



## **Government Response to the Consultation on the Proposed Offshore Carbon Dioxide Storage Licensing Regime**

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## **Executive Summary**

1. The Energy Act 2008 established a legislative basis in the UK for permitting the offshore storage of carbon dioxide. A consultation document published on 25 September 2009 set out proposals for an appropriate licensing system, together with draft licensing regulations, which will also implement much of the EU Directive on geological storage of carbon dioxide. This document sets out the Government's response to the comments received.
2. In general, respondents were supportive of the broad structure of the proposed licensing system, including the proposal for a licence which would cover all phases of such developments (exploration/appraisal, operation, post-closure) and would convey an exclusive but time-limited right to apply for the storage permit required by the Directive.
3. A number of issues prompted particular interest or comment. These included the scope of the licence and its relationship to the lease. Broadly speaking, DECC envisages that the licence will refer to an essentially two dimensional plan, authorising the relevant activities within that area and its downward projection, in the same way as the established petroleum licences. But the storage permit when issued will contain three-dimensional definitions of the storage site and the storage complex, and the authorisation conveyed will relate to these areas. The initial agreement for lease issued by The Crown Estate will relate to the same area as the licence, and the subsequent lease will incorporate the same definition of the site as that in the permit.
4. There was also interest, and some concern, about the possibility of closely adjacent developments, or even situations in which two relevant geological formations, though separated in depth, might overlap in plan. The Department considers that such developments can in principle be licensed by an approach building on existing experience with petroleum licensing. Both at the exploration and appraisal stage, and at the development stage, the Department would expect appropriate consultation with other interests which might be affected by the proposed activities. And the Department will issue a licence or permit only where it is satisfied that the new activities can be carried out without material disadvantage to those already authorised. That said, the Department agrees that a cautious approach will be necessary in such circumstances, aiming at progressive reduction of risks and uncertainties.
5. There was also particular interest in the relationship between carbon storage projects and existing petroleum developments. The Government is not persuaded by a number of proposals made for new powers to regulate such situations, but is giving further consideration to the possibility of giving priority, in certain limited circumstances, to operators of producing hydrocarbon fields for redeveloping these fields for carbon storage.
6. A number of comments were received on the draft licensing regulations, and some changes have consequently been made to the draft. With these changes, the Government now intends to make the regulations at the earliest opportunity. These regulations (except the provisions concerning the public register) will apply only to licences granted by the Secretary of State under section 18 of the Act, in respect of storage activities within the territorial sea (other than activities solely within the territorial sea adjacent to Scotland) or the Gas Importation and Storage Zone (GISZ) (see the Gas Storage and Importation Zone (Designation of Area) Order 2009 (SI 2009/223)). DECC and The Crown Estate will continue

to develop the practical arrangements for licensing carbon storage activities, taking account of the responses to this consultation, and leasing storage sites. Advice and guidance for prospective developers will be published on the respective websites and elsewhere.

## **Introduction and main issues**

7. The Energy Act 2008 established a legislative basis for permitting the offshore storage of carbon dioxide. That framework is intended to ensure that there are clear, fit-for-purpose provisions to encourage investment in offshore storage projects that minimise the potential impact on the environment setting out the requirements that must be met in licensing this activity. In June 2008 we consulted on the content of the draft Directive on the geological storage of carbon dioxide which had been published by the European Commission, to help us plan its implementation and to help inform our approach to regulating the storage of carbon dioxide. The response to this consultation was published in June 2009 and set out our broad approach to licensing storage sites. The Directive (2009/31/EC) was agreed in February 2009 and came into force on 25 June 2009. It has to be transposed into national law by 25 June 2011. The consultation document published on 25 September 2009 set out further proposals on implementing the storage requirements of the Directive, including draft regulations which will implement the greater part of the Directive. This document sets out our response to the comments received in this consultation.

8. The Scottish Government has seen and noted the responses to this consultation on licensing carbon storage under the Energy Act 2008. The Scottish Government will now be informed by these responses and will lay separate regulations in the Scottish Parliament for the licensing of carbon storage as regards Scotland and its territorial sea.

9. We received 30 responses, many of which covered topics beyond the scope of the consultation. This response deals with the points raised that were relevant to the core licensing provisions of the Directive. Where comments have been made about other aspects of the Directive (such as the third party access provisions) these have been brought to the attention of the relevant officials within Government.

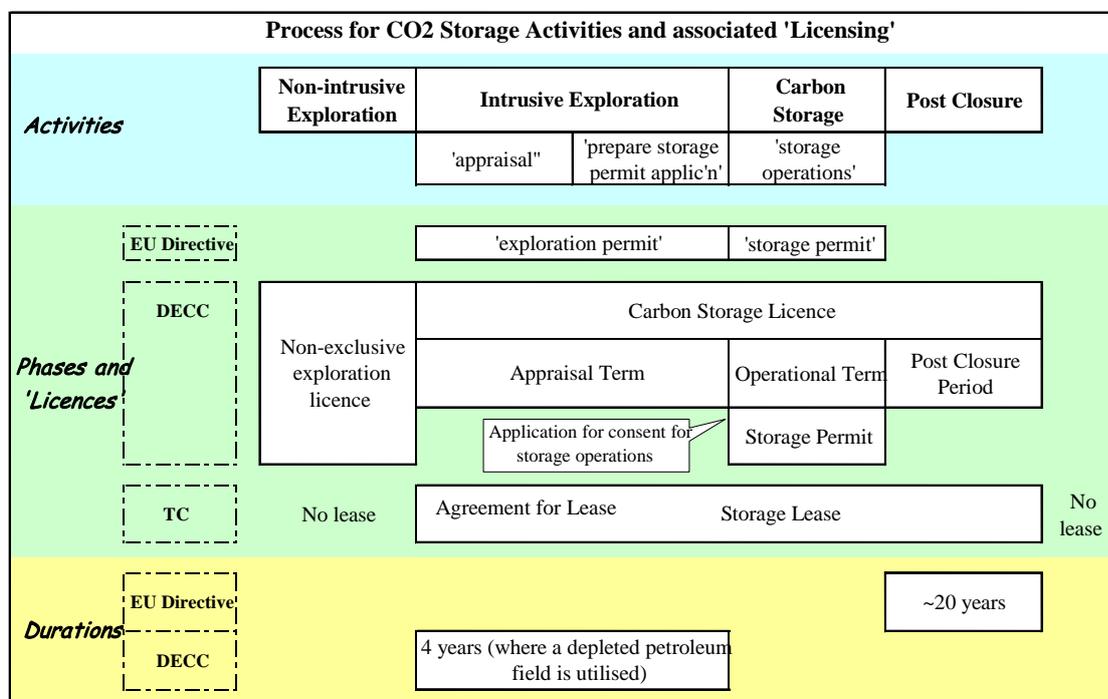
10. The issues which generated most comment were:
- The scope of the licence and its relationship with the lease.
  - The treatment of adjacent or overlapping developments.
  - The relationship with existing petroleum developments.

### THE SCOPE OF THE LICENCE AND ITS RELATION TO THE LEASE

11. Many respondents asked for further information about how the licence and leasing arrangements will work in practice. Particular concerns included how the three-dimensional licences are to be defined and how these will relate to the initial exploration area; how extensions would be handled, and extension of the lease and licensing arrangements in the event of migration of carbon dioxide beyond the original boundaries of the store. One respondent asked whether the storage complex would be licensed as well as the storage site, and one suggested that the lease should automatically be extended if the stored carbon dioxide were to migrate beyond the boundary of the site. There was also an interest in more

detailed information about how the application procedures for the lease and the licence would be coordinated.

12. The distinction between property rights granted by a lease, and regulatory permission granted by a licence is a consequence of the Energy Act 2008. The reason for this approach was set out in the *Towards Carbon Capture and Storage* consultation, and the subsequent response. It differs from the system of petroleum licences, but follows the model that is common elsewhere in the onshore and offshore economy. In the response to the *Towards Carbon Capture and Storage* consultation the Government confirmed that the licensing authority and The Crown Estate will work together to facilitate storage in the offshore area. DECC and The Crown Estate (TCE) are working closely together in developing practical processes which will enable the two sets of applications to progress in tandem while minimising duplication. But it is not possible to describe in advance how all possible scenarios will be dealt with, and the processes can be expected to develop over time. The diagram below (provided by BP as part of its response and reproduced here with their kind agreement) sets out how the various phases of leasing and licensing fit together.



13. Non-intrusive exploration can be conducted under a general non-site specific licence issued by DECC, which applies throughout the UK offshore area, and allows non-intrusive investigation as well as drilling to a depth of 350m. But once a developer has identified a specific site to explore in greater detail, a carbon storage licence will be required. At this stage it will also be necessary to obtain property access rights from TCE to enable intrusive exploration, and to enable test injection where necessary. Applicants should agree with DECC the duration of the initial term of the licence and the related work commitments. It will also be necessary to propose to TCE a two-dimensional area proportionate to the applicant's exploration requirements. This area should be sufficient to encompass all intrusive activities expected in this phase of the development and during construction of any required facilities, including monitoring facilities. It should also include the vertical projection of the formation which is proposed for use as the storage site. If approved by

TCE, this area will be incorporated in the agreement for lease and in the licence: the agreement for lease will convey exclusivity during the initial period. It should not be necessary to extend this area during the initial period of the licence, but DECC and TCE would treat any such request on its merits. (Even if no intrusive exploration is necessary, a licence is necessary in order to apply for a storage permit. In these cases, the applicant should discuss with DECC a suitable initial term for the licence.)

14. The operator should discuss with DECC, during the initial period of the licence, his development intentions, and the proposed three-dimensional definitions of the intended storage site and storage complex. When DECC and the operator have reached agreement on these definitions, the operator will include them in the application for the storage permit. These definitions will then be included in the lease by TCE. It should be noted that the lease will convey exclusivity only in relation to the volume of the storage site and the area of seabed reasonably required for any installation of seabed facilities, and the operation and maintenance of the facilities and store. So that the extent of exclusivity will generally be reduced when the project moves from the initial appraisal phase into the operational phase.

15. It is of course expected that the stored carbon dioxide will be retained permanently within the storage site, and any migration outside the site may represent a “significant irregularity” within the meaning of the Directive, in which case the operator will be required to institute corrective measures, as specified in the corrective measures plan. However, the storage complex will already be defined within the permit, and migration within the complex would not necessarily require any modification or extension of the permit or the licence. TCE are considering further how such situations can be addressed in the context of the lease. Where migration does imply a risk of leakage outside the complex or an increase in environmental or public health risk, then it will represent a significant irregularity. In such cases the necessary corrective measures will have to be undertaken and the position reassessed when this has been done. There can be no presumption that the licence or lease will simply be extended in these circumstances.

16. Some respondents suggested that the licence and lease should be extended if it turns out that the reservoir has a greater capacity than expected. The Directive requires the permit to specify the total amount of carbon dioxide that will be stored, but it also provides for the permit to be modified in the light of the latest information on the behaviour of the stored carbon dioxide. Where the regulator is satisfied that the capacity of the store can be increased without detriment to other sites or potential sites, and without significant additional risk to the environment or human health, then it is likely that such modification will be agreed. Where this also involves an increase in the physical size of the storage site, so that the three-dimensional definition of the site has to be amended, then the definitions in the lease and licence will be updated accordingly. Similarly, if later or improved information shows that the conformation of the site is in practice different from the three-dimensional definitions incorporated in the permit and the lease, these definitions will be updated.

17. The Directive does not allow multiple licensing of the same storage site, but sets out no similar restriction in respect of storage complexes. It is therefore possible in principle for more than one storage site to rely on the same storage complex. However, much more practical experience in the characterisation of sites and complexes will be necessary to form any view on how far this possibility might be realised in practice.

## OVERLAPPING DEVELOPMENTS

18. A number of concerns were expressed about potentially overlapping developments, including what happens when a storage licence is awarded in respect of an area already subject to a petroleum licence. Our broad approach to such circumstances was set out in the response to the *Towards Carbon Capture and Storage* consultation published in June 2009. In that response we made it clear that established rights to extract petroleum would not be compromised by the storage arrangements, but the existence of petroleum rights in a particular area would not preclude the grant of storage rights over the same or overlapping areas, provided the different activities did not conflict. The consultation document indicated that it would be our intention to consent to an overlapping development only where there is evidence that suitable liability and operational agreements are in place. Some respondents thought that there should be more explicit requirements for such agreements to be in place; some asked who would decide whether overlapping developments were feasible and safe, or how the holders of existing petroleum licences can have input to the approval process, or how their interests would be protected, for example where the new development might wish to drill through the area of an existing petroleum licence. One respondent suggested that a precautionary approach should be adopted and it might be better to maintain complete geological and spatial separation between oil and gas reservoirs and geological stores of any kind.

19. Some of these concerns arise from a perceived conflict of approach between the licences and leases to be issued for carbon storage, incorporating three-dimensional definitions, and the established approach of petroleum licences, based on a two-dimensional map and its downward projection. As noted above, the formal incorporation of three-dimensional definitions in a licence is still a relatively new concept, and will need continuing work. But it is clear that the contrast between established petroleum practice and the new need for “three-dimensional licensing” can be overstated. The petroleum licence conveys no right to development, which requires a separate consent, namely consent to a development plan. DECC’s consenting to petroleum developments has always been based on detailed delineation of the proposed field, and has always included consideration of potential interactions with existing or already consented developments.

20. The Department considers that this approach can be built on to address situations in which developments are more nearly adjacent than previously, or even where two projects address separate formations which overlap in plan. However, we also agree that a cautious approach is necessary in such situations, aiming at progressive reduction of risks and uncertainties. Though DECC will not rule out proposals for new developments merely because they are closely adjacent or overlapping in plan with an existing or already consented development, developers considering any such project should recognise that

- (i) potential interactions will require more consideration;
- (ii) the burden of proof that any interactions can safely be managed and that the activities will not conflict lies with the developer of the new (second, or subsequent) project; and
- (iii) consent will necessarily be refused if the existing evidence base is inadequate to support any such proof.

21. Some respondents asked specifically about the licensing of aquifers which extend through an area subject to an existing petroleum licence. DECC considers that the approach outlined above will also apply in these situations, but would note that aquifers are often very

large in area. It is unlikely that the whole of an aquifer would be licensed for carbon storage; it seems more likely, at least for the foreseeable future, that most storage permits relating to aquifers will be for sites comprising only a small part of the formation. It is also possible that more than one site might be permitted in a single aquifer, though subject of course to due consideration of potential pressure interactions.

22. Aside from potential interaction between different formations, there could be concerns that closely adjacent or overlapping developments might result in interference with each other's operations, either on the surface or the seabed, or through drilling through a formation relevant to the earlier development. DECC does not consider that these possibilities differ in essence from those which can arise in existing North Sea developments, and does not see a need to place novel obligations on developers through the licences. However, the Department notes that situations in which two sets of operations overlap in space or in time will be of particular interest to the HSE, and advises early discussion with the Executive in such situations, so that their requirements can be factored in as early as possible.

23. Overall, DECC concludes that it should approach proposals for new developments, of whatever nature, which might interact significantly with any existing or already consented development, in two stages. When a licence is sought for the new development, DECC will expect evidence to be provided that the proposed exploration or appraisal activities have been discussed with all potentially affected operators or developers and can be carried out concurrently with the activities already consented. Subsequently, at the stage of development consent (i.e., in the case of a carbon storage project, the issue of a storage permit), DECC will expect evidence to be provided that all reasonably foreseeable interactions have been addressed in the application, and that these issues have been discussed with the operators of the potentially affected activities. The Department will consent to the development only if it is satisfied that there is a technically feasible and safe way forward which will allow both developments to co-exist without material disadvantage to the activities already authorised. At both stages, it will require evidence that appropriate operational and liability agreements are in place.

24. Some respondents expressed concerns about potential conflict between carbon storage rights and petroleum rights already granted for the same area. Provided that potential interactions between the two sets of activities are addressed as discussed above, however, DECC sees no reason why carbon storage activities should not be licensed within the area of a petroleum licence, and a storage permit subsequently issued. There is no reason why the two kinds of licence should have the same areas or boundaries.

#### RELATIONSHIP WITH EXISTING PETROLEUM DEVELOPMENTS

25. Many responses commented on some aspect of the relationship between existing hydrocarbon developments and subsequent carbon storage projects. One of the specific questions we asked during the consultation was whether existing petroleum rights holders should be given any priority for the exploring of a formation for carbon dioxide storage potential if they have the petroleum rights. The consultation proposed that the holder of a petroleum licence should be able to seek a carbon storage licence in certain limited conditions (only in respect of fields still in production, if there is a clear scope and schedule of proposed work, and provided the application was made at least twelve months before the expiry of the licence). As with the responses on this issue to the *Towards Carbon Capture and Storage*

consultation, views were divided. Holders of such licences thought this degree of priority appropriate; others generally disagreed, though some respondents acknowledged the usefulness of a limited window of time within which some preference might be allowed. Some suggested that any preference would be anti-competitive or contrary to the EU Directive on geological storage of carbon dioxide.

26. Clearly any arrangements we introduce must meet the requirements of the Directive. They also have to strike a balance between the widest possible competition for the new rights and the potential benefits of incentivising operators of existing fields to integrate initial work on a storage development with continuing operations. DECC is considering the balance of advantage further in the light of the views expressed.

27. Several respondents suggested that prospective developers should have access to detailed data on production and well performance in order to facilitate their plans, and one suggested that incumbent petroleum licensees should if necessary be compelled to make it available. Considerable amounts of data are already available in the public domain, though new data is normally proprietary to the licensee for a period of up to four years, depending on the age of the licence. DECC will consider how the information already available can be enhanced to make it more useful in this context. DECC sees no need to depart from the established pattern of proprietary rights in respect of new information, but will discuss with the industry the possibility of setting up a framework agreement which could facilitate access to further information.

28. A number of respondents suggested rather more intrusive powers should be available to government, for example to compel petroleum rights holders to lease or dispose of their facilities or rights. The Government does not believe that such powers are warranted.

29. Finally, in relation to reuse of existing facilities, a number of respondents noted that in a case in which reuse of an existing field is contemplated, the decommissioning regime could weaken incentives for the sale of the existing infrastructure by the incumbent licensee(s). The concern is that they might prefer to go ahead with decommissioning, rather than sell the facilities, in order to minimise uncertainty about the extent of their liabilities. If that were to happen, it would not necessarily prevent redevelopment, but would add costs and delay. DECC notes that there is no assurance at this stage that existing infrastructure will generally be acceptable for reuse, and the scope will have to be assessed case by case. The Government has however taken steps, in the Energy Act 2008, to apply the decommissioning regime of Part 4 of the Petroleum Act 1998 to carbon storage installations; this will enable decommissioning plans for existing offshore structures to be modified where those facilities are to be put to alternative use. It will be noted that the decommissioning regime of the 1998 Act serves a major objective of public policy in protecting the taxpayer from the risk that subsequent owners of the infrastructure might not in practice have the resources to meet the costs of decommissioning. But DECC will look further at this issue with a view to removing any unnecessary barriers to the reuse of existing facilities, where reuse is a realistic option, while preserving proper protection for the taxpayer against exposure to future liabilities.

## **Other issues**

30. Complementing the more general issues discussed above, set out below is a summary of more detailed points raised in the responses made to the questions posed by DECC in the consultation exercise. The Government's responses are set out in italics.

**Q.1 Do you agree that the approach outlined above in relation to the priority rights for an incumbent petroleum licensee wishing to apply for a carbon storage licence is appropriate? If not, please explain what other approach you recommend and why?**

There were 25 specific responses to this question: from :Bellona ;BG; BGS; BP; CCSA; CEFAS; ConocoPhillips; CO2DeepStore Limited; EDF; English Heritage; Environment Agency; E.ON; HSE; JNCC/CCW; Law Society; National Grid; Natural England; Oil and Gas UK; Peel Group; Progressive Energy ; RSPB; RWE; SSE Scottish Power; Shell UK; Shepherd Wedderburn; Statoil

31. Arguments advanced in support of DECC's proposals included

- Incumbents are in a position to reduce or eliminate costs and due diligence process associated with the transfer of infrastructure ownership
- Management of decommissioning liabilities will be easier if the ownership is unchanged.
- Priority rights would enable the production licence holders to commence early planning, negotiations with TCE and to begin the process of applying for a storage licence during a field's final production phases.

32. It was also argued that priority rights do not exclude new entrants as:

- Not all incumbent owners will wish to convert oil and gas reservoirs into CO<sub>2</sub> stores.
- There are significant areas of the UKCS that hold suitable storage structures and reservoirs and are not licensed for oil and gas production.
- New entrants may have opportunities to participate in a CO<sub>2</sub> storage licence as a partner to an existing hydrocarbon licence holder.

33. Against DECC's proposed approach, it was argued that

- Incumbents could occupy a dominant position with consequent cost implications along the CCS chain.
- New entrants could bring a new focus, different perspectives and innovation that could otherwise be missing.

34. It was also argued that existing petroleum licence holders would have the opportunity to apply on a level playing field basis for CO<sub>2</sub> storage licences, and if they were best placed to develop a store, they would presumably emerge successful if an open competitive process was adopted instead. The incumbent's ownership of existing infrastructure and experience of operating the reservoir will be a strong advantage in any competitive situation.

35. Against the suggestion that incumbents might hoard storage sites, two respondents argued that if they have no interest in taking forward CO<sub>2</sub> storage at the end of hydrocarbon production then, in the absence of a revenue stream, it will be a commercial imperative to either relinquish the licence and decommission the infrastructure as soon as possible or to divest the infrastructure to a third party for re-use. The costs of maintaining offshore pipelines, platforms and wells safely, and keeping them in a condition suitable for re-use, is significant and will typically run to many millions of pounds per year. These provide strong incentives against hoarding.)

36. One respondent suggested that a code of practice (similar to the oil industry Infrastructure Code of Practice) may be required if the proposal for priority rights was adopted.

37. *DECC is considering this issue further in the light of the comments received.*

**Q2. Do you agree with the time periods proposed for the appraisal period and submission of a storage permit application? What time period might be appropriate where a deep saline formation is being characterised rather than a petroleum formation?**

There were eighteen specific responses to this question from: Bellona; BG; BP; CCSA; ConocoPhillips; CO<sub>2</sub>DeepStore Limited; EDF; E.ON; HSE; JNCC/CCW; National Grid; Natural England; Oil and Gas UK; Peel Group; Progressive Energy ; RWE; SSE Scottish Power; Shell UK; Statoil.

38. There was wide consensus that a four year period for the appraisal of the CO<sub>2</sub> storage potential of depleted oil and gas fields though two respondents thought this could be achieved in less time quoting two years and with one suggesting the proposed 4 year interval is treated as a long-stop period rather than a typical or benchmark period.

39. There was also consensus on a longer time period being necessary for the appraisal of a saline aquifer with six years being commonly suggested. This was thought necessary as there will be much less information available and there will need to be additional injection testing. One respondent said that since no deep saline formations on the UK Continental Shelf has yet been sufficiently characterised for CO<sub>2</sub> storage they consider it appropriate that DECC should approach the appraisal period of these on a case by case basis.

40. Respondents generally recognised that DECC will wish to retain the flexibility to determine time periods on a case by case basis.

41. All respondents stressed the need for discretionary extensions to be available if justified, for example the test CO<sub>2</sub> injection may turn up unexpected results.

42. *DECC agrees that four years for the appraisal term of a petroleum reservoir and six years for an aquifer is suitable as a bench mark. However, DECC would be happy, in tandem with discussions with TCE, to consider the exact periods required on a case by case basis, taking account of the nature of the proposed development. DECC agrees that the licence appraisal term can be extended where a justified case can be made by the developer.*

43. One respondent said that any party making a licence application for intrusive exploration and test injection (“appraisal”) should be required to demonstrate (i) a minimum qualifying knowledge of the formation to be appraised – for example preliminary assessment of seismic data, (ii) a realistic and financially sound programme of works for exploration, and (iii) a description of the intended sources of CO<sub>2</sub> and transport method.

44. *DECC confirms that it will require the elements at (i) and (ii) above as is the case with Petroleum Licence requirements. In relation to (iii) this will be looked at on a case by case basis depending on the circumstances of each particular project.*

**Q3.Do you have any views on the suggested structure of the licensing regime outlined in Stages 2-4? Do you agree with the proposal for a framework licence which covers the development from the appraisal phase right through to the post closure period, and provides a framework for the application for and consenting to a storage permit?**

There were nineteen specific responses to this question from :BG Group; BP; CCSA; ConocoPhillips; CO<sub>2</sub>DeepStore Limited; EDF; English Heritage; E.ON; HSE; JNCC/CCW; Law Society; National Grid; Natural England; Oil and Gas UK; Progressive Energy ;RWE; RSPB; SSE Scottish Power; Shell UK; Statoil

### **Licence framework**

45. All respondents supported the proposal for a framework licence which covers the development from the appraisal phase though to the post closure period, and which provides a framework for the application of a storage permit within the meaning of the Directive.

46. *DECC therefore intends to introduce the licence framework on this basis. We are therefore proceeding with the licensing regulations that accompanied this consultation incorporating the changes summarised in the response to Q6 of this consultation, together with other changes that proved necessary on further examination.*

### **Single Operator**

47. One respondent believes that the rights and obligations associated with the integrity and security of a CO<sub>2</sub> storage site should be managed as a single entity by a single operator. The operator would act pursuant to the authority of the licensees under the terms of a joint operating agreement. This structure would be very similar to that currently used by petroleum licensees in the UK.

48. *DECC envisages that a single entity will be approved under the Licence in the capacity of operator, within a framework of joint and several liability of all holders of the licence, as is the arrangement for Petroleum Production Licences. However, liability would be joint and several on the part of all participants in the Licence, but operational responsibility would be assigned to a single licence holder.*

### **Initial term of the licence (para 65 of the consultation document).**

49. There were five responses to this aspect of the consultation with a consensus suggestion that the period for such an initial term (where no exploration was necessary) should be one year with the possibility of one or two year extensions when circumstances demonstrate that this is reasonable.

50. One respondent agreed with the concept of an initial term where appraisal studies are not required, but noted that it would be difficult to generalise the required duration as this will depend on the scale of the proposed operations and/or the geological complexity of the reservoir itself.

51. One respondent expressed concern with the suggestion that in some circumstances the initial term period can be agreed with DECC and TCE on a case by case basis. They believed that this would not be sufficiently transparent, and that any extensions agreed must be fully justified and the reasons for the extension placed on the public register. The process must be as transparent as possible with clearly defined timescales identified, including the length of time an operator can keep a storage licence without undertaking any construction activity.

*52. DECC agrees that a one year initial term to allow for the application for the storage permit may be suitable with the possibility of an extension when this is justified. However each case will have to be considered on its merits. Licences and agreements for lease will be issued on the basis that a programme of exploration (where needed) is carried out and that a storage permit application is submitted within a limited time period. Failure to achieve these milestones will result in the expiration of the agreement for lease and licence. The duration of the licence and any extensions will be placed on the public register.*

### **Overlapping developments**

53. In addition to the more general issues discussed in paras 18-24 above, one respondent expressed concern that DECC might seek to define the nature or form of the liability agreements which are to be in place before an overlapping development was consented.

*54. DECC confirms it has no such proposals.*

### **Accidental damage to third party facilities or reservoir**

55. Three respondents asked about the situation where one licensee causes damage to another licensee's facilities despite both parties acting in accordance with their licence/lease rights and suggested that guidance be provided on how this should be handled

*56. DECC does not intend producing guidance on this matter. In the circumstances described resolution of any dispute over liability would be a matter for the parties involved to pursue as matter of civil law.*

57. One respondent asked where responsibility will lie for the repair and the purchase of EU-ETS credits should a third party breach the integrity of a CO<sub>2</sub> store

58. *Under the terms of the Directive any release of carbon dioxide is the responsibility of the permit operator. If the operator considers that any third party has a responsibility in the matter, it would be for the operator to pursue this as a matter of civil law*

### **Suspension of carbon dioxide injection.**

59. Two respondents asked what provisions exist for injection to be suspended for periods of time.

60. *DECC does not envisage any obligation within the licence or permit to maintain any minimum rate or pattern of injection over time.*

### **Completion of decommissioning**

61. One respondent suggested that it should not be necessary for all the decommissioning activities to have been completed before the handover of a storage site can be effected.

62. *The Directive requires that all injection facilities are removed and the site sealed before transfer of responsibility to the State. Insofar as other facilities may be required for the ongoing monitoring of the storage site once transfer of responsibility has taken place, this should be addressed in the post-closure plan.*

### **Third party access**

63. Three respondents said clarity is needed regarding any anticipated regulated or negotiated third-party access requirements, particularly for storage sites and asked how will risks and liabilities be apportioned in the event of multiple parties using the same reservoir

64. One respondent said in relation to third party access that unlike the transportation of oil or gas in offshore pipelines, the profile of which will generally decline with time and thus open up spare capacity for additional sources to utilise, the profile of CO<sub>2</sub> supply from power stations and most other large industrial sources is expected to be steady over many years. In any event, the storage capacity in any given reservoir will be finite. By comparison there is therefore likely to be much less spare capacity available for third-party users. Obligations to provide access must recognise this or risk eroding primary capacity rights and undermining the power generation or other industrial processes served by this and the incentive to invest by generators/infrastructure owners.

65. They believe that negotiated rather than regulated access will provide far stronger signals and greater incentive for infrastructure owners / developers to efficiently use existing capacity and to expand capacity where it is economic to do so.

66. The sanctity of long-term capacity contracts has been subject to considerable pressure from various quarters over the last few years, but they view these as a fundamental risk management tool for underwriting the substantial costs and risks involved in infrastructure development. Further, the failure by power stations and other sources to secure long-term certainty of access to pipeline and storage capacity risks leaving them exposed to either paying emissions allowances for the CO<sub>2</sub> that cannot be evacuated or otherwise

compromising the power generation or other industrial activity from which the CO<sub>2</sub> emissions result.

67. One respondent encouraged DECC to ensure that such third-party access proposals commence from a 'clean slate'; are carefully considered; easily understood; unambiguous and internally consistent. In addition, any such scheme should be carefully designed and implemented in order to; avoid the process becoming excessively lengthy or unwieldy; prevent unduly onerous conditions; and provide a reasonable degree of certainty in the outcome of the process. In any event, they strongly believe that the development of third-party access arrangements must recognise the sanctity of long-term contracts, both for CO<sub>2</sub> storage and transportation, and for hydrocarbon extraction, processing and transportation activities; as these are fundamental risk management tools for underwriting the substantial costs involved in infrastructure development for both sets of activities.

68. One respondent suggested that the requirements stemming from the Directive to offer third party access should be incorporated into the storage licence. A licensee might be required to publish third party access terms to the satisfaction of DECC prior to DECC consenting to a storage permit.

69. *DECC has set out its approach to implementing the third party access to storage sites and pipelines as part of its clean coal industrial strategy (Clean coal: an industrial strategy for the development of carbon capture and storage across the UK. March 2010 URN10D57). We expect to consult in more detail on draft regulations later this year.*

## **Monitoring**

70. Three respondents asked how monitoring to be carried out in the post closure period if facilities are to be prepared for decommissioning at the end of the storage phase.

71. One of these pointed out for example, that one of the more effective means to monitor a store will be via pressure measurements in injection wells. This will not be feasible if the platform allowing access to the wells is removed and the wells plugged and abandoned. As such it will be difficult to demonstrate that CO<sub>2</sub> in the storage site has stabilized as predicted and that permanent containment has been achieved – necessary for responsibility for the storage site to be transferred to the State.

72. Two respondents noted that Paragraph 74(a) requires that monitoring for the purposes of modelling the behaviour of the formation water within the storage site will be required. This is a direct transposition of the provisions of Article 13 of the Directive, but lacks any detail on exactly what will be required of site operators or what is intended to be achieved by it. Recognising the significant costs attached to any monitoring requirements they would appreciate further details from the Department on the proposed objectives of this obligation.

73. One respondent said there should be a requirement that, within a period of two years before the injection period ceases, a plan is submitted by the Licensee explaining the decommissioning process and how post monitoring is going to be performed. Such a plan should take into consideration new technology development.

74. In addition, they believe that the transfer of responsibility to the state should occur as soon as possible after closure of the store if the conditions for transfer are met. They are of

the view that the operator will build experience and gain knowledge during the injection period, and that risk and uncertainty will be for most cases understood before closure of the store. As a result transfer of responsibility may well be completed before 20 years.

75. One respondent said that in considering the corrective measures plan, that needs to be submitted as part of the storage permit application, they believe the following factors will be important to consider:

-How can the corrective measures plan be modified over time to take account of technology advances and improved understanding of the storage complex?

-How to assess the balance of environmental impact between the proposed measures versus potential leakage in selecting or deciding to implement corrective measures?

-How to factor in the economic viability of implementing corrective measures once the balance of environmental impact is clear?

-How is the requirement for periodic updates of the corrective measures plan to be implemented?

-What needs to be demonstrated and carried out to be able to hand over a store to Government?

76. Three respondents asked for a performance standard be defined by DECC for closure and handover to the government once it can be shown that the CO<sub>2</sub> plume is not expected to encounter a leakage pathway. One of these respondents said they believe that any test for meeting this criterion must be objective, simple to measure and cost-effective to implement. It is critical that all transfer criteria should be stipulated from the start as part of the storage licence so that operators are clear as to what conditions they need to satisfy at the point of transfer.

77. They also believe that an operator will need to rely upon models, monitoring and other tools to demonstrate containment rather than providing physical proof of permanent storage. They therefore recommend that operators should be required to demonstrate conformity of the actual behaviour of the injected carbon dioxide with a modelled pressure decline curve for the post closure period, with a monitoring programme tailored to the requirement. Pressure dissipation in the reservoir following the cessation of injection operations can be practically modelled and is both relatively simple and objective to measure and can be related to important reservoir/rock parameters such as capillary pressure and fracture pressure, which are key parameters in assessing any potential leakage pathways to surface. It is anticipated that an agreed numerical 'model' be approved by DECC before injection commences so that pressure monitoring can be carried out throughout the injection phase of the project and the operator will have agreed criteria which if satisfied will release him of his obligations and result in the transfer of the storage site to the State.

78. They said that greater clarity is necessary over the requirements for the monitoring and handover phases of a given project. The Directive suggests the application of a 20 year period before handover from a storage operator to the State can take place. It is understood that in practice this time period would be determined by the competent authority. It is important that transposition of the Directive maintains the freedom of the competent authority

to adjust this timeframe, as appropriate, on a case by case basis. It is envisaged that the monitoring procedures associated with CO<sub>2</sub> storage projects will represent significant long term costs to projects and hence, will be a major factor in determining the economic viability of potential projects. The respondent said they have concerns over the costs associated with monitoring activities, which will be determined by the monitoring protocols and technologies associated with these. In this respect, DECC should provide detailed information regarding the proposed requirements of the monitoring regime, thereby allowing an assessment of costs likely to be incurred through monitoring obligations. Overall monitoring requirements should be fit-for-purpose and site specific. A 'one size fits all' approach would not be appropriate given the unique characteristics of each CCS site.

79. Three respondents asked for a clear performance standard be defined for defining when the licence may be returned to the state once it can be shown that the CO<sub>2</sub> plume has stabilised and is not expected to encounter a leakage pathway. One said as a general principle any test(s) for meeting this criterion must be objective, simple to measure and cost-effective to implement. In addition, to minimise regulatory uncertainty, all transfer criteria should be stipulated and agreed as part of the award of the storage licence so that operators know from the outset the conditions they will need to satisfy at the point of transfer. Notwithstanding the above comments, operators should have the flexibility to apply to vary the transfer criterion throughout the operational phase of the licence if additional information becomes available which justifies a variation.

80. One respondent said they do not believe there is a need for long term monitoring arrangements to be in place once the storage site has been closed, provided the site has been operated in line with the terms of its storage permit and leakage has not taken place during the operational period.

81. One respondent said they believe the annual monitoring requirement, as detailed in Paragraph 75, appears excessive if it is to include 4D seismic information. Annual may be appropriate in the first few years of operation, but two yearly or even five yearly may be sufficient thereafter, if the plume is stable.

82. Two respondents recommended that the transfer of responsibility to the state should occur as soon as possible after the closure of the storage once the relevant conditions for transfer are met. They are of the view that the operator will build experience and gain knowledge during the injection period, and that risk and uncertainty will be understood before the storage is closed.

83. *DECC has noted these points and intends to publish guidance for comment on the DECC website in due course which will provide more detail on the proposed monitoring arrangements for carbon storage developments.*

### **The Crown Estate's processes**

84. Three respondents requested clarification on what the 'appropriate processes' are that TCE will conduct to evaluate competing interests in a given storage site (Consultation paragraph 44).

85. *TCE is developing guidance on this aspect of their leasing role and will publish that guidance in due course.*

### **Extent of licensed area.**

86. One respondent asked whether the licensed area needs to cover the full areal extent of the future CO<sub>2</sub> migration plume (at the point in time of ceasing injection or over a long period thereafter) or the areal extent of any pressure change caused by the CO<sub>2</sub> injection?

87. *This question seems to relate to the definition of the site, rather than the area of the licence. The storage site has to secure permanent retention of the carbon dioxide, and so must be defined so that it can contain the entire foreseeable evolution of the plume. It is not necessary that the site should contain all pressure effects from the injection activities, but the full extent of the foreseeable pressure effects will have to be taken into account in the permitting process.*

### **Land banking**

88. One respondent said they were concerned that where an operator fails to progress appraisal, development or operational activities in relation to a licensed subsurface volume there should be a mechanism for the licence to be rescinded in such cases.

89. *DECC notes that the appraisal term of the carbon storage licence (the period for the exploration work programme to be undertaken and an application made for a storage permit) will be a limited period that may be extended only where this is shown to be necessary. Failure without good cause to progress that appraisal work and make the application for the permit, will result in the licence being terminated. TCE intends to include similar safeguards in the agreement for lease and lease.*

### **Development Plans**

90. One respondent asked if at Stage 3 of the proposed regime a Storage Development Plan (GSDP) would be submitted. Five respondents noted the absence of discussion on a CO<sub>2</sub> storage development plan and hoped there would be further guidance on this aspect.

91. *In the carbon storage regime, the storage permit fulfils the same purpose as the Gas Storage Development Plan does in the case of the methane gas storage regime, albeit with additional requirements specific to carbon dioxide storage such as monitoring plans, post closure plans etc. As in the case of a GSDP, the grant of a carbon dioxide storage permit allows construction of facilities to take place and the agreed amounts of gas to be injected for storage. DECC will be issuing further guidance on the considerations for submission and approval of storage permits.*

### **Back producing stored carbon dioxide for EOR**

92. One respondent suggested that there should be provision for a carbon storage licence to be adapted to allow stored CO<sub>2</sub> be produced back and transferred to another licensed storage site (e.g., for use in Enhanced Oil Recovery) and asked would such a transfer be protected from any liability for emissions credits?

93. *DECC has noted this question and will give it further consideration.*

## Financial security arrangements and liabilities

94. One respondent said that Directives 2009/29/EC (amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community) and 2009/31/EC (on the geological storage of carbon dioxide) together create the possibility of significant long term liabilities for storage licensees. Although the probabilities of these arising are thought to be small, there is no significant track record, making insuring and pricing the risks difficult. These uncertainties have long been recognised as a significant threat to the development and long-term deployment of CCS. The requirements for financial security could, if insufficiently flexible, exacerbate the problem.

95. They said this is an area where proportionality, within the constraints of the Directives, is critical. Their view is that a risk-based approach is vital in attempting to reach a balanced understanding of potential liabilities, if unacceptably onerous conditions are not to be attached to industry to the point of deterring development and investment. They believe that this issue can only be resolved through a co-operative approach between Government, Industry and the commercial insurance market, and that there is a role for each to play in underwriting transitional CO<sub>2</sub> leakage, prior to site decommissioning and transfer to Government as required by Article 33 of the EU CO<sub>2</sub> Storage Directive.

96. One respondent said that if a significant leak occurs this will represent an unreasonable penalty and an unforeseeable risk for the operator – this may represent a “potential show stopper” for developments. The authorities should indemnify the operator for unexpected and very high cost exposures – avoiding an economic barrier for initial projects. A kind of a cap/back-stopper arrangement on both financial security and liability should be introduced maintaining that the operator still has a part of the burden and, as such, is not relieved of the obligation to act as a prudent and reasonable operator. Force majeure situations have to be described including consequences for the financial security and the associated potential liability. How the industry will be relieved if force majeure situations occur should also be described.

97. One respondent said that there is a range of largely leakage related contingent liabilities associated with undertaking a CO<sub>2</sub> storage project for which, as yet, there is inadequate liquidity or capacity in the insurance markets to provide cover for. To the extent that the commercial market is unable to provide adequate cover then, in the absence of any alternative arrangements, it will be for individual project developers to accommodate these on their balance sheets. However, the potentially significant exposure that this represents, albeit of very low probability, is likely to represent an insurmountable hurdle for any one individual company to absorb.

98. Therefore they said, in the interests of expediting the demonstration and deployment of CCS, they would encourage Government to consider transitional support until such point that there is sufficient capacity to fully insure these risks. Only in the event of insufficient funding from the project developers insurance provisions might the Government be required to underwrite any shortfall.

99. They said they do not believe this structure is without precedent. There are parallels in the nuclear industry, for example, where Government acts as an insurer of last resort, providing cover to meet the gap between total liabilities and available commercial cover.

They believe a similar approach could be developed for CCS. The level of premium and its relationship to the unit cost of CCS and/or the unit cost of an EUA will clearly have a significant impact on the commercial viability of CCS and they are keen to work with DECC to understand how such an approach might work.

100. From a review of the Directive they cannot see any provision that would preclude Government from providing, either for demonstration or commercial deployment, underwriting support during the “Operations, Closure and Post Obligations” phase as envisaged above. Indeed the Directive clearly provides that liabilities during the injection and subsequent phases should be dealt with at a national level.

101. One respondent said this is a complex area and current legislative developments should provide flexibility to adopt a range of models that could be, at the end, acceptable to all parties. Para 79 states that Operator must provide financial security “or equivalent provision”. This respondent said they appreciate that DECC and TCE need to have certainty regarding the various companies’ ability both in terms of technology and financial strength and the financial security provided by the operator should be decided on a case-by-case basis and the competent authorities should accept different types of securities.

*102. The Directive requires that the operator is solely responsible for the site during the period of the permit. That responsibility includes liability for remedial measures in the event of environmental damage, and in relation to the surrender of allowances under the emissions trading scheme. We would expect to publish additional guidance on the requirements for financial security over the coming months that take account of discussions within Europe about this aspect of the Directive. In the meantime we would welcome further views on this issue.*

#### **Enhanced oil recovery and the need for a lease from The Crown Estate**

103. Two respondents requested clarity that paragraph 46 (TCE exclusive agreement to lease to holders of existing production licence wishing to undertake EOR) only applies if the developer intends opting-in the EOR operation for ETS allowances.

*104. It would not be possible to give a lease to a third party in relation to storage activities in a formation still in use for petroleum production (irrespective of whether the storage activities are to be combined with EOR).*

**Q4. We would welcome views as to what exactly should be in the public register and additionally what form the register should take. Would a purely web based register (open to all) be satisfactory or should a hard copy version be produced by the Department?**

There were nineteen specific responses to this question: from Bellona; BP; CCSA; CEFAS; ConocoPhillips; CO2DeepStore Limited; EDF; English Heritage; E.ON; JNCC/CCW; Law Society; National Natural England; Oil and Gas UK; Progressive Energy ; RWE; SSE; Scottish Power; Shell UK; Shepherd Wedderburn; Statoil

105. Of the nineteen responses to this question, seventeen thought that a purely web based register would be satisfactory and three thought a hard copy should also be provided by DECC. There was consensus that the overarching principle should be that all information is held as a matter of public record except information whose disclosure (1) would be contrary to interests of national security; or (2) would prejudice to an unreasonable degree a person's commercial interests (see section 29 of the Energy Act 2008).

106. The suggested items for inclusion were :

A: A copy of the licence, which will show:

- Name and address of the licence holders and the operator;
- The appraisal term (during which the storage permit must be applied for);
- Licence assignments if any;
- Whether the licence has been revoked or relinquished;
- The TCE lease number.

B: A copy of the storage permit, which will show:

- The injection period (the operational term);
- The committed volume of CO<sub>2</sub> to be stored over the operational term;
- The permitted composition of the CO<sub>2</sub> to be injected;
- Maps showing the extent of the storage site and the storage complex;
- The approved monitoring plan (including updated monitoring plans);
- The approved corrective measures plan;
- The approved provisional post closure plan;
- The composition of the financial security

C: Copies of any written opinions received from the European Commission on the draft permit, and the reasons stated by the competent authority in the event that it has departed from those opinions.

D: Estimates of the total volume of storage capacity for carbon dioxide available in the storage site.

E: Notices served by the competent authority.

F: Details of significant irregularities or leakage events and remedial actions.

G: Copies of all other reports to the competent authority.

*107. DECC agrees that the essential purpose of the register is to provide as much information as possible on a storage development with the exception for information that, in the view of the licensing authority, would be detrimental to the national interest or would be commercially damaging to the developer. To this end the register should contain all the items listed in para. 106.*

*108. In order to provide an audit trail of all carbon storage licences issued and their record of progression to storage, or otherwise, all the licences issued will be entered onto the register at the point of award, and the register will specify whether they are in the appraisal, operational, or post closure stage, or whether the site has been transferred to the responsibility of the State.*

*109. As this register will need to provide hyperlinks to a range of information documents, (some of considerable volume) any hard copy provision of this data will be unwieldy and*

*impracticable. DECC concludes that the register should be web based, although facilities will also be provided for hard copies of entries to be obtained on payment of a fee.*

**Q5. Do you have any comments on the draft terms and conditions for carbon storage licences proposed in Annex A attached?**

There were seventeen specific responses to this question from BP; CCSA; CEFAS; ConocoPhillips; CO2DeepStore Limited; EDF; E.ON; JNCC/CCW; Law Society; National Grid; Natural England; Oil and Gas UK; Progressive Energy RWE; Scottish Power; Shell UK; Shepherd Wedderburn

**Clause 19 (Reports to be treated as confidential)**

110. Three respondents said they were surprised to see at Clause 19 of the draft licence terms that “All records, returns, plans, maps, samples, accounts and information (in this clause referred to as “the specified data”) which the Licensee is or may from time to time be required to furnish under the provisions of this licence will be treated as confidential.” They thought best practice would be the reverse of that position and referred to the statutory requirements for public access to environmental information, and thought it contrary to the spirit of the Aarhus Convention and the Freedom of Information Act 2000.

*111. Clause 19 is in line with the arrangements for Petroleum Licences and the specified data in question is of a geological nature and not environmental. As provided for by paragraph 2 of Clause 19, such confidentiality does not apply to information reported as a result of any monitoring required by the storage permit. DECC agrees that this and other environmentally significant information relating to the behaviour of the injected carbon dioxide and the integrity of the store should be publicly available as detailed in paragraph 113 in relation to the contents of the public register. DECC notes that the Freedom of Information Act provides an exemption for data which is provided to the department on a confidential basis, and similar protections (other than in relation to emissions) apply under the Environmental Information Regulations 2004 .*

**Clause 23 (Transfer of the licence)**

112. Ten respondents were concerned that Clause 23 of the draft licence terms only allowed for the transfer of the licence before CO2 injection has commenced. They stated that inability to transfer or ability to divest its interest at any time (particularly in light of the long-term nature of a storage project) will act as a material barrier to any potential developer. Transfers subject to approval by the Minister, should be acceptable.

*113. DECC agrees that the ability for a licensee to transfer the licence to a third party (with the consent of the Minister) at all stages of the licence duration is desirable and necessary. The licence condition at Clause 23 will be amended accordingly.*

*114. Such a transfer will not however affect any decommissioning liability which will stay unchanged as per the arrangements for petroleum licence transfers.*

## **Clause 27 and 28 (Relationship with MOD and the fishing industry)**

115. One environmental agency respondent said that at Clause 27 and 28 of the draft licence terms a provision is made for a relationship with the MOD and the fishing industry but there is no mention of liaising with the relevant statutory agencies. They suggested that the relevant statutory agencies should be contacted at all stages of licence and they advise that the licence should need to have regard to their advice/comments.

*116. Clause 27 and 28 relate to day to day operations, where it is important that the licensee should liaise with the fishing industry and the MOD so that their respective operational activities can be coordinated effectively. There is in general no similar need for coordination with any operational activities of the statutory agencies.*

*117. As regards the processes for permitting activities under the licence, however, such as seismic survey and drilling operations, DECC confirms that the statutory agencies will be consulted in the same way as for petroleum licences, and their advice taken into account.*

## **Cl. 29: Incidental discovery of petroleum**

118. Seven respondents wished for clarity the requirement for notification to the Minister where petroleum was discovered during drilling operations under a carbon storage licence. One respondent said that Clause 29 implies that the licensee could simply enter into an arrangement with the holder of a petroleum licence and as such be under no obligation to notify the Minister and that this appears to contradict Paragraph 81 of the consultation document, which indicates that the carbon storage licence holder shall have no claim on these hydrocarbons.

119. Two respondents recommended that operators should have up to 30 working days to submit the information in writing as required under this schedule, rather than as soon as is reasonably practicable

120. Two respondents suggested that minor occurrences of e.g., shallow biogenic gas should not require to be reported.

*121. In the interests of simplicity and to be consistent with the petroleum licences, DECC agrees that any discovery of petroleum by someone drilling under a carbon storage licence should be reported to DECC. For the time being, we think that every discovery of petroleum should be reported, but as experience develops, it may prove possible to issue guidance on reporting levels for such discoveries. The suggestion of a 30-day reporting period appears reasonable and will be adopted.*

122. Two respondents thought that if petroleum was discovered in an area not covered by a petroleum licence during the appraisal of a potential storage site, the carbon storage licence holder should have a preferential right to request a petroleum licence and develop the hydrocarbons using the knowledge they have gained and the facilities (wells) that they have constructed.

*123. In issuing petroleum licences DECC is required by law to comply with the Hydrocarbon Licensing Directive which stipulates that licences must be awarded in open competition. This could be as part of a general licensing opportunity (a licensing round) or*

*through a more locally focused out-of-round opportunity. The carbon storage licence holder who had discovered the petroleum would be well placed to bid for such a licence, but DECC does not see any scope for departure from the procedures prescribed by the Directive..*

### **Cost of data provision**

124. Three respondents said they supported the obligation on a licence holder to provide relevant information (well records, geological data, etc) to the Minister or the appointed agent of DECC, such as British Geological Survey. However, they regarded the proposal that the licensee should pay the Minister such fees and expenses for such examination as the Minister may specify as unreasonable and thought it inconsistent with provisions in other consenting regimes and should be covered by the licence fee.

*125. There would be no intention for the licensee to pay any fee to the Minister for such examinations but merely to cover the cost of supplying such data within its own resources and not to require payment from the Minister for doing so. This requirement builds upon these in place for petroleum licences. These arrangements have worked for many years without concerns from that industry of an undue burden.*

**Q6. Do you have any comments on the draft transposition Regulation, implementing Directive 2009/31/EC on the geological storage of carbon dioxide into UK law, attached at Annex B?**

There were sixteen specific responses to the two questions above: from:  
Bellona ; BP; CEFAS; ConocoPhillips; EDF; JNCC/CCW; National Grid; Natural England;  
Oil and Gas UK; Progressive Energy ; RWE; RSPB; SSE; Scottish Power; Shell UK;  
Shepherd Wedderburn; Statoil

126. One respondent suggested that that in all instances where “site” is mentioned it should be expanded to read “storage site”.

*127. DECC agrees and will make these changes in the Regulations.*

128. One respondent was concerned that there might be over-implementation in the provisions relating the CO<sub>2</sub> stream purity. The requirement for the stream to be “overwhelmingly” CO<sub>2</sub> is defined by the provisions concerning incidental and tracer substances in Article 12 of the Directive (the phrase “to this end”) , but also through a separate (and apparently undefined) obligation in Schedule 1 to the regulations. This creates a risk that the UK implementation is requiring higher purity standards from the capture process than is necessary.

*129. DECC does not agree that there is a material difference in the transposition of the requirements of the Directive. We note that the requirement that the stream consist overwhelmingly of carbon dioxide is also found in Annexes II and III to the OSPAR Convention, as amended to permit carbon dioxide storage, and that the application of the criteria in Article 12(1) of the Directive can if necessary be clarified by means of Commission guidelines under Article 12.2. However, to clarify the position of incidental and*

*tracer substances, paragraph 1(2) of the Schedule to the Regulations will be amended to read “The stream [...] (b) may contain incidental or trace substances [...], but only if etc.”.*

130. One respondent proposed additional provision to improve protection of the marine environment.

*131. The purpose of the Regulations is to directly transpose the requirement of the Directive. A robust framework of environmental legislation has already been developed for offshore energy industries to protect the environment in the context of sustainable development, and relevant environmental legislation is being amended so that it can be applied to the new types of developments intended to be covered by the new Energy Act licences.*

132. One respondent suggested that the relationship between the DECC licence and TCE ease, together with the requirement to deal with both bodies, needs to be clearly described in regulations 3 and 5 of the regulations.

*133. There is nothing in the Directive to require this. The role and responsibilities of DECC and TCE have been set out in this and other documents, and will in due course be set out in guidance by both bodies.*

134. This respondent also suggested that Regulation 5 should include an obligation to demonstrate that all parties affected by the application for a storage permit have been consulted and, either, confirm they have accepted the proposed storage operations or describe the specific amendments that have been requested and how they have been addressed.

*135. The Environmental Impact Assessment process covering the storage permit application will involve the consultation of all affected parties in open public consultation for a three month period.*

136. This respondent also suggested that the authority should not undertake corrective measures without first directing the storage licensee to do so (as provided in regulation 9(3)).

*137. It is a requirement of the Directive that the competent authority has the power to take either option: see the last sentence of Article 16.3. To provide differently would be to incorrectly transpose the Directive.*

138. This respondent suggested a number of other changes in wording, on “water column”, and “storage complex”.

*139. The Regulations follow the terminology and definitions of the Directive.*

**Q7. Q7. Do you have any other comments on the proposals put forward in this consultation package? Are there other issues which should be covered by the licensing regime but are not addressed here?**

There were fifteen specific responses to this question: from Bellona; BG; BP; ConocoPhillips; CO2DeepStore Limited ;EDF; Environment Agency; E.ON; HSE; Law Society; National Oil and Gas UK; Progressive Energy ; RSPB; RWE; SSE Scottish Power; Shell UK; Statoil.

**The 350 metres criterion**

140. One environmental respondent said that while drilling to less than 350 metres may be regarded as non-intrusive from a geological or oil and gas perspective, it is undoubtedly intrusive from a marine perspective, and asked why the depth of 350 metres has been adopted as a demarcation point.

*141. This arrangement, and demarcation depth, is in line with the arrangements for petroleum licences. Shallow drilling, normally of only a few tens of metres below the sea bed, is normally done when sea bed samples are required, for example before emplacement of an installation. 350 metres is an established demarcation point which conveniently separates this shallow drilling from deep drilling into, e.g., petroliferous formations. The Habitats Regulations will need to be complied with for any drilling (deep or shallow). As noted above, relevant environmental legislation (such as the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001) will shortly be modified to apply to offshore storage activities.*

**Storage sites straddling the boundary with the Scottish territorial sea.**

142. One respondent pointed out that the legislation covers the Gas Importation and Storage Zone (GISZ) as well as territorial seas. Scottish Ministers have devolved powers in relation to the territorial seas adjacent to Scotland. He asked how sites which straddle adjacent areas – so that both the Secretary of State and Scottish Ministers have powers – would be administered.

*143. DECC is currently progressing a Memorandum of Understanding with the Scottish Executive. This includes arrangements for licensing sites that straddle the UK Government area of competence and that of the Scottish Executive*

**Long term liability and transfer to the State**

144. One respondent commented that can occur to provide certainty to operators, it might be necessary to prescribe best practice standards and criteria to be met before transfer of responsibility.

*145. DECC plans to lay further regulations under section 31 of the Energy Act 2008 specifying the arrangements for the termination of the Licence and the transfer of responsibility to the State. DECC will be issuing guidance on the criteria to be met before such a transfer can take place*

**Test injection**

146. One respondent asked for clarity over which body will define limits on how much CO<sub>2</sub> may be "test"-injected? In the case of a deep saline formation, might this also include test production of brine to determine pressure response (for example if the operator's plan is to produce brine to "make room" for CO<sub>2</sub>)? They said it would be helpful to clarify which regulations and decommissioning obligations would apply to test wells that are no longer required post test injection, particularly where the exploration operator decides that the site is inappropriate for CO<sub>2</sub> storage.

*147. DECC's technical and environmental teams in the Energy Development Unit would be responsible for assessing and approving test injection and brine discharge operations. The decommissioning regime for all wells, whether drilled for petroleum or carbon dioxide, will be that of the Petroleum Act 1998, as provided by Clause 11 of the draft Carbon Dioxide Storage Licence. DECC will consider on their merits any applications for test injections as part of the initial phase of a carbon storage licence.*

### **Technical definition of the storage site and storage complex**

148. One respondent thought there would be difficulties in defining the boundaries of the site and complex. For example, would the upper boundary of the complex be the shallowest zone where (non-well) leakage of single phase buoyant CO<sub>2</sub> may be trapped? Equally, in the case of CO<sub>2</sub> dissolving into brine, would the base of a CO<sub>2</sub> storage licence have to take into account how deep this high-density CO<sub>2</sub>-rich water may go in the time between initial injection and the end of the post closure period? would the boundaries of the storage complex need to take into consideration the pressure front associated with any increases in pressure resulting from CO<sub>2</sub> injection?

*149. The technical definitions of a storage site and storage complex are still under consideration. The boundaries for each site and complex will of course be site specific and there is not a general specification at this stage.*

150. This respondent asked whether the conditions specified in the application for consent for storage operations, for instance on injection, would effectively become operational limits to the storage operation, and how much variability or uncertainty will be incorporated into the storage permit to provide operational flexibility.

*151. DECC considers that maximum injection rates and pressures specified in the permit, in accordance with the Directive, would be operational limits and there would be no flexibility about that unless an amendment to the storage permit is made.*

### **Monitoring and reporting**

152. One respondent requested further clarity over how the EU monitoring and reporting guidelines under the ETS will be implemented on CCS projects. For example, in paragraph 74, does the monitoring of injection facilities include an implicit obligation to measure possible leaks as part of the obligation to detect (74 (d))? Furthermore, do all the metering obligations exclusively result from the obligations of the ETS?

153. *The European Commission has amended the Monitoring and Reporting Guidelines relating to the ETS so as to cover the capture, transport and geological storage of carbon dioxide (Decision 2010/345/EC).*

### **MMO, Marine Scotland and IPC**

154. Two respondents requested further guidance and clarity on the role and accountabilities of the Marine Management Organisation, Marine Scotland and the Infrastructure Planning Commission in CCS.

155. One said the consultation document notes that “proposals to develop and operate carbon storage facilities will have to take account of relevant marine policy documents” (page 11). It is not clear to them what exactly is intended here, or the regulatory obligations that may flow from this requirement for project developers. If this relates to the Marine Policy Statement and marine plans under the new Marine and Coastal Access Act 2009, then they were concerned that these not be available in the short term. They believed that the principle should be that determination of exploration and storage licences will be on the basis of current policies and plans. Emerging marine policies and plans may be taken into account, but determination of licence applications should not be delayed pending their finalisation.

156. *DECC believe that the principle should be that determination of exploration and storage licences will be on the basis of current policies and plans. Emerging marine policies and plans may be taken into account, but determination of licence applications should not be delayed pending their finalisation. Marine Scotland will be the licensing authority for the Scottish territorial sea. The IPC will have no offshore responsibilities in relation carbon storage.*

### **Environmental regulation**

157. One respondent sought assurance that DECC should ensure that the full range of environmental assessment is undertaken at appropriate stages throughout the exploration process for petroleum, carbon dioxide storage or gas unloading of natural gas.

158. *DECC will shortly lay the necessary amending instrument before Parliament in order to achieve this objective. The full range of environmental legislation applied to offshore oil and gas developments will then, where relevant, be applicable to carbon dioxide storage; natural gas storage; and the unloading of natural gas to an installation.*

### **Safety regulation**

159. The Health and Safety Executive (HSE) noted that carbon capture and storage work activities offshore are not currently covered by the Health and Safety at Work etc. Act 1974 or the offshore permissioning regime. HSE is however taking steps to ensure that the Health and Safety at Work etc. Act 1974 (Application outside Great Britain) Order 2001 extends the prescribed provisions of the Health and Safety at Work etc. Act 1974 to CCS work activities offshore.

160. This will ensure that all work (e.g. construction, operation, maintenance and decommissioning) associated with CCS activities (e.g. the well, reservoir and storage or

carbon dioxide) are covered by the prescribed provisions of the Health and Safety at Work etc. Act 1974. For further details please contact :

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**Q8. Provided on the home page to this consultation is a partial Impact Assessment on the cost to industry and Government on administering the offshore carbon dioxide storage regime. We would welcome further information on the costs and benefits outlined in the document, in particular on the costs of providing financial security, to assist us in finalising this Impact Assessment.**

Responses on this question came from: Bellona; BGS; BP; CCSA; CEFAS; ConocoPhillips; EDF; English Heritage; Environment Agency; E.ON; HSE; The International Underwriting Association; JNCC/CCW; Law Society; Lloyds; National Grid; Natural England; Oil & Gas UK; Progressive Energy; RSPB; RWE; SSE; Scottish Power; Shell UK; Shepherd Wedderburn; and Statoil.

### **Financial security arrangements**

161. Two respondents urged DECC to be flexible, and not be overly prescriptive, in the range of what they would regard as acceptable financial instruments, especially in the early days when there is little track record. Three respondents said that the cost of letters of credit (which they estimate at up to 10% of face value, per annum) will be a significant potential cost burden for prospective developers

162. One respondent said the principal difficulty in producing financial security to cover low probability but large liabilities will be the lack of track record and experience to allow the risks to be priced. Until there is such experience, it will be difficult to find or create cost effective financial products to support the risk, and it is likely that the risks will need to reside with the promoters of the scheme, with parent company guarantees as appropriate. He was of the view that for the initial demonstration by means of the competition, when uncertainty will be at its highest, it is likely that the risk will need to be shared between the Government as purchaser and the consortium operating the scheme (guaranteed by its parents) as contractor. For later demonstrations, it would be likely that the most practical option will be parent company guarantees (dependent upon the financial standing of the parties in question) supplemented, as experience grows, by commercial insurance products. He suggested that storage operators will require the risk costs to be reflected back to the power generator (either by way of pricing or indemnity) and therefore inefficient handling of the financial support around the liabilities will impact the affordability and viability of CCS as a carbon reduction

option. A pragmatic and cost effective approach to supporting the liabilities created by EU legislation is needed to ensure that CCS is not stifled at birth in their view.

163. A representative group from within the insurance industry suggested that the area of financial security is one where the insurance industry can have the greatest impact in the proposed CCS offshore licensing regime. Products offered by the insurance industry could, in time, provide real flexibility to financial security options to the benefit of both operators and competent authorities. They agreed with the Impact Assessment that it is difficult to estimate the cost for insurance at this early stage. There were, however, some important (and positive) messages that they wish to give to DECC as part of this consultation.

164. The first is that many of the constituent parts of CCS are already well known to and routinely covered by the insurance sector as part of their involvement in the offshore oil and gas industry and related transport activities. For example, existing insurance products cover:

- (i) oil and gas field assets, platforms and mobile units;
- (ii) the construction of complex offshore projects and oil/gas pipelines,
- (iii) third party liabilities and business interruption; and
- (iv) operator's extra expense in the form of well control and re-drill expenses.

In relation to CCS projects as a whole, there is therefore real scope for developing cost effective insurance products that will satisfy the need for financial security.

165. The second is that, from the standpoint of insurance, the development of products to satisfy the financial security aspects of the proposed licensing regime (and the pricing of those products) would be greatly facilitated by the introduction of additional certainty around particular issues. In particular:

- (i) Maximum liability exposure. No limit is suggested so far, especially in relation to operators' long term post closure risks. Unlimited liability for operators could make the development of suitable insurance products difficult and their attractiveness to operators limited. This is to the detriment of all stakeholders. Conversely, where Government could help to cap loss, insurance products could be developed to play a very useful role and at commercially attractive prices.
- (ii) Insured perils. It is proposed that operators must provide evidence of financial security for meeting "*all obligations under the storage permit*". However, development and pricing of insurance products is greatly facilitated where the risks for which the insurers might be liable are defined with more specificity.
- (iii) Time periods. The requirement for security to remain effective possibly for an indefinite period makes insurance product development and pricing more complex. If more certainty could be developed around the period during which financial security must be in place following closure, insurers would be able to develop and price products better.

166. These respondents add that even where the risk is not (or cannot) be taken by the insurance market itself, the risk management skills of the insurance industry might be deployed to good effect where the risk is carried by others or insured on a "pool" or mutual insurance basis. The experience in areas like political risk, terrorism, the transport of oil cargoes in bulk and nuclear liability demonstrates this.

167. One respondent said that the financial security arrangements will mainly need to cover the decommissioning and monitoring costs. With regards to liabilities under the EU ETS in the event of a leak, this respondent agrees that the probability of such an event is very

low. He suggested that any financial guarantees can be based on a risk-weighted assessment of the financial consequences of leakage, and that Article 19 of the EU Directive provides scope for this. A requirement for a guarantee against the full liability of the stored CO<sub>2</sub> volume was in his view not necessary and highly likely to prove prohibitive to the widespread deployment of CCS. This respondent does not support a mandatory requirement to insure risks, or to contribute to an industry-wide fund as this will not incentivise operators to develop the lowest risk storage sites, as they will know that they can always fall back on the industry fund. Selecting, characterising and operating a high quality and therefore low risk site should be a source of competitive advantage with benefits accruing to the respective operator.

168. *DECC has noted these points and is discussing the issues of liability under the Directive with the European Commission, which intends to publish guidance on a number of issues, including the financial security requirements of the Directive, in the autumn.*

### **Monitoring Costs**

169. Five respondents said they would like to see further details of how the costs of monitoring operations have been derived and the underlying assumptions.

170. *The costs of monitoring were drawn from the estimates for £/tCO<sub>2</sub> in the IPCC Special Report on CCS (ref in the text, and the weblink shown earlier in footnote 1). The range presented in the report £0.08-£0.09 for basic monitoring and £0.14- £0.15/tCO<sub>2</sub> for the enhanced version. To capture the full range £0.08 and £0.15 were then applied to the assumed 1.5MtCO<sub>2</sub> per project per year, to give annual monitoring costs of £120,000 to £225,000 per project.*

171. *The IPCC special report on CCS gives life-cycle monitoring costs for two different monitoring packages: “basic” includes periodic seismic surveys, microseismicity, wellhead pressure and injection-rate monitoring; the “enhanced” version adds periodic well logging, surface CO<sub>2</sub> flux monitoring and other advanced technologies).*

### **Policy Option 1 (Do nothing)**

172. Five respondents questioned the conclusion in the Impact Assessment that both the costs and the benefits of doing nothing are zero. They referred to the IEA assessment that meeting 2050 global greenhouse gas emissions reductions targets without CCS will cost 70% more than otherwise and, therefore, the inability to store CO<sub>2</sub> on the UK’s continental shelf would represent a major cost.

173. Two respondents wanted to emphasise that there is significant value to the UK in developing an efficient licensing regime, given the potentially large realistic storage capacity within the UK sector of the North Sea continental shelf. Indeed, the secondary benefits of CCS – such as job creation, development of green technology, security of supply and UK leadership – should not be underestimated.

174. *The Impact Assessment (IA) for ‘a framework for the development of clean coal: a response to consultation’ assessed the cost of doing nothing of no CCS going forwards is specified in the non-monetised section, and in the benefits of the licensing regime non-*

*monetised costs, with direction to the framework doc. All the benefits mentioned outlined in the consultation responses summarised above are included in the framework IA. To have costed them into the IA for the offshore storage consultation would have been to double count them across IAs. You can view the framework for the development of clean coal IA here: [http://www.decc.gov.uk/en/content/cms/consultations/clean\\_coal/clean\\_coal.aspx](http://www.decc.gov.uk/en/content/cms/consultations/clean_coal/clean_coal.aspx)*

## **Costs**

175. One respondents said they were worried that the DECC itself calculates that the cost to an applicant for applying for each licence will be approximately £650,000, of which £612,000 represents the cost to the applicant of developing a Storage Permit for approval. These sums appear high to the respondent if the Government is serious about fostering and developing offshore carbon dioxide storage in the UK as a contribution to reducing the UK's carbon dioxide emissions. The technology has yet to be proved to be commercially viable. The regulatory costs need to facilitate and not deter the development of the technology. The Department needs to review the proposed licensing regime with that objective in mind.

176. One respondent said they were keen to understand how DECC estimated this figure and to see a breakdown of the various costs involved. It would also be useful if DECC were able to provide a breakdown of the various processes/costs they foresee within the £612,000 estimate of total costs to the developer, incurred through the 'development of a storage permit for approval' process.

*177. BERR conducted in 2006 a business burden exercise on the oil and gas industry of cost to them in complying with Petroleum Licence provisions. One of these provisions was the preparation and submission of a "Field Development Plan" (FDP) in order that when consented to oil and gas production installations could be constructed and production commence. The estimation in the exercise of cost to the developer in preparing a FDP was £306k. In many ways a Storage Permit submission is similar in nature to a FDP submission but with the additional requirements deriving from the CCS Directive. The technical team within DECC who progress FDP consents, and will deal with Storage Permit consents, have estimated that on average Storage Permit application would require a doubling of effort by the developer from that of a FDP. Therefore £306k has been doubled to give a figure of £612k for a Storage Permit submission. However, until we progress a real one there is no way of telling what the actual resource input (i.e. time) will be.*

## **TCE charging regime**

178. Two respondents expressed concern on the absence of a published fee structure by TCE.

179. *TCE intends to provide guidance on its charging structure in due course.*

## **ANNEX A**

### **List of Respondents**

Bellona Europa  
BG Group  
British Geological Survey (BGS)  
BP  
Carbon Capture and Storage Association (CCSA)  
Centre for Environment, Fisheries and Aquaculture Science (CEFAS)  
ConocoPhillips  
CO2DeepStore Limited  
EDF  
English Heritage  
Environment Agency  
Eon UK  
HSE  
Joint Nature Conservation Committee and Country Side Council for Wales  
Law Society  
Lloyds and The International Underwriting Association  
National Grid  
Natural England  
Oil and Gas UK  
Peel Group  
Progressive Energy  
Royal Society for the Protection of Birds (RSPB)  
RWE npower  
Scottish and Southern Energy (SSE)  
Scottish Executive  
Scottish Power  
Shell UK Ltd  
Shepherd Wedderburn  
Statoil  
The Crown Estate