

Comments by Dr Peter J. Cook on behalf of the Cooperative Research Centre for Greenhouse Gas Technologies.

1. Should legislation regulating the injection and long-term underground storage of carbon dioxide be treated as stand-alone legislation?

The key technology steps involved in a CCS system (capture, transport and injection) are already being applied for purposes other than the mitigation of greenhouse gas emissions and are subject to a range of regulations which have proven effective. Whilst any legislation will obviously need to address any interface with a range of existing legislation, it is not clear at this stage of technology deployment that stand alone legislation will be necessary. CCS storage has many features in common with the existing regulatory framework for oil and gas exploration and production and appropriate amendments to that legislation may suffice for parts of the CCS operations. There is a need to proceed with some caution at this stage, given the likelihood of a significant learning-by-doing phase with the monitoring and verification regimes and linkages with the emissions trading scheme which will provide a market driver for the deployment technology. The long-term nature of storage is a unique feature of CCS that will require consideration.

2. Is there a need for Victorian legislation regulating the geological storage of carbon dioxide to expressly classify or define the stored carbon dioxide as a resource or a waste?

There is no obvious technical need to classify CO₂ as a resource or a waste. In some circumstances it can be seen as a resource (eg. where it is used for EOR), in other circumstances where its abundance is far in excess of any current or projected use, it could be seen as a “waste”. However classification as waste is likely to bring a different legal treatment which may lead to a complex legal regime for CCS. If it is regarded simply as “carbon dioxide” (or “CCS stream”) for example there is no obvious need to classify it as a waste or a resource.

3. Should Victorian legislation regulating the long-term underground geological storage of carbon dioxide include the following statement of purpose:

“To regulate the injection and long-term underground geological storage of carbon dioxide in Victoria, as part of CCS activities, including exploration for storage sites.”

The statement could be modified to read ... “including exploration for, and characterisation of storage sites”.

4. Is there a need for legislation regulating the long-term underground geological storage of carbon dioxide to have a statement of objectives?

There is likely to be merit in having a statement of objectives. It would give clear guidance to the courts on the intent of the legislation and provide the opportunity to outline public good that results from mitigating emissions.

5. Should Victorian legislation regulating the geological storage of carbon dioxide include guiding principles? If yes, what principles should be included?

There is no technical difficulty in having generalised guiding principles. These could cover not only what is expected of the project proponent but also the need to address greenhouse issues.

6. *Should the term “CCS stream” (or similar) be used to describe carbon dioxide injected into a geological formation for storage as part of CCS operations?*

This could work from a technical perspective.

7. *Should other greenhouse gases be covered by the term “CCS stream” (or similar)?*

The term “CCS stream” could cover all other gases and substances that are produced as an integral part of the separation and capture process, potentially including methane, carbon monoxide, SO_x and NO_x.

8. *Should the term “CCS operation” be used to describe CCS activities? If so, what activities should the term cover?*

The term “CCS operation” could be used but it has to be recognised that some operations may only involve the storage part of the CCS process. An alternative term could just specify “CO₂ storage operation”, or “geosequestration” or “GHG operation”. This point highlights a problem with the terminology in the paper. It may be better to focus language onto CO₂ storage and relevant legislation change thus keeping a degree of regulatory flexibility for this technology which is at such an early stage in development and deployment.

9. *Is there a need for the term “CCS exploration” to be expressly defined? If so, are there any activities additional to the conducting of geological, geophysical and geochemical surveys, the making of wells and the taking of samples for the purposes of chemical or other analysis, that the term should cover?*

There is always a danger that in seeking to expressly define the term “CCS exploration”, as something will always be missed out. It is suggested that any definition is very generalised and indicates desired outcomes rather than specifying technologies.

10. *Is there a need for the term “CCS injection” to be expressly defined? If so, are there any activities additional to the injection and storage of carbon dioxide for long-term geological storage that the term should cover, for example monitoring and verification activities?*

There is no obvious technical benefit in expressly defining the term (see comment 9).

11. *Is there a need for Victorian legislation regulating the underground geological storage of carbon dioxide to clarify who owns the stored carbon dioxide? If yes, is it appropriate for the legislation to specify that (a) on injection and until surrender or cancellation of the CCS injection licence, the stored carbon dioxide is the property of the CCS operator, and (b) on surrender or cancellation of the CCS injection licence, the stored carbon dioxide becomes the property of the State?*

There is a need to clarify who owns the CO₂ as this may have implications to legislation and liability. It is appropriate to specify various phases of a CCS project, but the legal implication of this to ownership may need to be considered.

12. Should Victorian legislation regulating the underground geological storage of carbon dioxide expressly provide for ownership of the storage formation? If yes, is it appropriate that the legislation expressly provide that ownership of the underground geological storage formation vests in the Crown?

Pore space is a resource and it may be appropriate to handle a storage tenement in the same way as a mineral or petroleum tenement where the State owns the ground but leases it to a company for exploitation. When mineral exploitation is completed the company returns the lease to the State and storage could similarly be dealt with in the same way.

13. Should legislation regulating the injection and long-term underground geological storage of carbon dioxide enable the grant of separate rights in relation to a sub-surface stratum of land?

Pore space can be treated in the same way that any other “mineral” resource is treated. However in doing so, it also has to be recognised that there is a public good in encouraging use of this resource in order to decrease greenhouse gas emissions.

14. Is it appropriate that the tenure system for underground geological storage of carbon dioxide be based on the existing Victorian regime for petroleum operations?
It would appear to represent a good starting point.

15. Is the proposed duration of the CCS exploration permit (5 years, with the option of renewal for a further 5 years) appropriate?

The State may wish to also consider whether there is a benefit in some circumstances, in having a clause that requires surrender of a portion of the lease area after a period of time where a holder of a permit fails to take adequate steps to prove up or utilise the resource. This may occur if the Minister determines that the scale of impacts of climate change are so great that urgent action is needed in the public interest to utilise pore space to mitigate emissions.

16. Should legislation regulating the injection and storage of carbon dioxide impose any constraints on the power of the Minister to give directions to a CCS exploration permit holder where a CCS storage formation is discovered?

Constraints could be consistent with those applied to other types of exploration permits.

17. Where a CCS exploration permit holder discovers petroleum or a petroleum exploration permit holder discovers a geological formation suitable for the long-term storage of carbon dioxide, should there be an obligation for the explorer to report that discovery to the State?

In view of the public benefit in mitigating emissions to avoid serious climate change, there is merit in ensuring that any discovery of a suitable storage resource is reported to the State. The technical reporting obligation could be consistent

with the reporting obligation attached to other permits, eg. petroleum tenements. An obligation to report should not necessarily change the legal rights of the explorer to further explore or develop that resource. It should also be recognised that there are likely to be additional reporting obligations relating to particular technical issues such as monitoring and verification (M&V). The community will wish to be assured on HSE issues and therefore consideration could be given to making results of M&V publicly available.

18. Should the legislation allow a CCS or petroleum exploration permit holder to enter into an arrangement with an applicant for a production or injection licence over the same area, to enable the carrying out of that other activity? If yes, what constraints, if any, should be placed on the arrangement?

All the existing storage projects (in Salah, Weyburn, Sleiper and Snovit) are within petroleum tenements. If a petroleum tenement holder is willing to reach an agreement with storage proponent there is no obvious reason for the Government to object, provided all the normal technical requirements are met for the storage site.

19. Given the Commonwealth Government's commitment to the introduction of a national emissions trading scheme by 2012, is it appropriate that a CCS retention lease be subject to a commercial viability requirement?

Government has no obvious reason to try to second guess industry on whether or not a project is commercially viable.

20. Is 15 years an appropriate time period for the duration of a CCS retention lease?

It is conceivable that a storage site could operate for much longer than 15 years, so a statutory progress review after a defined period of say 15 years may be a suitable mechanism to protect the public interest whilst giving the operator investment confidence.

21. Should the Minister be able to release areas for CCS injection and storage without requiring the area first be subject to a CCS exploration permit?

It is unlikely that injection would be permitted until the project proponent has carried out technically competent and thorough site characterisation including assessment of any impact on other resources (or potential resources) within the area.

22. What factors should a decision-maker have regard to in determining whether to grant a CCS injection licence?

Factors requiring consideration include the technical viability of the proposal; the technical competence of the proponent; the assessment of the risk of impact on other resources; the risk of leakage; any risk to the environment and safety.

23. Is it appropriate for the CCS operator to have the onus of showing that an underground geological formation is suitable for the long-term storage of carbon dioxide, particularly given the proposals for long-term liability as set out in Part 15 of this paper?

It has to be recognised that “suitability” should be a risk-based technical assessment. There is no such thing as the “perfect” storage site; there will also be the prospect of a leak occurring, although as pointed out by the IPCC, the likelihood of a significant amount of leakage is very remote.

24. Should legislation regulating the injection and storage include restrictions on the area to which the CCS injection licence applies?

This seems reasonable for surface activities although the alternative approach might be to restrict storage to a particular geological unit or units.

25. Is it appropriate for a CCS injection licence be issued for an indefinite term or should it be limited by time period or by volume of carbon dioxide injected?

If restrictions are to be applied then it may be appropriate on the basis of volume of CO₂ injected, but this limitation should be subject to review in the light of the technical experience gained from the injection of CO₂, which may increase or decrease the amount of CO₂ that can reasonably be injected.

26. What factors should a CCS injection development plan be required to address?

The list provided looks satisfactory, but “static and dynamic models” and particularly “plan for monitoring and verification” could to be added. The list should also aim to be “indicative” to allow for other components to be added to (or removed from) new sites in the light of experience gained from other operations.

27. Should a CCS proponent who wishes to utilise a storage reservoir in a petroleum production licence area for longterm storage of carbon dioxide be able to apply to the Minister for the excision of that area where the consent of the petroleum operator, is unable to be obtained? If yes, is there a need for the criteria for assessing whether third party access to the storage reservoir should be granted to include a public interest test?

This is a difficult question to answer from a technical perspective. There is likely to be a “public interest” test to allow the Government to override commercial interests where there is a necessity to do so. However the concept of one commercial interest over-riding another commercial interest may lead to legal issues that could “tie up” the area for many years. This in turn would greatly inhibit the development of CCS. Nonetheless, from a technical perspective and using a risk-based approach, it would be technically possible to inject CO₂ into a region where petroleum production is underway and minimize the prospect of the CO₂ having an impact on petroleum resources. An alternative approach to “parallel” leasing might be to give existing petroleum tenement holders a once-off opportunity to overlay a storage tenement on the petroleum tenement, with an agreed time (5 years?) to assess the storage prospectivity. At the end of this time the holder of the storage tenement might be required to surrender a proportion of the storage tenement.

From a national perspective the test of any scheme should be “will it potentially accelerate or slow down the deployment of CCS?”

28. *Where a CCS storage reservoir extends over a number of areas that legally entitles more than one CCS injection licence holder to inject carbon dioxide/ CCS stream, should the Minister be able to require the CCS operators affected to enter into a cooperative arrangement for injection and storage of the carbon dioxide so as to inject the carbon dioxide as effectively as possible and/or to keep disruptions to the environment to a minimum?*

The issue raised here is very similar to one that arises during petroleum production. The adjacent operators use unitisation to develop a sensible and equitable approach to field development. The same approach could apply to CO₂ storage.

29. *Should pipelines situated wholly within a CCS injection licence area be able to be exempted from the requirements of the Pipelines Act 2005 (Vic)?*

No comment.

30. *How should resource use conflicts be managed?*

All the options offered in the text have their problems. Some may lead to legal disputes, which could mean that there would be little progress with CCS. Any titles system for CCS should aim to ensure that money spent by project proponents is spent on proving the feasibility of the project and not on lawyers.

31. *Should legislation regulating the injection and storage of carbon dioxide provide for grant of a special access authorisation to enable a CCS operator to undertake exploration activities to gain geological information for their own use or for sale?*

Authorisation would need to take account of the rights of pre-existing licence holders.

32. *In relation to the grant of a CCS exploration permit, retention lease or injection licence, is there a need for mandatory conditions? If yes, what matters should the mandatory conditions of a CCS exploration permit, retention lease or injection licence address?*

From a technical perspective, any mandatory conditions could reasonably be modelled on those applying to petroleum operations, but there will probably be a need for matters specifically relating to CO₂ storage to be addressed, such as the need to monitor and verify CO₂ storage, the composition of the injected gas, the CO₂ migration pathway and impact on any natural resources.

33. *In giving the Minister broad discretion to impose any additional conditions on a CCS exploration permit, retention lease or injection licence he or she thinks fit, are there any discretionary conditions that should expressly be provided for in legislation?*

The Minister may reasonably wish to have the power to act in the public good in any circumstances. This may be particularly important should governments decide that the rate of climate change is leading to unacceptable impacts and mitigation measures, including CCS, will need to change or accelerate.

34. *Is it appropriate that transfer of a CCS title be subject to a best interest requirement? If yes, should the test to be applied be specific to the best interests of the people of Victoria?*

No comment.

35. *Should a CCS proponent be required to continue to undertake monitoring and verification activities for a specified period following completion of the injection phase of CCS operations, before a CCS injection licence may be surrendered? If yes, for what period of time following completion of injection activities should a CCS proponent be required to undertake these monitoring and verification requirements?*

It is difficult to specify a defined period for which monitoring and verification should be carried out. Rather than specify an arbitrary period of time, it may be more appropriate to consider a performance-based system, where agreed milestones such as no CO₂ detected at a particular location; or no detectable migration of CO₂ in a geological formation, are met before surrender can take place.

36. *Following surrender of a CCS injection licence, is there a need for ongoing monitoring and verification of the injection site? If yes, should responsibility for such monitoring and verification activities, including any remediation or rehabilitation required in the post-closure period be transferred to the State?*

There is no obvious practical option other than the State taking on responsibility for long term monitoring. However there is no reason why this should be onerous or costly, provided agreed performance indicators have been met prior to surrender. It is likely that the project operator will have remediated the site prior to closure. The risk of leakage from a well characterised site is extremely low. Therefore any post closure residual liability will be very small.

37. *In what circumstances should the Minister be able to cancel a CCS exploration permit, retention lease or injection licence?*

Agreed condition of the licence not met (subject to taking into account any extenuating circumstances).

38. *Should the Minister be able to issue directions to a CCS proponent where a CCS exploration permit, retention lease or injection licence is to be surrendered or cancelled? For example, as a minimum should a CCS proponent be required to undertake monitoring and verification requirements for a specified period?*

See earlier comments on desirability of meeting agreed key performance indicators.

39. *Given the variety of legislation which may apply to a CCS injection and storage project, is there a need to streamline the approvals processes? If yes, how should this be achieved?*

There is a need to streamline the approvals process because undue delays will add to project costs and delay CO₂ mitigation. However, given the importance of needing to build public confidence in this technology, any streamlining of approvals should not be at the expense of an appropriate environmental assessment regime, including community consultation.

40. How should planning approvals for CCS exploration and injection operations be managed?

Most States have well established planning approvals processes and most surface installations will need to meet and conform to those processes. Presumably the only subsurface approvals required will be covered by CCS-specific regulations rather than the planning approvals process.

41. If planning approvals for a CCS injection and storage project are to be streamlined, should CCS operators be subject to a consent regime similar to that for petroleum operators as detailed in Part 9 of the Petroleum Act 1998 (Vic)?

The petroleum consent regime is likely to be an appropriate model for CCS in most circumstances.

42. In preparing a CCS operation plan, what matters should a CCS proponent be required to address?

The operations plan of a CCS operation could potentially follow the general terms of the Petroleum Act, with specific requirements relating to the injection process and monitoring operations.

43. Section 165 of the Petroleum Act 1998 (Vic) details specific obligations a petroleum operator must undertake in conducting any petroleum operation. Is there a need for legislation regulating the exploration for suitable underground geological formations and the injection and long-term storage of carbon dioxide to include similar general provisions? If yes, what matters should such a provision address?

Legislation needed for CCS exploration can probably reasonably be modelled on those for oil and gas exploration. The injection and storage operation will probably require specific obligations.

44. In determining whether compensation is payable for any loss or damage as the result of CCS operations over Crown land, is there a need for the Minister to take into account any benefits that may accrue to the people of Victoria from the CCS operation?

It is likely that the Minister will wish to consider whether the operation has the potential to produce a significant public benefit through the mitigation of carbon dioxide emissions. Related to this is the potential benefit of cost effective mitigation.

45. Should legislation regulating the injection and long-term storage of carbon dioxide modify the common law liabilities of a CCS proponent? If yes, in what way should the common liabilities of a CCS proponent be modified?

No comment.

46. Should liability be transferred to the State in the long-term?

It is difficult to see how a CCS proponent could be expected to retain liability for hundreds of years. To place such a requirement on a proponent could greatly inhibit the deployment of CCS which in turn would diminish the public good that

could accrue from making deep cuts in CO₂ emissions. The long term liability regimes for completed oil and gas operations, mining operations and some waste management operations may be relevant to CCS operations post closure.

47. Should a CCS proponent be required to obtain and maintain insurance against the expenses or liabilities which may arise as a result of CCS injection and storage activities? If yes, what type of insurance would be required? For what period of time should a CCS proponent be required to hold such insurance?

There could be a range of ways in which insurance might be used to meet liabilities. However it is early days in the development of CCS-specific insurance and it would be premature to designate a specific type of insurance or its duration.

48. In requiring a CCS proponent to take out a bond or financial assurance, what matters should the bond or assurance cover?

The system of mining or petroleum bonds may provide a guide.

49. For what period of time should a CCS bond or financial assurance be held?

The period could relate to the meeting of key performance indicators

50. If the State is to be responsible for long-term monitoring, verification and remediation of a CCS injection and storage site, how should such activities be funded?

The costs of long term monitoring, verification and remediation are likely to be low, provided the requirements are not made unduly onerous. A general fund for handling all CCS projects might be considered, rather than making any funds project-specific. This activity may be a legitimate use of some of the funds raised through auctioning of permits under the emissions trading scheme.

51. Should a CCS operator be charged rent for the storage of carbon dioxide in an underground geological storage formation? If yes, is it appropriate that the revenue raised be used to fund the long-term monitoring, verification and remediation of a CCS injection and storage site?

It is important to encourage the mitigation of CO₂ in the most cost effective manner. The optimal course of action will vary from place to place, but if CCS is an appropriate mitigation option then its deployment could be inhibited through excessive rental charges. If on the other hand charges are solely to cover long term monitoring and verification then that could be seen as an alternative to a bond (see 50). It should also be noted that emissions trading permits which will drive the deployment of technology in the long term are a charge that industry may have to meet for approval to sequester carbon dioxide. It is important to bear in mind that the costs of long term monitoring will not be large in a well conducted storage project.

52. How should legal issues relating to the cross-border migration of stored carbon dioxide be addressed?

There are already rules for the cross-border transport of natural gas and they are likely to provide a guide to cross-border transport of CO₂. In the case of storage, issues relating to carbon credits (and debits) may need to be addressed.

53. Is it appropriate that CCS proponents be subject to a geological information collection and dissemination regime?

Any rules governing geological information can probably reasonably use the Petroleum Act as a guide.

54. Is there a need for a mechanism to require the release of geological information from petroleum operators to CCS proponents in specified circumstances – for example where there is a risk that a potential CCS operation may impact on an existing petroleum operation?

At the present time, all of the major CO₂ storage projects (Sleipner, Snovit, In Salah, Weyburn) are conducted by the petroleum operators. There would obviously be issues between companies where a CCS operation was undertaken within an existing petroleum operation. As a minimum, there would need to be a close working relationship between the CCS and the petroleum operators. An alternative might be for the petroleum operator to also be the CCS operator.

55. Should legislation regulating the injection and long-term underground geological storage of carbon provide for the establishment of a CCS register?

Such legislation would seem to be necessary from a technical perspective because long term monitoring and verification measurement will be required to meet market expectations and public policy objectives. Because the market is likely to pay on the basis of very long term sequestration, a register is likely to be necessary to reduce the potential of release through inappropriate activity in or near a reservoir.