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Regulating a Pilot Project in the Absence of Legislation Specific to Carbon Storage

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Abstract

The CO2CRC Otway Project was initiated in 2004 as a first of a kind pilot project when there was no legislation for regulating Carbon Capture and Storage (CCS) activities. After much deliberations on how this project was going to be regulated in 2006 and the preparation of documents for regulatory approvals in late 2006 and 2007, the project came into operation in April 2008 with approval from three key authorities.

This paper sets out the journey of how the Otway Project, a pilot carbon storage project, was approved in the absence of legislation specific to regulating carbon storage. It covers the challenges of getting a pilot project approved through government including:

- managing timelines and resources;
- clarifying the regulatory framework for a pilot project;
- ensuring that the project approvals are fit for purpose;
- engaging the right authorities in the project approvals processes;
- allowing adequate time and resources for land access negotiations;
- allowing for continuation of pilot projects with the development of new legislation;
- resolving project responsibilities and long-term liability prior to project commencement; and
- taking a proactive approach to stakeholder engagement including engaging the media.

The Project presented many challenges along the way but these were worked through between the Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC), the operator of the Project and the Victorian Government. With lateral thinking on the regulators' part and sheer perseverance of project facilitators in Victorian Government, the Project was delivered putting Victoria on the map as a State making an important contribution to advancing research into greenhouse gas geological storage.

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1. Project description

The CO2CRC Otway Project is Australia's first carbon storage project. Stage 1 of the Project involved storing CO₂ in a depleted gas field and this was completed with the injection of 65,000 tonnes of CO₂. Stage 2 of the Project involved investigating the behavior of CO₂ once injected into a saline geological formation. The first part of Stage 2 has also been completed. The project infrastructure includes a CO₂ extraction well, Buttress-1, two injection wells, CRC-1 and CRC-2, a monitoring well, Naylor-1 and connecting pipelines. The nomenclature used in this paper is below:

Nomenclature

CCS	Carbon Capture and Storage
CH ₄	Methane
CO ₂	Carbon Dioxide
CO2CRC	Cooperative Research Centre for Greenhouse Gas Technologies
DOI	Department of Infrastructure
DPI	Department of Primary Industries
EPA	Environment Protection Authority
SRW	Southern Rural Water

2. Timelines for regulating a pilot project

Firstly, to provide some context on why this Project is of State Significance, Victoria holds a significant proportion of the world's brown coal endowment (430 billion tonnes), however, brown coal produces large quantities of CO₂ in the energy generation process (DPI, 2012).^[3] For Victoria to continue to enjoy the benefits of this vast resource, it is mandatory that greenhouse gas emissions from brown coal must be addressed as Australia moves towards a low carbon economy.

The Otway Project was initiated in 2004 with the first community meeting in February 2006, with approximately 70 people in attendance. Initial work at the site commenced in mid-2006 with the flow testing of Buttress-1 well, approved by the Department of Primary Industries (DPI), in its role as the petroleum industry regulator. The Buttress-1 well would serve to be the valuable CO₂ resource for the Project, which gives this Project a unique advantage over other such demonstration projects throughout the world.

In August 2006, the authorities that had an interest in regulating this Project liaised with each other in developing the process for approving this first of a kind project. The key authorities involved were the Environment Protection Authority (EPA), Southern Rural Water (SRW) and DPI.

In October 2006, the Victorian Government signed an agreement with the CO2CRC to progressively release \$4 million for Stage 1 of the Project which enabled the drilling of Australia's first CO₂ storage well, CRC-1, in February 2007 with approval from DPI.

In June 2007, the Project was elevated to the highest level of priority, by the gazettal of the declaration by the Minister for Planning that the Project is of State Significance. This also included the gazettal of the planning scheme amendment to accommodate this first of a kind project.

In July 2007, the approvals from the EPA and SRW were finalised and in December 2007, the EPA accepted the reports under the EPA approval and approved the commencement of injection at the Otway site.

In April 2008, the Project was launched by the Commonwealth Minister for Resources, Energy and Tourism and State Minister for Energy and Resources marking the commencement of first injection into Australia's first carbon storage well, CRC-1.

In August 2008, the CO₂ injected was detected at the monitoring well, Naylor-1, which was a well inherited from the former tenement holder and fitted with elaborate monitoring equipment which is part of the Project's world class monitoring and verification program. In September 2009, injection at CRC-1 was suspended with the injection of approximately 65,000 tonnes of CO₂ completing Stage 1 of the Project.

In October 2009, Stage 2 of the Project was approved by the EPA and in late January 2010, a second injection well, CRC-2 was drilled for injection testing into a saline geological formation. The drilling of CRC-1 was approved by DPI as it was accessing a depleted gas field, and the drilling of CRC-2 was approved by SRW as it was accessing a saline aquifer. Stage 2 of the Project was also funded by the Victorian Government in an agreement to release \$2 million which was signed in October 2009.

By this stage, Victoria's new legislation for carbon storage was finalised and about to come into operation, but did not fully cover for the continuation of the Otway Project, so project specific regulations were made to enable Stage 2 and these regulations came into operation in December 2009. With all the necessary approvals, injection testing at CRC-2 started in June 2011 and was completed in September 2011.

In December 2011, the findings from the Otway Project were published in the prestigious Proceedings of the National Academy of Science of USA recognising the contribution this Project has made to developing the technology which will address CO₂ emissions from fossil fuel resources, as we eventually transition into renewable energy sources including geothermal.

3. Challenges of regulating a pilot project

One of the most significant challenges put before this Project was how it was going to be regulated to the satisfaction of community expectations to ensure that safety and environmental requirements were met in the absence of legislation specific to carbon storage.

After investigating all the applicable legislation, it was resolved that the best way forward would be to regulate the Project primarily under the research, development and demonstration approval provisions of the *Environment Protection Act 1970*. Whilst this approval is the overarching approval which is regulating this Project, there were other approvals required for various sub-activities e.g. drilling of wells which were regulated under the *Petroleum Act 1998* and *Water Act 1989*.

In regulating such a project which is a new activity, it was of utmost importance to ensure that the approval process used is valid and enforceable. The research, development and demonstration approval provisions offered this security. The various approvals used to regulate this Project are discussed in more detail in the sections below.

In the absence of legislation dedicated to regulate CCS activities, there was considerable confusion as to who should be regulating what aspect of the operation. After a number of meetings between the project proponents and regulators, it was resolved that in principle, the EPA would issue the main approval for the Project with parts of the operation regulated by DPI and SRW.

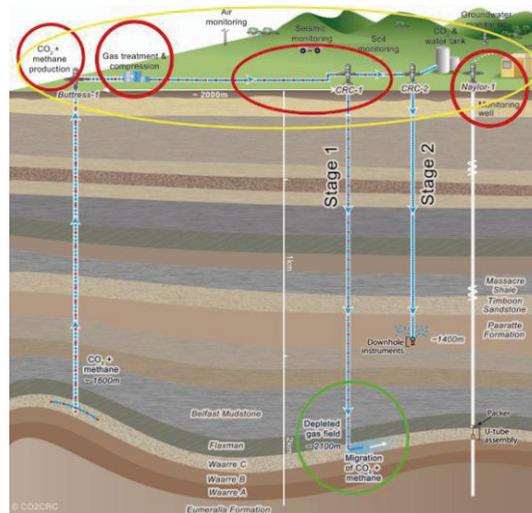
Even though this agreement existed, as the Project evolved, so did the regulatory framework which applied to the Project. The regulatory framework applied to Stage 1 of the Project is summarised in the regulatory approval matrix presented in Figure 1 below.

ACTIVITY	EPA	DPI	SRW
CONSTRUCTION			
Preparation of Buttress-1 for extraction	✓	✓	✓
Installation of surface plant at Buttress-1	✓	✓	✓
Construction of the pipeline (gathering line)	✓	✓	✓
Drilling and preparation of CRC-1 for injection	✓	✓	✓
Installation of monitoring equipment at Naylor-1	✓	✓	✓
OPERATION			
Extraction of gas from Buttress-1	✓	✓	✓
Treatment of gas in surface plant	✓	✓	✓
Transport of gas along pipeline	✓	✓	✓
Injection of gas into CRC-1	✓	✓	✓
Monitoring of site before, during and after injection	✓	✓	✓
CLOSURE			
Plugging and abandonment of wells	✓	✓	✓
Removal of infrastructure	✓	✓	✓
Monitoring of site after infrastructure removal	✓	✓	✓

✓ means covered by the Authority listed above.

Figure 1. Coverage of project activities by approving authorities (Source: Ranasinghe, 2008)^[4]

By looking across the rows in Figure 1 above, it is clear that every aspect of the Stage 1 operation is covered by one or more approval assuring that there is full coverage of the Project through approvals. When regulating pilot projects, it is important to go through such a detailed analysis to ensure that no aspect of the operation is excluded from regulatory approval coverage. This also helps identify where the boundaries are in terms of regulatory responsibility in setting conditions on approvals. It will also help with reducing regulatory burden where overlaps are observed. Figure 2 below is a visual presentation of Figure 1 above.



Green – EPA and SRW, Red – DPI, Yellow – Planning and Land use

Figure 2. Coverage of project components by approving authorities (Sharma, 2008)^[6]

4. Impact assessment and planning approvals

In Australia, Commonwealth, State and Local Governments, assess if a proposal impacts on its surrounding environment. Generally, if a proposal is identified as having a considerable level of impact, then an elaborate process is followed to ensure that these impacts are identified, minimised and managed by the preparation of impact assessment and management reports and consulting the stakeholders associated with the project.

The Otway Project was referred to the Commonwealth Department of Environment and Heritage in March 2006 under the *Environment Protection and Biodiversity Act 1999*. In April 2006, the Department published the decision that the Project was not a controlled action - meaning an elaborate assessment process is not required. In essence, this Act applies a national and international significance test giving consideration to environmental and biodiversity factors e.g. flora, fauna, ecological communities, cultural and heritage values. As the Project is located on farmland, it posed no risks to environmental and biodiversity factors at national and international levels, so there was no need for the Project to be a controlled action.

A similar process exists at State level but as this Project is a small-scale trial which posed no impacts of State significance, the Project did not trigger the need to be referred to the Victorian Minister for Planning under the *Environment Effects Act 1978* for a decision on whether an Environment Effects Statement was required.

In terms of local planning requirements, initially, the planning scheme did not recognise carbon storage as a land use as carbon storage was a completely new activity, so in June 2007 the decision to amend the Moyne Shire Planning Scheme to accommodate the Otway Project was published in the Victorian Gazette.

5. Environmental authority approvals

In principle, any activity which has the potential to impact on the environment, should be referred to the environmental protection portfolio area for consideration. Similar to other Australian States, Victoria lists these environmentally relevant activities in Schedule 1 of the *Environment Protection (Scheduled Premises and Exemptions) Regulations 2007* which require approval from the EPA. At the time of the development of this Project, Schedule 1 did not include CCS.

Schedule 1 was since amended to include CCS as follows: “carbon sequestration - premises which capture, separate, process or store waste CO₂ for the purpose of geological disposal.” However, this amendment was made in 2009 after the approval of Stage 1 of the Otway Project. Furthermore, the carbon sequestration item in Schedule 1 was modified to exclude activities approved under the newly introduced *Greenhouse Gas Geological Sequestration Act 2008* which came into operation in December 2009.

It is worth noting here that including this item in the regulations, does not necessarily solve the problem of how this activity will be regulated because environmental considerations do not necessarily include other considerations such as safety, land access and liability.

The environmental protection legislation in Victoria allows for the collection of financial assurances for waste disposal facilities. Although the regulations were amended to include carbon sequestration, the financial assurance provisions were not activated for carbon sequestration operations. Further thought and discussion will need to take place prior to setting such a requirement on carbon sequestration operations.

As the approval process advanced, it was observed that the EPA regulators needed technical advice from the petroleum regulators at DPI in assessing the proposals and the various reports submitted as part of the EPA approvals. As such, the EPA forwarded reports submitted by the CO2CRC to DPI for advice because the expertise in the technologies used in CCS lie within the petroleum regulation unit of DPI.

After a number of meetings on how this Project would be regulated, it was resolved that the EPA would hold the overarching approval for the Project. However, the EPA regulators would seek expert advice from the DPI in assessing and approving the activities proposed as part of the Project. To date, the EPA regulators continue to work with the DPI regulators in administering this Project which has worked effectively.

The application for EPA approval for Stage 1 was submitted in November 2006 and the EPA approval was given (for a period of 9 years) in July 2007. The EPA approval included conditions which are:

- general e.g. requirements to adhere to environmental policies;
- prescriptive e.g. noise and liquid storage requirements;
- general management; and
- reporting requirements.

The environmental approval required an Environmental Improvement Plan (EIP) to be submitted prior to injection. The EIP was approved in December 2007.

The application for EPA approval for Stage 2 was submitted in May 2009 and the EPA approval was granted (for a period of 6 years) in October 2009.

An important step in approving the Project involved the setting of Key Performance Indicators (KPIs) with the EPA. In essence, KPIs were agreed outcomes which the proponent would demonstrate meeting via the monitoring and verification program, thereby providing evidence of compliance with the Project approval requirements. (Sharma, 2006)^[5]

6. Petroleum authority approvals

The application of the *Petroleum Act 1998* was a complex matter to resolve because whether CCS activities could be treated as petroleum exploration or development activities is somewhat ambiguous. For the purpose of approvals, the Project construction for Stage 1 involved:

- drilling and installation of the injection well, CRC-1;
- construction of the processing plant at the existing extraction well, Buttress-1;
- construction of the pipeline from the extraction well to the injection well; and
- installation of equipment at the monitoring well, Naylor-1.

Buttress-1 and Naylor-1 were existing wells which were inherited by the CO2CRC in the transfer of tenements from petroleum industry operators. So firstly, the CO2CRC had to apply for a transfer of tenements, PPL11 and PPL13, to gain control of the tenements.

The drilling and installation of CRC-1 was regulated under the *Petroleum Act 1998* as this activity could be considered to be “petroleum exploration” under Section 7 of the *Petroleum Act 1998* by virtue of the fact that the gas stream from Buttress-1 contained about 20% methane (CH₄), a hydrocarbon.

This activated an exemption from planning requirements under Section 119 of the *Petroleum Act 1998* so the approval for drilling from DPI was obtained expeditiously and construction could commence. In February 2007, CRC-1 was successfully drilled with approval from the petroleum regulators at DPI.

Prior to drilling CRC-1 (i.e. prior to commencing petroleum operations), the CO2CRC had to submit an Operations Plan, in accordance with Section 161 of the *Petroleum Act 1998*, which included an Environmental Management Plan, Safety Management Plan and Geological Prognosis.

Similarly, prior to extracting gas from Buttres-1, the CO2CRC needed to submit a Petroleum Production Development Plan, in accordance with Part 5, Division 6 of the *Petroleum Act 1998*, for carrying out petroleum production in a petroleum production licence area. However, it was questionable if the activity carried out by the CO2CRC actually fell within the definition of “petroleum production” in Section 8 of the *Petroleum Act 1998*.

In November 2007, the DPI approved an Operations Plan submitted by the CO2CRC covering the extraction and transport of CO₂ but excluding the injection component which was to be covered by the EPA.

The CO2CRC was exempted from the requirement to prepare a Storage Development Plan, in accordance with Part 5, Division 7 of the *Petroleum Act 1998*, which is a requirement prior to injecting any petroleum into a reservoir in a tenement area because of two reasons.

Firstly, it was questionable as to whether the storage proposed in this Project could constitute “petroleum production” as defined in Section 8 of the *Petroleum Act 1998* which specifically states: “Petroleum production is . . . (b) the injection and storage of petroleum in reservoirs for the purpose of later recovering it.” As there was no intention of recovering the injected material, it was considered safe to conclude that the CO2CRC would not need to prepare a Storage Development Plan.

Secondly, it was confirmed by this stage that the injection aspect of the operation would be covered under the EPA approval so the safety and environmental considerations were covered under the EPA approval with expert advice from the petroleum regulators who had experience with approving Storage Development Plans for the petroleum sector.

When the Buttress-1 gas mixture was tested at the early stages of the Project, it was expected that the gas would mainly be CO₂ because such wells existed in the area e.g. Boggy Creek where CO₂ is extracted commercially for soft drink production.

Upon testing it was found that the Buttress gas contained about 20% CH₄, which may have been immediately seen as a disadvantage to the Project because the Project is about storing CO₂. However, when it came to regulating the Project, this came as an advantage because as with the drilling of CRC-1, the presence of CH₄ meant that this activity could be readily regulated under the *Petroleum Act 1998* making the approval process more efficient with well experienced petroleum regulators and access to exemptions.

The construction and operation of the processing plant was regulated by both the EPA and DPI regulators. Although this may appear as an overlap in regulatory roles, this was needed because the EPA considerations focussed on the environmental aspects and the DPI considerations focussed on the safety and environmental aspects of the plant. So both regulators were needed to properly consider the overall implications of the plant.

The construction of the pipeline from Buttress-1 to CRC-1 could have been regulated in two ways. It could be regulated as a petroleum pipeline under the *Pipelines Act 2005*, or a gathering line under the *Petroleum Act 1998*.

The pipeline could fall under the *Pipelines Act 2005* because of the CH₄ content in the gas mixture because petroleum is defined in the *Pipelines Act 2005* as: “any naturally occurring or processed mixture of one or more hydrocarbons and one or more of the following: hydrogen sulphide, nitrogen, helium, carbon dioxide or water.” In this case, the gas mixture was CH₄ a hydrocarbon and CO₂.

As the approval process for a short (2 km) pipeline seemed unduly onerous under the *Pipelines Act 2005*, it was resolved to treat the pipeline as a “gathering line” under the *Petroleum Act 1998* which is defined (in Section 82) as: “a gathering line is a pipeline which is situated wholly within a production licence area and that is used (or intended to be used) or designed to convey petroleum (or a petroleum product) from one place to another in that area.”

Then the question was raised if it was possible to treat this pipeline as a gathering line considering the above definition refers to “within a production licence area” and the pipeline crossed from one production licence area to another.

It was later resolved that the pipeline in fact served as a gathering line although it straddles over two licence areas which lie adjacent to each other held by the same operator. The intent of the legislation would not be compromised in treating this pipeline as a gathering line. So the pipeline was approved as a gathering line under the *Petroleum Act 1998* which included environmental and safety considerations.

Once again as the petroleum regulators were familiar with approving such pipelines so this approval was processed quickly taking some of the burden of regulation from the EPA. Energy Safe Victoria was involved with reviewing safety considerations in approving this pipeline.

The other parts of the operation which were approved by the DPI regulators via Operations Plans included the installation of Naylor-1 and seismic survey work.

As mentioned previously, in Stage 2, CRC-2 was drilled under the *Water Act 1989* but with expert advice from the petroleum regulators in DPI, and the pipeline connecting into the new injection well was once again treated as a gathering line under the *Petroleum Act 1998* making the approval process less cumbersome.

7. Water authority approvals

Under Section 76 the *Water Act 1989*, a person needs approval to dispose of any matter underground by means of a bore. This approval is issued by SRW which is the authority responsible for protecting the ground water resources. In July 2007, the CO2CRC was issued with this approval (licence) for Stage 1 which was valid to 30 June 2010. In summary, this licence contained conditions relating to:

- monitoring, record keeping and management of quantities being injected;
- prevention of pollution; and
- annual reporting.

This approval could be seen as having an overlap with the EPA approval. However, this approval focuses on the protection of ground water resources and SRW is the organisation which has the most intimate knowledge of the quality and quantity of ground water resources in the area thereby making them the best placed regulator to consider the implications of injection. SRW considerations were an important part of approving this Project.

The annual fee specified in the licence is \$230. However, when calculations were made on the charges which apply to how much material is injected, the figure was much greater because the *Water Act 1989* did not cater for storage of large quantities of CO₂. Therefore, these charges were waived from this non-commercial research demonstration project and a more reasonable licence fee was set.

In Stage 2, the drilling of CRC-2 was approved under Section 67 of the *Water Act 1989*. The conditions of approval were basically well construction and installation requirements but the injection testing was carried out under the original licence issued for Stage 1 and of course the EPA approval which is the main instrument of approval for this Project.

8. Land access and compulsory acquisition

Land access matters are amongst the most sensitive issues for projects of this nature and it is important to capture any lessons from such experiences because land access issues can significantly impact on projects.

A land access issue arose which involved the matter of securing access to privately owned land on which a critical part of the Project, Buttress-1 was situated. The CO2CRC and the owner were unable to reach an agreement regarding access. Compensation offers were made by the CO2CRC which were rejected by the landowner.

Farmers in the Project area are well aware of generous compensation offers made by the petroleum sector when their land is accessed under Section 128 of the *Petroleum Act 1998*. However, petroleum operations are generally commercial operations, whereas this Project is clearly non-commercial.

To further paint the picture, pressure was building on this Project from its funding bodies to adhere to timelines and milestones set in funding agreements. However, as the options for resolving this issue is being investigated, timelines were slipping as this was an unforeseen situation.

The CO2CRC sought legal advice regarding options which may be available to resolve this issue. The options available through the *Petroleum Act 1998* required the matter to be dealt with by Victorian Civil and Administrative Tribunal in situations where the proponent (in this case, the CO2CRC) and the landowner were unable to reach agreement regarding access, which could be a rather lengthy and inconclusive process.

At this stage, covering the Project (or at least part of it) under the *Pipelines Act 2005* was considered because of the land acquisition provisions in Division 2 of that Act which allowed the Victorian Minister for Energy and Resources to compulsorily acquire land for the purpose of pipeline construction should this be deemed a necessary and appropriate course of action under the Act. However, this was not considered to be the most appropriate process, as the public notification and consultation process under this Act were seen as being unduly burdensome for this small scale Project.

The CO2CRC arrived at an option which was then taken forward, as outlined under Part 9A of the Victorian *Planning and Environment Act 1987*. This was considered to be the best option to facilitate required access to the land to enable the Project to proceed, whilst ensuring fair and reasonable compensation to the landowner.

Section 201F of the *Planning and Environment Act 1987* allows the Minister for Planning to declare a proposed development to be of “State or regional significance” by notice published in the Government Gazette. Under this process, the relevant authority (in this case, the Secretary of the Department of Infrastructure (DOI) compulsorily acquires the relevant land for the purposes of a declared project under Section 201I of the Planning Act.

The Minister for Planning may declare specified land required for a declared project to be “special project land” for the purposes of the Victorian *Land Acquisition and Compensation Act 1986*. Then the process in the *Land Acquisition and Compensation Act 1986* is followed (in this case, by the Secretary of DOI) in compulsorily acquiring the land required for the project where an agreement could not be reached.

At this stage, a communications plan was developed including a detailed schedule on how the above process would be followed and all of the senior officials involved were well briefed on the subject to ensure that they were able to answer any questions on the subject on especially why such a process was appropriate. The process went relatively smoothly and was completed within a short period of time.

In summary, an easement on the landowner’s property was compulsorily acquired temporarily transferring its ownership to the Secretary of DOI. Once the property was acquired, DOI was able to issue a licence to the CO2CRC on how they would conduct their operations taking the landowner’s concerns into account. Most importantly, an officer from DOI was allocated to mediate between the landowner and the CO2CRC which was a necessary step to ensure that any issues between the parties were closely monitored and promptly addressed.

After the commencement of construction, a compensation amount would be determined and paid to the landowner based on an independent valuer’s recommendations. Owing to the urgency of resolving this issue, Sections 7(1)(c), 106(1) and 26(4) in the *Land Acquisition and Compensation Act 1986* were utilised to expedite the land acquisition process.

Although this was one of the more challenging issues for the Project, the matter was resolved fairly, in the shortest possible time, without compromising the integrity of the approach and the Project could proceed. In summary, the lesson here was that land access issues need to be taken into account right at the start of the project and time and resources will need to be allowed for any difficult negotiations as was the case here. The land access issues not only apply to the project area but also to the envelope within which monitoring and verification activities are carried out as shown by the land access issues which surfaced during seismic survey work.

9. Miscellaneous approvals

In addition to the major approvals discussed above and other considerations including Native Title and heritage values, there were other authorities involved at various stages of this Project including:

- Energy Safe Victoria - e.g. safety aspects with the gathering line;
- Worksafe Victoria - e.g. use of explosives in seismic monitoring;
- Country Fire Authority - e.g. to notify any potentially fire generating activities; and
- Department of Sustainability and Environment - e.g. Crown land and State water monitoring bore access.

10. Transitional arrangements

The Otway Project had commenced in the absence of legislation specific to carbon storage but when Stage 2 was being developed, the *Greenhouse Gas Geological Sequestration Act 2008* was about to come into operation. Upon reviewing this Act, the CO2CRC's lawyers raised the matter that the new Act does not fully cater for the continuation of the Otway Project, so project specific regulations, *Greenhouse Gas Geological Sequestration (Exemption) Regulations 2009*, were made to exempt the Otway Project from the *Greenhouse Gas Geological Sequestration Act 2008* provided it had approval for its activities under the environmental, petroleum or water legislation as done with Stage 1.

11. Liability and responsible person

One of the important considerations in setting up a pilot project where a broad collaboration is involved is, who is going to take on the responsibility for being the operator of the site for the purpose of obtaining approvals. The CO2CRC at the time of this consideration was a joint venture consisting of about 30 partners from industry, research and government sectors. The joint venture was not a suitable entity to hold the approvals which were to be issued to this Project and a company needed to be created for this purpose.

In November 2005, for the purpose of creating an entity that could hold approvals to operate the Project, the CO2CRC Pilot Project Limited (CPPL) was formed consisting of a subset of 10 industry members from the original joint venture. The members of this company, CPPL took on the task of being an operator of a pilot project in a regulatory environment which was not entirely clear at the time and the issue of liability was starting to be debated. The members came from oil, gas and coal sectors making them ideally suitable to take on this role, being aware of the risks and liabilities in their own sectors and this knowledge which can be directly transferable to the new and emerging CCS sector.

The members took on the issue of liability seriously and sought to clarify the responsibility matrix early on in the project planning phase in order to reasonably understand the liability regime which would apply to this Project before allowing for the commencement of any operations.

After gaining an in principle understanding of how liability would play out as the Project progressed, they agreed to proceed with the Project. Generally, the operator would hold liability for the Project during construction and operations and for a period of time when monitoring was carried out for the purpose of demonstrating that the CO₂ has been stored stably. After requirements agreed between the operator and the regulator were met and when the tenements were handed back to government, the liability would transfer back to the State but this did not rule out any common law liabilities for the operator after this handover.

Furthermore, to bring matters to a balance, the following considerations were made in allowing the Project to progress:

- The site was selected carefully to guarantee success and every effort was made to use best practice control measures including a world class monitoring and verification program.
- The members involved are familiar with the risks associated with their respective sectors and is well placed to assist with minimising and managing the risks associated with this Project.
- Even if there was an incident, it would not be catastrophic as this is a small-scale, highly controlled and monitored experiment.

Another important consideration here is that, CCS projects are likely to have contractors working on site. The operators of the CCS projects will need to be mindful that if a contractor causes an incident owing to negligence on the operator's part to educate the contractor of their obligations, then the operator could be held responsible for the incident. So operators of CCS projects will need to give some thought to how contractors will be managed on site to minimise the possibility of an incident by informing the contractors of the regulatory requirements including the obligations associated with other stakeholders such as landowners.

12. Stakeholder engagement

One of the matters of critical importance to government, especially with a pilot project such as this where perception risks are high, is to ensure that any politically sensitive issues are managed properly. The engagement aspects of the Otway Project has been documented by Ashworth *et al* (2010) as a project which provides many valuable lessons for other CCS projects through its successes and difficulties.^[2] This section will focus on what was relevant to government in community engagement and communications aspects of the Project because managing these properly is an important part of the government approvals processes.

One of the things which worked well in the engagement strategy is the community reference group meetings which were attended by the local community, regulators and project experts. Having the regulators and the project experts in the room with the community was especially useful in allaying any concerns the community had in relation to the Project and CCS more generally, as the community could direct their questions to the people directly involved in the Project.

Local community attitudes transitioned from initially being quite sceptical about the Project and later being supportive of the Project and feeling comfortable enough to even answer questions from each other. This is clear evidence that the acceptance of this new technology will be improved with a proper education campaign and access to experts as confirmed in a recent study by Ashworth *et al* (2012) for the Victorian Government on understanding stakeholder attitudes to CCS in Victoria.^[1]

One of the greatest achievements of the CO2CRC in stakeholder engagement is allocating the funds to hire a locally based community liaison officer. This officer has made a significant contribution to this Project by keeping the local community and landholders onside, by individually hearing and addressing their issues.

13. Media coverage management

For government, one of the highlights of this Project was how the relationship with the media was managed. Both the CO2CRC and DPI monitored the media to capture any issues early and promptly addressed these issues, particularly in critical times such as during the process of compulsory acquisition and the Project launch when project critiques are likely to surface. The close relationship with the government helped with keeping government spokespeople well informed of any issues which may be raised with them.

The CO2CRC also effectively captured any media opportunities such as meeting project milestones and funding announcements to convey positive and accurate messages about the Project and more broadly the CCS sector. Effectively managing the media is undoubtedly a crucial part of any such project.

14. Summary of lessons

Finally, this Project presented a number of challenges from a government perspective but the team involved were able to work through each of these challenges and deliver an iconic Project for Victoria which has clearly put Victoria on the map as making a contribution to advancing the research into greenhouse gas technologies. The lessons from this Project are summarised below:

1. Adequate time and resources need to be allocated for the project approvals processes, particularly for pilot projects where the regulatory framework for the project is unclear.
2. Project operators and regulators should collaborate at the concept phase of the project to clarify the process for approving the project.
3. The project approvals should be appropriate depending on the scale and the impacts from the project.
4. Although a project may be approved by one authority, there may well be other authorities that need to be consulted for their specialised expertise.
5. The petroleum industry regulation model has a lot to offer for the carbon storage industry regulation and the expertise from regulating the petroleum sector is directly transferrable to the carbon storage sector.
6. Water authority approvals are an important part of regulating carbon storage projects, particularly where there are fresh water aquifers in the vicinity of the project.
7. Adequate time and resources need to be allocated for any likely land access issues even if a project is a small-scale, non-commercial research project.
8. In developing new legislation alongside having projects in operation, the transitional provisions need to provide for the projects already in existence.
9. Although, liability is a challenging topic to resolve, discussions must take place early on in the project planning phase to clarify the distribution of liability over time especially in the long-term.
10. Stakeholder engagement is a critical part of any pilot project and needs to be planned and managed carefully, including a proactive approach to managing media matters.

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References for further information

Generally, applications for approval and approval documents are public documents and can be accessed by getting in touch with the proponent (CO2CRC) and approving authorities (e.g. EPA, SRW, DPI, DOI), respectively. All Victorian Government Acts and Regulations are available on the Victorian government legislation website on <http://www.legislation.vic.gov.au/> and all gazettal documents are available from the Victorian Government Gazette website on <http://www.gazette.vic.gov.au/>. Further materials including media releases and publications are available from the CO2CRC website on <http://www.co2crc.com.au>.

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