

Critical issues for CCS communication & outreach activities in Australia

Peta Ashworth
TRIM: EP101441
February, 2010

Prepared for ANLEC R & D
Mark Davies





A report commissioned by Australian National Low Emission Coal R&D Program

Acknowledgment

The authors wish to acknowledge the financial support provided through Australian National Low Emissions Coal Research and Development (“ANLEC R&D”) by the Australian Government through the Clean Energy Initiative and ACA Low Emissions Technologies Limited.

Disclaimer

Use of the information contained in this report is at the user’s risk. While every effort has been made to ensure the accuracy of that information neither ANLEC R&D nor the authors make any warranty, express or implied, regarding it. Neither ANLEC R&D nor the authors are liable for any direct or indirect damages, losses, costs or expenses resulting from any use or misuse of that information.

The views offered in this report may not be considered as necessarily representative of organisations commissioning or undertaking this work.

Copyright notice ©

No reproduction of any part of this report may be sold or distributed for commercial gain nor shall it be modified or incorporated in any other work, publication or website. All reproductions of this report must be reproduced in full and must fully attribute authorship to the stated authors, unless you have the authors' express written consent.

Enquiries should be addressed to:
Peta Ashworth
Tel: 07 3327 4145

Distribution list

John Carras	1
Paul Graham	1
Mark Davies	1
Noel Simento	1

Copyright and Disclaimer

© 2010 CSIRO To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of CSIRO.

Important Disclaimer

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Acknowledgements: Front cover photo: Henry Browne/ Guardian News & Media Ltd 2010.
<http://www.guardian.co.uk/environment/2009/aug/25/climate-camp-protest>

EXECUTIVE SUMMARY

Across the world there are a multitude of stakeholders working to progress the rapid deployment of carbon dioxide capture and storage (CCS). Given the large resource investment required, both time and money, any savings that can be identified through enhanced coordination between projects and eliminating repetition will be welcomed by all. This report serves to meet that purpose for Australia by documenting issues that have arisen when considering outreach for CCS projects; highlighting key players currently with an interest in communicating about CCS projects; providing an overview of the current Australian programme; and identifying any gaps that exist. Finally the report makes recommendations for a body of research that ANLEC R&D may wish to implement.

There are a number of benefits and risks that CCS presents when it is first considered by various stakeholders. Understanding these is deemed important, because experience has shown that where commercially viable, societal acceptance is a critical issue for successful deployment. Recent experiences have shown that when some projects failed to identify a clear local benefit to the communities they were wishing to operate in their projects have been delayed or even halted. Other outreach issues that need to be addressed include:

- recognising the differences between awareness and acceptance and understanding when it is necessary to gain acceptance and when it is not;
- the importance of trust in the messenger;
- how prior experiences with companies, both positive and negative, can impact on whether CCS may be welcomed into a community;
- considerations around siting of storage and transport; and finally
- whether there is enough capacity to develop such an industry over the coming years.

In addition, there a number of issues unique to Australia which are identified such as our heavy reliance on coal fired power; the opportunity presented by having remote areas available for storage; regulations already developed for this emerging industry; and the lack of a price on carbon and additional problems that it may bring.

Identifying the range of projects and stakeholders here in Australia and further afield helps to make sense of the work that needs to be done to ensure no overlap and wasted efforts occur. The figure below demonstrates how this may be achieved. It separates the work currently being undertaken by focusing on whether they address either awareness or acceptance. Obviously the two can be interrelated, but to date, the investment in public outreach here in Australia has been quite poor. This means awareness is low with uninformed opinions presenting a high risk of localised opposition either through fear and uncertainty about the technology as well being more open to influence from negative debate. This in itself presents a strong argument for early engagement and to raise levels of awareness of the need for CCS and where it sits in the portfolio of mitigation options. Without adequate information and engagement, ultimately acceptance is likely to be more difficult. Although similar to other countries, it highlights how critical the first demonstration projects will be and how important it is to get the outreach right!

Given that many of the identified stakeholders already have a programme of outreach and communication activities planned or underway, there is an assumption in this report that these activities will be committed to. These activities are either focused on more generic raising awareness of the need for CCS, or are more specific communication and outreach in relation to

a specific project. Both will be critical because early research has demonstrated that the more experience individuals have with CCS, set in the context of climate change, allows them to discuss more freely their opinions. The opportunity to hear a range of view points often ends in them becoming more positive in their attitude towards CCS than they were when they first heard about the technology.

	Australia	International
Acceptance Projects	<p>PROJECT PROPONENTS*</p> <p>ANLEC R & D</p>	<p>IEA GHG R & D</p>
Awareness	<p>NLECC</p> <p>CSIRO</p> <p>CS TASKFORCE</p> <p>CO2 CRC</p> <p>NEWGEN COAL</p>	<p>GCCSI</p>

* Project Proponents may include both industry and government representatives.

Based on the review of activities that are currently planned, and separate to the proactive communication activities arising from the NLECC recommendations, there are three obvious research niche's that complement the roles of the ANLEC R&D programme. Some require proactive work while others are in the form of support to projects to ensure they optimise opportunities for successful deployment

The first is in relation to enabling an informed low emissions conversation at the national and opinion leader level. This can be done in a variety of forms but will be most effective when

coordinated with other communication activities that are taking place. Many of these conversations will be high level and one on one. However, there is also opportunity to use more deliberative approaches such as round table discussions, engaging politicians and their support staff through facilitated workshops and actively engaging representatives from other low emissions energy industries and non government organisations. ANLEC R & D's role could be to inform of the technological progress being made, updating on a national level the state of various R & D projects as well as communicating their findings about current levels of understanding and perceptions to the NLECC and others. This work can help to monitor progress being made at the national level.

The second option that seems appropriate is to set up longitudinal tracking of public perceptions of projects in the local areas in which they are occurring. This would be very helpful in supporting deployment of CCS projects in Australia. Employing a mixed methodology including baseline surveys, focus groups, and media monitoring in the local area will help to ascertain how knowledge and attitudes towards the project are developing over time. Ongoing monitoring will help alert project developers to any issues or misperceptions that may arise along the way and they can work to ensure clear messages are available to clarify the misperceptions that have developed.

A third option may be to liaise with projects to ensure that they work to identify a local benefit for their projects in the communities they are working with. The issue of local benefits has been identified as one of the critical components for projects long term acceptance. A deliberative research process that engages community and other stakeholders can be helpful in identifying the things that communities deem essential and the priorities they place on various options (Arvai & Gregory, 2003). One decision making research process that has been well developed for this activity is to take communities through a five step process that includes:

1. A clear understanding of the problem that is the focus – in this case a CCS project
2. Thorough exploration of the values and concerns, expressed as objectives, of the interested and affected parties
3. A list of potentially acceptable alternatives that address the defined problem
4. An understanding of how the alternatives perform; and
5. The need to address trade offs.

By engaging local stakeholders in such a process it is much easier for project proponents to define a local value proposition that works for all involved. Although not specifically the role for ANLEC R & D it may be useful for them to encourage projects to proactively engage communities clearly identify the local value proposition using a research process such as above. Some projects may require some help to define such a process and ANLEC R & D may be able to facilitate this learning.

There are other activities that could be undertaken but, as the current landscape sits, it seems that most other activities will be picked up either in response to the communication strategy developed as part of NLECC and the CS Taskforce reports, or through the higher level awareness raising work of the GCCSI. It is critical to ensure that the effectiveness of each of

the activities being undertaken is assessed and any gaps identified. It will also be critical to monitor the whole work program to ensure the current plan of suggested activities is actually delivered as otherwise it could mean a far greater role for ANLEC R & D to play to continue to move the debate forward with some degree of urgency.

CONTENTS

Executive summary.....	iv
1. Introduction	11
2. Review of issues	11
2.1 Common concerns and benefits of CCS	11
2.1.1 Identifying Local Benefits.....	12
2.2 Outreach issues that need to be addressed	13
2.2.1 Awareness versus Acceptance.....	13
2.2.2 Trust – who is the messenger.....	13
2.2.3 Legacy Issues.....	14
2.2.4 Capacity – available specialists to undertake the research	15
2.3 Unique or unusual Australian issues.....	15
2.3.1 Reliance on coal for power and overall delay	15
2.3.2 Remote areas for storage	15
2.3.3 Regulations developed	16
2.3.4 Lack of international and national motivation.....	16
3. Australian CCS Projects	16
3.1.1 Shortlisted Flagship projects.....	16
3.1.2 Australian Demonstration Scale CCS Projects	17
3.1.3 Australian Pilot Scale CCS Projects	18
4. Global state of the art	19
4.1 Key Australian Players	19
4.1.1 Department of Resources Energy and Tourism.....	19
4.1.2 State Government Departments	20
4.1.3 Global Carbon Capture and Storage Institute (GCCSI)	21
4.1.4 Australian Coal Association	21
4.1.5 National Low Emissions Coal Council (NLECC).....	21
4.1.6 Australian National Low Emission Coal R & D (ANLEC R & D).....	22
4.1.7 Carbon Storage Taskforce.....	22
4.1.8 CSIRO.....	22
4.1.9 CO2 CRC.....	22
4.1.10 Geoscience Australia	23
4.1.11 Australian CCS Websites	23
4.2 Key international players	24
4.2.1 Asia Pacific Partnership on Clean Development and Climate (APP).....	24
4.2.2 Carbon Sequestration Leadership Forum (CSLF)	25
4.2.3 International Energy Agency.....	25
4.2.4 European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP).....	25
4.2.5 Carbon Capture and Storage Association, United Kingdom.....	27

4.2.6	Regional Carbon Sequestration Projects, United States of America	27
4.2.7	World Resources Institute, United States of America.....	28
5.	Examples of International outreach projects impacting on deployment	28
5.1.1	Barendrecht, the Netherlands.....	28
5.1.2	Lacq, France.....	29
5.1.3	Greenville, Ohio, United States of America	30
5.1.4	Climate Camp, England.....	31
6.	Potential focus areas for ANLECR & D.....	33
6.1.1	Target Stakeholder Groups	33
6.1.2	Contextual considerations for communication in Australia	34
6.1.3	The communication landscape for Australia.....	35
6.1.4	Role for ANLEC R & D.....	37
7.	References	40

List of Figures

Figure 1 Map of stakeholders and their interest and influence in CCS.	34
Figure 2 Organisations facilitating CCS communication activities in Australia.....	36

List of Tables

Table 1 Identified risks and benefits of CCS	11
--	----

1. INTRODUCTION

There are many stakeholders, both in Australia and internationally, working to progress the rapid deployment of carbon dioxide capture and storage (CCS) as a way of mitigating greenhouse gas emissions. Given the large resource investment, both time and money, required to achieve this goal, there is little room for overlap or repetition. As such the Australian National Low Emissions Coal Research and Development Program (ANLEC R&D) commissioned this report to provide a review of outreach issues around CCS demonstration projects and to identify any gaps and recommend where it may be appropriate for ANLEC R & D to support research in the area to assist the deployment of CCS projects in Australia.

The report begins by summarising the risks and benefits currently being espoused by lay people and others when they hear of the concept of CCS. It then identifies a number of key outreach issues that need to be addressed to enable deployment of CCS in Australia. Next the report outlines the major projects that are currently on the table in various forms across Australia including the four shortlisted flagship projects. The players from within Australia relevant to outreach and communication for CCS are then summarised followed by international counterparts. Section five of the report summarises recent international examples that highlight where projects have met opposition and been delayed or cancelled as a result. The final section focuses on the Australian landscape and identifies what is a sensible body of research for ANLEC R & D to enhance and support the deployment of key CCS projects to 2015.

2. REVIEW OF ISSUES

2.1 Common concerns and benefits of CCS

In the earlier work sponsored by ACARP Ashworth et al., 2008 completed a road map of the major CCS communication activities that have taken place around the world. The benefits and concerns that were common across projects were summarised later in the article “From Research to Action: Now we have to move on CCS communication” which featured in the Special Issues of the 9th International Conference of Greenhouse Gas Control Technologies. The risk and benefits identified are listed in Table 1 below.

Table 1 Identified risks and benefits of CCS

BENEFITS	CONCERNS
It could provide a good bridge to the future	Safety risks of a CO ₂ leak
If successful, can avoid large quantities of CO ₂ from release to the atmosphere	The risk of contamination of ground water
Allows continued use of fossil fuels, which provides an economic advantage for some countries	Will it harm plants and animals near storage sites?
Energy security around the world	Assumption that CO ₂ is explosive

Helps to clean up coal fired power plants for developing countries who need access to energy	Is it the wrong solution for climate change, a Band-Aid?
Allows emissions to be reduced without having to change lifestyle too much	<p>Are there enough available storage sites?</p> <p>It appears to require a large infrastructure which does not necessarily exist today</p> <p>Long term viability issues</p> <p>Cost – economic efficiency</p> <p>Scale required for successful CO₂ mitigation</p> <p>It is an unknown technology</p> <p>Should not be pursued at the expense of renewable energy sources</p>

One of the critical issues that arise when examining this table in more detail is that there is a direct contrast between the risks and benefits. That is many of the risks are local in nature while all of the benefits tend to be more global. However, risk communication literature suggests, that for an emerging technology with perceived high risks to be accepted, there is a need to ensure benefits outweigh the risks almost two to one (Cormick, 2002). In addition, it is apparent that for CCS to be accepted then the benefits will need to be local not global in nature.

Liang (2009), discussed that many experts in China do not consider CCS as enabling energy security. Rather they find, the energy penalty required for the early stages of CCS development will mean less energy will be available for general consumption and therefore many Chinese will be disadvantaged. This is likely to apply in other developing countries as well.

2.1.1 Identifying Local Benefits

The issue of local benefits is likely to be one of the most fundamental issues that will need to be addressed for CCS deployment. Fortunately, where more remote communities are involved the benefits can often be more easily articulated because of the increased financial return any large infrastructure project will bring to a community. This was evidenced in early engagement work completed for one flagship project by the CSIRO in 2006. When hearing about the plans to build a pipeline to transport CO₂, responses from members of the local community who participated in a focus group was:

Pipeline! That has got to be good. It will surely mean that we can have a permanent doctor from now o

However, this is less likely to be the case in more built up areas. Where populations are denser, the local benefit will need to be more clearly defined. Project proponents may need to be prepared to negotiate around this topic and sometimes even be prepared to offer compensation or rewards for those communities to be one of the lead testing beds for CCS.

For example, a review of the Barendrecht case in the Netherlands (Kuijper, 2009), revealed that one of the major concerns for the residents in the local area was the likely affect of the project

on their house prices. Similarly, in previous years when the nuclear industry was being developed in the UK (Desbarats et al., 2009), one community was so opposed to the idea of housing a nuclear plant in their local area that they were offered free electricity in lieu of accepting the nuclear power plant. This in turn led to its successful deployment and operation. Hence the suggestion that project proponents may have to be prepared to offer some form of compensation if local benefits are not easily identifiable.

2.2 Outreach issues that need to be addressed

2.2.1 Awareness versus Acceptance

To date levels of awareness of CCS remain low. Although there has been some increase in recognition from earlier days, most likely a result of the work of the NewGen Coal website and their related activities combined with the more recent announcements by the federal government of the CCS Flagship program, public awareness and recognition of CCS will be an integral part of gaining the social license for CCS projects to be deployed in Australia. However, awareness does not always mean acceptance and vice versa. This point is best evidenced in the reflections below, of a leading psychologist researching public perceptions and acceptance of CCS internationally:

So, I don't know whether for successful implementation of CCS an informed and positive constituency and acceptance of CCS is needed. I guess that for the general public it goes that the majority is not motivated to process any information on CCS (and why should they?). For people living near CCS activities it might be that they are attentive at first (Is this safe?) and when they perceive reassuring cues (e.g. a highly credible source guarantees it is safe) they lose interest and don't oppose (note: this is not acceptance). However, when those cues are not reassuring (e.g. a source that is not trustworthy provides the same guarantee) residents perhaps search for more information and are probably susceptible for (also invalid) information on risks and this may result in opposition.

Leading organisational psychologist, email, 2009

Regardless of whether one is trying to raise awareness or gain acceptance of CCS any communication that takes place at the local level is really just the tip of the communications pyramid. In the absence of wider communication and engagement on the topic it will be difficult to engage local communities in dialogue around the specifics of a project. In some ways, a more global communication program focusing on the link between climate and energy mitigation as one of the least cost options of achieving a low carbon future needs to be highlighted.

2.2.2 Trust – who is the messenger

Trust will also be essential for CCS to be deployed within communities. The University of Leiden in the Netherlands has conducted extensive research around this topic and many of their findings are also applicable in Australia. For example, Bart Terwel found that most lay people

consider both environmental non government organisations (ENGOS) and industrial organisations to have significant expertise on the topic of CCS. However they expect industry organisations to act based on their economic motivations and with a vested interest in the technology. As such these organisations will gain most trust from communities when they are open about their reasons for doing a project i.e. economic gain and then perhaps environmental concern. If a company claims their motivations are from one of environmental concern and not economic gain they are more likely to be mistrusted.

On the other hand the public expect ENGO's to be involved out of their concern for the environment and therefore from a position of public good. As a result ENGO's tend to be more trusted than industry and government. Similar findings have also been reflected here in Australia. Terwel (2006) and Ter Mors (2006) found that involving multiple stakeholders with various views towards CCS is more likely to instill trust and help to foster acceptance of CCS projects. Combining forces with various groups of opposing viewpoints creates a much more credible project and information source for those in the public who are less familiar with CCS. The best example they gave was when an oil company joined forces with an ENGO in information provision. The public perceived the information to be of a higher quality than when either one provided the same information separately. Similarly such collaboration does not harm the individual reputations of each organization.

Trust therefore becomes a critical component of any communication activity and recognising the need to include multiple stakeholders will be essential for any ongoing information activities associated with CCS Flagship projects.

2.2.3 Legacy Issues

Experience from projects such as the Carson project in California, Ketsin in Germany and other US Regional Sequestration Partnerships help to highlight the importance of acknowledging that the legacy or a community's experience with previous and existing industries will impact on a their decision of whether to accept a CCS project in their local area or not. Specifically whether the experience has been positive, negative or neutral, will affect the way any new proposal is likely to be viewed by a community. This issue relates heavily to issues of procedural justice, that is: Is the process fair to all parties? Has it allowed everyone who wishes to participate, do so equally?

With the Carson project, procedural justice issues were raised by environmental justice representatives which affected the project in its early stages. The environmental justice groups expressed concern that low socio economic groups were being marginalised by the project and their rights were being infringed. This caused some delays to the projects however, the lack of a commercial value chain was the main reason this project was delayed until a more suitable commercial model could be found.

In addition to the regular issues raised with siting of a storage site, transport is also going to be an issue of considerable importance in Australia. This is mainly because the majority of projects will require an element of transportation of the carbon dioxide for it to reach the appropriate storage site. Although there is evidence of pipelines being successfully deployed elsewhere, this issue is still recognised as a major issue because of the need for pipes to

potentially move through built up areas, the need to acquire easements, and the overall costs associated with this component of any project. The Carbon Storage Taskforce has recently release their report recognising this issue and within that a number of other issues for stakeholder engagement are highlighted.

2.2.4 Capacity – available specialists to undertake the research

Although not often considered as a major issue it is worthwhile recognising that there is potentially a capacity constraint across Australia with enough skilled communication experts that understand the technology to conduct the appropriate outreach and communication programs for CCS. Some technical experts believe that such a program can be conducted by any PR or communications type person, however, time is needed for anyone involved in communication to get up to speed on the technology. Therefore, investing in educating experienced communicators in the topic may be an appropriate long term strategy for the technology.

2.3 Unique or unusual Australian issues

2.3.1 Reliance on coal for power and overall delay

Australia has been considered a leader in progressing CCS by many countries. With an energy supply so totally focused on coal fired power production, for those who believe in climate change there is little room to move without the development of such a technology at commercial scale. Given the uncertainty and perceived risks of CCS, the size of investment and enormity of infrastructure required to make the technology succeed there are several sceptics who doubt the technology will ever come to fruition. This scepticism is also becoming prevalent from within the CCS community itself where delays and inaction have become a breeding ground for doubt about the technology's real potential.

2.3.2 Remote areas for storage

Experiences from international projects have identified that local benefits are essential for CCS projects to be accepted. In Australia some of the early projects are situated in remote areas where such projects may deliver the hope of sustaining and accelerating economic prosperity for these communities. One of the clear advantages is that it is easier to engage in considered discourse with smaller communities where both the advantages and disadvantages can be tabled for a relevant project. This reduces the social acceptance risk, and may help to enable some of the early Australian projects' success, where they are planned for remote areas. Such societies are also more likely to notice the tangible benefits a project will bring to them. However, it must be recognised that this will not be the same for every project and as such attention will have to be paid to identifying the local benefit that allows key messages to be framed when communicating about the project.

Conversely, the sheer remoteness of the storage site can have a negative impact on the cost of the project mainly due to the amount of transport required. This includes the challenges of

building new pipelines to accommodate the movements of CO₂ in communities who may not understand the need for such pipelines. As such there will be a whole body of work around engaging communities across the pipeline easement as part of successfully deploying CCS.

2.3.3 Regulations developed

As a recognised leader in this area the early work completed by members of the Ministerial Council on Mineral and Petroleum Resources (MCMPR) has established some excellent regulatory principles to make it easier for projects in their planning processes. Although not all has been set in stone of the key areas that have been identified as show stoppers for CCS is the lack of regulatory frameworks to progress deals. It appears that the work already completed in Australia will hold all project proponents in good stead when the time arises.

2.3.4 Lack of international and national motivation

Failure of governments from around the world to secure “a deal” in Copenhagen in late 2009 has had some effect on CCS projects. Although there are still large amounts of international government funding promised for early demonstration projects, the lack of urgency, reflected by the Copenhagen failure has in some ways jeopardised the urgency to deploy projects.

In addition, Australia’s failure to secure an ETS, either through the CPRS or other mechanism had also highlighted that climate change does not seem to be as much of a priority for the Australian government as it was first thought. Although not essential to have a price on carbon, it does help to provide some greater opportunities to progress the likelihood of CCS. By placing some kind of investment in the environment through a carbon price it should assist early R & D projects achieve internal support where previously it may have been lacking.

3. AUSTRALIAN CCS PROJECTS

There are a number of Australian CCS projects that have been on the table at various times over the past few years. This section highlights those that have been selected as the shortlisted flagship projects and then other projects. They are listed in no particular order of priority. It should be noted that the list aims to identify the current projects at the time of writing. Any that have been suspended by project proponents are not included in this summary.

3.1.1 Shortlisted Flagship projects

As part of the Budget announcements in May 2009, the Australian government pledged \$2.425 billion over nine years for the Carbon Capture and Storage (CCS) Flagships program. This included \$2.0 billion in new funding, for development of low-emissions coal technologies and to support two to four industrial-scale CCS projects. As a result of a competitive process on December 8, 2009, the Minister for Resources and Energy, Martin Ferguson announced a shortlist of four CCS projects (<http://minister.ret.gov.au>). In no order of priority the four proposed projects include:

1. **CarbonNet Project** - in Victoria's Latrobe Valley which aims to store between 3 and 5 mega tonnes of CO₂ per annum, captured from coal-fired power plants in the region;
2. **Collie South West Hub** - southwest of Perth which aims to store up to 3.3 mega tonnes of CO₂ per annum, captured from surrounding industry including coal-fired power plants;
3. **Wandoan Power Plant** - northwest of Brisbane, generating 334 mega watts (MWe) and aiming to store up to 2.5 mega tonnes of CO₂ per annum; and
4. **ZeroGen Power Project** - west of Gladstone in Queensland, generating 400 MWe and aiming to store up to 2.0 mega tonnes of CO₂ per annum.

3.1.2 Australian Demonstration Scale CCS Projects

Gorgon Project

The \$841M Gorgon Project is a Chevron Australia, Exxon Mobil and Shell project, located at Barrow Island in Western Australia, the largest geological sequestration project of its type world wide. Construction of the LNG facility commenced in 2009 and will take approximately 5 years to complete. To date a data well has been drilled and a major study is underway of the subsurface. The project involves the geosequestration of CO₂ in a low permeability saline aquifer beneath Barrow Island, Western Australia. With a potential life of 40 years, the project anticipates the secure sequestration of 3.3 million tonnes of CO₂ per year, or 125 million tonnes over the life of the project.

HRL Mulgrave Capture Project

A consortium of local and international interests, including a Chinese power station equipment suppliers and developers, have come together to build and operate a commercial scale 550MW demonstration plant in the Latrobe Valley. Their aim is to produce 30% less carbon emissions than current coal fired power stations. The plant is planning to use integrated drying gasification combined cycle (IDGCC). At this stage, HRL claim the plant is to be operational by 2013. The project has received funding from both the Victorian Energy Technology Innovation Strategy (ETIS) and Federal government's Low Emissions Technology Demonstration Fund (LETDF).

FuturGas Project

The FuturGas project is a Hybrid Energy Australia and Strike Oil project which seeks to utilise a coal-to-liquids gasification process along with integrated electricity generation and carbon capture and storage to produce 10,000 barrels of ultra-pure diesel per day whilst generating low-emissions electricity. The coal-to-liquid component of the project is proposed to be located in Kingston, South Australia with a CO₂ storage site intended in the Otway Basin, in Victoria. A feasibility study is due to be completed in 2011, at which time an Environmental Impact

Study will also be available for public review, and comment. The project is still in the development phase of operation.

3.1.3 Australian Pilot Scale CCS Projects

Callide Oxyfuel Project

The \$206M Callide Oxyfuel Project is a CS Energy led joint venture that seeks to demonstrate the commercial feasibility and economic viability of retrofitting oxyfuel technology to existing CS Energy power stations, and potentially to new power stations across Australia and overseas. A small scale pilot project has been successfully completed along with a two year feasibility study into the technical and cost factors associated with developing the project. Following the completion of underground sandstone formations studies in the area surrounding Callide, construction commenced in 2008. Electricity generation reliability run tests were completed and civil works commenced at Callide A Power Station in 2009. Oxyfuel conversion is set to commence this year (2010). In 2011 the 30MWe demonstration phase of the project will commence. Completion of the project is anticipated to be in 2015 with potential commercial application by 2020 of >250MWe.

CO2CRC Otway Project

The \$40M CO2CRC Otway Project, an Australian Federal and Victorian State government led partnership with CO2CRC members and the US Department of Energy, is Australia's first CO₂ geosequestration and monitoring demonstration project. Located in Nirranda in South Western Victoria, the project has to date injected over 65,000 tonnes of CO₂ into its CRC-1 well. Marked with chemically benign tracer compounds the injected CO₂ is distinguishable from naturally occurring CO₂. This permits monitoring of CO₂ baseline levels against project life samples of soil, air, groundwater, and subsurface. Findings to date are in line with predicted modelling, with no evidence of leakage. A second stage to the project has been proposed following its success to date. This will involve drilling a second injection close to the existing CRC-1 injection site, and injecting 10,000 tonnes of CO₂ into the Paaratte Formation (1.5 km deep).

CO2CRC H3 Capture Project

The CO2CRC H3 Capture Project is a \$10M dollar joint venture between CO2CRC, International Power, and the Victorian Government. The project commenced in July 2009 at the Hazelwood Power Station in the La Trobe Valley in Victoria, the project seeks to determine performance of post-combustion capture technologies with brown coal flue gases, specifically through investigation of three large scale capture options, that is, solvent absorption, membrane separation, and vacuum swing absorption. As at late 2009, the project has been capturing some 25 tonnes of CO₂ per day. Potential capture is anticipated to be up to 50 tonnes per day.

Hazelwood Carbon Capture Project

The \$10M Hazelwood Carbon Capture Project is an Australian Federal and Victorian Government project (through the Low Emission Technology Demonstration Fund and the Energy Technology Innovation Strategy, respectively). The project, located at International Power's Hazelwood Power Station in the Latrobe Valley in Victoria, is successfully capturing and sequestering CO₂ at a rate of up to 25 tonnes per day through post-combustion capture. Sequestration of CO₂ is possible through a chemical sequestering process which results from combining solid calcium carbonate and plant ash water.

Loy Yang Project

The Loy Yang Project, a component of the Latrobe Valley Post Combustion Capture Project, valued at \$5.6M, is a joint CSIRO, CO₂CRC, Victorian Government project. Established in January 2008, the plant commenced operation in April of the same year, utilising post-combustion capture of CO₂ via solvent technology. Project objectives were to research and develop post-combustion capture technologies to determine best possible pathways for retrofitting these technologies to Australian coal and gas fired power stations. The pilot facility captured approximately 1000 tonnes of CO₂ per year.

Tarong PCC Project

The \$5M Tarong PCC Project has been established by the CSIRO and Tarong Energy with a view to capturing 1500 tonnes of CO₂ per year using post-combustion CO₂ capture applying amine technology. The pilot plant is located at the Tarong Power Station in Kingaroy, Queensland. Due for completion of construction in January this year, the pilot plant should have become operational in March at which time an experimental program was due to commence, with a completion date of June 2011.

4. GLOBAL STATE OF THE ART

4.1 Key Australian Players

4.1.1 Department of Resources Energy and Tourism

The Department of Resources, Energy and Tourism (DRET) has carriage for CCS within its portfolio. Its work has been instrumental in formulating Australia's position on CCS while at the same time developing Australia's reputation as one of the leading countries in the world to advance the technology. This is mainly seen through its advanced regulatory policies and other initiatives such as the Global Carbon Capture and Storage Institute (GCCSI) and the Carbon Storage Taskforce. More recently DRET is also helping to develop the Energy White Paper which will set the strategic planning for the range of technologies to be developed for Australia over the coming years.

Representatives from DRET are also actively involved in the Carbon Sequestration Leadership Forum. Australian representatives are well respected within the CSLF as they are considered critical advisers to countries who have been somewhat delayed in addressing regulatory and communication issues.

As an entity DRET's involvement in any communication and outreach activities will be critical, particularly in relation to off shore storage, ensuring adequate regulations, liability and attention to environmental issues are attended to in a responsible manner to enable safe and early deployment of the flagship projects. However, gaining support across departments can sometimes be time consuming. The support of the Minister is also important to advance societal awareness of an adaptive and resilient energy supply through engagement of other energy technology representatives, and the media in general. This will be helpful in progressing the overall awareness, acceptance and pre-requisites for successful CCS.

4.1.2 State Government Departments

There are several state governments who are active in supporting the deployment of CCS. Those most active are ones which have a heavy dependence on the coal industry for coal production, export and power generation. Each state government department has various responsibilities ranging from ensuring appropriate regulations for CCS projects to operate under are developed, through to ensuring local community concerns are heard by project proponents to minimise any negative perceptions arising in relation to the projects.

State governments are also responsible for environmental regulation in relation to projects that will be operating in their state. Up to now the major shortlisted flagship projects have their state government backing and it is expected that if selected, the state governments will also be responsible for working with the industry partners of the projects to ensure a high standard of communication and outreach is delivered.

This is already taking place in relation to Queensland where state government representatives from the Department of Environment and Resource Management (DERM) have been working closely with Queensland projects to ensure key messages are aligned and that they are kept informed of developments in relation to the EIS. Similarly in Western Australia, Department of Mines and Petroleum are heavily involved in progressing the Collie Hub proposal and related work and are likely to start community consultation in the near future based on their planned program of work.

While in Victoria the Department of Primary Industries has been proactive in hosting some public meetings in relation to their acreage release. It is worth noting that not all of these were very positively received and opposition to the concept was evidenced in several of the discussions. In addition in 2009 the DPI Victoria held a high level energy scenario planning exercise with influential stakeholders from across Victoria. The results of this work were delivered to their Minister and plans to communicate these findings to wider community are being considered. New South Wales Department of Primary Industries is also undertaking a wider exploration at present and as part of their clean coal bid they have sought proposal in relation to public awareness and acceptance.

4.1.3 Global Carbon Capture and Storage Institute (GCCSI)

The Global Carbon Capture and Storage Institute (Global CCS Institute) was announced by the Australian Government in September 2008 and formally launched in April, 2009. It has as its objective “to accelerate the commercial deployment of carbon capture and storage (CCS) projects to ensure their valuable contribution in reducing carbon dioxide emissions”. The Australian Government has committed AUD\$100 million annual funding over the next five years. The aim is for the Institute to work collaboratively with a range of government, non-government and industry organisations to achieve their deployment goals.

To date the Global CCS Institute has been actively recruiting employees to drive the program. Up to June 2009, they have allocated funding to various organisations and consultancies, where priority needs for CCS deployment have been identified. More recently, through their “Project Funding and Support Program”, where AUD\$50 million per annum has been made available as support to CCS projects across the world. More than 50 applications were received and they represent more than \$500 million in assistance sought which demonstrates the demand for co-investment/ subsidy/assistance to enable CCS projects become financially viable.

Also relevant to this work is that the GCCSI has contracted CSIRO to deliver a number of activities in relation to CCS communication and outreach. The contract is specifically designed to work with international research partners to address what the social research network has identified as gaps and opportunities to enhance information delivery in relation to CCS. Details of each of the projects deliverables are included in the report “Communication of carbon capture and storage: Outcomes from an international workshop to summarise the current global position” (Ashworth, 2010).

4.1.4 Australian Coal Association

The Australian Coal Association (ACA) is the peak industry body of the Australian black coal producers. Predominantly Queensland and New South Wales based but some members can also be found in Western Australia and Tasmania. The ACA has been integral in progressing CCS by establishing the Coal 21 fund in 2003. This was an early partnership between power generators, coal producers, unions, government and research bodies. As part of this it bought about the Coal21 fund which is raising over \$1 billion over ten years since 2006 through a coal levy to support CCS and other low emission technologies.

4.1.5 National Low Emissions Coal Council (NLECC)

The National Low Emissions Coal Council, established in July, 2008 brings together stakeholders to develop and implement a national low emissions coal strategy. This includes research and development, accelerating the deployment and commercial deployment of low emission coal technologies which includes CCS. More recently it made recommendations to the Minister based on early experiences with networking with government.

4.1.6 Australian National Low Emission Coal R & D (ANLEC R & D)

The ANLEC R & D was announced in June 2009 as the research and development arm of the National Low Emission Coal Council (NLECC). It has as its goal to implement a national program for low emission coal research and development to address research priorities identified in the NLECC strategy. It aims to address the critical research issues for CCS deployment in an Australian context, particularly in relation to the advancement of the 2015 to 2020 demonstration projects.

4.1.7 Carbon Storage Taskforce

The Carbon Storage Taskforce (CST), , incorporates representatives from the coal, power generation, petroleum and pipeline sectors and is convened on behalf of the Minister for Resources and Energy. The main objective of the CST is to develop a National Carbon Mapping and Infrastructure Plan in Australia. The CST summary report was recently released and the complete report is soon to be finalised. It sets out the priorities required to accelerate CCS deployment in Australia and is working closely with the National Low Emissions Coal Council.

4.1.8 CSIRO

The CSIRO has been actively researching public perceptions to low emission energy technologies for the past seven years. Working with the Centre for Low Emission Technology, delivering workshops on behalf of Rio Tinto and Zenergy it has developed a range of expertise in options for informing the public about CCS and other technologies. Over the past year a new initiative called Energymark is focusing on delivering information to the general public on climate change and the portfolio of options to reduce greenhouse gas emissions from power generation. This process also focuses on changing energy consumption behaviours in the household but is a way of increasing knowledge about the range of technologies and a general awareness of the portfolio of options. One of the key findings from all of the research is that when time is taken to discuss the technologies, particularly new and emerging technologies such as CCS, is that individuals who were unsure of the technology become more positive about it when they have been provided with information that is from an objective source, set in the context of climate change and as part of a diverse energy portfolio.

4.1.9 CO₂ CRC

The Cooperative Research Centre for Greenhouse Gas Technologies (CO₂CRC) is one of the world's leading collaborative research organisations focussing on CCS. It is well recognised for the expertise it brings in relation to CCS particularly through the work it has done on the Otway Basin research project. The CO₂CRC also provides access to a range of experts who are very helpful in dispelling myths in relation to CCS and will be critical to help in progressing demonstration projects in Australia. The CO₂CRC also has a dedicated education officer who is working with a range of stakeholders to ensure adequate materials for schools are developed and made accessible to both Australian and international partners. The CO₂CRC works closely with the IEA GHG R & D programme to facilitate their summer school program which is aimed

at building capacity for CCS across all areas of technical, regulatory and is now broadening to public perception and acceptance work.

4.1.10 Geoscience Australia

Geoscience Australia (GA) have been actively involved in many areas of the CCS world in Australia predominantly around providing advice to government in relation to geological storage of CO₂. It has also been working closely in relation to site selection for exploration release and works with many international bodies in the same area. GA is well trusted as experts on this topic. They have produced a number of factsheets and will participate in activities where appropriate to discuss with the public the issues in relation to storage. They are also working with the CSIRO's Division of Marine and Atmospheric research to measure carbon dioxide levels in the air.

4.1.11 Australian CCS Websites

As part of the research we used Google to locate the most common websites that would appear. Those websites that were in favour included:

1. www.newgencoal.com.au - the NewGenCoal website is the public face of the Australian Coal Association as an information source around low emission coal technology. The website aims to provide an overview of the climate change challenge and the role that CCS can play in carbon dioxide mitigation alongside other technology options. It attempts to address some of the more difficult questions individuals face in relation to the trade offs they might have to make for energy security, price of electricity and so forth. This is a valuable resource, however because it is governed by the Australian coal industry is most likely to be perceived as a message from a vested interest source and therefore less likely to be trusted.
2. www.csiro.au – CSIRO provides an overview of CCS and discusses some of the technologies that they are working collaboratively to develop. Provides a range of videos to demonstrate the technology as well as information around various alternative low emission energy technologies. Also has links to other websites.
3. http://www.ret.gov.au/resources/carbon_dioxide_capture_and_geological_storage/Pages/CarbonDioxideCaptureandGeologicalStorage.aspx - as mentioned earlier this is the website of the Department of Resources, Energy and Tourism. It has a direct link to the CCS website which provided information on the technology, Australian projects, legislation and international projects and organisations
4. www.co2crc.com.au – the CO2CRC website provides an excellent resource for a range of high quality information in relation to the technical information surrounding CCS. The website contains useful factsheets, videos and animations on not only the general processes of CCS but what is occurring at the demonstration project, Otway.

5. www.globalccsinstitute.com – The Global Carbon Capture and Storage Institute (GCCSI) aims to provide a range of information for projects, policy makers and so on to share. Their commitment is to knowledge sharing and the website is a critical tool.
6. www.new.dpi.vic.gov.au/energy/.../carbon-capture-and-storage-ccs - this is the website of the Victorian Department of Primary Industries which provides general information about CCS as well as further reading and links to projects in the state.

The two other websites that come up include www.energymatters.com.au and www.austrade.gov.au however both of these are limited in the information that they provide.

The six websites highlighted above are the main ones which come up as the first 30 - 40 most popular entries from the Google search. Drilling down it was found that no websites that appeared in the first 30 – 40 are opposed or negative towards CCS. Consistently the sites were CSIRO, GCCSI and the CO2CRC and then government websites. Obviously as more words are added to the search the more websites that appear.

However, if you Google climate change and CCS together a few other websites do surface in the search. Of those the following two seemed to employ a more negative approach.

1. www.aclimateforchange.org – this is a community social networking and news site focussed on climate change. Their goal is to create a space where people from all over Australia and the world can connect and share their experiences of climate change. You can join groups, blog, find and promote environmental events etc. It is a community driven site developed by OXFAM. You can come across both positive and negative blogs on CCS as it is just a vehicle for people sharing their opinions and blogging news.
2. www.greenpeace.org.au/blog/energy - this blog is run by Greenpeace Australia Pacific's climate and energy team to help keep abreast of the climate change debate. The website aims to expose what's political hot air and what are real climate solutions in the Australian climate debate from Greenpeace perspective. There is an archived section of CCS related articles of which the majority are opposed to CCS.

4.2 Key international players

4.2.1 Asia Pacific Partnership on Clean Development and Climate (APP)

The APP brings together seven countries to address the challenges of climate change, energy security and air pollution. It has a number of taskforces operating underneath it including the Cleaner Fossil Energy Taskforce which is helping to identify the potential for CCS in the APP countries. Although not critically engaged in outreach activities the taskforce can help to raise awareness within their countries particularly with influential stakeholders.

4.2.2 Carbon Sequestration Leadership Forum (CSLF)

The Carbon Sequestration Leadership Forum (CSLF) is an international climate change initiative comprising of 23 members. The CSLF brings together technical and policy experts to progress the development of CCS by identifying issues that need to be addressed for successful deployment. Both groups meet regularly at various times and places to review progress and identify further research directions as well as encourage collaboration across all stakeholders involved in CCS.

Relevant to ANLEC R & D includes the activities held by the CSLF through capacity building. Although these tend to be short awareness raising activities rather than in-depth capacity building the CSLF has recently been awarded money by the GCCSI to enhance this activity in various developing countries around the world. The CSLF also undertakes comprehensive media monitoring of all English speaking countries as well as issuing various press releases as deemed relevant to the CSLF. More recently, the CSLF has developed an Education Taskforce which is mapping the tertiary courses that are relevant to CCS and identifying opportunities for education to help build expertise across the CCS industry.

4.2.3 International Energy Agency

The International Energy Agency conducts a broad programme of energy research and publishes information on energy policies and practices. Their relevant areas that work on CCS related activities include the IEA Greenhouse Gas Research and Development Programme, the IEA Clean Coal Centre and the IEA Working Party on Fossil Fuels.

More recently the IEA GHG R & D programme has formally adopted the social research network and held their first two day network meeting in Paris in November 2009. Over 40 social researchers attended the event and a report on the findings arising from the two days is available through the IEA GHG R & D website. This group will be critical to the international research efforts for understanding the effects of various outreach activities for demonstration and commercial projects.

4.2.4 European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP)

The European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP) is a coalition of industry, research agencies and environmental non government organisations. This group of stakeholders work together to: enable CCS a key technology for combating climate change; make CCS commercially viable by 2020 via an EU-backed demonstration programme; and accelerate R & D into next generation CCS technology and its wider deployment post 2020.

The ZEP recognises a number of pilot projects including:

1. **CO₂Sink** – located near Ketzin, Germany was the first onshore pilot project to inject and store CO₂ in a deep saline aquifer. Its outreach activities were very well received and they worked hard to bring in key trusted locals as part of their

deployment program. For example, they opened the site at various times and had the local fire brigade provide barbecues for anyone that came.

2. **Lacq** – is located in south-western France – is the first integrated CCS application using oxy-fuel combustion from Total’s Lacq natural gas power plant. One unique aspect of this project is that it is not reliant on government funds. The project met some local opposition however, the company invested much resource, including the time of various senior organisational representatives to engage with the local community and discuss the issues they raised.
3. **Schwarze Pumpe** –. Located near Vattenfall’s existing 1,600 MW coal-fired power plant in north Germany this €70m demonstration aims to capture up to 100,000 tonnes of carbon dioxide a year and bury it 3,000 metres below the surface. The project has an output of 30MW of thermal power and is claimed as the world’s first based on oxyfuel technology for CCS at a coal-fired power plant. The pilot plant is scheduled to operate for at least 10 years.
4. **Niederaussem** – is Germany’s first post-combustion CCS pilot plant. It is a cooperation between RWE Power, “The Linde Group” and BASF. The aim of the pilot project is to significantly reduce the energy consumption required to capture CO₂.

In addition, there are a number of commercial projects which they showcase. These include:

1. **In Salah** – is a full-scale CO₂ capture and storage project between BP, Sonatrach and StatoilHydro. Since 2004 the project has been removing CO₂ from gas fields and injecting up to 1 million tonnes of CO₂ into a deep saline aquifer 2km below the surface. The major outreach and engagement for this project was with the government and locals who had some interest in the desert area where the project was undertaken.
2. **Sleipner** – is a Statoil project launched in 1996 to remove CO₂ from a natural gas field and safely store it in a deep saline aquifer formation below the North Sea bed. Because the project is predominantly off shore and in response to government legislation there was little outreach done in relation to this project.
3. **Snohvit** – is also a Statoil project where they aim to capture and store CO₂ from a natural gas field in the Barents Sea. Similarly the outreach and communication for this project has not been extensive as it sits under similar projects natural gas projects.
4. **Weyburn-Midale** – stores CO₂ in depleted oil fields in Canada. The project involved a 330 kilometre pipeline which connects the oil fields in Canada to a coal gasification plant in the United States of Australia. Within the area that this project operates enhanced oil recovery is a normal activity. Therefore little outreach and engagement activity was required.

4.2.5 Carbon Capture and Storage Association, United Kingdom

“The Carbon Capture and Storage Association exists to represent the interests of its members in promoting the Business of Carbon Capture and Storage (CCS). The Association works to raise awareness, both in the UK and internationally, of the benefits of CCS as a viable climate change mitigation option, and the role of CCS in moving towards a low-carbon global economy.”

Source: <http://www.ccsassociation.org.uk/> Accessed 1st November, 2009

The CCSA is a well respected advocacy group for CCS and has as its membership all of the key industry players that are interested in deploying CCS. They deliver a weekly newsletter which is a useful information piece providing an overview on all activities and news events that may have happened in relation to CCS. In addition they utilise the services of a professional communications company to assist them with promoting their work and organising events. Quite often these events are targeted at the influential stakeholders in particular finance, insurance and policy makers. They also participate in many of the side event activities in relation to the UNFCCC meetings.

The major aims of the CCSA include: encouraging the development of CCS both in the UK and internationally; to inform the range of stakeholders on the benefits of CCS as well as provide advice to policy makers on both regulatory and incentive issues that may be associated with CCS; to liaise with other groups, peak bodies and industries who have an interest in energy and potentially the role of CCS; and finally to encourage an exchange of information forum as well as enable networking opportunities to exchange information on CCS.

4.2.6 Regional Carbon Sequestration Projects, United States of America

There are seven partnerships that form the Regional Carbon Sequestration Projects (RCSP). These are based around geographical locations across each of the areas and are working to progress all issues related to CCS including technological, regulatory and public outreach, education and awareness. Although they operate independently of one another there is a large focus on sharing findings and results to assist in furthering the deployment of CCS. Just recently they published a manual of best practice in relation to outreach and this should become a valuable resource for all projects, not just those in the USA.

Best Practice Guidelines

Within the manual there are ten identified best practices that are suggested will help to enable a more successful engagement process for specific projects. The ten steps included:

1. Integrate public outreach with project management;
2. Establish a strong outreach team;
3. Identify key stakeholders;
4. Conduct and apply social characterization;
5. Develop an outreach strategy and communication plan;
6. Develop key messages;

7. Develop outreach materials tailored to the audiences;
8. Actively oversee and manage the outreach program throughout the life of the CCS project;
9. Monitor the performance of the outreach program and changes in public perceptions and concerns; and
10. Be flexible and refine the outreach program as warranted.

4.2.7 World Resources Institute, United States of America

The World Resources Institute (WRI) is a not for profit organisation that works closely on a range of issues relevant to policy makers and others. Under their climate, energy and transport section the WRI developed legal and regulatory guidelines in relation to CCS. They are now working on community engagement guidelines using a similar approach to developing the regulatory guidelines where a range of industry and research organisations are invited to contribute ideas to what would be helpful guidelines in relation to the topic. Their last meeting was held in February 2010 and will soon be sent to external reviewers to confirm the final content before publication.

5. EXAMPLES OF INTERNATIONAL OUTREACH PROJECTS IMPACTING ON DEPLOYMENT

More recently there have been a number of examples where projects have been delayed as a result of public opposition. Although not all of them with devastating effects it has left a question as to what might be the potential way forward for several of the projects. This section illustrates some of the examples where roadblocks have been met and the reasons provided for the opposition. Perhaps one of the most well known examples is the Barendrecht case in the Netherlands.

A more recent report which may be of interest to ANLEC R & D examines a range of energy technologies and their perceived or espoused overall support. It is titled “A review of the public participation practices for CCS and non CCS projects in Europe” and can be found at the following website.

http://www.communicationnearco2.eu/fileadmin/communicationnearco2/user/docs/Review_of_the_public_participation_practices.pdf

5.1.1 Barendrecht, the Netherlands

Within the Netherlands the Dutch government has been committed to progressing CCS as part of their portfolio of options for reducing greenhouse gas emissions. To help progress CCS the government was keen to have two smaller storage demonstration projects in operation before any major demonstration projects are launched in 2015. As a result in 2007, the Dutch government releases a tender invitation procedure to identify suitable projects. Preference was stated for an on shore location with an early start date.

As such the Barendrecht project was developed which is a cooperative CCS effort between Shell Netherlands, NAM (Nederlandse Aardolie Maatschappij) – the biggest producer of natural gas and oil in the Netherlands and OCAP (Organic Carbon Dioxide for Assimilation of Plants). Plans were to inject CO₂ from the Shell Pernis refinery into two depleted gas fields which are situated close to the Pernis refinery. Although the project met all of the technological, logistical and regulatory criteria for a feasible CCS demonstration scale project – it has been delayed and possibly shelved due to the resistance from the local community.

The potential CO₂ injection and storage site is located within a densely populated area. Citizens of Barendrecht are concerned mainly about the potential health risks arising from CO₂ leakage, and the perceived loss of value to their real estate. In February 2009, the city of Barendrecht rejected plans to store CO₂ in the underground gas field. The Mayor and city council members made their case against the project based on ‘supposed’ expert advice. Margriet Kuijper, Shell, introduced the term “NATME: Not According To My Expert” at a conference in November 2009. She identified NATME as a critical influencer in public opinion as there are many considered “experts” within society and it is difficult to control their messages when they have a vested interest in either supporting or averting a project progressing. The major argument that arose opposing Barendrecht was that CO₂ has the potential to interact with underground rock formations, cements and pipeline and other potential risks would include the upward movement of the surface as a result of an increase in rock formation volumes.

Other key elements identified by Shell as to why the project failed was first because of delayed communication by the national government. The lack of a local value proposition, although the project provided national and global benefit via learning, all of the risks and impacts were at the local level with very little benefit to outweigh the risks and finally the risk perceptions challenges of the project were not taken into account when communicating about the project. At the time of writing there was still no final decision as to whether the project would go ahead or not.

5.1.2 Lacq, France

The Lacq project is unique in that it is completely funded through the organisation and not dependent on additional financial support from the government. This allows it much freedom in the way it may engage constituents affected by their project but at the same time everyone was serious in their approach in gaining acceptance so worked hard to achieve a positive outcome. Similar to other work being done Total found that the majority of locals had no understanding of the concept of CCS and as such were neither for or against the technology. However, once they heard more information more of them become negative towards CCS.

Luc de Marliave from Total suggested one of the challenges for deploying a project is being able to monitor the range of discussions going on. In this case there were three areas that were needing focus. The first was technical and scientific developments and dialogue with the scientific community. The second, was public awareness, environmental NGO’s, and other elected representatives and third, the administrative instruction process, regulatory framework, formal submission documents etc.

Overall they had a number of priorities to address in relation to their public outreach which included:

- Sharing the opportunity of having such a project in the area and provide information of the Lacq pilot
- Provide a better understanding of CCS technology context, issues and therefore promote CCS technology deployment
- Have all questions raised in able to propose answers
- Provide information on short and longer term scientific follow up and monitoring
- Help identify project possible contribution to local socio-economic development
- Demonstrate transparency and provide access to relevant information

Despite all of the best intentions not everything went to plan and several of the community still raised questions about the project. As such several high level representatives from Total were made available to meet with the local communities to discuss their concerns. Key findings from the process included:

- The importance of allocating adequate resources early in the process and understand all of the relevant stakeholders by mapping all of the social relationships that would impact on a project
- Acknowledge the asymmetric decision making rule, that all participants in the dialogue will not take part in the final decision, but all participants in the decision making take part in the public dialogue.
- It is essential to establish the right level and timing of stakeholder management including both those at the local and regional level and those at the national level.
- The importance of the proper timing for public consultation
- That it was more efficient to have the technical project people available to answer questions during consultation; and finally
- That the public generally have a limited understanding of geoscience and there is a need to understand this lack of knowledge when communicating about CCS.

5.1.3 Greenville, Ohio, United States of America

The Greenville Project was a US\$93 million project that was to be partly funded by the Battelle Memorial Institute (US\$32 million, including US\$3 million from the State Government of Ohio) and the United States Federal Government (US\$61 million). Residents opposed the project fearing that seismic activity and a decline in property values would result. In addition, the State Representative for Ohio, Jim Zehringer, opposed the project in separate letter to the Director of the Ohio Department of Transportation, who would have been responsible for issuing the permit to conduct seismic tests. Subsequently, the Battelle Memorial Institute has withdrawn their funds from the project, and the proposed supplier of CO₂ (Andersons Marathon

Ethanol LLC) has not agreed to be involved, effectively preventing the project from going ahead.

One of the key groups that opposed the Greenville project was a group known as “Citizens Against CO₂ Sequestration”. It has been particularly public in its opposition of the project, via public demonstrations and a website (see <http://citizensagainstco2sequestration.blogspot.com>). They argued that “[sequestration] is instead the same out-of-sight, out-of-mind way that problem wastes have been handled for years”. They have now made themselves a focal point for opposing any onshore storage in the USA. Their website also makes the following claims:

“We do not consider this to be “green technology” – it is an experiment and we are the guinea pigs! It is an experiment that risks our health, safety and environment – funded mostly by your tax dollars. Let’s not leave this experiment for future generations to clean up!”

It finishes with a general call to arms inviting all and sundry to email an address stating

“This site was created for people all over the world opposed to CO₂ Sequestration (CCS)”

5.1.4 Climate Camp, England

Climate Camp is a movement which began in August 2006 with a demonstration staged at Drax coal fired power station in West Yorkshire in the UK. It is a movement that organises temporary camps for environmental protesters. Its website describes it as *“a place for anyone who wants to take action on climate change; for anyone who’s fed up with empty government rhetoric and corporate spin; for anyone who’s worried that the small steps they are taking aren’t enough.”* Camps usually culminate in a day of mass action at a climate change target.

In 2007, Climate Camp openly targeted Heathrow airport to protest the building of a new third runway and in 2008 it move to Kingsnorth power station Kent. E.ON have proposed a new coal fired power station. On April 1, 2008 Climate Camp protesters were also found outside the European Climate Exchange protesting to the G20. The Climate Camps are moving outside of England and are now targeting Scotland, Wales and Northern Ireland.

5BEXAMPLES OF INTERNATIONAL OUTREACH PROJECTS IMPACTING ON DEPLOYMENT



Climate Camp protesters on the 'No new coal march' in 2008.

Photograph: Leon Neal/AFP/Getty Images

<http://www.guardian.co.uk/environment/2009/aug/25/climate-camp-protest>

6. POTENTIAL FOCUS AREAS FOR ANLECR & D

This section has been written under the assumption that work proposed by other Australian organisations identified above is either underway or will commence in the near future. This is because a number of recommendations that were made in earlier documents to the CS Taskforce have identified a plausible way forward. However, there are still some questions about where the work might sit and who will take the lead to implement all that is proposed. As such it is not guaranteed but without it any successful deployment is more likely to be minimal.

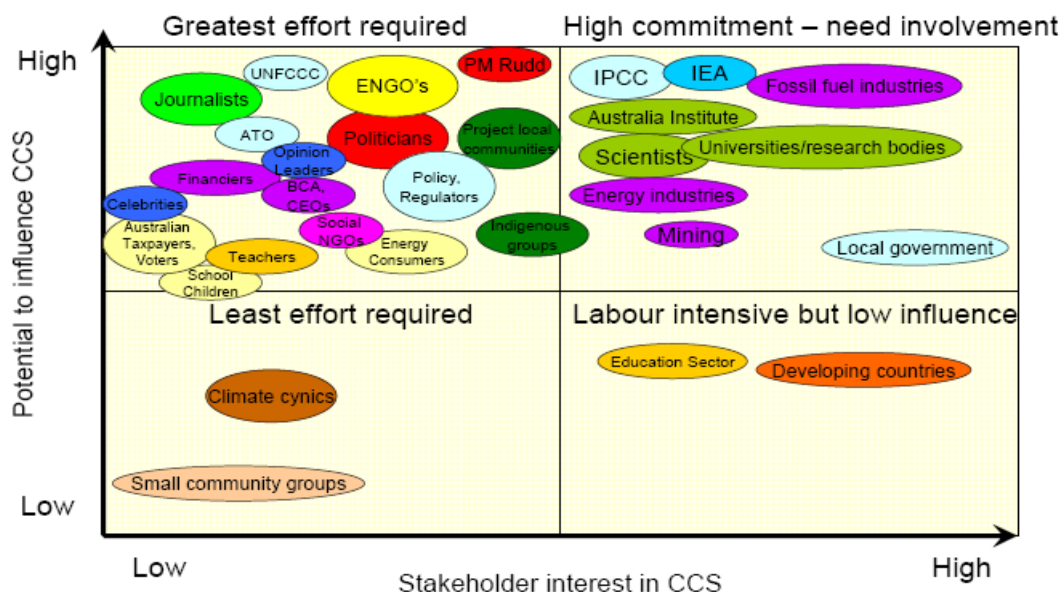
6.1.1 Target Stakeholder Groups

As a result of earlier research Ashworth has identified a way to segment audiences when considering communicating about CCS. These include:

- Influential others – includes CEO’s of major organisations necessary for deployment e.g. financial and legal organisations, policy makers and non government organisations. This area requires high resource investment including money and time.
- Community – refers to the wider community and can include large and small groups and the wider Australian public.
- Education – includes targeting not only school education programs across all levels but also wider institutions such as museums, libraries and so forth.
- Project specific – focuses on the areas directly impacted by a proposed project. Within this group it is recommended that the three target groups identified above are also identified and focused on within the local area.

Each of the target groups are explained in more detail in the report “A strategic approach for communication and outreach activities of CCS” prepared for the Carbon Storage Taskforce (Ashworth, 2009). In the report the range of stakeholders are mapped on a common grid to show their potential to influence CCS deployment compared with their interest in CCS. The stakeholder map is shown in Figure 1 below.

Figure 1 Map of stakeholders and their interest and influence in CCS.



Source: Ashworth, 2009. A strategic approach for communication and outreach activities for CCS. Page 16.

6.1.2 Contextual considerations for communication in Australia

In addition to the stakeholder mapping exercise, Ashworth (2009) identified a number of contextual considerations for communication about CCS. These are also relevant for this exercise and have been included below.

1. The increased momentum by governments best reflected in the increased allocation of funds including the \$2 billion for industrial scale demonstration projects in Australia
2. Communicating to ensure all stakeholders understand the reason for the size of investment required, the diversity of portfolio technology options and costs to achieve a low carbon future for Australia. The portfolio cost needs to be one of the focal points in communicating the results of the CS Taskforce’s work.
3. The need to engage proactively with the range of representatives from alternative energy technologies, including for example, geothermal, solar thermal, biomass, wind, and tidal industries.
4. Developing a common message that is understood and supported by government, industry and the general public is also critical. Suggestions for this common messaging include the need:
 - a. To include energy efficiency as any part of the mitigation solution

- b. For increased communication about CCS and other alternative energy technologies that is easy to understand, accessible and in the right format
 - c. To understand the sense of urgency to address climate change across all levels of society through communicating the impacts of climate change and range of mitigation options.
5. Timing – not only the time needed to communicate with the range of stakeholders about the findings of the CS Taskforce. But also, the time required for exploration and proving storage sites, as well as the actual time required to build a project.
 6. Siting - both for transport pipelines and ultimate storage sites. The CS Taskforce is producing schematic versions of maps showing emissions nodes, pipeline connections and storage regions which need to be communicated proactively to the communities that will be impacted by the infrastructure.

Following on from the release of the Carbon Storage Taskforce (CST) and that of the National Low Emission Coal Council (NLECC), a small steering group was formed to progress the recommendations in relation to communication and outreach of CCS in Australia. Facilitated by the Department of Resources, Energy and Tourism (DRET) a communications consulting company was engaged to develop a fully costed communications strategy for CCS across Australia. That strategy has now been presented and endorsed by the steering group however the actual organisation responsible for taking the strategy forward is yet to be agreed upon. There are implications for consideration by ANLEC R & D which include being aware of the overarching messages and direction being taken so that these can also be used to complement the work of ANLEC R & D.

6.1.3 The communication landscape for Australia

Figure 2 below takes into consideration all of the players that have some input and impact into CCS communication in Australia at present. It should be noted that project proponents may include both government and industry organisations, depending on how each project is structured. As such individual government organisations have not been identified within the matrix figure below. The figure also only shows those most relevant to Australia and has excluded the wider international organisations except those that may directly have some input into local communication here in Australia.

The two organisations that reach across both international and Australia include the IEA GHG Social Research Network (SRN) through CSIRO's involvement and the GCCSI. The GCCSI currently seems to be working on both awareness raising and acceptance issues and hence are shown to fall across both of these areas. It is still unclear as to exactly what role the GCCSI will be playing in relation to the communication of CCS projects in Australia however they are participants on the steering group of the NLECC work and are expected at some stage to make further contribution and support to Australia's demonstration projects.

Figure 2 Organisations facilitating CCS communication activities in Australia

	Australia	International
Acceptance Projects	<p>PROJECT PROPONENTS*</p> <p>ANLEC R & D</p>	<p>IEA GHG R & D</p>
Awareness	<p>NLECC</p> <p>CSIRO</p> <p>CS TASKFORCE</p> <p>CO2 CRC</p> <p>NEWGEN COAL</p>	<p>GCCSI</p>

*May include both industry and government organisations depending on funding sources

Although the figure delineates between awareness and acceptance, any awareness raising exercises should be helpful in creating a more positive perception of CCS which is likely to have some impact on demonstration projects being accepted. Therefore, the work that is currently underway by each of these groups is relevant and acknowledged as contributing to overall work undertaken by demonstration projects.

In addition at times representatives from organisations such as the CO2CRC may be important in attending information evenings, individual briefings to help answer questions that stakeholders may ask. Similarly, CSIRO has been used as a knowledge broker for a range of industry and government workshops, research programs as they do not have a vested interest in any one technology. This provides them with greater credibility to talk honestly about the pros and cons of each of the technologies and in this case CCS. The importance of the need for an

independent is probably best highlighted in a recent excerpt of Hansard reporting from the Queensland government.

There was no positive alternate independent view put forward; it was either opposition or nothing. That caused me concern. It is my understanding that people who have concerns are not necessarily opposed to this project; they just want independent information. I ask the minister to release any independent information that she may have in regard to this particular project. The concerns are primarily around contamination of groundwater and land. There have been other pilot projects but nobody can find any ongoing projects. They have all been pilot projects that have not progressed or there have been negative reports with regard to them. When one hunts for information it is difficult to find anything but negativity.

Queensland Parliament, Hansard Reporting, 2010

6.1.4 Role for ANLEC R & D

Given all of the work that is currently planned there appears to be three areas that ANLEC R & D that would be an appropriate role for a research focus and these are elaborated on below.

Enabling a low emissions discussion

The first is in relation to enabling an informed low emissions conversation at the national and opinion leader level. This can be done in a variety of forms but will be most effective when coordinated with other communication activities that are taking place. Many of these conversations will be high level and one on one. However, there is also opportunity to use more deliberative approaches such as round table discussions, engaging politicians and their support staff through facilitated workshops.

As part of this discussion there is an opportunity for ANLEC R & D to actively engage representatives from other low emissions energy industries and non government organisations. ANLEC R & D's role could be to inform of the technological progress being made and updating on a national level the state of various R & D projects. As part of this role it will be important that ANLEC R & D communicate their findings about current levels of understanding and perceptions of CCS and associated projects to the NLECC and others.

Longitudinally tracking the public's perception of projects

The other gap that seems to exist, that would greatly assist in supporting the deployment of CCS projects in Australia is for ANLEC R & D to track local public perceptions to a CCS project over time. That is, ascertaining the impact of the project on local community opinions and how they change as the project develops and hopefully becomes assimilated into the local environment.

There are many ways that such a tracking process could be undertaken and it would draw on a mix of qualitative and quantitative research methods. Researchers could work closely with

project proponents to ascertain the levels of engagement that are taking place, for example community liaison groups, meetings with local councils and so forth. In addition, baseline surveys and focus groups would be conducted to understand what the community knows about the project and their attitude and perceptions to it. Monitoring local media would also add another dimension to longitudinal research. These activities could be repeated on an annual or six monthly basis to ascertain any changes in knowledge and opinions over time.

Such research should commence almost immediately in the project areas and form an ongoing monitoring and evaluation process. The data that is collected in this way would make a rich background of testimonials for other CCS projects as they come on line and it would also provide excellent feedback to decision makers and the wider Australian community. However the main advantage of beginning such a longitudinal research project is that it provides a far more accurate assessment of the community's perceptions to the project and can allow the early identification of any misperceptions or areas of negativity that may arise. Monitoring in this way allows the opportunity for issues to be corrected speedily, with the correct information that acknowledges the concerns of local stakeholders.

Identifying Local Benefit

Although overall outreach for projects will be completed by the project proponents, a critical issue that has been experienced with other CCS projects internationally has been the failure to identify any local benefits for communities hosting a CCS project. There is an opportunity for ANLEC R & D as a key CCS research arm to assist project proponents with the research element of identifying local benefits using a methodology that focuses on what communities' value and are prepared to trade off. Although not the responsibility of ANLEC R & D there is an opportunity to play an integral part in assisting projects identify local benefits in a systematic way.

Review of several of the case studies have shown that by failing to articulate a clear local benefit many communities are likely to become more opposed. Many planning processes for CCS and climate change as well as other environmental or social problems—are aimed at creating detailed inventories of stakeholder concerns, monitoring tools, and mitigation options. Often the discussions of the elements by both stakeholders and technical experts are poorly structured with the result that only the most salient (but not necessarily most important) aspects of the process receive attention. It is also frequently the case that certain participants are able to dominate discussions, and hence the overall planning process, leading to an inequitable focus on certain concerns, monitoring tools, or options.

This is problematic because it leads to plans that reflect the personal or research agendas of individuals or groups rather than a systematic and defensible assessment the problems and potential solutions that affect the broadest possible array of affected parties. One way to overcome this issue is to use a methodology developed by Professor Joe Arvai from Michigan State University where instead of generating a long list of concerns, tools or options it is better to develop a comprehensive and action-oriented plans. To do this a series of deliberative sessions involving stakeholders and technical experts that together comprise five basic elements.

1. A clear understanding of the problem that are the focus of the planning event – the way problems are stated will frame the decisions that follow both in who the people to involve are and identifying alternative courses of action.

2. A thorough exploration of the values and concerns, expressed as objectives, of the interested and affected parties – carefully eliciting objectives will help to determine the concerns and values that should be the focus of the planning efforts. Ensuring a wide range of diverse viewpoints are included is critical to ensure that one area is not over looked. Participants would likely include a mix of local residents and technical experts who may be from industry, government agencies or universities. From this it is possible to differentiate between means and ends objectives to identify what is important for the final product. A process can then be used to prioritise the outcomes and what most people value within the local project.

3. A list of potentially acceptable alternatives that address the defined problem – what is different about these alternatives is that because they were developed with both stakeholders and decision makers they are likely to be more accepted by both groups.

4. An understanding of how the alternatives may perform – establishing the consequences of all alternatives under consideration is an essential element of the planning process. The measures identified in step 2 above can help to guide the monitoring and evaluating the options under performance. In doing so it is also important for the experts to acknowledge any uncertainties that arise as a result of this process.

5. The need to address tradeoffs – this is probably the most difficult step in the process. The time when different view points question whether the overall approach is really worth it. Assigning weights to the original objectives can also be helpful as part of this process.

A deliberative process that engages community and other stakeholders in this way is very helpful in identifying the things that communities deem essential, the priorities they place on various options and therefore helping to define a local value proposition that works. Although an investment of time and resources is needed in this process, it does empower stakeholders involved in the process accept the decision made. Conducting research in this way through ANLEC R & D also allows priority areas and local benefits to be shared between project proponents. Although they will not always be the same it can be helpful to know what similar communities value in relation to their CCS projects.

There are other activities that could be undertaken but, as the current landscape sits, it seems that most other activities will be picked up either in response to the communication strategy developed as part of NLECC and the CS Taskforce reports, or through the higher level awareness raising work of the GCCSI. It is critical to ensure that the effectiveness of each of the activities being undertaken is assessed and any gaps identified. It will also be critical to monitor the whole work program to ensure the current plan of suggested activities is actually delivered as otherwise it could mean a far greater role for ANLEC R & D to play to continue to move the debate forward with some degree of urgency.

7. REFERENCES

- Arvai, J.L. & R. Gregory. (2003) Testing alternative decision approaches for identifying cleanup priorities at contaminated sites. *Environmental Science & Technology* 37:1469-1476.
- Ashworth, P. (2009). A strategic approach for communication and outreach activities of CCS. Prepared for the Carbon Storage Taskforce. P2009/966. CSIRO:Brisbane.
- Ashworth, P., Boughen, N., Mayhew, M., Millar, F. (2009). From research to action: Now we have to move on CCS communication. *International Journal of Greenhouse Gas Control*. Volume 4, Issue 2, March 2010, Pages 426-433 (available online 2 Dec 2009)
- Cormick, C., (2002) 'Australian attitudes to GM food and crops – changes in public attitudes to GM technology' *Pesticide Outlook* 13(6), 261–264.
- Desbarats, J., Upham, P., Riesch, H., Reiner, D. et al. (2010) “A review of the public participation practices for CCS and non CCS projects in Europe” and can be found at the following website.
http://www.communicationnearco2.eu/fileadmin/communicationnearco2/user/docs/Review_of_the_public_participation_practices.pdf
- De Marliave, L. (2009) Case study: communicating CCS and public dialogue. Demonstrating CCS in an onshore site in Europe. The current status of the Lacq integrated CCS project. *Presentation to Communication for CCS projects Conference*, Paris.
- Queensland Parliament. Hansard Record of Proceedings: First session of the Fifty Third Parliament, Tuesday 23 March, 2010. www.parliament.qld.gov.au/hansard/ Page 954.
- Kuijper, M. (2009). Public Acceptance of onshore CO₂ storage in depleted gas fields. Theory and practice based on the Barendrecht company pursue me. *Presentation to Communication for CCS projects Conference*, Paris.
- Reiner, D. & Liang, X., (2009) Stakeholder perceptions of demonstrating CCS in China: A Study for UK-EU-China Near Zero Emissions Coal Initiative (NZEC)
<http://www.nzec.info/en/assets/Reports/CamNZECWP52finalrevisions97-03v28aug09Update.pdf>
- Queensland Parliament (2010). Hansard Record of Proceedings: First session of the Fifty Third Parliament, Tuesday 23 March, 2010. www.parliament.qld.gov.au/hansard/ Page 954.
- Ter Mors, E., Weenig, M., Ellemers, N. & Daamen, D. (2006). *The influence of communicator expertise and trustworthiness on acceptance of CCS technologies*. GHGT-8, 8th International Conference on Greenhouse Gas Control Technologies, Trondheim: Norway.
- Terwel, B., Harnick, F., Ellemers, N., & Daamen, D. (2006, June 18 - 22). *Just say what they expect you to say: The influence of argumentation on trust in organizations*. Paper presented at the 8th International Conference on Greenhouse Gas Control Technologies (GHGT-8), Trondheim, Norway.



Contact Us

Phone: 1300 363 400

+61 3 9545 2176

Email: enquiries@csiro.au

Web: www.csiro.au

Your CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.