria and there was a consensus that a flexible approach should be adopted to future screening exercises. It is important to note that an asset's inclusion in this list does not confer any legal status and is provisional and indicative prior to more detailed assessment, to be done in consultation with asset owners, and the OGA and BGS.

It was suggested that any information on the scheduled decommissioning of an asset should also be considered. Several respondents noted that some of the assets in the list may have already submitted decommissioning programmes, including an assessment of the re-use potential.

One respondent suggested that the assessment of stores should consider whether there is evidence that it has previously hosted CO_2, indicating the potential to store it safely over geological timescales. Greater understanding of the occurrence of these stores could also allow this assessment to be applied in comparable stores where CO_2 is absent.

A small number of respondents suggested that the annex should be expanded to include physical infrastructure identified as part of question 1 of the consultation, for example platforms and wells.

Government view on identification of infrastructure and next steps

Infrastructure with re-use potential:

We retain the view that trunk pipelines and depleted oil and gas reservoirs have the greatest potential for re-use as part of a CO_2 transport and storage network. The views of the significant majority of respondents are in agreement with our stated position on the types of oil and gas infrastructure with the most potential for re-use for CCUS projects.

On the basis of evidence submitted to the consultation, on both infrastructure identification and the preservation of assets, we believe that further work will be needed to assess the feasibility of re-using assets for CO_2 transport and storage, including detailed technical appraisal of the specific assets with the greatest re-use potential. There is a particular need for further evidence on the technical feasibility and potential cost benefits of re-using of existing operational wells.

Action 1: Further evidence is needed on the technical and commercial feasibility of re-using oil and gas wells in CCUS projects. This will be examined by the British Geological Survey (BGS) as part of the REX-CO_2 Project, which is funded by BEIS through the Accelerating CCUS Technologies (ACT) Programme (see Box 2). As the project develops we will consider the emerging findings and develop advice on the re-use of wells in consultation with industry and the OGA.

Box 2 – The REX-CO_2 Project

The Re-using Existing Wells for CO_2 storage operations (REX-CO_2) project will develop a dedicated well-screening tool and best practice recommendations for re-using wells. The UK component of the project is led by the BGS and funded by BEIS under the ACT programme.

REX- CO_2 will develop a qualification process and knowledge base that will enable identification of existing well infrastructure that may be safe to re-use, while determining which wells must be remediated to ensure long-term storage. The study, which encompasses the interrelated technical, environmental, economic and regulatory aspects affecting well re-use aims to reduce both CO_2 storage project costs and time. More information is available here.

We retain the view that in the majority of cases platforms will not be suitable or economical to preserve and re-use for CCUS projects. We note that in some cases the removal of the platform structure may impact the ability to re-use off-platform wells. The BGS will be assessing this as part of the REX-CO_2 project.

As highlighted in the evidence submitted, there may be value in re-using other types of oil and gas infrastructure in specific CCUS projects. We recommend that the preservation and re-use of these assets should be considered by CCUS project developers on a case-by-case basis to determine the feasibility and the whole-life cost, compared to the construction of new infrastructure.

To reiterate, the inclusion of an asset by BEIS in a list or map does not confer any special legal status and the government retains the ability to evaluate individual assets on a case-by-case basis where necessary. Oil and gas operators are currently required to consult with the OGA and give full consideration to whether a submarine pipeline or offshore installation has the potential to be re-used for CCUS activities, prior to submitting a decommissioning plan to OPRED.

Although it is not physical infrastructure, the evidence we received highlighted the importance of retaining verifiable information and data on the appraisal, history, and condition of an asset. This is likely to be essential in determining whether it is suitable for re-use in a CCUS project, for example against the criteria we have proposed (under Question 2). In some cases, an owner and operator may be minded to decommission an asset before a CCUS developer is ready to undertake a detailed assessment of its suitability for re-use. We agree that it is vital that the relevant information is collated and stored in the intervening period.

One respondent proposed that all oil and gas data of potential value to CCUS projects should be identified, collated and centrally stored. The OGA already host and coordinate the National Data Repository (NDR), a central repository of petroleum-derived data and information, some of which will likely be of value to CCUS projects (such as data relating to wells, seismic surveys, production history, reservoir characterisation, and upstream petroleum pipelines and infrastructure). Additionally, the BGS host and coordinate the CO_2Stored database (see Box 3).

Action 3: We are working with the OGA and BGS to determine how the existing NDR and CO_2Stored resources could be further integrated, and the functionality improved for CCUS-specific purposes. This includes active linking of databases and advising of data types and data resolution used to assess North Sea infrastructure re-use for CO_2 transport. This exercise will be conducted in consultation with industry.

Box 3 - British Geological Survey CO_2Stored database

CO_2Stored, the UK's CO_2 Storage Evaluation Database, is the global leader in the provision of high-quality detailed data of a nation's geological storage resource.

The CO_2Stored database contains detailed information on more than 570 prospective storage units underlying the seabed around the UK.

The data was acquired by industry and research partners supported by the Energy Technologies Institute and BEIS. Input data were assessed, abstracted, and compiled, and complex calculated values derived for potential storage capacity in geological formations and hydrocarbon fields.

The database has been further developed through improvements to data and functionality. Data is freely available via the CO_2Stored website to registered users.

Of the additional infrastructure proposed by respondents, onshore gas terminals were the most frequently mentioned. We agree with the views expressed that these facilities would have an important role in monitoring and operating CO_2 pipelines.

Action 4: Based on the feedback received, the OGA have conducted an initial assessment of existing UK onshore gas terminals to determine their location and connections to the trunk pipelines identified as having the greatest re-use potential. We will undertake further work with the OGA to determine the capacity, anticipated end of life, and feasibility for re-using infrastructure at these sites.

The re-use of cross-border infrastructure may become more important with increased CCUS deployment. However, we do not view the detailed assessment of the potential to re-use cross-border infrastructure to be a priority at this early stage.

Criteria to assess the re-use potential of infrastructure:

The majority of respondents were in broad agreement with the criteria we identified as being important in deciding whether individual oil and gas assets are suitable for re-use in CCUS projects.

This list of criteria is by no means exhaustive and the appraisal of assets will involve in-depth assessments on a case-by-case basis. Based on our stakeholder engagement and further analysis of the evidence we received, we agree with the views expressed that well integrity and asset availability are two factors which should be included under our list of criteria.

We recognise that information on the availability of an asset will be a crucial consideration in determining whether it can be re-used for CCUS. This will need to include an indication of anticipated cessation of production, as well as the potential for the asset to be used at a later date for further hydrocarbon extraction activities, in line with the UK Maximum Economic Recovery Strategy. This assessment will also highlight where there are more immediate decisions to be made by industry regarding the decommissioning or suspension of assts with re-use potential.

Action 5: We are working closely with the OGA to make an assessment of availability and future cessation of production plans for the pipelines and storage sites we have identified as having the most re-use potential.

We currently hold the view that publishing an indication of the approximate cessation of production date for assets over 5-year intervals would be appropriate and proportionate.

However, recognising that there are potential commercial sensitivities around publishing this information we intend to consult with industry on this proposal over the coming months.

We received a large amount of highly technical information in response to this question, which warrants further consideration. The government is working in partnership with industry, through CCUS Expert Groups, to consider a range of commercial, technical and delivery aspects applicable to future business models and these topics will be considered in more detail as part of this process.

Specific assets with re-use potential:

Alongside the consultation document we published an annex including the pipelines and stores identified as having the greatest re-use potential. This was intended to aid discussions around the potential to re-use an asset as it approaches the end of its economic life for oil and gas purposes. The consultation document also contained a table listing assets that we had identified as likely to have the greatest re-use potential and a figure illustrating the locations of stores and pipelines.

Through our review, we have concluded that these tools are not dynamic enough to depict the range of different UK Continental Shelf interfaces and technologies.

As part of Phase 2 of the Energy Integration Project (see Box 3), and following publication of the report[12] in August, the OGA have mapped infrastructure with re-use potential, which will be integrated with other offshore data in an interactive digital map to be published later this year. This will allow interested stakeholders to visualise the location and interaction of key assets, which may be of strategic value for CCUS projects. We believe this is a more appropriate and dynamic means of holding this information.

Action 6: Information on the oil and gas assets we have identified as having re-use potential will be integrated into an interactive digital map hosted by the OGA. This will include stores and trunk pipelines (originally included in the annex published alongside the consultation document), in addition to the spur lines and onshore gas terminals, which we have included based on the feedback we received through this consultation exercise. This will be published later this year, subject to legal checks. The OGA will also be publishing an app combining data from the OGA, The Crown Estate, and The Crown Estate Scotland to provide information on UK Continental Shelf leasing and licensing for CCUS projects and offshore wind activities.

Following our review and planned consultation on the availability of oil and gas assets, and with the consent of industry, we are recommending that a future iteration of the digital map also includes cessation of production information for the pipelines, stores, and onshore gas terminals we have identified as having re-use potential.

Box 4 – UK Continental Shelf Energy Integration Project

[12] https://www.ogauthority.co.uk/news-publications/publications/2020/ukcs-energy-integration-final-report/

The UK Continental Shelf Energy Integration Project has been led by the OGA, working with BEIS, The Crown Estate, Ofgem and other stakeholders to test for potential technical and regulatory opportunities in the short-term, while also looking at longer-term opportunities to maximise the value of the UK Continental Shelf through energy integration. This can also enhance the value of the existing infrastructure; skills, technology and supply chains.

The project has been funded by a £900,000 grant from the Better Regulation Executive's Regulators' Pioneer Fund.

It is important to note that inclusion of an asset in this tool is provisional and subject to change. Each asset identified would need further, more detailed appraisal, to confirm its re-use potential and suitability. There is also potential for other assets, which may fall outside the parameters applied, to have re-use potential.

The inclusion of any asset in the interactive map does not confer any legal status, including in relation to the potential availability of Change of Use Relief under the proposed policy (see pg. 18) or that an application for suspension will be approved.

We welcome further engagement with external stakeholders as we develop and refine the assets identified. Any proposal to remove an asset from the infrastructure map will require independent verification by BEIS of the supporting evidence provided, in consultation with OGA, BGS, and industry.

Action 7: We will continue to work with both industry stakeholders and the relevant regulators to ensure that oil and gas assets with re-use potential continue to be identified.

Facilitating the re-use of oil and gas assets for CCUS projects

The summer 2019 consultation proposed to expand on an existing discretionary power for the Secretary of State to remove the decommissioning liability from previous oil and gas owners if assets are transferred to a CCUS project. As set out in the consultation document published last year, we emphasised that this proposed power would be discretionary and, if exercised, prior consideration would be given by both BEIS and HMT to any contingent liabilities that might arise for the government, including the extent to which the transferee can demonstrate that it has adequate resources to give effect to a decommissioning programme as and when it is required to do so, and to ensure that there would be no disruption to the wider oil and gas decommissioning regime.

In the consultation document we set out some of the potential challenges to overcome in re-using assets for CCUS projects. These were:

- Some oil and gas assets that have re-use potential are likely to be decommissioned in the coming years before CCUS projects may be willing and able to take ownership of them.
- Whilst it might be possible to defer decommissioning of offshore oil and gas assets to a date that would increase the likelihood of an asset being transferred to a CCUS project, this would result in essential ongoing monitoring and maintenance costs being incurred by the asset owner.

- The decommissioning regime which applies in respect of offshore oil and gas infrastructure means that in the event that the current owner is not capable of meeting their decommissioning obligations, the Secretary of State can call upon previous owners and operators to decommission the infrastructure.

Our stakeholder engagement highlighted that the perceived uncertainties regarding the potential differences in decommissioning some types of CO_2 transport and storage infrastructure (both in terms of the technical requirements and cost), compared to the oil and gas regime, may also act as a disincentive to transfer assets. The UK's international obligations on decommissioning are principally governed by the Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR Convention) Decision 98/3, which requires all fixed installations to be completely removed unless a derogation is granted.[13]

Are there any additional substantial barriers to the effective transfer of assets? If yes, please provide evidence for your answer. (Question 4)

Of the 35 responses received, 20 responded directly to this question.

Respondents perceived there to be a lack of clarity regarding the legal, fiscal and regulatory framework within which a transfer of assets would take place. As a result, there is perceived to be a lack of existing incentives to transfer assets relative to decommissioning, and in particular a lack of clarity regarding abandonment liabilities.

Other additional barriers raised by respondents included:

- Complex asset ownership arrangements, where one or more joint venture partners do not currently have an interest in participating in a CCUS project.
- Uncertainty over the implications for decommissioning tax relief of the re-use of oil and gas assets for CCUS.
- Ongoing maintenance and monitoring costs.
- Uncertainty over future decommissioning costs. Assets reaching the end of their economic life are typically decommissioned as part of a package in order to reduce costs. Removing an individual asset from a scheduled decommissioning programme, in order to preserve and suspend it, might result in increased decommissioning costs for assets not later re-used.
- Concerns about the potential reputational damage for previous owners in the event of a liability materialising following CO_2 injection.
- Data availability, quality, and transfer issues.
- Lack of clarity regarding potential license overlaps between CO_2 storage and other co-located subsurface activities.
- Uncertainty on the technical feasibility of re-using specific infrastructure for CO_2 transport and storage.

[13] Offshore Oil and Gas Decommissioning Guidance Notes November 2018

- Potential conflicts with the OGA UK Maximum Economic Recovery Strategy.

Are changes to the current policy and legislative regimes needed to help facilitate the re-use of oil and gas assets for use as part of a CCUS project? (Question 5)

Of the 35 responses received, 20 responded directly to this question.

The majority of respondents believed that changes to the current policy and legislative regimes are needed to incentivise the transfer of oil and gas assets to CCUS projects. The justifications provided largely reflected the barriers outlined under question 5 and many respondents combined their answers for both questions.

It was suggested that an independently mandated body could coordinate and manage the transfer of assets, including the appraisal of infrastructure identified as having re-use potential, a minimum of two to three years before estimated cessation of production to coordinate the transfer of valuable data and information.

Several respondents suggested that clarity is needed over the status of these assets under Transferable Tax History.

Do you agree that the proposed policy is an effective and proportionate measure? (Question 6)

Of the 35 responses received, 20 responded directly to this question.

Responses were generally supportive of the proposed policy and felt that it would encourage asset transfer and provide clarity on liabilities. However, a small number of respondents said that the scope of the proposed policy was inadequate and should be expanded to include all infrastructure with re-use potential.

Several respondents representing the oil and gas sector highlighted the need for clarity on the status and eligibility requirements of Change of Use Relief (including that this is entrenched and protected once agreed), with the view that this would need to be confirmed with all parties before any asset transfer could take place.

It was also suggested that the government consider how dispute resolution will differ in the CCUS regime, where there may be a greater number of stakeholders involved in asset ownership and operations.

Timing of the Trigger Event

We consulted on options for an earlier designation of the trigger event, whilst emphasising that our primary consideration will be ensuring that there is not and can never be a point where neither the former oil and gas owners/operators or the incoming CCUS operator are liable to decommission the asset.

What event should be used as the point at which the Secretary of State could make a decision on removal of decommissioning obligations to previous duty holders? (Question 7)

Of the 35 responses received, 17 responded directly to this question.

The majority of respondents did not state a preference with regards to the timing of the trigger event or did not respond to the question. Of those who did respond and stated a preference, there was disagreement on the appropriate timing of the trigger event, which could be largely categorised according to the organisation responding. The large majority of respondents in support of the designation of the trigger event being at the transfer of ownership (option 1) were from the oil and gas sector.

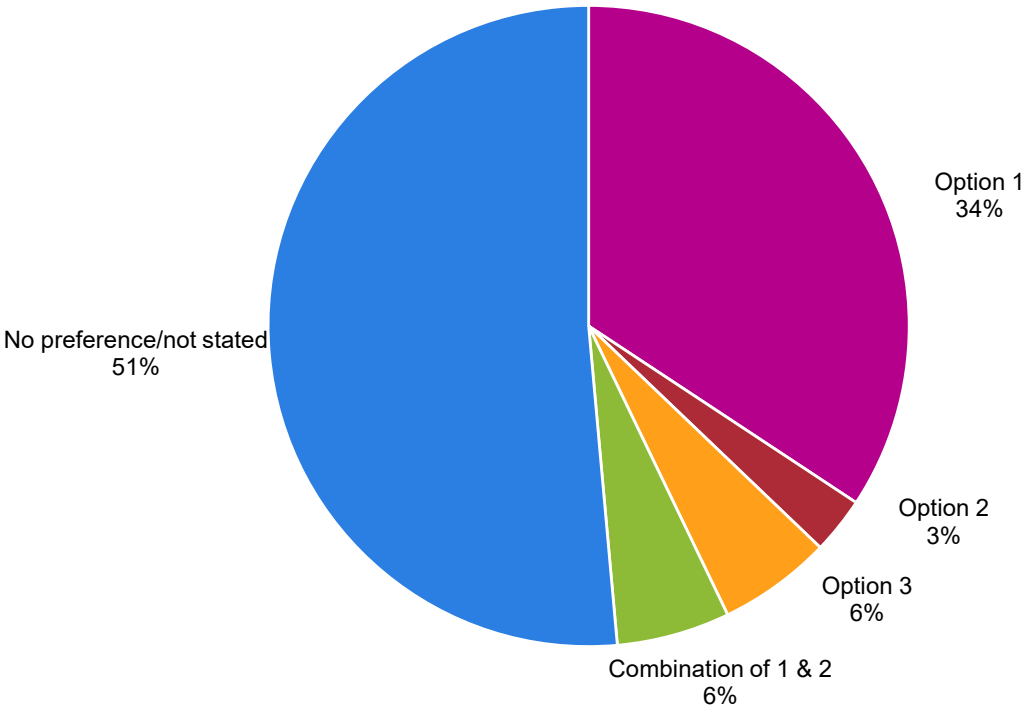

Figure 2: Pie chart showing preferred timing of the trigger event in evidence received. Option 1 - the point at which ownership of the asset is transferred from the previous owners and operators to the CCUS project; Option 2 - the point at which the associated CCUS project secures a permit from the OGA, or relevant authority, for offshore CO_2 storage; Option 3 – the point at which the new CCUS project first injects CO_2 into any associated geological storage site.

To what extent would the removal of the liability on previous owners to decommission a pipeline when it is transferred to a CCUS project encourage such a transaction? (Question 8)

Of the 35 responses received, 16 responded directly to this question.

The majority view was that whilst the policy proposal would encourage the transfer of assets, government should also consider how the barriers identified under question 4 could be more broadly addressed. Most respondents viewed the policy to be an effective incentive for operators to suspend or transfer assets identified as having re-use potential where these were linked to proposed CCUS projects and/or emissions clusters, and with a greater chance of being re-used.

As with responses to question 6, several respondents noted the need for Change of Use Relief to be entrenched once applied, with clear eligibility criteria and with the potential to widen the scope to include other infrastructure, such as wells and platforms.

Government view on facilitating re-use and next steps

It is widely recognised that barriers to the deployment of CCUS at scale in the UK are largely commercial, rather than technical. This is why last year we launched a consultation on CCUS Business Models alongside this consultation, which looks to address some of these concerns. This includes business models for a CO_2 transport and storage network.

Stakeholders told us that the perceived risk of a CCUS project being unable to meet their decommissioning obligations (resulting in the Secretary of State calling upon previous owners and operators to decommission the asset) may be having a limiting effect on the deployment of CCUS projects. However, since the consultation there have been a number of market developments, which suggest that this potential barrier (as outlined on page 19) may not be as limiting as originally envisaged, as suggested by recent changes in CCUS project ownership structures and developments in the UK CCUS sector.

On the basis of the evidence received and discussions with stakeholders as part of this consultation exercise, we can still envisage scenarios in which it might be appropriate to make use of the Change of Use Relief power outlined in the consultation document.

However, our view is that further analysis and discussions with industry are needed in order to fully understand how such a policy might interact with the full range of project ownership structures which have been suggested to us since this proposal was first considered. This includes the potential role of commercial agreements between former and prospective parties to handle contingent liabilities and how projects could demonstrate the need for policy intervention in order for the Secretary of State to be satisfied that a designation for Change of Use Relief is appropriate.

We plan to set out a more conclusive position on the policy later this year, alongside an update on transport and storage business models which will inform this view. In the intervening time we will be requesting further detailed information from relevant industry stakeholders on the circumstances in which they would seek to benefit from a power such as this to prevent an asset otherwise being decommissioned and how they would demonstrate to the satisfaction of the Secretary of State that the use of the power might be justified, as well as how to protect Government from any associated transfer of risk.

Preservation of assets

A number of oil and gas assets that are suitable for re-use are likely to be decommissioned in the coming years before CCUS projects may be willing and able to take ownership of them. These will require some kind of preservation if they are to remain viable.

For pipelines this will likely involve putting the asset into the Interim Pipeline Regime (IPR) and undertaking the appropriate monitoring and maintenance activities. Alternately, this could also involve decommissioning the asset using methods that do not preclude its later re-use but are consistent with the wider offshore decommissioning regime.

Similarly, for wells, this would ideally involve putting the well in a suspended state. Where this option is not available, for example if it is not technically feasible or would significantly adversely affect a wider decommissioning programme, this could involve plugging and abandoning the well in a way that increases its resistance to corrosion.

Are there any monitoring or data collection activities, such as intelligent pigging, that it would be essential to carry out before preserving an asset for CCUS re-use? (Question 9)

Of the 35 responses received, 18 responded directly to this question.

Oil and gas operators and asset owners routinely collect and hold information on the condition of an asset and conduct monitoring as part of their basic maintenance procedures. For pipelines this includes undertaking internal and external inspections.

When a pipeline is placed in the IPR it is cleaned, inhibited and preserved to minimise the potential for internal corrosion and to ensure that it is maintained in an appropriate condition that does not pose a risk to the environment or other sea users.

We consulted on the essential types of monitoring and data collection activities that would be needed before preserving an asset for later re-use. There was a consensus amongst respondents that any monitoring or data collection activities would need to be largely infrastructure-specific and likely to depend on the condition of an individual asset. Figure 3 shows the essential monitoring activities suggested by respondents, against the frequency raised.

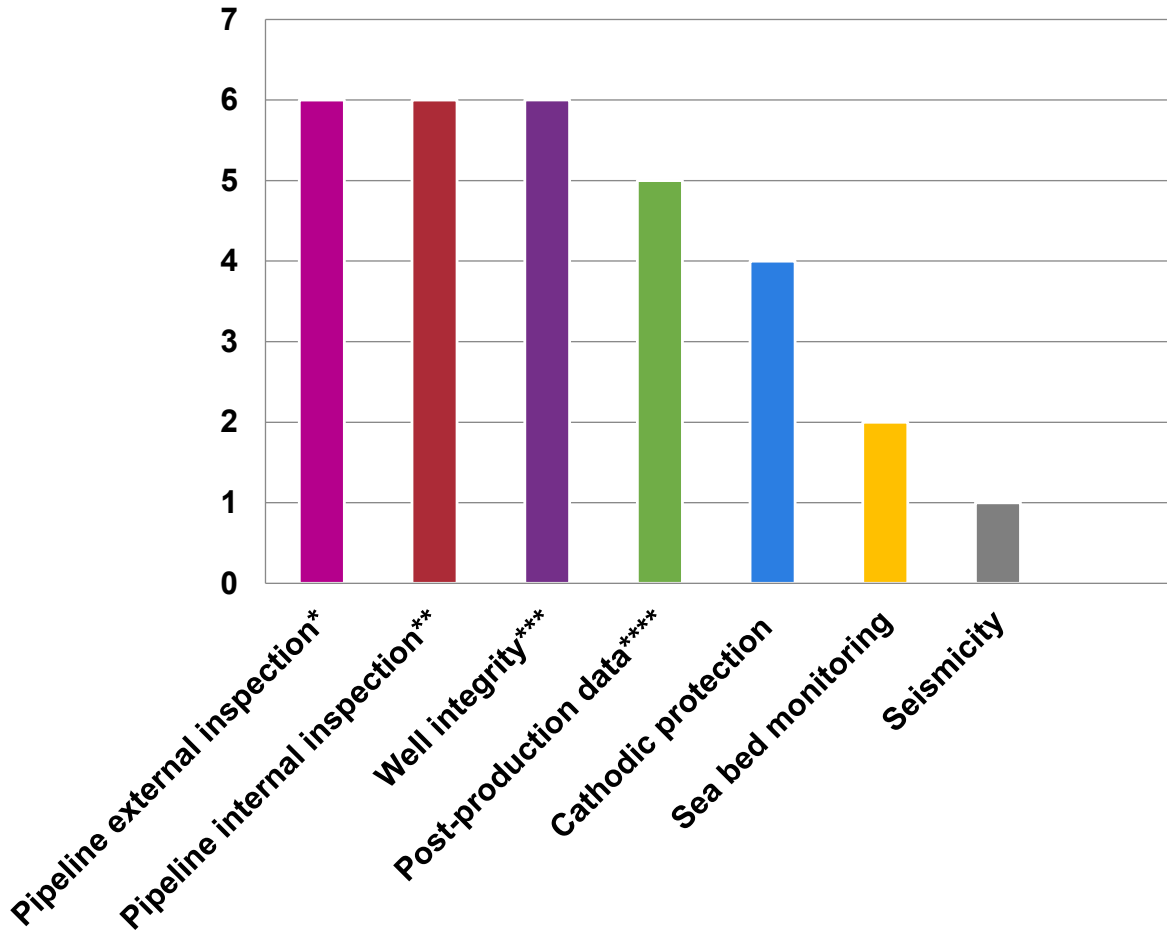

Figure 3: Bar chart showing the number of respondents raising additional types of monitoring.

e.g. by Remotely Operated Vehicle (ROV) to assess the presence of free spans, debris, etc; ** e.g. assessment of pipeline wall thickness, epoxy coating, corrosion, defects or deformation; * e.g. by intelligent pigging. This could include post-production geophysical logging, abandoned well integrity; **** Including reservoir pressure monitoring, annulus pressure monitoring of operational and suspended wells, and fracture pressure monitoring.*

The majority of respondents noted that the primary concern in preserving a pipeline to allow for future re-use for CCUS is ensuring that it is hydrocarbon-free and effectively inhibited and suspended.

It is recognised that there may be a gap in time between the suspension of an asset by the existing owner, and a CCUS project being ready to undertake full and detailed appraisal work, which will likely require monitoring and data collection beyond what would be required to place an asset in a suspended state.

Several respondents suggested that prior to CO_2 injection, monitoring and data collection of the seabed and outcropping geological formations should be carried out, particularly for depleted oil and gas reservoirs with abandoned wells. This could provide a baseline to accelerate reservoir understanding and enable early identification of potential CO_2 leakage, reducing the risk profile of CCUS projects. For some abandoned fields permanent monitoring instrumentation may already be in place, including seismic and micro-seismic geophones, pressure and temperature sensors, and formation fluid sampling equipment. Where possible this should be retained prior to suspension.

Do you agree that the period of suspension should be up to 10 years? Please provide evidence for your response. (Questions 10)

Of the 35 responses received, 15 responded directly to this question.

In the consultation document we proposed a recommended upper limit of 10-years for asset suspension (for example, from placing the asset in the Interim Pipeline Regime) to allow a CCUS project to develop and the transfer of assets to take place, or for a period of time which is deemed technically feasible. In the event that it is clear that a suspended asset will not have been transferred to a CCUS project within this timeframe, the normal decommissioning process would proceed.

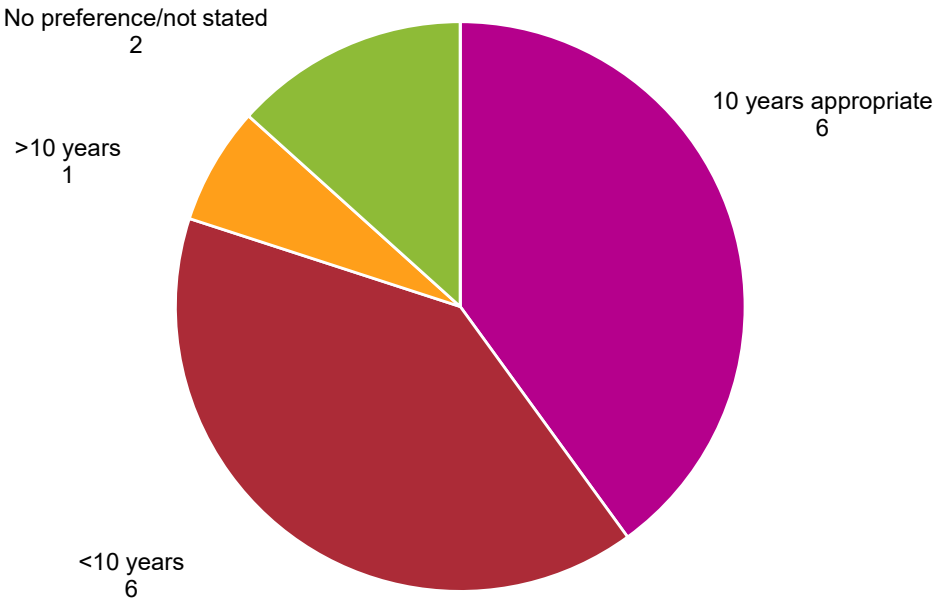

Figure 4: Preference on the length of the proposed 10-year suspension period against frequency raised by respondents

Many respondents said that this should be broadly asset-specific and that the appropriate suspension period would be largely dependent on the readiness of a CCUS project to take on ownership of the asset. It was also noted that the assessment would also need to consider the condition and design life of the asset to prevent deterioration and associated risks to the environment or other sea users.

The majority of oil and gas operators viewed a 10-year suspension period to be too long and likely to result in increased costs for the monitoring and maintenance of the infrastructure, which could not be offset if the asset is not ultimately re-used. One respondent suggested that the demonstration of a credible pathway to a CCUS project should be a pre-requisite for suspension, and that requirements for activities or commitments by certain dates could be included in the terms of the CCUS license.

Evidence presented to the Government to date suggests that the costs of maintaining pipelines or wells for re-use are relatively low and so financial support for this will likely not be required. Do you agree with this? Please provide evidence for your answer. (Question 11)

Of the 35 responses received, 16 responded directly to this question. Most respondents highlighted that costs would largely be asset-specific, dependent on the condition and integrity of the facilities; however, the majority agreed with the statement that the costs of maintaining pipelines or wells for re-use are relatively low.

Respondents provided some additional evidence on the costs of maintaining pipelines and wells, as wells as other types of infrastructure identified as having re-use potential, as outlined below:

For **pipelines and sub-surface infrastructure,** preservation costs were generally considered to be relatively low compared with other infrastructure (the estimated cost range cited was £300,000 to £450,000 per year). There is an initial cost associated with cleaning and inhibiting the pipeline to ensure that it is hydrocarbon-free, followed by ongoing costs for routine external inspections (for example to check for free spans). There may be significant costs for interventions required to preserve a pipeline beyond its anticipated design life, for example through replacement of the cathodic protection system.

Wells that have been plugged and abandoned are unlikely to be suitable for re-use, and therefore decommissioning of the well would need to be delayed if it was to be maintained for re-use in a CCUS project. The evidence we received suggested that wells that had been plugged but not abandoned would need to be monitored routinely to ensure integrity (examples given indicated a range of every 3 to 5 years), at a cost.

Different parts of the well structure, such as topside and jacket structures, would require different approaches to maintenance and monitoring. This may impact on the feasibility and economic case to preserve these structures for re-use, rather than to construct new ones for a specific project.

One respondent noted that delaying the plugging of wells located on platforms (dry tree wells) would require the platform structure to be retained to ensure safety and security. This would result in significant additional costs.

An asset owner's decision to preserve an asset and to take on additional monitoring and maintenance costs will likely be considered against the likelihood of a CCUS project progressing. Several respondents suggested that financial support, for example through a relief or incentive, could be made available for oil and gas operators preserving assets.

Can you provide evidence on the increased ongoing liabilities that owners and operators may face from suspending assets for up to 10 years? (Question 12)

Of the 35 responses received, 13 responded directly to this question.

Many respondents combined their responses to questions 11 and 12. It was noted that there are also ongoing liabilities for offshore structures arising from interaction and damage from other users of the sea, for examples snagging and anchor damage.

Will plugging and abandoning wells to a standard which minimises the risks of CO_2 leakage in the associated field come at significant additional costs and, if so, who is best placed to bear this? (Question 13)

Of the 35 responses received, 16 responded directly to this question.

Most respondents from the oil and gas and industry sectors responded that the additional costs to plug and abandon a well to a higher standard to minimise the risk of CO_2 leakage would result in significantly increased decommissioning costs, compared to industry standard practice (estimates given ranged from a 20-30% increase in cost). This is mostly attributed to increased costs for the additional monitoring requirements.

Several respondents said that further consideration should be given to historic wells which have already been plugged and abandoned in reservoirs of interest and the interventions needed to prevent CO_2 leakage following injection. This may have been carried out without consideration of potential future CO_2 injection into the reservoir. These wells would likely

require modification and recompletion to replace certain materials and components that might negatively interact with CO_2. In some cases the data available on the location, design, materials used, and processes to plug and abandon these wells may be limited or poor quality.

Government view on preservation of assets and next steps

We view there to be three stages of monitoring and data collection activities as part of transferring an oil and gas asset for re-use in a CCUS project. These are:

1. At the end of oil and gas operations:

- Operators are already required to carry out integrity assessments on assets as part of a decision to suspend and preserve an asset.
- Owners and operators are expected to cover these costs.

2. During the suspension of an asset/Interim Pipeline Regime:

- It is expected that during this time limited monitoring and data collection will be required in order to ensure safety.
- Where suspension is intended to facilitate later re-use, this should be carried out in a way that minimises degradation and provides the option to re-use for CCUS. This should also include an assessment of the design life of the asset.
- It is expected that the cost associated with this will be minimal and will be met by the owners and operators of the infrastructure.

3. Appraising an asset for re-use in a CCUS project:

- This may include external and integrity verification studies beyond what it required for the suspension of an asset.
- It is expected that CCUS project developers will cover these costs.

The additional cost for activities required to maintain assets for re-use may be partially offset by the ability to delay the costs of decommissioning for a period of time and the potential for decommissioning liabilities to be transferred to a new owner. However, we recognise that this will be partly dependent on external market conditions and the potential to achieve cost savings by bundling individual assets as part of a wider decommissioning campaign. With increasing time there is likely to be some increase in the liability faced by owners and operators, through age-related degradation of some of the components. However, this is likely to be highly dependent on the condition and integrity of specific assets.

The recommendations presented here aim to encourage and facilitate the transfer of assets. However, as we have previously outlined, the Department does not impose legal obligations on existing asset owners requiring them to suspend and maintain assets with re-use potential. The decision to do so rests with asset owner, and where appropriate any joint venture partners.

Action 9: BEIS will continue to work with OPRED, HSE and OGA, including through the CCS Regulation Forum, to review of the existing oil and gas regulatory framework, including whether guidance regarding the suspension of assets may require amendments to be appropriate for the CCUS regime.

Where appropriate we will recommend amendments to policy guidance and processes regarding decommissioning to encourage oil and gas asset owners to propose maintaining those assets for a period to support CCUS projects.

This would only be applicable to the small number of assets which have been identified by BEIS, the OGA and industry as having significant re-use potential, based on guidance developed using the criteria set out under question 2, and that have a demonstrable chance of being re-used within the suggested ten-year timeframe proposed in the consultation. We will work with OPRED, HSE and OGA to determine the appropriate arrangements to safety preserve the assets during the 10-year timeframe.

Based on the evidence we have received, we view the 10-year suspension period for assets identified as having re-use potential to be appropriate and proportionate.

In some cases, for example where a CCUS project is not ready to take on the asset, this may need to be extended beyond the indicative 10-year period. We are recommending that the decision to extend the suspension period is contingent on the progress of an associated CCUS project. Our initial view is that an appropriate milestone to assess this against could be the associated project being awarded a CO_2 storage license.

We recognise that an extension to the suspension period will likely lead to additional costs and an extension of liabilities for the existing asset owner and operator. Our view is that these should be handled through commercial agreements between the asset owner and the CCUS project developer as part of the transaction.

Action 10: Further work is needed to build our evidence base on the cost of suspending assets for re-use, including consideration of how the costs are managed.

We will also consider the monitoring requirements and associated costs as part of our wider work on developing a UK CO_2 transport and storage network. This includes ongoing research and development activities on integrity monitoring for infrastructure, such as CO_2 injection and investigation wells and pipelines.

We will also consider findings from research activities focused on monitoring the integrity of CO_2 storage sites, including projects currently funded by BEIS through the ACT Programme, such as British Geological Survey's SENSE Project (see Box 5), the preACT project, and the DETECT project.

Box 5 - British Geological Survey's Assuring integrity of CO_2 storage sites through ground surface monitoring (SENSE) Project

The objective of the SENSE Project is to advance fast, cost effective monitoring for CO_2 storage sites in order to ensure the integrity of a CO_2 store and provide assurance for operators and regulators.

Monitoring of geological CO_2 storage sites is crucial for verification of site behaviour and to enable storage site closure in the long term. Monitoring plans for such large-scale storage sites need to include both the injection and post-injection phases to ensure CO_2 is stored over geological timescales and effectively monitored in the subsurface.

> The SENSE Project aims to develop reliable and cost-efficient monitoring based on ground movement detection combined with geomechanical modelling and inversion, utilising new technology developments and optimisation of data processing.

A commonly expressed view in the evidence received was the need for appropriate and detailed guidance on plugging and abandoning wells to retain the integrity of CO_2 stores and minimise the risk of CO_2 leakage.

Action 11: We have commissioned Oil and Gas UK to coordinate the development of appropriate guidance on plugging and abandoning wells to retain integrity of an associated CO_2 store, in consultation with industry, government, and the OGA.

Decommissioning CCUS infrastructure

We have identified that further work is needed to understand the differences between the current oil and gas decommissioning regime and the CCUS regime with regards to the technical aspects of decommissioning. This could include an assessment of the costs to decommission CCUS infrastructure, in particular pipelines and wells.

A more in-depth study of decommissioning assets in CCUS projects would help bodies like OPRED and HSE assess future CCUS decommissioning plans and to consider securities and would also help government develop CCUS guidance.

In recent years the offshore oil and gas decommissioning industry has achieved rapid cost reduction through innovation across the sector and the supply chain. We view there to be an opportunity to apply and replicate this success in the CCUS sector to reduce the costs of preservation, re-use and end of life decommissioning, by utilising the existing expertise of the oil and gas sector and service companies. For example, the development of alternative barrier materials and placement techniques.

Action 12: We will undertake work to explore the technical requirements for decommissioning infrastructure used for CO_2 transport and storage, including oil and gas assets re-used in CCUS projects. This will build on the expertise of leaders in this area, such as the Oil and Gas Technology Centre. This work will be done in consultation with the regulators and industry stakeholders.

Annex A: Actions and indicative timeframe to deliver

Summary of actions	Q3 2020	Q4 2020	Q1 2021	Q2 2021
1: Review of feasibility to re-use oil and gas wells in CCUS projects.				
2: Ensuring re-use is appropriately considered at an early stage in the decommissioning process.	Ongoing			
3: BEIS to work with the OGA and BGS to determine how the NDR and CO_2 Stored resources could be further integrated.				
4: Assessment of re-use potential of infrastructure at onshore gas terminals.				
5: Assessment of availability/future cessation of production plans for assets with re-use potential.				
6: Publication of OGA digital map with assets identified as having re-use potential.				
7: Identification of specific oil and gas assets with re-use potential.	Ongoing			
8: Update on policy proposals to facilitate the transfer of assets				
9: Review of the existing oil and gas regulations and guidance on the suspension of assets.				
10: Assessment of the cost of asset suspension for re-use.				
11: OGUK to coordinate the development of guidance on plugging and abandoning wells to retain integrity of a CO2 store.				
12: Assessment of the technical requirements to decommissioning CCUS infrastructure.				

Annex B: Consultation questions

Question 1: Have we identified the correct types of oil and gas infrastructure that are likely to be important for re-use in CCUS projects?

Question 2: Are there additional or different criteria that would need to be considered when assessing whether a piece of offshore infrastructure is re-useable as part of a CCUS project?

Question 3: Do you agree with this preliminary assessment? Should any specific assets detailed in Table 1 or in Annex A be removed? Should any assets be added to these lists? Please provide justification using the referenced criterion for your answer.

Question 4: Are there any additional substantial barriers to the effective transfer of assets? If yes, please provide evidence for your answer.

Question 5: Are changes to the current policy and legislative regimes needed to help facilitate the re-use of oil and gas assets for use as part of a CCUS project?

Question 6: Do you agree that the proposed policy is an effective and proportionate measure?

Question 7: What event should be used as the point at which the Secretary of State could make a decision on removal of decommissioning obligations to previous duty holders?

Question 8: To what extent would the removal of the liability on previous owners to decommission a pipeline when it is transferred to a CCUS project encourage such a transaction?

Question 9: Are there any monitoring or data collection activities, such as intelligent pigging, that it would be essential to carry out before preserving an asset for CCUS re-use?

Questions 10: Do you agree that the period of suspension should be up to 10 years? Please provide evidence for your response.

Question11: Evidence presented to the Government to date suggests that the costs of maintaining pipelines or wells for re-use are relatively low and so financial support for this will likely not be required. Do you agree with this? Please provide evidence for your answer.

Question 12: Can you provide evidence on the increased ongoing liabilities that owners and operators may face from suspending assets for up to 10 years?

Question 13: Will plugging and abandoning wells to a standard which minimises the risks of CO2 leakage in the associated field come at significant additional costs and, if so, who is best placed to bear this?

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