Towards a Public Communication and Engagement Strategy for Carbon Dioxide Capture and Storage Projects in Scotland

A Review of Research Findings, CCS Project Experiences, Tools, Resources and Best Practices

Working paper SCCS 2010-08

Jim Hammond and Simon Shackley

Scottish Carbon Capture & Storage

Author affiliations:
Jim Hammond - Scottish Centre for Carbon Capture, University of Edinburgh.
Dr Simon Shackley - Scottish Centre for Carbon Capture, University of Edinburgh.

Working Paper SCCS 2010-08
Available at: **www.sccs.org.uk/publications.html**
Reported output from Scottish CCTS Development Study, Work Package 4, Stakeholder/Public Information and Communication.
Published 2010.

Reviewed by Dr. Stewart Russell, Institute for the Study of Science, Technology and Innovation, University of Edinburgh.

Executive Summary

In order to develop carbon capture and storage (CCS) technology and deploy it in time to mitigate the worst effects of climate change many more CCS facilities must be constructed. The IEA CCS Roadmap suggests that 100 large projects will be required by 2020 and 3,400 large projects by 2050 (IEA 2009). This massive scaling-up of activity is well recognised by industry and government, and it is increasingly being recognised that the public is a key stakeholder in this process. Since 2008, a number of small- to large-scale CCS projects going through the planning process began to encounter opposition from local communities and were either cancelled or have gone ahead in a reduced form due to local public opposition.

The purpose of this report is to stimulate the design of effective engagement strategies between the public and proponents of CCS projects in Scotland. Engagement is the process of having an informed, two-way discussion as to whether a CCS project is appropriate in a particular locality and context. Successful engagement is not a guarantee that every project will go ahead. Projects may be rejected by publics even if they are technically viable, and establishing if this is the case early on would greatly speed the search for a suitable site. However if the reasons for a CCS project are sound, the plans carefully laid, and social conditions favourable, a good engagement strategy should greatly increase the chances of acceptance. Key steps towards public acceptance have been identified (Figure I). Whilst not every step will be necessary for every stakeholder, during an engagement campaign this is the likely minimum information which will be required.

This report delivers a non-prescriptive approach to designing an engagement and communications or outreach strategy. For example, options ranging from zero public input to very high levels of public input are described and the arguments given for each. Common public concerns with CCS are described and issues arising from aspects of the CCS chain are listed. Most notably, offshore storage seems preferred to onshore storage, although there is currently little empirical evidence to back this up.

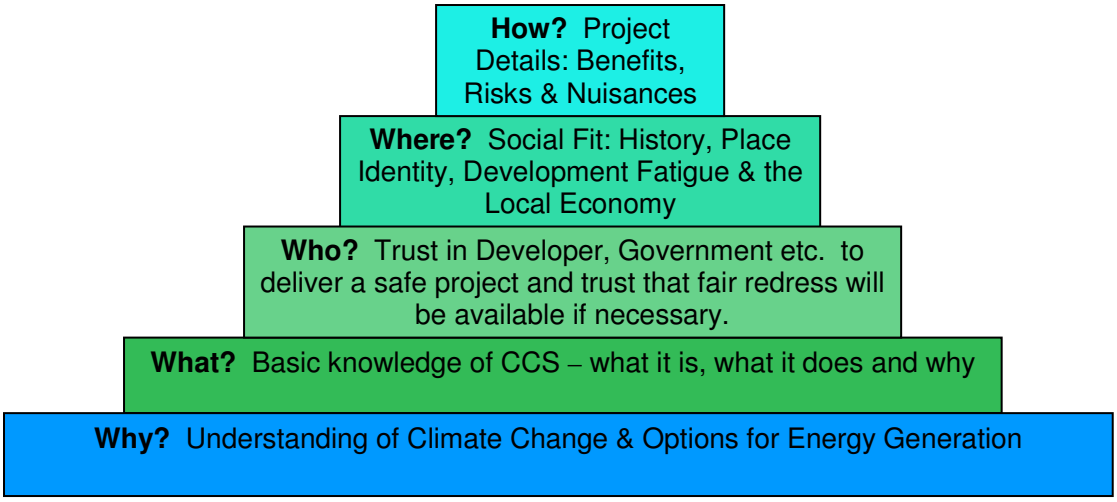

Figure I. Steps towards public acceptance of CCS projects.

The focus of this report is at the local to sub-national level – i.e. individual projects and engaging with local publics and stakeholders. Engagement with the wider public on what CCS is and why it may be necessary is extremely useful and important in preparing local communities and stakeholders and enabling them to make informed decisions about individual projects. There is at present a gap in that no organisation has advanced this goal national level public engagement (either in Scotland or the UK as a whole). Such a process would also help to align public understanding of the role of CCS within wider policy attempts to limit greenhouse gas emissions, and provide a forum for the public at large to decide if it is indeed an approach they wish to endorse.

Best practice on engagement globally has been delivered by the seven Regional Carbon Sequestration Partnerships (RCSPs) in the USA which has generated a wealth of valuable experience. A more systematic approach to public and stakeholder engagement at the EU scale is greatly needed. One of the key findings of the RCSPs is that public understanding of technical issues is not as important as is commonly believed by industry and government. Rather, public trust in the developer, regulators and government (at various levels) to:

- deliver truthful information and a safe project;
- operate a transparent and fair decision-making process;
- be accountable should things go wrong; and,
- to treat local publics fairly in the distribution of economic benefits and any hazards;

turned out to be more important than technical information on the project detail or risk assessment. This is not to imply that hazards and risks of environmental and health and safety impacts are not of concern to communities. It does suggest, however, that the sense of empowerment enjoyed by a community – that is, the degree to which it has a 'voice' which is heard by the powerful ('those in charge') – has a strong influence over its willingness to embrace unknown technologies.

Locations and communities differ greatly, even within a small geographic area, and the 'social fit' of a project in its local context can be an important indicator of potential public acceptance or opposition. Relevant factors can be assessed through social characterisation, including: local relationships (historic and contemporary) with the fossil fuel and energy industries; the suitability of the project to the character of a place (e.g. rural idyll or industrial town); reactions to other recent infrastructural developments; and the fit with the needs of the local economy (including any compensation which might be part-and-parcel of a development).

Successful engagement strategies have maintained a civil dialogue between publics / stakeholders and developers, have often involved independent expert and stakeholder endorsement, and have created transparent, participative processes for decision-making. Public trust in a developer can be lost when it is thought that: information is being withheld, the public's concerns are not being taken seriously and/or that risks are not being thoroughly assessed. Once public trust in a developer is lost it is very hard to regain, and constructive dialogue becomes much more difficult and, in some cases, impossible. Without constructive dialogue, positions may become polarised into either support or opposition, and an impasse may be reached.

This report provides the theory and practice for implementing good engagement and communication strategies and for maintaining positive developer-public and stakeholder relations. Key concerns for publics are summarised and key issues arising from analysis of CCS cases are discussed in the context of literature on engagement and the planning process. Tools in the design of an engagement strategy are outlined and practical resources such as different engagement techniques, communication and outreach materials and working with the media are listed. Where

appropriate we provide references to other useful resources. The document guide below (table 1) presents a summary of the topics covered and guides the reader to the appropriate location in the document and sources of further information.

Document Guide

Topic or Issue	***Section***	***Location in Report***	***Description and Notes***	***Further Resources***
Background				
Definitions of key terms	Box 1	p.13	Definitions of key terms including engagement, communication, publics, stakeholders.	
Levels analysis; the need for wider engagement	Section 1.2 Figure 1	pp.14-19 p.16	Engagement operates at different levels from local to international – but who delivers what is not so clear.	Ashworth et al (2007); Reiner (2008).
Analysis of CCS and gas case studies	Table 2 Section 2.2 Annex 1	pp.21-25 pp.26-34 pp.105-156	Summary table Key observations Detailed case summaries.	Desbarats et al (2010); Total (2008).
Findings from CCS public perceptions research	Table 3 Table 4 Section 2.3	pp.36-37 pp.38-39 pp.35-43	Key concerns from hypothetical CCS Key concerns from actual CCS cases Discussion of studies	See Tables 3 and 4.
Useful concepts in understanding public responses	Section 2.3.2.1 Section 2.3.2.2	pp.43-44 pp.44-45	Trust, fairness and accountability NIMBYism and place identity	Bradbury et al (2009) Divine-Wright (2009)
Towards an Engagement Strategy				
Different styles of decision making (degrees of public participation)	Table 6 Section 3.1.1	p.49 pp.48-54	Summary table of main styles Description and discussion of styles	Held (1987); Van Zwandenberg and Millstone (2005)
Engagement for different purposes	Figure 6 Section 3.1.3	p.57 pp.56-57	From engagement for pure research to engagement for a real project. Summary figure and discussion.	
Risk Communication	Box 2 Section 3.1.2	p.56 pp.54-56	Communicating risk to non-technical audiences. Summary box and discussion.	IRGC (2005)
Designing an engagement	Figure 7	p.59	Summary: the elements of a strategy	NETL (2009)

strategy	Section 3.2.1 Figures 8-10	pp.58-69 pp.60-62	Descriptions and discussion of elements Examples of different strategies.	
Matching engagement and project timelines	Section 3.2.3 Figure 11	p.71	Early and continued engagement matched to technical and regulatory project timelines	Bellona (2009), NETL (2009) pp.38-41.
Early engagement	Box 3	p.65	Social characterisation	Wade and Greenberg (2009)
Stakeholder Engagement	Box 4 Box 5	p.66 p.67	Criteria for an inclusive process Info box on stakeholder identification.	NETL (2009), pp. 17-22; IRGC (2005)
Media Engagement	Box 8	p.82	Info box on media engagement	NETL (2009), p. 23, p. 47; US NIST (2002)
Evaluation of the engagement process	Box 7 Table 7	p.70 p.70	Example criteria by which to evaluate the outcomes and process of an engagement campaign.	Rowe & Frewer (2000)
Best practice guidelines for engagement and communication	Table 8	pp.72-77	Summarises key points and main uses of various sets of guidelines for CCS engagement and communication campaigns.	See Table 8.
Implementing a campaign				
The CCS Chain	Table 9	pp.78-81	Breaks down CCS into the relevant component variables and examines likely issues arising from each.	
Engagement techniques	Table 10	pp.83-88	Strengths, weaknesses and examples of the various engagement techniques	See Table 10
Communication and outreach techniques	Table 11	pp.89-93	Strengths, weaknesses and examples of the various communication techniques	Reiner (2008), US NIST (2002), NETL (2009)
Materials for use in outreach and communication	Table 12	pp.94-96	List of existing publicly available resources for communicating CCS to publics.	See Table 12

Table 1 A guide to the contents of the report. We also refer the reader to selected high quality guidance on aspects of CCS public engagement, outreach and communication.

Contents

1 Introduction

Carbon dioxide capture and storage (CCS) is viewed by many governments, businesses and non-governmental organisations (NGOs) as an essential part of the solution to mitigate the worst effects of climate change. It is such an attractive solution because it holds the potential to abate between 15 and 50% of anthropogenic greenhouse gas (GHG) emissions by 2050 (IPCC 2001, IEA 2009), and it permits the continuation of fossil fuel burning for power, which delivers security of supply and a steady base load without requiring the shift to a radically different energy system. Carbon dioxide capture and storage also has its detractors, who consider that the continuation of fossil fuel use is an argument against CCS and that resources would be better spent developing and deploying more sustainable energy systems such as wind, solar or tidal. Critics of CCS regard it as costly and unproven, doubt the long term integrity of carbon stores and argue that it contributes to carbon lock-in (Shackley & Thompson, forthcoming).

At present, five industrial scale and more than a dozen smaller scale CCS facilities have deployed, tested, and demonstrated the technology in action. Some facilities have demonstrated aspects of the entire chain (e.g. only carbon capture), and some have demonstrated the entire chain (IEA 2009). Developing the technology is essential to bringing down costs, and verifying the predictions of carbon dioxide (CO_2) behaviour once injected is essential to the long term efficacy of CCS.

In order to develop the technology and deploy it in time to reduce GHGs to a level considered to avoid dangerous climate change, many more CCS facilities must be constructed. The IEA CCS Roadmap suggests that 100 large projects will be required by 2020 and 3,400 large projects by 2050 (IEA 2009). This massive scaling-up of activity is well recognised by industry and government, and it is also being increasingly recognised that the public is a key stakeholder in this process. A number of proposed facilities have been cancelled or have gone ahead in a much reduced form due to local public opposition.

1.1 The Scope of This Report

The purpose of this report is to help in the design of effective engagement strategies for CCS projects. This entails factors specifically relevant to CCS – such as the safety concerns arising from onshore storage – and factors relevant to any new infrastructure project – such as the degree of public input into decisions. We review public perceptions of and reactions to CCS projects, and draw upon insights gained from the wider literature on public engagement and responses to infrastructure developments. We make explicit different modes of engagement and other factors which influence the design of an engagement campaign. Finally, we cover the more practical components such as communication and engagement techniques and materials already developed which can be used to inform publics about CCS.

Engagement is a two-way process of providing information and collecting responses to it – what is done with the responses collected varies. This report is not a set of 'best practice guidelines' stating what *should* be done: these have been written, are based upon strong evidence and are listed in Table 8. The present report lays out all the different options and choices to be made in designing an engagement strategy; lists factors influencing public responses and the evidence upon which they have been based. We hope that an engagement strategy based upon well informed decisions will be a good engagement strategy.

The focus is at the individual project level, and as such we do not discuss in detail the options for engagement at national level (although this would be a valuable step towards facilitating CCS deployment). We do however outline the need for more strategic thinking – and action – around wider engagement and CCS.

We focus particularly on public responses and less so on other stakeholders for the reasons that stakeholder responses are fairly well understood and most developers already have set practices for dealing with stakeholders. Where guidelines have

already been written we do not seek to re-write them; we have guided the reader instead to the relevant section of the relevant document.

Box 1: Key Definitions

Communication: The use of remote or direct means to convey a *one way* flow of information. A range of media can be used, though the most frequent are pre-prepared written and audio-visual material.

Engagement: Undertaking a *two-way* process of communication and interaction between a proponent (developer, government department, etc.) and an affected party – e.g. stakeholders, lay public, local community, sub-group of the community, etc.

Public: the lay population who are not organised in formal groups. The public is split into the affected public (experiencing a direct impact from the project) and the observing public (not directly impacted)

Stakeholders: socially organised groups that are, or will be, affected by the outcome of the event or activity and/or by the management options taken in response to that activity.

Outreach: the use of written or audio-visual media to communicate with a target population (e.g. leafleting, web-based media, TV or radio, etc.). The delivery of information is remote and one way.

Media: those organisations involved in preparing, presenting and broadcasting or otherwise disseminating written, audio-visual (TV and radio) and web-based communications.

Opinion formers: individuals who are influential in establishing, maintaining or challenging particular opinions and viewpoints on the event or activity.

1.2 Strategic Thinking on Engagement for CCS Deployment

Communication and engagement around CCS has not moved as quickly as might be expected considering the scale of deployment envisaged by proponents (Reiner 2008; Ashworth et al 2009; Shackley et al 2009). The fact that public knowledge is low will make it more difficult for each new project to achieve acceptance or support from local publics. Discussion of, and familiarity with, CCS at national level would help local publics to understand the issues if a project is proposed in their own area.

1.2.1 **Levels**

Bodies delivering engagement to publics and stakeholders operate on many levels – from international to local (Cash et al. 2006). Some topics which are discussed during engagement strategies relate to higher or lower levels – climate change and national energy planning relate more to national or international issues, and may be better delivered by a national or international body. In contrast, issues such as local environmental changes, construction, jobs and perceived risks are more local in nature, and may be better delivered by local level bodies – such as the developer of a project. This type of level analysis may be seen in Figure 1.

Project developers can and do deliver engagement at local level, and the Zero Emissions Platform (ZEP) is committed to engagement at European level, but there is a gap at regional and national level. No group has yet taken it upon itself to engage the general public in the UK, although some groups have stated intentions to do so or are beginning to address this gap. Launched in March 2010, the Office of Carbon Capture and Storage states one their main goals is "raising levels of understanding about CCS within governments, industry and the public" (OCCS 2010). The Carbon Capture and Storage Association (CCSA) have begun initial work on communication at the national level. The Scottish government have conducted a stakeholder consultation informing the recently published roadmap (Scottish Government and Scottish Enterprise 2010), acknowledge that "governments will have a crucial role"

and advocate a coalition of government, NGOs, academia and industry to address public awareness issues. Promisingly, engagement activities are included in the Scottish Government roadmap; but a more proactive approach than has been stated will be necessary to achieve the goal of public acceptance. The UK Government conducted during 2009 a stakeholder consultation which received over 2250 responses and has informed UK policy and plans for CCS development (DECC 2009). The UK Government also states its intention to "Increase public awareness and stimulate an informed debate on the role of CCS in mitigating climate change" (HM Government 2010). It should be noted that stakeholder engagement does not necessarily lead to public acceptance and that stakeholder engagement and public engagement are distinct activities and should be treated as such.

Discussion and debate regarding CCS at national level may help local projects through increasing public knowledge and understanding, but also in other ways too. Susan Owens (2004) points out that local disputes may become a substitute for a wider national dialogue in the absence of any opportunity to participate in that wider national debate. Local disputes can become a forum for expressing frustration or discontent with wider issues.

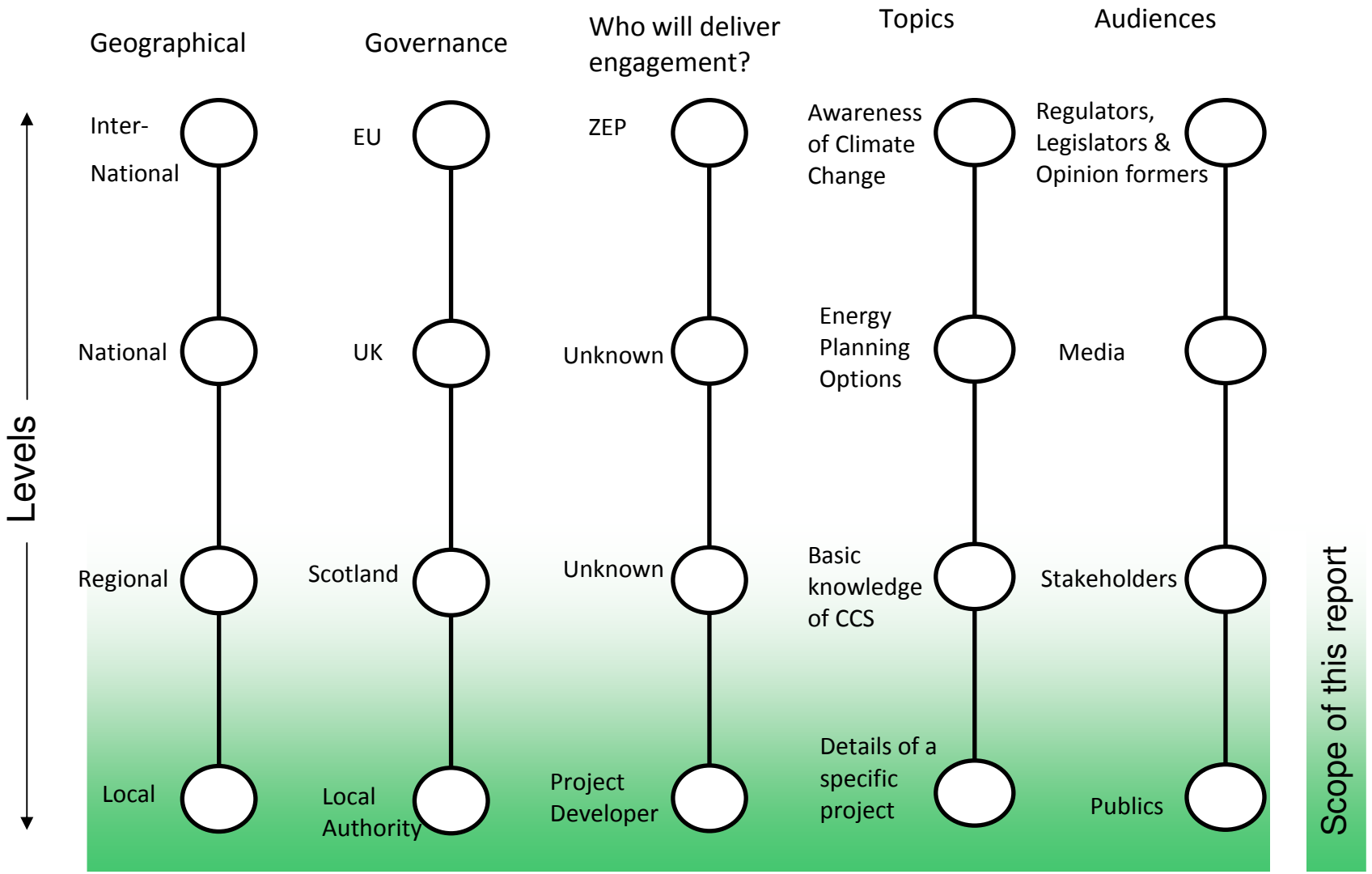

Figure 1 Levels of various aspects relevant to CCS engagement, relevant to Scottish CCTS Development Study.

1.2.2 **Interactions between levels**

Levels are not fixed, discrete units and there is much interaction between levels. Goals at one level may build upon goals achieved at other levels – for example the goal of nationwide CCS deployment would not be possible without individual projects going ahead; and appropriate high level support is required for individual projects to proceed (Wilson et al 2009). Some harmonisation between actions on different levels is therefore desirable. Figure 2 illustrates the concept of multi-level interaction, showing how various levels of engagement activities may build to influence one person.

Some media – for example the internet – cut across levels, presenting local events globally or making global events locally relevant. Cross level alliances are also possible, between opposition groups or advocates. This type of alliance often strengthens the weight of argument and the staying power of the group. An example would be national protest organisations with an anti-fossil fuel agenda joining up with local groups opposed on grounds of visual intrusion and local nuisance.

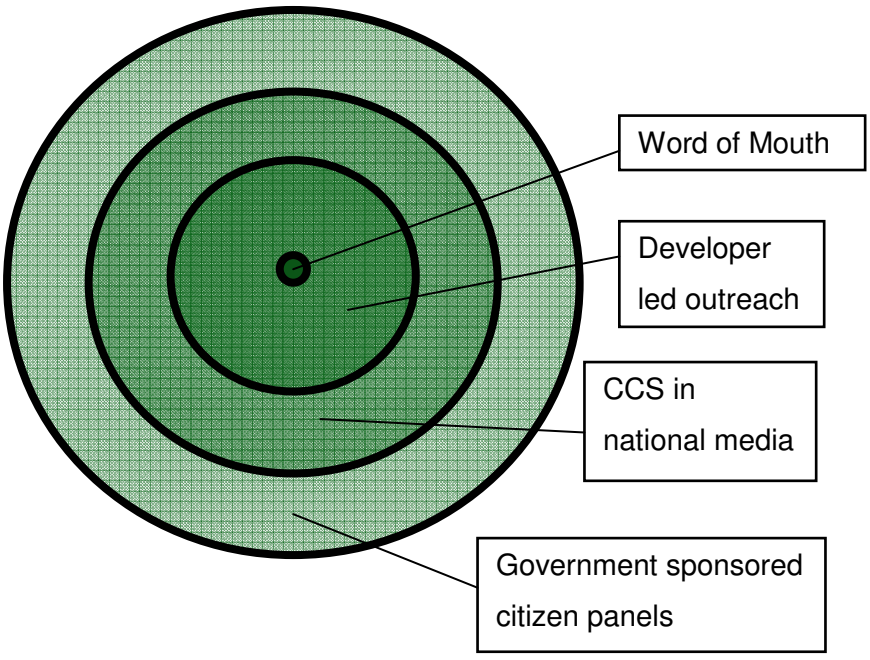

Figure 2 Nesting – the various levels of engagement occur 'within each other'.

1.2.3 **Timing**

National engagement – information delivery and debate – around CCS would 'prepare the ground' for individual projects to go ahead. However national level engagement might be more effective once there are some CCS facilities operating in the UK, as it would then be clear what kind of thing was being discussed. Striking a balance between these two positions would be helpful, and could be managed by using operating CCS projects in other countries as examples.

Engagement activities have been under-discussed if discussed at all in roadmaps for CCS advancement. Technical, economic, political and regulatory milestones have been published (e.g. Gibbens & Chalmers 2008; Gough et al 2010, IEA 2009), but engagement strategies have generally not been included in these plans. An example of a CCS deployment plan (Gibbins & Chalmers 2008; Figure 3) may be modified to show how a longer term plan for engagement might operate.

Each tranche will need appropriate communication and engagement activities as well as technical and regulatory systems in place. Local level engagement for a new facility will always be necessary, but will be greater for the earlier projects because they are new and relatively unknown by the public. As more CCS facilities are constructed and national level engagement becomes stronger, awareness and understanding, and hopefully support, for CCS will grow, and be at a point to permit widespread deployment by 2020-2030. Gibbins & Chalmers' diagram can be modified accordingly (Figure 4).

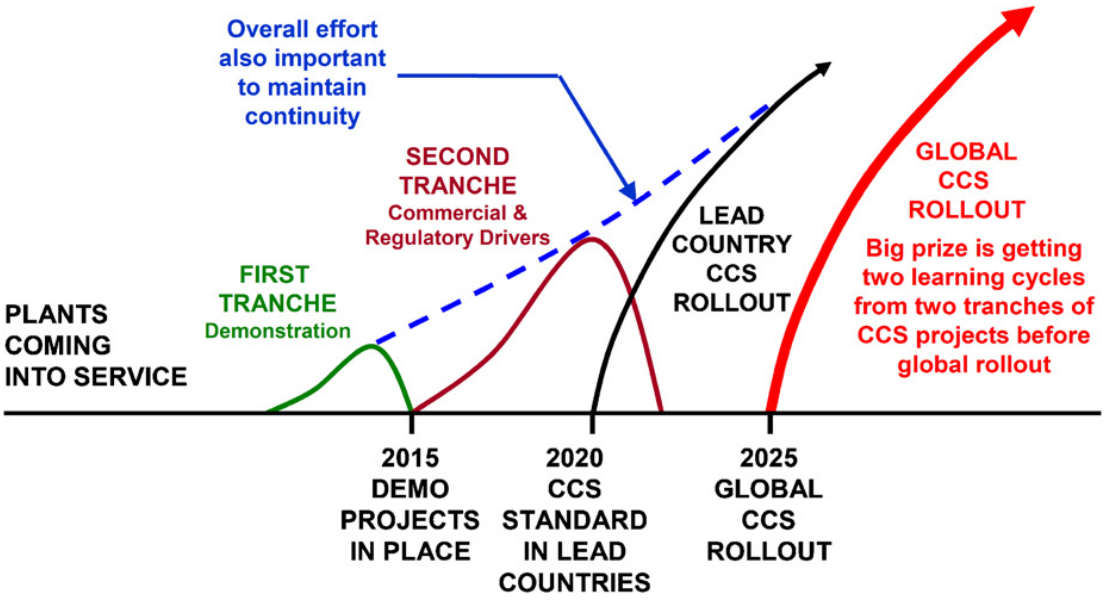

Figure 3 A plan for CCS roll-out (Gibbins and Chalmers 2008)

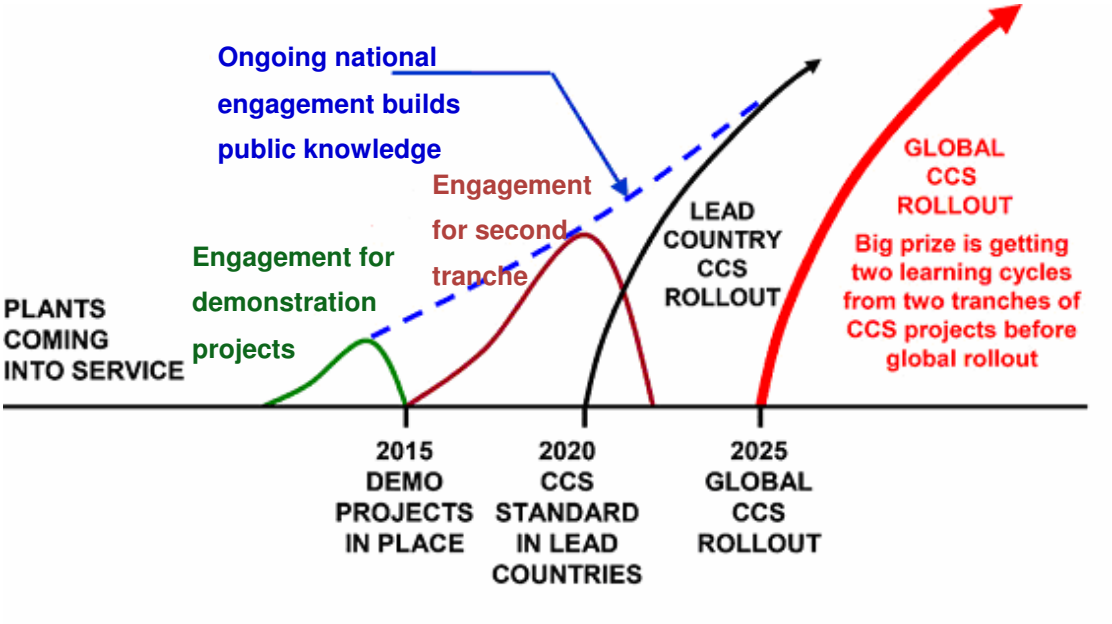

Figure 4 A sketch of how engagement activities should build towards CCS roll-out.

2 Public Responses to CCS: Building Knowledge from Practice and Research

2.1 Summary of CCS and Gas Infrastructure Case Studies

As the development of CCS moves into the demonstration phase, the public is increasingly coming into contact with large projects. The early large-scale projects – in particular Sleipner, In Salah, Weyburn-Midale and Rangley, went ahead without any public opposition. This may have given rise to a false sense of security amongst developers in the early 2000s that there would be no public opposition to future projects. While CCS advocates did mention the importance of public communication from time to time, there was little systematic activity in this area until recently (Reiner 2008). The acceptance of the early stage projects may have been a consequence of: an offshore location (Sleipner); the very low population densities in the storage areas (In Salah, Weyburn); and / or of the historical use of Enhanced Oil Recovery (EOR) (Weyburn, Rangley), such that CO_2 storage was, in effect, a moderate addition to an existing practice.

It came as something of a surprise, therefore, when public opposition to a number of high-profile CCS projects in Europe and the USA began to emerge in around 2008. Several high profile opposition movements have emerged, led by local public groups expressing concerns primarily about the safety of proposed projects. In some cases these concerns have been addressed and local publics satisfied with the response, and in some cases local publics have not been satisfied, and projects have been halted, or delayed and gone ahead in reduced form against the wishes of local publics. We review nine CCS cases, both controversial and not controversial; as well as four other infrastructure projects dealing with natural gas transport and storage. Observations have been made upon factors leading to successful or not successful outcomes. Detailed case notes may be found in Appendix 1 and are briefly summarised in Table 2.

Case study, lead developer and project start date	***Project type***	***Summary***	***Engagement Activities***	***Outcome – developer's original goal***	***Outcome – engagement process***
Barendrecht, Netherlands, Shell. Project announced 2007.	Demonstration onshore CCS from oil refinery resides to hydrogen gasification plant	Local public opposition seriously impeded project	Early engagement was not followed by satisfactory provision of information, which caused major problems. Good engagement came later, but it was too late.	In November 2010 the Dutch Ministery of Economic Affairs, Agriculture and Innovation announced the decision to cancel the project. The delay of the CO2 storage project for more than 3 years and the complete lack of local support were given as the main reasons to stop.	Very bad – strong local public and local political opposition, negative media coverage.
Greenville, Ohio, USA, Batelle. Project announced 2007	Demonstration onshore CCS from bio-ethanol plant	Local opposition stopped project	Early engagement, information gathering, public presentations, regular informal meetings	The project was cancelled before regulatory phase was completed	Serious lack of trust in developer and regulators identified, but not overcome. Strong opposition.
Schwarzepumpe, Germany,	Demonstration onshore CCS,	The oxyfuel and capture element had no	Very little engagement. This	The full CCS chain could not be tested	The little engagement was

Vattenfall. Construction began 2007.	oxyfuel. Storage site was not approved prior to capture project starting.	opposition, but the capture site has been refused by local public.	was fine in the high trust/well known technology location; but not in the low trust/unknown technology location.	because of local popular and political opposition to storage.	not satisfactory when dealing with a technology which is perceived as unfamiliar.
Lacq, France, Total. Announced 2007, began operating 2010.	Demonstration onshore CCS, oxyfuel.	Good engagement, good social fit, project went ahead as planned.	Open and transparent early engagement campaign, took all concerns seriously and dealt with all issues.	Project went ahead as planned, delayed by one year.	Considerable local support, though some feel they could have been more involved. Total have earned plenty of trust.
Ketzin, Germany, German Research Centre for Geosciences (GFZ). The project started 2004 and began injection 2008.	CCS pilot, onshore, research led.	Project went ahead as planned. Good social fit.	Early and comprehensive engagement. That developers were scientists was important for trust.	Project went ahead as planned	Stakeholders satisfied with engagement.
FutureGen, Illinois, USA, FutureGen Alliance. The competition was announced 2003, 2007 a winner was picked.	Commercial CCS, onshore, hydrogen gasification.	Communities competed to host this 'next generation' facility, and the $2bn it brought. Mattoon, Illinois won.	Comprehensive early engagement in all sites, good information provision. As communities were self selecting, good social fit was more	The project was announced in Mattoon, to the celebrations of the township. US Department of Energy then pulled funding which has	Good engagement as well as self selection led to stakeholder support, but delays are undermining this.

			likely.	delayed the project.	
Weyburn-Midale, Canada, Petroleum Technology Research Centre (PTRC). Launched 2000.	Demonstration and research CCS and EOR project. CO_2 from gasification facility.	Running since 2000, long term data has been produced on CO_2 behaviour and modelling.	Very little information is available on engagement activities. Very low population density and long history with oil and enhanced oil recovery (EOR) may account for this.	The project is considered a success.	There are no records of opposition to this project. Occasional positive statements in local press.
Peterhead, Scotland, Scottish and Southern Energy, BP.	Demonstration scale pre-combustion hydrogen power station, with offshore EOR (at Miller field)	The oil field was being decommissioned and the project relied upon a government subsidy which did not happen. BP pulled out of the project and the Miller field is now being decommissioned.	Early engagement at the pre-planning stage with council, local publics and interested parties were very positive, and media welcomed the project.	The project was cancelled because of the lack of government subsidy to make it economically viable.	Local authority and publics supported the project, as did high level politicians. The loss of the project is a sore point for many.
Carson, California, USA, BP. Project announced 2006.	Demonstration CCS onshore gasification and hydrogen power from petroleum coke with EOR.	Initial use of oil field below a densely populated area for EOR was abandoned in favour of an oil field site in a more rural area (Kern County). The official	Extent of engagement strategy at Carson unknown, early and proactive in Kern county. Social fit is better in Kern	Although delayed by 3-4 years, the project is now in a location where it appears that it will go ahead.	Perhaps due to the timely retraction of the project, opposition movements have now died away

		reason given was complications over the ownership of the field, though a local campaign against the storage plans may also have been a factor.	county.		(unlike in Greenville, Ohio).
Milford Haven – Gloucester pipeline. Project began 2003, completed 2008.	120 km natural gas pipeline, from Liquified Natural Gas (LNG) terminals in Wales to end users in England.	Marred by safety concerns over the LNG terminals, opposition in three sites evolved, and issue became a political football.	Targeted and locally sensitive engagement was countered by the linking of national and local opposition groups, and modern safety risks with historical grudges.	Delayed by a year, the pipeline was constructed.	Many stakeholders were satisfied, and many were not. One of the three opposition sites was resolved amicably.
Rossport, Co. Mayo, Ireland, Shell. Project announced 2000.	90 km high pressure pipeline transporting gas from an offshore well to an onshore refinery.	Unsatisfied by safety evaluation and failed by democratic means, local concerns evolved into entrenched opposition.	Good quality engagement came too late, once opposition had become entrenched.	Everything except the onshore pipeline has been built. A completely new route is now being investigated. The project is delayed by three years.	The media coverage has been negative and sparked national debates in Ireland. Since opposition began, the gap has never been broached.
Gateway Gas Storage, Rampside	Offshore gas storage in salt	Open and thorough engagement strategy,	Early engagement with stakeholders in	The project received all	Local publics and media were

Chesire, England, Stag Energy. Announced 2006, all permits obtained 2010.	caverns, with onshore compressor.	good social fit at the beginning of a new phase of developments contributed to a successful project.	pre-planning phase and public exhibitions stressing personal communication.	necessary licences and permissions to begin construction in a timely fashion.	supportive, but are beginning to grumble now a slew of other energy projects have been announced.
Saltfleetby, Lincolnshire, UK, WinGas. Announced 2006.	Onshore gas storage in a depleted gas field.	Local opposition due to greenfield site, dis-amenity and risk delayed project. Attempt now to gain permission from central government	Thorough engagement strategy including face to face meetings, public meetings and a citizens panel maintained cordial relations; but did not resolve dispute.	The project has been delayed by three years.	It seems that trust relations have endured, but the results of the engagement have not been used to modify the project proposal, and therefore the dispute has endured.

Table 2 Summary of CCS and gas infrastructure case studies.

2.2 Observations from case Studies

The reasons why publics may oppose and block a project from going ahead cannot be readily deduced from a small number of case-studies and as such remain debatable. It is difficult - if not impossible - to test hypotheses in a scientific manner. Between the studies, however, patterns do emerge and the main observations are presented here.

2.2.1 **Stakeholders**

The most important stakeholders seem to be the local public, local public groups, and local politicians. Where opposition has occurred, groups of local people, supported by local politicians, have been the most committed agents of that opposition, whether through democratic means (e.g. the planning process), legal means (e.g. court cases) or protests (e.g. marches).

Local stakeholders may be supported in various ways by external groups and these are frequently the most effective campaigns. For example, national level NGOs are able to provide advice, support and resources to local groups, and to publicise the cause in media circles not otherwise accessible to the local groups. Intervention from higher level politicians can have great impact upon outcomes either way, and experts who oppose projects can be very influential in the media. Often these non-local groups are concerned with non-local issues (such as climate change, or promoting sustainable energy), and there is a tendency for oppositional movements to embrace all the various concerns, building them into an argument against a project.

2.2.2 **Social Fit: Trust**

The level of public trust in developers is an important variable. If trust get so low that publics or stakeholders do not believe the information they are presented with, it will be impossible to have constructive dialogue Although high trust levels may give developers more leeway, they are not a substitute for dealing with substantive concerns which may be raised.

Where a historical relationship has been built up with a company trust may be high, but often companies are perceived as having more interest in profit than in the public good. Scientists are perceived as pursuing knowledge rather than profit, and therefore more likely to align their practice with the pubic good. Depending on local conditions, governmental or political actors may or may not be perceived as acting in the best interests of the locals. In some cases, national government is not trusted, but local government is trusted. Locally-based, or national level non-governmental organisations also tend to be trusted more highly as they are perceived to have nothing to gain from misleading the public. Projects which have been led by research organisations, or have been supported by trusted independent parties have tended also to benefit from greater perceived credibility.

2.2.3 **Social Fit: History**

In all of the successful CCS examples analysed, there was a history of extractive and fossil fuels industry in the area, predisposing local acceptance. In the cases where opposition occurred, the fossil fuel industry was generally new, and did not have a good long term relationship with local stakeholders. The history of a location can predispose people either for *or* against a project.

A good example of this is from Germany, where various storage facilities in the state of Brandenburg have been opposed, and one – Ketzin – has been successful. Ketzin is located in an area which relied heavily upon gas storage for the local economy, which is now coming to an end. The other sites in Brandenberg by contrast are picturesque medieval market towns, relying on tourism for the local economy. The Milford Haven gas pipeline is perhaps a counter example, as the gas pipeline was not welcomed despite a history of coal mining; but a host of other factors combined to result in opposition.

Population density is also a factor – all the successful projects have occurred outside of cities. The two cases which attempted projects in high density areas (Carson and Barendrecht) met with greater of opposition. Groups in Greenville, Ohio took offence

to the idea that CCS projects should go ahead in less densely populated areas, understanding it to mean that rural lives are less valuable than urban lives. This is of course not the case; the issue is that when there are less people, there is less likelihood of opposition snowballing and there are less people to engage with, making the task easier and more manageable. Where there are fewer landowners it may be an easier task to convince them to sell necessary land. This could be a particular concern for pipeline transport.

2.2.4 **Anticipation and Early Engagement**

Early engagement and preparedness seem to be hallmarks of a good engagement strategy. Early, informal engagement conducted face-to-face or in a friendly and personal way serves both to build trusting relationships and to gather information on local concerns and preferences, allowing a more widespread engagement strategy to be tailored to the local context. Some concerns expressed may seem to the developer to be irrelevant to the project: but they are still valid in the minds of those who expressed them and should be dealt with.

Public meetings conducted without sufficient anticipation of public concerns can backfire. If questions are asked which cannot be answered, or if evidence is requested which cannot be delivered within an acceptable timeframe, this can be taken as evidence of risks, or that the developer is hiding something. A good strategy seems to be to expect that all questions that could be asked will be asked.

2.2.5 **Meaningful Engagement**

A good engagement strategy builds trust relations with and between the developer and the stakeholders, and it provides information about local preferences. Depending on the 'decision making style' adopted by the developer, local preferences can be used to influence further project design or project re-visioning. In the case of Saltfleetby, the engagement strategy has maintained relations between the developer and stakeholders, but had not resolved the dispute, because the local concerns had not

translated into sufficient alterations of the project. Of course the developer may have valid counter arguments for why this has not been done, but they must be presented clearly and honestly to convince opponents. This case shows that a good engagement strategy alone is not enough to compensate for an unpopular project – although it can point towards what a popular project might be.

2.2.6 **Managing expectations**

Stakeholders in different contexts expect different levels of input into decisions which affect them. Those engagement strategies which have been clear from the start about how much influence stakeholders (including the public) can have and what they should expect from the process appear to have been more successful. The best example of this is the Lacq case, where the developer published a 'consultation charter' in which they "guarantee a meaningful dialogue with all stakeholders" and lay out the actions they intend to take.

Matching the expectations of stakeholders to the engagement and decision making process can lead to satisfactory outcomes for all, even if the engagement process is weak. In Germany, the central government makes decisions effecting national energy policy, and often local authorities are informed only late in the process

Local publics are generally informed by media, and not by industry sponsored engagement. Where trust is high and the development is not perceived as risky technology (e.g. the capture element in Schwarze Pumpe), stakeholders are generally satisfied with this outcome. When expectations are mismatched however, the greatest opposition can erupt. In Barendrecht the general public for the most part stayed out of the debate; but when the decision against the development was overturned by the national government, local publics felt their democratic rights had been infringed and attended by far the biggest and most outspoken expression of anger during the whole process. This contributed to the eventual cancellation of the project. The gas pipeline in Rossport in Ireland is an example of how far people will go if they feel their rights have not been respected; some people have been prepared to defy the law and serve a prison sentence.

2.2.7 **Honesty and Transparency**

If the developer and the information they provide are perceived as being dishonest, it will not be accepted. Once trust has been lost and the developer has gained a bad reputation, even high quality, independent, scientific information and engagement tends to be viewed as biased propaganda if it supports the developer's standpoint. This is a dilemma, because if the developer does not provide evidence to support their project, they risk criticism and if they do provide evidence they are accused of presenting false and biased evidence. This was particularly notable in Barendrecht and Rossport, and in Greenville on the topic of water contamination.
The best way to guard against this is by early, well prepared and high quality engagement, with support from independent and trusted third parties. Willingness to answer all questions, proactive engagement with all stakeholders and the ability to provide evidence quickly are all important. Timeliness is of utmost importance, as delays can be perceived as evidence of nefarious behaviour or of a lack of concern or interest in what the public and opponents think about a proposed development.

Transparency of process can be useful: explaining what decisions have been made, and what alternatives were assessed; as well as involving senior decision makers from the project developer in the public processes; and making it clear how stakeholder input will be used. Lacq or Ketzin are good examples of a transparent process.

2.2.8 **Public Concerns**

Public concerns are addressed more thoroughly in section 2.3 summarising the findings from research. From observation of the cases studied, it seems clear that the primary local concern is of safety and risk to personal health, homes and land value. Secondary to this issue are other supporting arguments against CCS which can be taken up, bolstering opposition: doubts over efficacy to combat climate change, especially when compared to other sustainable energy options; responsibility for long term liability; decreased plant efficiency, implying higher costs and more fossil fuel extraction and combustion; perpetuation of the fossil fuel industry.

On the positive side, there are various locally perceived benefits to CCS projects, most notably those that extend or improve the local economy. This is particularly relevant in areas which have relied upon fossil fuel industries for employment, and where the long term future of this is in doubt. Cutting edge projects and technology development in the local area can be a source of pride, and industry sponsored benefits such as community development funds may improve stakeholder perceptions, although there is little evidence of this. At present, the strongest evidence we have that communities can perceive CCS to be highly positive arises from the FutureGen project in the USA. The large amounts of public and private-sector investment in that project, meaning 1000 new jobs, and the proximity to coal fields, may help explain the strongly positive associations of the local community with the FutureGen project. These conditions are less likely to occur in the UK.

2.2.9 **Geological and Physical Fit**

The question 'Why is it here?' often remains unanswered, despite the efforts of developers to explain the technical and logistical reasons. Opponents are quick to claim they are being taken advantage of by a mistrusted party – usually the developer or the national government – and cite this as the real reason for the project location. Better explanation of why one location was chosen over others (including social factors), and what other options were assessed, may help to alleviate this problem. It does not look good when a failed project relocates to another location – there is a tendency for opposition to follow. (This may be occurring in Indiana, where there have been press reports that Battelle is seeking a substitute for Greenville, Ohio, in Randolph County, provoking public opposition even before any official announcement). The FutureGen approach of launching a competition to host the project worked well; with communities self selecting and actively wanting the project, rather than feeling it may have been imposed upon them.

The geological and physical viability of injection sites is of primary concern to developers, and much attention is paid to ensuring that CO_2 does not escape. Local

groups are interested in this too, but may be interested in other factors which developers do not consider likely enough to warrant investigation; such as earthquakes, landslides or contamination of drinking water and a resulting loss in property value. A wider assessment of geological and physical characteristics may be helpful in guarding against these types of concerns early on.

2.2.10 Storage is the most contentious element

The capture element of the process seems to be so far perceived as no more than a novel extension of existing technology. However, any changes to what previously occurred on the site should be considered in the same way as for any other project – visual appearance, noise, nuisance, any new hazardous or explosive chemicals, are all of interest to local publics.

Storage is however perceived as something new, unknown and potentially risky. Onshore storage is much more contentious than offshore, because of the proximity to people and their livelihoods; indeed, no offshore storage projects have been opposed as yet.

There is little evidence about public reactions to using depleted gas or oil fields, as opposed to saline aquifers, although the economic opportunities of EOR and using a depleted gas or oil field for a new industry are attractive and probably help explain the acceptance of several projects (e.g. Rangley and Weyburn).

There have not been any reports of concerns over CO_2 transport; opposition has tended to be focused at the storage site. However, judging by the natural gas analogues, CO_2 has the potential become controversial, whether transported by pipeline or ship. The LNG terminals in Milford Haven and the proposed onshore pipeline route in Rossport attracted particular opposition, because of the proximity to housing and the perceived safety risks. If carbon storage gets a bad reputation then this could well rub off to the transport element of the supply chain. Pipelines, because of their lengthy nature, offer more sites and opportunities for opposition.

2.2.11 Background Knowledge

Research has shown that an understanding of climate change, energy planning and the carbon cycle are all essential to understanding the motivation for carbon capture and storage. This was borne out in Greenville where many stakeholders including the local media and public samples consulted were extremely sceptical of climate change science; and in Barendrecht where the project developer assumed too much knowledge about national energy planning options.

2.2.12 Political Football

Like many high profile issues, there is a risk that CCS projects become political footballs, which politicians support or oppose in order to gain popularity. In Beeskow, Germany, local elections were coming up around the time of explorations for sequestration sites, and it became popular to oppose the project. All party representatives then opposed the project regardless of their party position, as to not have opposed it would have given the other parties an advantage.

Particularly relevant is the relationship between the separate nations which constitute the United Kingdom. During the Milford Haven pipeline case, a narrative of Welsh subjugation by the English emerged, and the Welsh National Assembly intervened with recently won powers to influence events. Following the loss of the Peterhead project, the Scottish First Minister criticised the UK government for acting too slowly. These old tensions and battles for power may affect support or opposition to CCS projects.

Whilst political involvement is essential for CCS development, perhaps particularly sensitive times such as elections could be avoided, or at least cross-party support sought early on.

2.2.13 Amplification

Perceived risks, fears or evidence of untrustworthy activities can become amplified by the effect of the media, the internet and by word of mouth communication. This is why early impressions and speedy responses are important. 'Experts' who oppose or criticise the technical or safety aspects of a project can receive high coverage, even if their opinions are not held by the majority; in a similar way credible crusaders against a project (e.g. local politicians) may reach a large audience, even if their statements are contrary to technically derived risk assessments.

Positive issues may be amplified by the same means, and as such engagement with the media, opinion formers and publics can help to build positive opinions regarding a proposed project.

2.2.14 Outreach Materials

Experience with the materials used to explain to publics has shown that: 3D models are particularly useful; that diagrams should be approximately to scale especially when conveying the depth of geological storage sites; and that maps showing housing and storage sites encourage worries of leaks. Printed media and internet sites were very commonly used, as were presentations, and some degree of face to face communication and opportunity for question asking. Most cases do not provide enough detail to assess the utility of these methods. A sample of some of the best outreach materials are listed in Table 12.

2.3 Research: Findings and Theory

2.3.1 **Review of Past Literature on Perceptions of CCS**

We briefly review evidence on public perceptions of CCS. Studies have been undertaken in the USA, Australia, Japan, Netherlands, UK, France, Germany, Italy, Spain and Switzerland; references are available at the end of the document. Studies can be distinguished in terms of the research method(s) used and the purpose or underlying rationale of the study. Methods include surveys and questionnaires, interviews, workshops, focus groups and citizen groups; the relative strengths and weaknesses of each research method are summarised in Table 10. In terms of purpose, we can distinguish between: a) basic or pure research – where the aim is to further academic knowledge and understanding; and b) applied research – where the aim is to apply research concepts and tools to 'real world' situations with the intention of having some impact. The use of methods is likely to change as we move from basic to applied research, for example, from more passive methods such as surveys to more active methods such as citizen groups.

We also distinguish between basic research aiming to anticipate perceptions and reactions (anticipative basic research) and research understanding reactions to a proposed or actual development (which has been covered in the section on the experience of several CCS projects). There is not much research on reactions to CCS experiences [1], due to the recent nature of occurrences of opposition movements to CCS projects (which really only began in 2008).

Common public perceptions found during basic research and applied research are summarised in Tables 3 and 4 respectively.

[1] NearCO_2 - an EU project - has published a very useful case study analysis (Desbarats et al 2009)

Issue	***Notes***	***Examples / references***
Large-scale leakage of CO_2 from geological storage sites	Concerns about safety of storage – lack of understanding of how liquids or supercritical fluids occur in rock formations. Concerns over explosive release of pressurised CO_2 'bubble' or 'balloon' Defeats the purpose of CCS Health and safety risks arising to local populations Ecological impacts of leakage Induced seismicity / earthquakes Onshore storage sites viewed less favourably because of risks of leakage and induced seismicity Impacts on ground water	Palmgren et al. (2004) Shackley et al. (2005) Wallquist et al. (2009) Huijts (2003 ; 2007) Gough et al. (2002) Oltra et al. (undated) Sharp (2008 a & b) Terwel et al (2009a) Ashworth et al. (2007)
Leakage of CO_2 from pipelines and low-level leakage from storage sites	Risk of explosions Health and safety risks Local ecological impacts of leakage on plants, animals and ecosystems	
Avoids tackling 'real issue' of moving towards a genuinely sustainable future energy system	Short termism End-of-pipe technology: better to reduce emissions that to store Allows unsustainable use of fossil fuels to continue into the future Allows us 'off the hook' Could deter investment in, and policy attention directed towards, renewable energy development Could deter action on energy efficiency and reducing energy demand Green light to other underground storage of other waste streams Could it result in a larger rebound effect?	
Feasibility & Costs	Expensive Who is going to pay?	

	Not tested / technology not ready yet Is there enough storage capacity? Requires a massive infrastructure which does not exist today	
A use for CO_2?	Is there any way that CO_2 can be utilised such that it comes to have a value? Preference for making use of something that costs a lot of money to remove	
Trust and Confidence	Industry shouldn't be allowed to profit from this Motivations of industry and politicians involved are not trusted Where arguments promoted by industry are felt to be incongruent with that organisation's motives, trust decreased Range of view about trustworthiness of companies, governments, NGOs and scientists Liability / responsibility: who is responsible, especially in the long-term?	
Strategic Issues	CCS as a 'bridging mechanism' while other low-C technologies developed Relies on government subsidies There are better options for carbon reduction than CCS	
Moral issues	Are we 'playing God'?	

Table 3 Findings from anticipative basic research (i.e. undertaken without reference to a particular real-world case)

Issue	***Notes***	***Examples / references***
Local benefits	Importance of direct economic or other types of benefit to the local community – e.g. job creation, money into the area, prestige, advanced technology development, centre of excellence, a visitor centre promoting local tourism, etc. Maintaining core industries and skills and allowing continued use of resources such as coal Potential use of CO_2 in local industries or in Enhanced Oil Recovery, etc. Energy diversification?	FutureGen work in the USA Hund & Judd, (2008) Bielicki & Stephens (2008) Bradbury et al. (2009)
Local Issues and possible concerns	Impacts on water consumption / availability Production of saline water Costs of power Area disturbances - end up living in an industrial park Land-use rights Decommissioning Monitoring	
Property rights	Appropriate compensation packages Neighboring farmers / landowners wanting compensation for CO_2 storage and possible loss of mineral rights Property prices effected? Negative experience in the past, e.g. with pipelines adversely affecting agricultural land	
Role of information provision	Some evidence that concerns over CCS are positively correlated with understanding In one case, respondents' had general concerns about CCS which became better articulated as more information was received In one case, respondents support for CCS did increase over a one day	

	seminar, but only as part of a portfolio of approaches Physical models of CCS helped to increase understanding Local media positive about job creation and ability to sustain coal industry Deficiency of expert information	
Stakeholder Engagement	Active engagement with a range of local and regional stakeholders, opinion-formers and community-leaders appears to have helped in building local acceptance of projects	
Trust and Fairness	Lack of trust in government and the private sector Poor experience of oil and gas sectors in the past Desire for transparency, participation and redress should something go wrong Sense of empowerment would increase acceptability (empowerment being defined as ability to mitigate community-defined risks and to ensure that just procedures would be adopted) Concern that CCS plants will be dumped in poor and voiceless communities The key risk could be that of being neglected and ignored in the event of project failure Fear of being in a 'sacrifice zone' and being treated as 'guinea pigs' Lack of confidence in monitoring regime and lack of clarity on who would listen to concerns	

Table 4 Key Public Concerns regarding CCS Arising from Applied Research (surveys, focus groups, etc.) (i.e. undertaken in the context of a real-world proposed project)

2.3.1.1 **Findings from Basic Research**

2.3.1.1.1 ***Anticipative Basic Research***

An important point from surveys is that there is a very low level of knowledge or awareness of CCS technologies (e.g. Curry et al. 2005). This is hardly surprising since there is no particular reason why the public *should* know about CCS. Opinions ascertained from surveys have to be treated cautiously – they are frequently unstable and can change rapidly in response to a change in information, context or for no apparent reason (Daamen et al. 2006, de Best-Waldhober et al. 2009). There is general agreement amongst experts that opinions collected in surveys based upon cursory and technical accounts of CCS do not reflect likely perceptions when faced with the prospects of actual deployment (Malone et al 2009; Malone et al 2010).

The response to CCS has been shown to be 'lukewarm', not a strong acceptance. Methods such as focus groups, citizen panels, information-choice questionnaire (ICQ) testing and theoretical psychometric modelling, have tended to give a somewhat more (though largely not strongly) positive portrayal of CCS than have surveys. This is, again, not that surprising since more active methods provide an opportunity for providing information on what is, initially, a largely unknown entity.

The reaction of survey respondents to more information about CCS has been somewhat mixed, with some studies indicating a move towards more positive opinions, while others have indicated more negative reactions. The quality of information provided clearly matters and provision of accurate, balanced and understandable information appears to lead to more stable opinions (de Best-Waldhober et al., 2009). Providing information and perspectives from a range of stakeholders in the conduct of in-depth discussion groups or focus groups allows respondents to develop an informed opinion, and usually increase support (Roberts and Mander 2010; Shackley et al. 2005).

While increasing the amount of information available to respondents produces results that are less likely to be representative more widely, deeper engagement has been

shown to change public perceptions of CCS, sometimes drastically. In a group process, it is difficult to know, however, the extent to which the change in perceptions is due to the information provided *per se*, or to the social relationships which emerge between the participants and the expert or stakeholder speakers presenting to them. An external speaker may become a 'trusted informant' and develop a good relationship with the participants and this could be highly important in influencing how the information presented is perceived, may be more important the actual information itself! It is also important to note that there is rarely complete unanimity within in-depth discussion group: typically several different 'factions' can be identified during the course of debate (Shackley et al., 2005).

Assessment of CCS in focus and citizen groups may also have been influenced by presentation of the local benefits (jobs, technology centres, prestige, central government funding, etc.) and by comparison with other stigmatized technologies, especially nuclear power (but also, possibly, large-scale renewables). Organisers and facilitators of groups have considerable flexibility in how they present CCS – for example, as an 'answer to the problem of climate change whilst protecting energy security', or alternatively, as 'introducing inefficiency while perpetuating the unsustainable use of fossil fuels'. It is frequently hard from reading reports and papers to ascertain exactly how framing of the issue has been undertaken and whether this might have introduced bias.

2.3.1.2 **Findings from Applied Research**

A focus upon the context of potential or actual projects in applied research has allowed studies to become more nuanced and to reveal context-specific factors. It appears possible that the same group of citizens could readily respond quite differently to the idea of CCS 'in principle' and the proposal to construct a plant in a specific place and time, CCS 'in reality'.

Examples of applied research are the US regional partnerships, where small-scale drilling and CO_2 storage pilot studies have been undertaken, each of which has

involved work on stakeholder and public perceptions, and the Futuregen project in the USA. Indeed the inclusion of public and stakeholder engagement and communication as one of the primary goals of the US Regional Carbon Sequestration Program (RCSP) has resulted in some very useful outcomes. The seven individual regional efforts under RCSP, plus the FutureGen engagement process, has allowed a range of different methods and techniques to be trialled, compared and evaluated. Nothing on this scale has happened in the EU and a more pro-active and systematic work programme on engagement in Europe could yield enormous benefits. (This was one of the clear conclusions of the IEA GHG Social Issues Group meeting in Paris, November 2009).

Concerns expressed in applied research tended to be (understandably) more grounded and focused on the *location* of the project and its potential *local impacts*, be they environmental, socio-economic or political. Several of the US studies suggest that some communities (or parts thereof) perceive CCS projects as economic opportunities, whilst others focus upon the unfair distribution of hazards. Where a public sample can engage with the practical aspects and issues arising from a project, they are likely to do so rather than to evaluate CCS as an abstraction dealing with an abstract problem (climate change).

Such work also illuminates the point that the public is not a single entity, but encompasses multiple subgroups or 'publics' divided across lines of geography, income, education, health issues, historical interactions with industry and public institutions, and culture; and subject to influence and persuasion by multiple stakeholders and interested parties.

Some studies have noted a significant public attention to socio-economic and political concerns entirely unanticipated by researchers prior to the study. In one study, a set of issues around perceptions of fairness, equity, compensation, and redress in the face of unanticipated hazards far outweighed technical and scientific concerns specific to CCS technology (Bradbury et.al. 2009). These results are underpinned by research from the field of social and environmental justice scholarship, which shows that people generally respond more positively to issues when they deem that they have

been treated fairly. When people deal with authorities that they have had little contact with, the importance of fairness is not diminished, but opinions are driven by the degree of trust in the institution to compensate for the lack of direct interaction. Likewise, in the absence of detailed knowledge and understanding of technical and scientific concepts, the lay public frequently assesses the issue at hand by assessing the trustworthiness of the institutions which are involved in the evaluation process. Incorporating measures in the risk communication process which reassure people that their voices matter and that they will be treated fairly, may therefore yield increased public support for CCS.

A limitation of the current applied research findings is that they are nearly all exclusively obtained from research underway in the USA. We do not currently know the extent to which the findings may be culturally-specific to the USA context.

2.3.2 **Concepts useful to understand public responses to CCS**

2.3.2.1 **Trust, Fairness and Accountability**

Advocates of technocratic decision-making maintain that the public (and other stakeholders) take decisions on a mostly technical basis. As discussed in the section on decision-making, it is now more widely accepted that technical discourse is only an (often small) part of a real-world decision-making process. At least as important are the relationships that exist between the proponent, developer or government agency / regulator, and the individuals or communities (Roberts and Mander 2010; Bradbury et al 2009; Terwel et al 2009b). Trust, fairness and accountability should things go wrong are all important, connected variables.

For a decision-making process to be perceived as fair, participants must understand the process for taking part, and the basis on which their participation will be used in the making of the decision. Accountability deals with questions such as 'Who will be there if things go wrong?' 'Who is accountable when the developer had moved

elsewhere?' 'How capable is the government or developer of undertaking CCS in a way that protects human health and the environment?' Trust is arrived at through a history of 'good behaviour' which includes honesty and putting the public interest before those of profit; as well as perceptions of fairness and accountability. Trust also contributes to these and other factors, most notably the credibility of information and evidence provided by the proponent.

Some people might not engage in detail with the technical credibility of a project, but put trust in either the accountability or the competence of those who are operating a project (Bielicki & Stephens 2008). However good relations between proponents and publics are not a substitute for thoroughly designed and robust risk assessments: substantive issues are always questioned and failure to respond adequately can undermine projects, losing all the social capital that a developer has built.

2.3.2.2 **Nimby-ism, Place Identity and Place Attachment**

In some ways CCS is a 'classic' environmental technology in that the benefits are widely distributed (globally for CO_2 abatement) but the costs in terms of risks can be perceived as being concentrated – namely by those who live close to the development. This is a common way in which individuals and communities respond to new technologies and infrastructure (often termed 'not in my back yard' - NIMBY) and it is a reasonable assumption that they will turn to this 'frame of reference' for CCS, at least initially. NIMBY-type explanation tends to be used pejoratively to refer to people who are regarded as trying to stop a development for purely selfish motives, with no regard for the 'greater good'.

The use of NIMBY explanations has been criticized by writers such as Patrick Devine-Wright (2009) who have attempted to explain instead *why* people and communities have such strong opinions about proposed developments. They have drawn upon ideas from environmental psychology such as 'place identity' (the extent to which a particular place is important in the construction of personal identity) and 'place attachment' (the extent to which an individual or community feels a strong

sense of attachment to a particular place). Where strongly positive place attachment occurs, resistance to a development that is perceived to threaten that place is likely to be high. Hence, if a new industrial-type development is planned in a rural area, to which there is a high place attachment, some resistance could be anticipated. Strong place identity can also result in resistance to change, even from people who do not live there. An example relevant to Scotland would be the Beauly-Deny power lines or the proposed Lewis wind farm project: both fairly remote areas which are iconic to many of 'Scotland'.

It is worth noting that while one or two projects may be accepted, development fatigue may set in and a third or fourth project considered to be one too many. If a community feels they have borne an unfair proportion of recent developments, there may come a point at which opposition emerges, even if it was not evident initially.

2.4 Conclusions from Case Studies and Research

From the above research, we have identified five major topics upon which to engage the public (Figure 5). Not every person will require an answer to every question in order to form their opinion on CCS, but it is likely that all questions will be asked. Every step of the pyramid may not be necessary, but they will all contribute to acceptance or support for a project. Some topics may be better delivered by groups other than project developers operating at the local scale; but if they have not been done it may still benefit the developer to deliver engagement on those topics.

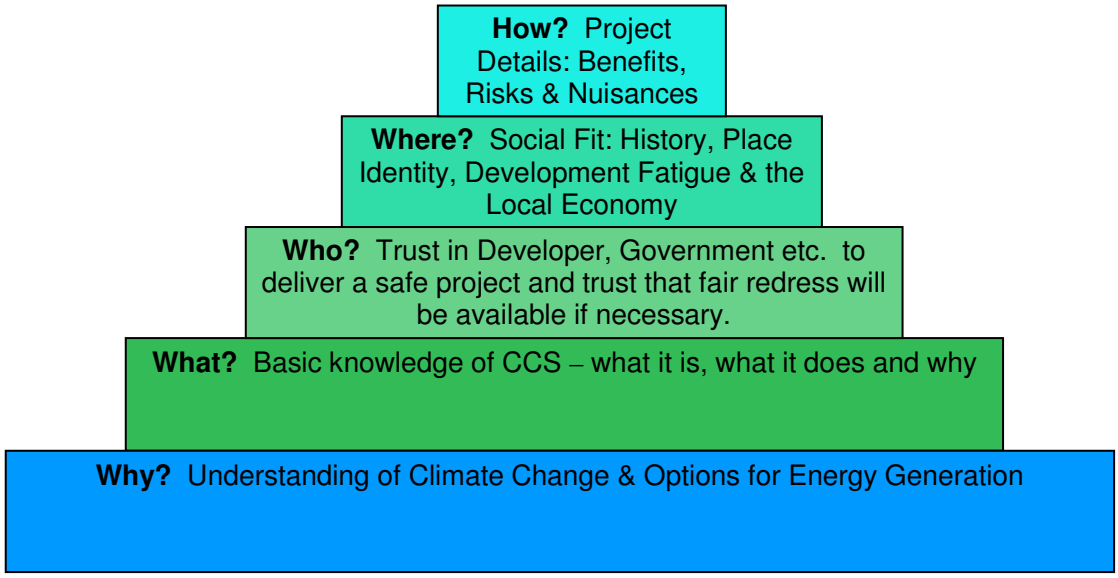

Figure 5 Steps towards public support and acceptability.

3 Tools for Designing and Implementing an Engagement Strategy

3.1 Approaches to Engagement

Arnstein's 'participation ladder' is a classic way of describing and presenting degrees of participation. An adapted and expanded version is presented here as Table 5. The key point of Arnstein's argument was that many practices that organizations describe as 'participation' actually treat the subject receiving the information as passive and do not respond to the input offered. She therefore distinguished between active and passive forms.

Number	***Name***	***Description***
1	Manipulation	Public involvement is focused upon trying to cajole the public into supporting a project
2	Therapy	Reassuring the public about a project
3	Informing	Provision of information on request
4	Consultation	Pro-active provision of information and response to questions
5	Placation / compensation	Engaging in face-to-face public consultation, but only in response to conflict, controversy, etc.
6	Partnership I	Open to suggestions from members of communities / stakeholders who are met individually or in a group
7	Partnership II	Designs shaped / influenced by members of communities / stakeholders who are met individually or in a group (discrete process)
8	Partnership III	On-going process of influence by members of communities / stakeholders who are met individually or in a group
9	Veto powers	Local community is given veto powers over plant design, operation, etc.

Table 5 The Participation Ladder: Adapted and expanded from Arnstein, S. (1969)

3.1.1 **Different Decision-Making Styles and the Role of Expertise**

There are no 'right' or 'wrong' answers with respect to what a proponent or developer should do vis-à-vis communication and engagement, but some approaches may be more likely to lead to public opposition than others. If no opportunity for public input is available, publics may oppose a project which could otherwise have been modified to satisfy both publics and the developer. Generally, the more public involvement and the greater transparency of process, the less is the risk of show-stopping opposition (Heiskenan 2008). The trade off is in the developer releasing some control over the project, the possibility of a slower and more expensive process, and ultimately the risk that publics preferences may alter the project so as to make it untenable. For these reasons it is important to give clear messages on the degree of public involvement and reasons why certain options cannot be taken.

It all depends upon the developer's objectives, values as an organisation and upon their explicit or implicit notion of how decisions are most effectively taken and implemented. For example, if a developer regards the public as largely 'passive' and believes the public is inclined to trust provided information, a very different communication / engagement strategy is implied than if the public is regarded as active and inclined to distrust received information. Before working out what type of communication or engagement should be undertaken, therefore, it is first necessary to demarcate different approaches to decision making, which sit on a spectrum from the technocratic to the deliberative. These explicit or implicit 'models of policy making' and associated expectations can have a major influence on the design of an engagement strategy – and can help to explain why strategies sometimes fail to live up to expectations. While the same types of methods are frequently used across different decision-making styles, the *use* to which those methods (and the resultant findings) are put frequently varies.

There is a long tradition in western societies of expert-led decision making, which is called 'technocracy'. In the technocratic model, 'the politician becomes fully dependent on the expert. Politics is replaced by a scientifically rationalised administration' (Weingart 1999:154). Or as van Zwanenberg & Millstone (2005: 14)

put it: 'The assumption of technocracy, that scientific and technical considerations are not just necessary but also sufficient for policy decision-making, implies that policy-making can and should be delegated to scientific and technical experts, because they and they alone are in possession of the relevant facts'.

A referendum, in which decisions are taken by a vote of the populace, could be seen as being located at the other end of the decision-making spectrum. Irrespective of the knowledge base or scientific training of the populace, the decision is taken by a popular vote. This is the ultimate expression of 'deliberative democracy'. In between technocracy and fully deliberative democracy lie a large number of potential approaches. Some of these are mapped out in Table 6. The theory behind these ideas is explained in Held (1987). We provide short examples of each of the five approaches identified.

Fully deliberative	***Deliberative processes inform decisions***	***Combination of expert input and deliberative processes***	***Expert-led decision-making***	***Fully technocratic***
Referendum & ballots	Citizen Juries – where decision is taken as final	Citizen Juries, where decision only an input to decision	Public may be consulted	Experts decide
	Planning Cells and Focus groups – inform design of policies and plans	Focus groups, indepth discussion groups / citizen panels– inform decisions	Focus groups – intelligence	Focus groups – intelligence
Examples of each approach				
Switzerland has a tradition of using ballots in decision-making	Initiative reform in Oregon	Nano-Jury UK Genetically Modified (GM)-Jury UK GM Nation	Southwood Working Party on BSE.	French energy planning (traditionally).

Table 6 Different styles of decisions making.

3.1.1.1 **Fully deliberative**

One of the best examples of fully deliberative decision-making is to be found in Switzerland, where there is a strong tradition of using referenda for making important decisions. Referenda are much more rarely used in most other countries due to the expense and time implications and to stronger traditions of technocracy. It should be noted that a referendum when the voters are poorly or mis-informed is only a superficial form of deliberation.

3.1.1.2 **Deliberative processes inform decisions**

Here we include deliberative processes which have some legislative foundation or backing. An example is the following.

A Citizens' Jury in Oregon: Initiative reform in Oregon that uses the Citizens Jury model, acting as fiscal sponsor for the Healthy Democracy Fund, Healthy Democracy Oregon's new 501(c)(3) arm. In June 2009 the Oregon legislature passed a bill authorizing that up to three ballot initiatives could be reviewed by a method called the Citizens Initiative Review. The findings of the 24-person "citizens panel" will be placed in the official Voters Pamphlet issued by the Secretary of State. (information from the Jefferson Center: http://www.jefferson-center.org/index.asp?Type=B_BASIC&SEC={549A0987-DDA4-43F7-8281-678FDDBDE3D8})

In the Oregon example, the citizen's panel does not have any statutory force, but its decisions are to be included in official information disseminated by the legislative authority. Also included in this category would be examples where the Citizen's Juries, also called Planning Cells in Germany, have had statutory influence, e.g. in decision over siting of waste facilities.

3.1.1.3 **Combination of expert input and deliberative processes**

In this case, a Citizen's Jury or Panel or Planning Cell or some other types of processes (an in-depth workshop or a town meeting, etc.) would be used as one input to decision-making. There is no statutory constraint on how a decision would be taken or what types of expert input would be required. That is left to the discretion of the conventional decision-makers: the legislators (elected politicians), taking advice from a range of stakeholders and interest groups. Examples might include initiatives such as GM Nation, GM-Jury, Nano-Jury, National Plant Biotechnology Consensus Conference and the Committee on Radioactive Waste Management (CORWM). One reason why many policies shy away from a statutory function for a participatory process is that deliberative democracy can, potentially, conflict with representative democracy. In a system of representative democracy, it is elected politicians who take decisions and are accountable as such and they are reluctant to cede decision-making power.

The Committee on Radioactive Waste Management (CORWM). CORWM undertook an extensive process of stakeholder and public engagement in 2005 and 2006, in the lead-up to the publication of a major report to government. The engagement included citizen panels, a large number of 'round-tables' with a range of interested parties and stakeholders, environmental NGOs and professional societies. Still, the final recommendations came from the members of CORWM – a mixture of academics, independent and industry experts and local authority officers. CORWM does not itself have legislative powers, but is advisory to the Government. (http://www.corwm.org.uk/Pages/Archived%20Publications/Tier%202%20(3)%20-%20Engagement/Tier%202%20(3)%20-%20Engagement.doc).

3.1.1.4 **Expert-led decision-making**

This is the most frequently style of technical decision-making that has been adopted in the UK. It is characterised by use of expert committees, conventionally constituted by technical experts only. The use of expert committees came under fire, especially after the BSE crisis (van Zwanenberg & Millstone 2005). Already in the 1990s, inclusion of non-technical members on committees was becoming more widely practised. This included academics from non-technical disciplines, experts on ethics and morality, legal scholars, public figures, influential media figures and representatives of consumer and health organisations

3.1.1.5 **Fully technocratic**

A fully technocratic approach to decision-making is, nowadays, rare. It might survive in some political cultures which are not democratic. In most democratic societies, there has been a sea-change from earlier closed practices by which decisions were made in an opaque fashion, influenced by pressure groups, special interests and so on. Technocracy was, in part, a response to these types of 'irrational' or 'corrupt' decision-making, which were not perceived as being socially 'optimal'. But one consequence of the opening-up and democratisation of policy-making, has also been a move away from elitist-based decision-making and a re-assertion of the role of politics and values at the core of government. Technocracy never established itself too securely in the UK due to a particular tradition of political contest and pragmatic scepticism.

3.1.1.6 **The Implications of Choosing a Decision Making Style**

Many of the same engagement techniques used can be used to support different decision making styles. Focus groups, for instance, are famously used by marketing and PR companies, as well as by governments and political parties, for intelligence gathering and to assess potential public reactions to messages, policies, actions and measures. Therefore, methods are not restricted to a particular decision-making style, though there are some constraints, as in the case of a Citizens' Jury. This method is unlikely to be used in a technocratic or highly expert-led decision-making style.

Organisations that are undertaking public engagement and communications activities might wish to evaluate what type of decision-making 'philosophy' they subscribe to, operate with, and believe will be most effective. For example, if an organisation adopts an expert-led decision-making philosophy, then there would be little point embarking upon an extensive engagement campaign, except as a token gesture. A focus group would, however, still be useful in gathering intelligence and understanding of how the public might react to a project. If an organisation believes

that deliberative methods are more likely to lead to publics' support, on the other hand, then simply conducting a survey or only holding a workshop would probably be insufficient. It might also be worth considering what expectations publics or stakeholders have of involvement in decision making.

3.1.1.7 **The Participative Turn in Decision-Making**

A defining feature of the politics of the past several decades has been a move towards more participatory and deliberative processes. This is a trend which can be witnessed across continents, countries, regions, cities and neighbourhoods. While scientific and technical decision-making was, to begin with, relatively unaffected, the BSE episode, along with controversy over GMOs, led to a fundamental change in the UK. Since the mid-1990s, participation in decision-making over new technologies has become the norm, not the exception.

There has also been criticism of the 'participative turn'. Critics say that token participation practices have sometimes been used to legitimate technocratic decision making, and that publics' input has sometimes been ignored or heavily steered (Rayner 2003, 2009; Ward et al 2003). There is certainly a tension between the discourse on one level that increased public participation is desirable and the desire of proponents to keep maximum control over their projects. Token engagement has a tendency to backfire – if public input is asked for, and then disregarded publics tend to react strongly, possibly more strongly than if they had never been asked for any input.

There are (at least) three reasons why participation is regarded as desirable.

- **Legal and Ethical**: meeting the moral imperative and legislative requirements of participative democratic decision-making. This relates to fulfilling peoples' expectations about living in a democracy[2].

[2] See Chiavari et al (2009) for a discussion for a discussion of the regulatory context for participation in CCS projects.

- **Pragmatic**: evidence shows that there is a greater chance of support or acceptance when people feel they have had a chance to voice their opinion in a meaningful way (Toke 2005; Toke et al 2008; Loring 2007)) .
- **Instrumental**: useful input can be gained, perhaps through local expertise, to improve the project (Yearley 2003)

3.1.2 Risk and Technical Communication

Different styles of decision-making tend to contain with them an implicit model of communication to the public. The form of risk communication, and the risks as perceived by members of publics, can have a strong influence over project acceptability (Singleton et al 2008). We can identify three distinct approaches to risk communication (Leiss, 1996).

3.1.2.1 Information Deficit Model:

The traditional approach has been to 'convey probabilistic thinking to the general public and to educate the laypersons to acknowledge and accept the risk management practices of the respective institutions' (IRGC, 2005:54). This approach assumes that individuals define risk in technical terms and undertake risk calculations and comparisons in a largely technical sense. It is the style of communication adopted by more technocratic technical decision-making.

3.1.2.2 Persuasion Model:

The limitations of the first approach became evident many decades ago when individuals and communities did not respond to risk as expected. It came to be

realised that non-technical information was highly significant, for example the social and institutional context. Given that most people were unable to engage in the technical discourse due to lack of time and motivation, a short-cut way of coming to a view on risk is for people to assess the organisations and institutions which are attempting to persuade them of some point-of-view. This critical insight, first made by Brian Wynne, highlighted the importance of trust between the public and the 'experts' or organisations promoting a new technology or development. If trust levels were low, then however good the technical evidence and arguments, it was unlikely that the public would be persuaded. One response to this was to use marketing and PR to try and persuade people to trust the experts and to modify their behaviour as necessary.

> 'The one-way communication process of conveying a message to the public in carefully crafted, persuasive language produced little effect. Most respondents were appalled by this approach or simply did not believe the message, regardless how well it was packaged' (IRGC, 2005: 54).

The failure of the persuasion model has led to the development of a third approach.

3.1.2.3 **Two-Way Communication and Learning Model:**

> 'The objective is to build mutual trust by responding to the concerns of the public and relevant stakeholders. The ultimate goal of risk communication is to assist stakeholders in understanding the rationale of risk assessment results and risk management decisions, and to help them arrive at a balanced judgement that reflects the factual evidence about the matter at hand in relation to their own interests and values…Good practices in risk communication help stakeholders to make informed choices about matters of concern to them and to create mutual trust'. (IRGC, 2005:54-55).

Four major functions of risk communication have been identified within the two-way communication model, see Box 2. For each of the functions the following topics need to be addressed (IRGC, 2005):

- Explain the concept of probability and stochastic effects
- Explain the difference between risk and hazard
- Deal with stigmatised risk agents or highly dreadful consequences
- Cope with long-term effects
- Provide an understanding of synergistic effects
- Address the problem of remaining uncertainties and ambiguities
- Cope with the diversity of stakeholders in risk appraisal and management
- Cope with inter-cultural differences within pluralistic societies and between different nations and cultures.

Box 2: Four Functions of Risk Communication (IRGC, 2005)

i) *Education and enlightenment*: inform the audience about the risks and the handling of these risks, including risk and concern assessment and management;

ii) *Risk training and inducement of behavioural change*: help people cope with risks and potential disasters;

iii) *Creation of confidence in institutions responsible for the assessment and management of risk*: give people the assurance that the existing risk governance structures are capable of handling risks in an effective, efficient, fair and acceptable manner (such credibility is crucial in situations in which there is a lack of personal experience and people depend on neutral and disinterested information). Trust can only be earned and accumulated by effective performance.

iv) *Involvement in risk-related decisions and conflict resolution*: give stakeholders and representatives of the public the opportunity to participate in the risk appraisal and management efforts and/or be included in the resolution of conflicts about risks and appropriate risk management options.

3.1.3 Different types of Engagement: for Academic Research, Applied Research and Practice

Engagement techniques can be used for a number of (mutually supporting) purposes. We draw a distinction here between engagement for academic research, applied research, and practice. The traditional purpose of *academic or basic research* is to develop better understanding, e.g. through theory development and hypothesis testing.

This provides a foundation for a*pplied research* which can be used as intelligence-gathering for developers preparing to undertake a real engagement campaign. Applied research may be undertaken by universities, other research organizations, consultancies and companies, and could, potentially, lead on to designing a communications and engagement strategy. Actually *implementing* an outreach, communications and engagement strategy would not conventionally be undertaken by a research organization. This is the realm of *practice* and requires different skill-sets and competencies from those involved in research and intelligence-gathering.

These three activities – basic research, applied research and practice – are not strictly demarcated and involve much exchange and iteration between one another. Clearly, applied research builds upon basic research and practice is designed and undertaken with the results of research in mind. Likewise, practice is typically what generates the 'raw material' for research questions and hypotheses to be formulated. An engagement, outreach or communications practice can build upon basic and applied research as indicated in the Figure 6 below.

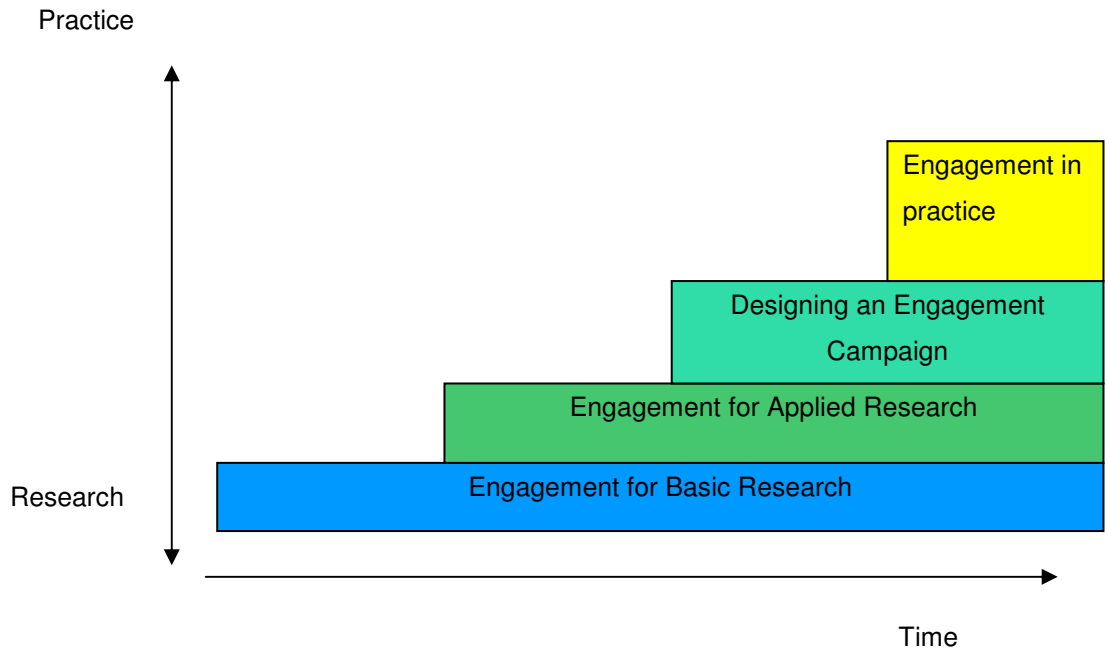

Figure 6 Engagement for different purposes, research to practice.

3.2 Designing an Engagement Strategy

An engagement strategy should be specific to each context, suiting the project, its location, the developers' philosophy and possibly matched to local expectations.

3.2.1 **Elements of an Engagement Strategy**

The elements listed here focus on engagement at the individual project level, and particularly on engaging with local publics. Each element is explained in more detail below. The elements do not have to occur in the order listed in Figure 7; the order and number of iterations will depend upon context specific factors as well as the approach of the project developer. Three illustrative configurations are given, suiting different decision making styles (Figures 8 – 10).

Philosophy	Project Design	Early Engagement	Engagement Campaign	Acceptance & Maintaining
•The decision making style adopted •Degree of public and stakeholder participation desired •Approach to Risk Communication •Transparency •Willingness to modify philosophy depending upon stakeholder expectations	•Project Vision •Location •Design •Alternatives considered •Justification – why in general and why this specific project? •Possibility to modify project design to accommodate stakeholder preferences	•Early Engagement •Stakeholder Mapping •Public mapping •Social Analysis •Location Analysis •Information Gathering •Begin building trust •Use information to begin designing communication and engagement campaign	•Engagement with Publics & Stakeholders •Communication with Publics, Stakeholders & Media •Responding to Issues as they come up •Risk Communication	•'Social Permit' to operate •Regulatory Permits in place •Local and National Planning permissions •On-going engagement throughout construction and operation phases

Figure 7 Elements of an Engagement Campaign

Expert Led, with Public Consultation

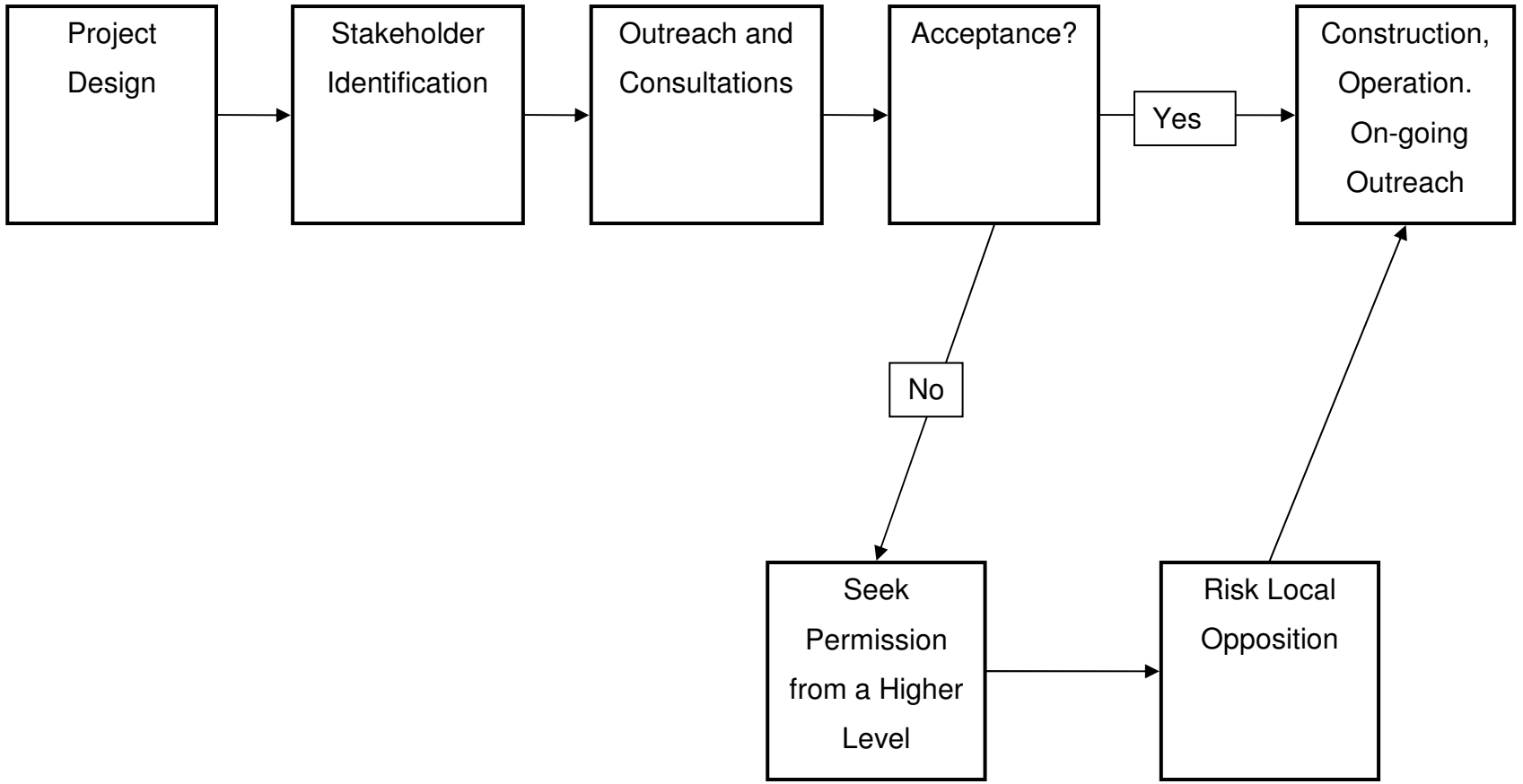

Figure 8 Expert Led engagement strategy

Combination of Expert and Public Input

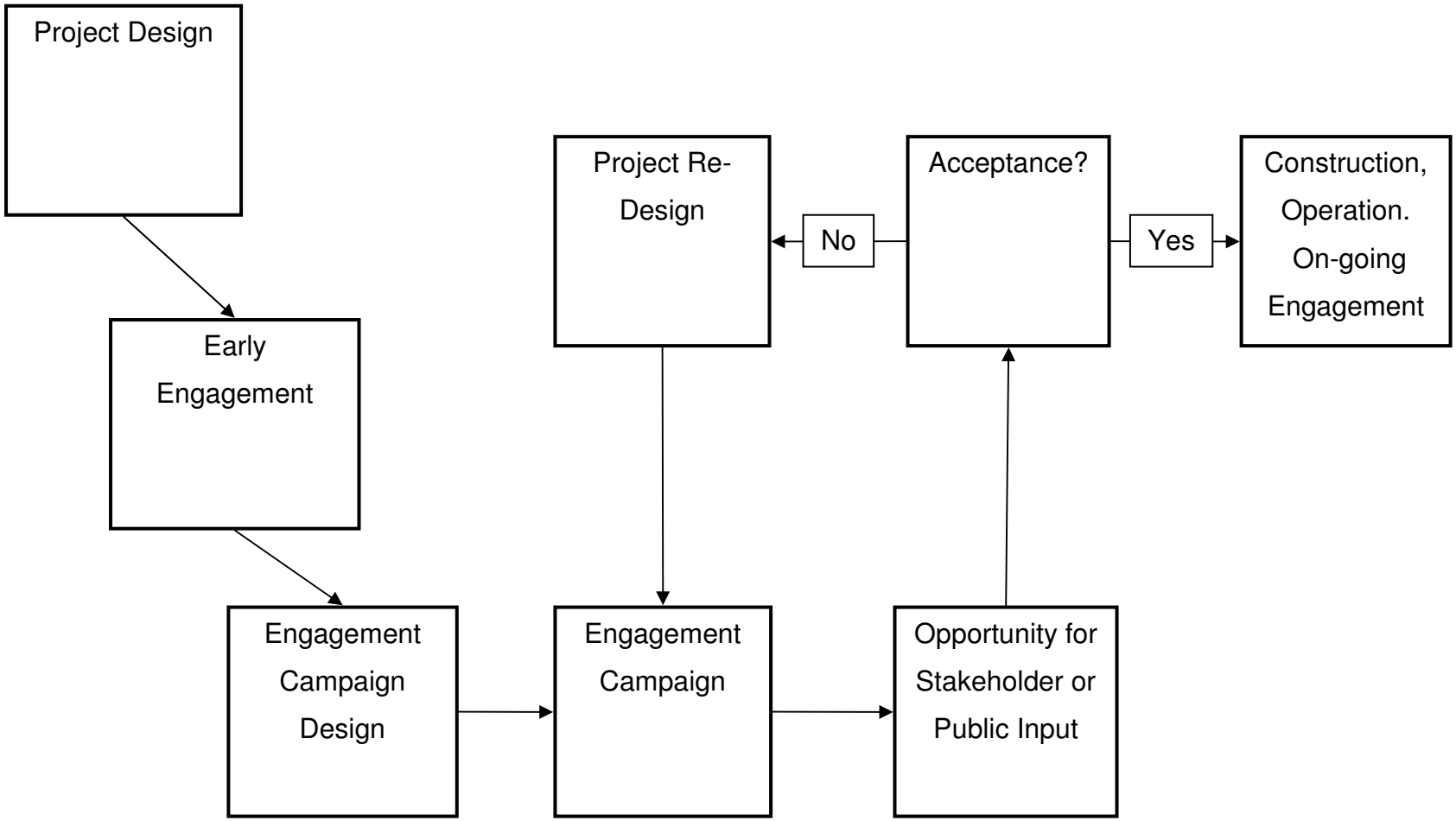

Figure 9 Combination of expert led and public input engagement strategy

Deliberative Process Informs Decision Making

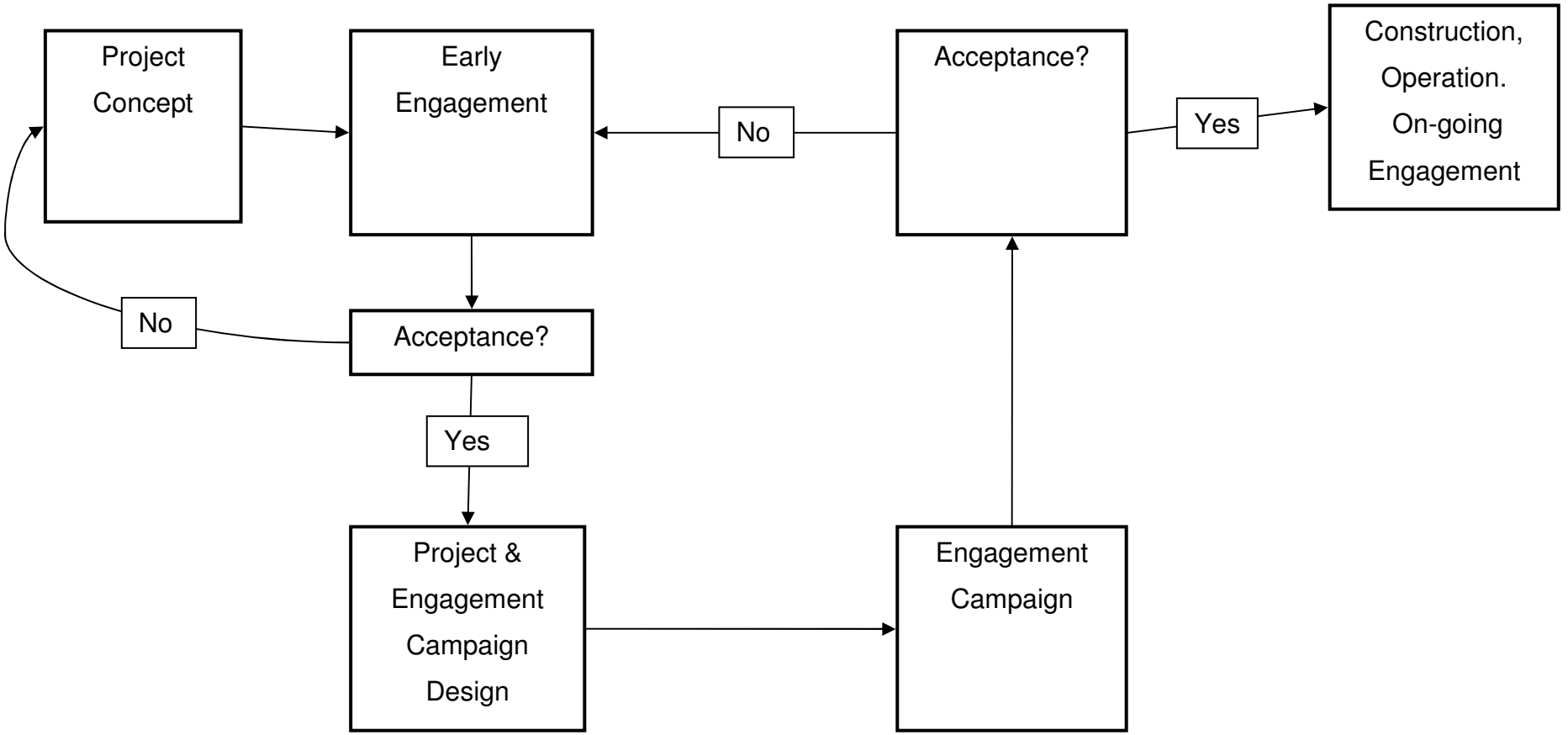

Figure 10 Deliberative process infrom project design engagement strategy

3.2.1.1 **Philosophy**

What? Various decisions to be made by the developer influencing the design of an engagement strategy, including: the style of decision making to be used, the approach to risk communication, the degree of transparency of process and degree of reflexivity and flexibility of process.

Why? Making assumptions explicit can help in deciding what kind of engagement campaign is desired, and what is most suited to a particular project. Matching stakeholders' and publics' expectations to the engagement campaign delivered might be worthwhile.

How? Reviewing literature and previous cases can show what has worked well before (e.g. Heiskanen et al 2008). Ethical and legal principles may apply.

When? This must be decided in the very early stages of planning a project because a highly deliberative approach will engage stakeholders and publics early in the design process.

3.2.1.2 **Project Design**

What? This includes all aspects of project design, from the initial justification for why the project is necessary and the developer's vision for what the project should be; to the location, the scale, the infrastructure, the benefits and the risk assessment; to the construction, operation, long term monitoring and final decommissioning of the facility. At all stages decisions may need to be justified with reference to the alternatives which have been considered.

Why? Allowing publics to understand how the project has been designed and why it has been designed the way it has can increase acceptance, and if proactive and timely can increase trust levels.

How? Depending upon the engagement strategy adopted, the developer may wish to keep publics informed as to how and when decisions are being made (transparency) and may wish to receive input from publics during the design stage (deliberation).

Methods to keep publics informed include press statements, newsletters and town meetings.

When? Depending on the engagement style, public input may be sought anywhere from very early to very late stages in the process; or may not be sought at all. Equally, publics may be kept informed as decisions are being made, only be informed once all decisions have been made or information provision may be somewhere in between.

3.2.1.3 **Early Engagement**

What? An initial process of gathering the information useful at the design stage, including stakeholder and public identification and initial interactions; and beginning to understand the local context through the various research methods termed social characterisation.

Why? To understand and anticipate likely responses to a project, and possibly to modify project design. The information gathered is also useful to design an appropriate engagement campaign, as well as start to build relationships between project staff and publics or stakeholders.

How? Early engagement techniques, especially face to face informal interviews and focus groups and surveys; study of the recent history of the community; analysis of local media and organisations.

When? This should be done fairly early on in the process, depending on what the results will be used for. If the results will be used to influence project design then it must be earlier than if the results are used to influence only the engagement strategy.

Box 3: Social Characterisation

What is social characterisation? A way of assessing the various social factors in an area which may influence the publics' response to a project. The concept has been used in work done in the United States on the Futuregen and Regional Partnership projects.

Why should social factors be considered? Public views on CCS are generally not based solely upon an understanding of that technology, but are created in reference to a whole host of other knowledge and experience (Bradbury et al 2009). A social characterisation can help determine if a project is more or less likely to be locally popular, and can provide useful information for designing an engagement campaign.

What factors should be considered? There are many factors to consider, and more will likely emerge during face to face work. Main factors include, but are not limited to: knowledge and views on climate change, energy policy and different energy generation options; trust levels in the developer, regulatory agencies and various levels of government; local sense of empowerment; familiarity with industries related to CCS; local economy; population density; project fit with place identity; policy fit in local and national context; history regarding other developments, especially if there has been past opposition or recent unwelcome development; local media or opinion forming groups; existing perceptions of energy developments and CCS.

What are the likely issues in Scotland? Scotland has a history of fossil fuel extraction from onshore coal field and, more recently, from the North Sea. Where experiences have been good this could be built upon for CCS; but where experiences been bad or are resented CCS may not be popular. There are many well loved iconic landscapes which may not be suitable (or likely) for development. Each area studied will present different issues.

How do you do social characterisation? Wade and Greenberg (2009) provide a useful guide in which they identify three stages: preliminary investigation using newspapers, websites and existing studies; direct engagement with key informants (interviews); and detailed data collection (focus groups, workshops, or surveys). We term this 'early engagement'.

How long does social characterisation take? Social characterisation can be integrated alongside technical site characterisation. Depending on the level of detail, it may take a period of months.

What methods are used for social characterisation? There are various methods employed including but not limited to: reviewing newspapers, internet sites, community histories, existing studies; informal conversations, interviews, focus groups, workshops or surveys.

Who should undertake a social characterisation? The developer may wish to establish a communication and engagement team for the project, who will undertake social characterisation, design of an engagement strategy and implementing the engagement strategy. Long term contact with the same staff members can build good relations between publics and developers.

3.2.1.4 **Engagement Campaign**

What? All dialogue and information sharing between the developer and other parties, once a project has been announced publicly. This includes communication and outreach activities and engagement activities; and includes stakeholders and publics. Whilst a campaign is improved by careful planning, a degree of responsiveness is necessary in order to deal with issues as they come up.

Why? To build support for projects, it is necessary for publics and stakeholders to know about the project. For stable long term support, it may be necessary to understand the project and the motivations for it.

How? Methods include focus groups, interviews, workshops, public meetings, exhibitions, citizen panels/jury, printed media, internet sites, press statements and newsletters. A full list and explanations are given in Table 10 and Table 11

When? Engagement and communication activities should run concurrently throughout the duration of a project, raising awareness before any major activities are undertaken..

Box 4: Aspects of an Inclusive Decision-Making Process (IRGC 2005)

- There has been a major attempt to involve representatives of all key stakeholders.
- There has been a major attempt to empower all actors to participate actively and constructively in the discourse.
- There has been a major attempt to co-design the framing of the issue in a dialogue with these different groups.
- There has been a major attempt to generate a common understanding of the magnitude of any possible risks (based on expertise of all participants) as well as the potential risk management options and to include a plurality of opinions that represent the different interests and values of all parties involved.
- There has been a major effort to conduct a forum for decision-making that provides equal and fair opportunities for all parties to voice their opinion and to express their preferences.
- There has been a clear connection between the participatory bodies of decision-making and the political implementation level.

Two central questions in structuring public and stakeholder engagement are: what and whom should be included? Topic and issue selection may itself be participative, with early engagement helping to define topics issues and participants. The International Risk Governance Council (IRGC 2005) has provided a set of criteria to address if the intention is to create an inclusive process (Box 4).

Box 5: Stakeholder Engagement
What are stakeholders? Stakeholders can be defined as socially organised groups that are, or will be, affected by the outcome of the event or the activity (from which the risk originates) and/or by the (risk management) options taken.
What is stakeholder mapping? The process of identifying the key stakeholders that have an interest in the event or activity or in the management response to the activity.
What are the main stakeholder groups? A useful description is provided in Table 2.1. NETL (2009), pp. 18-19. The key groups presented and described there are: officials, regulators, business interests, landowners and neighbours, civic groups, environmental groups, senior citizens, religious groups and educators.
What are the key stakeholder groups in Scotland? The developer is best placed to identify the key stakeholder groups with respect to a specific project. Offshore development entails its own distinctive stakeholder groups, well known to the oil and gas sectors. This includes: fishing interests (commercial & recreational), marine conservation and protection, Crown Estate, shipping and sailing interests, etc.
How can stakeholder groups be identified? CCS developers usually already have well developed identification of stakeholder groups. Inclusion of additional stakeholder groups needs to be considered on a case-by-case basis. Strategies for identifying stakeholders include contacting or consulting: national government, local authorities, SEPA, SNH, websites, local phone books, interviews (snow-balling of contacts), local newspapers, local chamber of commerce, local outreach team members, town clerks or surveyors, legwork (driving around an area), religious leaders, local universities and colleges, established environmental groups (e.g. Friends of the Earth, WWF, Transition Towns) and established marine societies / NGOs (e.g. SAMS, RYA, Scottish Coastal Forum, etc.).
How long does stakeholder engagement take? It depends on the case, but it can be very time consuming where a complex project influences multiple interests and stakeholders. Early planning is likely to be essential. Many consultancies offer professional stakeholder engagement services.
What methods are used for stakeholder engagement? See Table 10. The principal methods employed are: interviews, informal conversations, focus groups, in-depth discussion groups (citizen panels), workshops and town meetings.
Who should undertake stakeholder engagement? The developer needs to be clearly in charge of the process, but may contract out the service to a consultancy, many of which nowadays offer professional stakeholder engagement services. In selecting a consultant, it is recommended that at least one PhD-level trained expert in stakeholder engagement / analysis is involved in the team to ensure that the work takes account of state-of-the-art scholarship.

3.2.1.5 **Acceptance, and Maintaining Acceptance**

What? Various types of acceptance need to be obtained, including regulatory permits, planning permission and – the focus of this toolkit – a social permit to operate. The social permit must be maintained; it can potentially be 'revoked' by new concerns which may be outside of the control of the developer. The best way to guard against this is to maintain high levels of trust and to manage an open, transparent and robust process of engagement and communication, and of course a good safety record.
Why? Although not a legal requirement, local publics can make it very difficult and sometimes impossible for a project to go ahead.
How? Continuation of the engagement process, with an eye out for new interested parties and issues which may be raised. Any of the same engagement technique are useful, as well as site visits and community benefits such as employment and possibly a community fund.
When? The engagement strategy, coupled with a good project, aims to achieve acceptance. Once achieved it must be maintained through the construction, operation and decommissioning phases of the project.

A distinctive feature of CCS is the long term nature of CO_2 monitoring requirements. Some kind of engagement work should be planned throughout the 30 year after-drilling time period during which the company is responsible before handing over to the government for long –term stewardship. Raising this issue early may actually help publics' trust in the accountability of the developer, and the government – it shows that plans are in place for long term issues.

Long term support, and in particular a stable and robust public evaluation of CCS, that will not be susceptible to the latest media headlines or the inevitable setbacks, can only really come about if people are allowed to develop a deep understanding of the issues and work through their concerns. The criteria in Box 6 are useful in determining if an engagement campaign will deliver these types of long term benefits.

Box 6: Criteria for evaluating the Quality of a Decision Making Process (IRGC 2005)

- Have all arguments been properly tested?
- Have all truth claims been fairly and accurately tested against commonly agreed standards of validation?
- Has all the relevant evidence, in accordance with the actual state-of-the-art knowledge, been collected and processed?
- Was systematic, experiential and practical knowledge and expertise adequately included and processed?
- Were all interests and values considered and was there a major effort to come up with fair and balanced solutions?
- Were all normative judgements made explicit and thoroughly explained?
- Were normative statements derived from accepted ethical principles or legally prescribed norms?
- Were all efforts undertaken to preserve plurality of lifestyle and individual freedom and to restrict the realm of collectively binding decisions to those areas in which binding rules and norms are essential and necessary to produce the wanted outcome?

3.2.2 Evaluation of Engagement Practices

Despite much research on, and practice of, participation and engagement, there has been surprisingly little attention paid to the evaluation of the activity (Burgess and Clark, 2009). Evaluation contributes enormously to learning from previous work, and should be conducted in a way that accelerates the learning process.

Evaluation of outcomes assesses how well the process scored against pre-defined criteria. The following criteria for evaluating an engagement process and / or communication campaign may be useful, Box 7.

A more detailed set of evaluatory criteria for public acceptance and process efficiency has been defined by Rowe & Frewer (2000), Table 7. More technocratic models of decision making may reject certain aspects of these criteria (such as 'influence'), which, in turn, may or may not affect public acceptance.

Box 7 Criteria for Evaluating the Outcome of a Decision Making Process (IRGC, 2005)

- Effectiveness
- Efficiency
- Accountability
- Legitimacy
- Fairness
- Transparency
- Acceptance by the public
- Ethical acceptability

Criteria	*Description*
Public Acceptance	
1. Representativeness	Representative sample of the affected population
2. Independence	Process conducted in an independent, unbiased way
3. Early involvement	The earlier the stage of involvement the greater the sense of ownership of the process, especially at the stage where value judgements are important
4. Influence	Any participatory process should have a visible impact on policy
5. Transparency	The public should be able to see progress and how decisions are being made
Effectiveness of process	
6. Resource accessibility	Access to appropriate resources (information, experts, time, materials) to enable them to successfully fulfil their brief
7. Task definition	The scope of the exercise, the expected output and the mechanism of the procedure should be defined at the outset
8. Structured decision making	To enable debate over the underlying assumptions of a decision, how the decision was made, the extent to which it was supported
9. Resource use efficiency	The efficiency of the use of limited resources on the part of the developer and regulators

Table 7 Evaluation Framework for Public Engagement (adapted from Rowe and Frewer, 2000)

3.2.3 Fitting an Engagement Strategy into Project Timelines

It is a primary conclusion of NETL's (2009) recent report that engagement and outreach should be integrated within normal project management. Depending on how the engagement strategy is designed, fit with the project timeline will vary. Project timelines will also vary in detail from project to project. The environmental NGO Bellona (2009) has produced a number of illustrative timelines on this topic (Figure 11), and NETL (2009; pp39-41) provide a detailed table relating engagement activities to technical activities.

The main observations are that engagement should begin as early as possible; be fitted to technical and regulatory stages; and should provide awareness of practical operations before they begin so that local publics are aware of what it is going on.

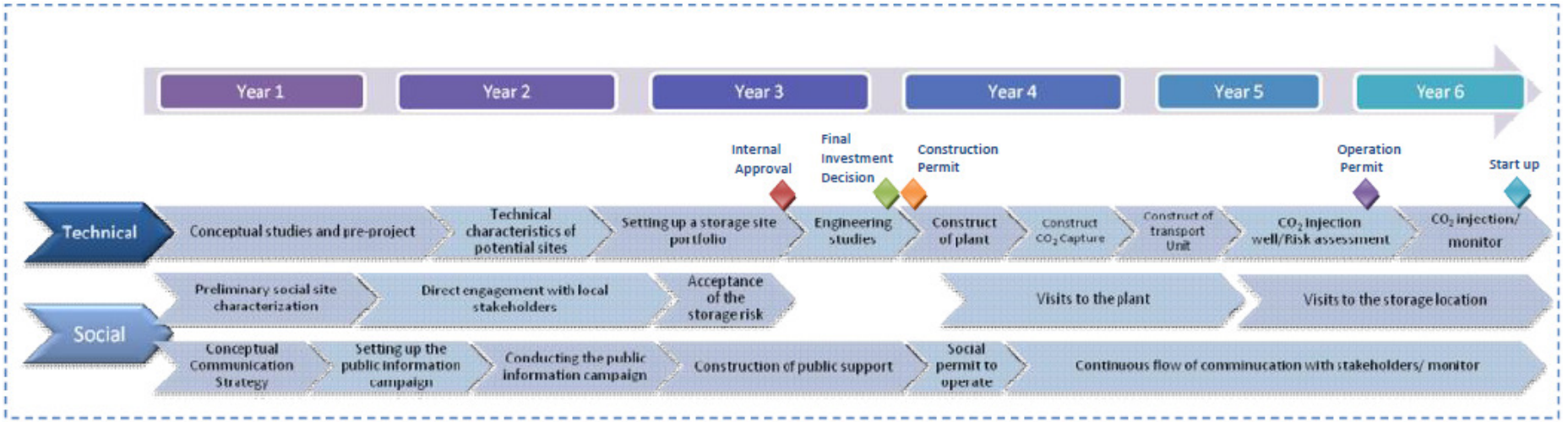

Figure 11 Fitting an engagement strategy to project timelines (Bellona 2009)

3.2.4 **Potential Frameworks: other best practice guidelines**

There is some useful work published for designing engagement campaign frameworks, timelines and advice; much of it based on first hand experience. The best guidelines are listed in Table 8 below. Ideally, the present study should be read in conjunction with these other engagement guidelines

Project name	***Team***	***Applications***	***References***	***Useful For***	***Key Components***
Best Practices for Public Outreach and Education for Carbon Storage Projects	National Energy Technology Laboratory (NETL) (USA)	CCS projects	NETL (2009)	Essential reading. Useful for all aspects of engagement and communication, especially stakeholders. Provides detailed guidance on specific topics.	This is the most comprehensive best practice guide so far published on public outreach on CCS, building upon the extensive experience of the US Regional Carbon Sequestration Partnerships. It outlines ten best practices as follows: 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 audience; 8. actively oversee and manage the outreach programme throughout the life of the CO_2 storage project; 9. monitor the performance of the outreach programme and changes in public

					perceptions and concerns; 10. be flexible – refine the public outreach programme as warranted.
ESTEEM	Eindhoven, ECN (Netherlands)	Energy projects - stakeholders and local communities	Raven et al. (2009)	Designing a project with a high degree of public and stakeholder participation.	Proposes a six-stage framework for project-based public engagement: projects past and present; vision building; identifying conflicting issues; portfolio of options; getting to shake hands; recommendations on action.
Carbon Capture and Storage Communication Workshops	University of Calgary, IISD, Climate Change Central (Canada)	CCS projects – stakeholders, local communities and the public	Climate Change Central (2007)	Designing a public communications strategy ad campaign.	A guide to 'do's' and 'don'ts' in communicating CCS to the public from a range of different perspectives. This includes how to build trust: 1. commitment – creating or negotiating reciprocal and verifiable behaviour; 2. accountability – doing what you say you will do, transparency, clarity; 3. disclosure – sharing weaknesses, flaws and uncertainties; 4. acknowledgement – recognize different contributions and sources of power, influence and knowledge. It also encompasses seven principles for undertaking public engagement work (accept and involve the public; plan carefully and evaluate performance; listen to your audience; be open, frank and honest; coordinate and collaborate with local credible sources; meet the needs of the media; speak clearly and with compassion).

An Integrated Roadmap of Communication Activities Around CCS in Australia and Beyond	Centre for Low Emission Technology, CSIRO (Australia)	CCS projects - stakeholders, local communities and the public	Ashworth et al. (2007)	Recommendations for stakeholder and public communications strategies. .	Recommendations to industry on how to devise communications strategies on CCS: 1. be proactive in communicating through dialogue and discussion; 2. partner with credible environmental NGOs and other trusted sources in developing communications material; 3. develop education curricula and materials; 4. engage high profile public figures to stimulate discussion; 5. test materials through use of focus groups with a range of target audiences; 6. develop multi-media communication tools; 7. demonstrate support for renewable energy as part of portfolio of solutions to climate change; 8. identify resources to support activity.
Breaking Ground: Engaging Communities in Extractive and Infrastructure Projects	World Resources Institute (USA)	Extractive and infrastructural projects – local communities	WRI (2009)	Designing a public engagement strategy.	Presents seven principles for effective community engagement: 1. prepare communities before engaging; 2. determine what level of engagement is needed; 3. integrate community engagement into each phase of the project cycle; 4. include traditionally excluded stakeholders; 5. gain free, prior and informed consent; 6. resolve community grievances through

					dialogue; 7. promote participatory monitoring by local communities.
ZeroGen New Generation Power – A Framework for Engaging Stakeholders	ZeroGen Pty Ltd., CSIRO (Australia)	CCS projects – stakeholders, local communities	Simpson & Ashworth (2009)	Designing a stakeholder engagement strategy.	Reviews an approach to stakeholder engagement by one company and provides some general recommendations to developers: 1. the need for a stakeholder analysis to identify those stakeholder groups with the potential to have the greatest impact on the project, either positive or negative; 2. appropriate communication activities to then engage the prioritized stakeholder groups; 3. champions within the influential groups that can help to raise awareness of the benefits of the project, particularly for government, investment and insurance agencies; 4. the use of community liaison groups, to provide the community with a voice, to meet regularly with the Project team; 5. proactive engagement with the local media to advertise project developments, public meetings and present the latest information about Project developments; 6. applying the principles of honesty, transparency and respect in all interactions.

Guidelines for Public Consultation and Participation in CCS Projects	Bellona Europa (Belgium)	CCS projects	Bellona Europa (2009)	Fitting engagement strategies to technical and regulatory project timelines.	Provides a useful set of concepts and resources for guiding a developer in designing public consultation and participation. 1. frame CCS in the context of climate change mitigation and as part of a portfolio of solutions; 2. understand factors contributing to risk perceptions in the area; 3. identify stakeholders and their interests in the area; 4. convey simple, clear and accurate descriptions, illustrated materials, printed documents and models; 5. hold face-to-face interviews and include experts at meetings so that the public can see that the developer takes its questions seriously; 6. provide the opportunity for the public to debate the issues openly and to reach their own informed judgements; 7. take the effort to organise and attend public meetings, giving high quality presentations and briefings; 8. use established procedures for including stakeholders, to promote dialogue and to reach consensus; 9. include site visits; 10. aim to build positive attitudes towards the technology; 11. make a commitment to take account of

					the results of public dialogue and to monitor public opinions; 12. keep stakeholders informed and create mechanisms for providing up-to-date information with clear ways of attaining public comments.

Table 8 Best practice frameworks and guidelines for engagement and communication activities.

3.3 Implementing an Engagement Campaign

This section contains practical information on topics to be discussed, engagement and communication techniques and materials to be used during engagement campaigns.

3.3.1 **The CCS chain: unpacking the variables**

Table 9 presents a non-exhaustive list of potential topics about which issues may be raised. This approach starts from the various aspects of the CCS chain and asks what issues may arise; but it is more illustrative than exhaustive, and should be used as starting point only.

Topic	***Variables***	***Issues***	***Groups affected***
Technology: Capture Unit	Precombustion, Postcombustion, Oxyfuel.	Visual appearance, noise, size, degree to which they are perceived as unknown and risky.	Local publics
Technology: Transport	Truck,	Increased truck traffic, safety.	Local publics
	Ship,	Onshore terminals, safety.	Local publics
	Pipeline	Potentially many sites for opposition. Gaining permission to use land. Environmentally sensitive areas. Safety fears.	Local publics, land owners and managers, landscape protection groups, ecosystem protection groups.
Technology: Storage	Onshore	Safety from leakage, seismic activity, water contamination, house price effects, local ecological impacts, long term liability for stored CO_2.	Local publics.
	Offshore	Potential for leakage to affect marine ecosystems. Infrastructure affects other ocean users.	Ecosystem protection organisations, fishermen, shipping, other energy infrastructure owners

	EOR	Opportunity for increased oil production, increased revenue, using CO_2 for 'something useful'. Hypocrisy of storing CO_2 to extract fossil fuels.	Local publics, anti fossil fuel campaigners.
	Gasfield/Oilfield/Saline Aquifer	Security of storage – fossil fuel fields are better understood by publics, but may be considered to have many test wells and therefore less secure.	Local publics.
Fuel	Coal	Environmental damages from coal sourcing and combustion (e.g. sulphur, particulates). Increased coal use due to efficiency losses.	Local publics, anti coal campaigners, environmental groups.
	Gas	Increased fuel use due to efficiency losses.	Local groups, anti fossil fuel campaigners.
	Heavy Oils/Petroleum Coke	Environmental damages due to combustion, contaminates in fuel source. Using a by-product in an efficient way could be perceived positively.	Local groups, environmental groups.
	Biomass	Source of biomass – contribution to deforestation or food price rises.	Local groups, environmental groups.
Scale of facility	Pilot to Commercial scale	It seems that larger facilities attract more interest/concern	Local publics
	Similarity to what was there before	Any changes are potential issues e.g.	Local publics

		increased vehicle transport; new use of chemicals (e.g. amines); storage of flammable materials.	
Long term storage	Location of storage site, long term plans for site, any other operators, migration of CO_2.	Will monitoring and necessary work be kept up after the project has finished? Who will ensure this? Safety and CO_2 reductions might be compromised.	Local Publics
Locations	Wilderness	Threat to ecosystems. Place identity. National parks.	Local publics; concerned non-local publics; landscape protection groups
	Rural	Threats to 'character' of a place – identity and attachment issues. Viewing it as 'cleaning up someone else's mess'.	Local publics; concerned non-local publics; landscape protection groups
	Town	Possible threat to 'character' of place.	Local publics
	Urban	High population density – opposition more likely to snowball.	Local publics
Local Economy	Need for employment	Employment benefits of facility will be of greater value if employment is needed.	Local publics
	Familiar with fossil fuel industry	Existing understanding and trust makes CCS easier to explain. Bad experiences with fossil fuel industry will have the opposite effect.	Local publics
	Non-industrial area	Threat to place – industrialising a non-industrial area	Local publics, landscape protection groups
History with developments	Trust in developers/ regulators	High trust levels help in conveying substantive information to publics; and	Local publics

		help allay safety concerns.	
	Development fatigue	Too much development in one area may lead to opposition	Local Publics
	Responses to previous developments/controversies	Previous failures of the democratic process may make opposition more likely.	Local Publics
	Sense of community empowerment	Where communities feel 'in control' of their future and ability to right wrongs done, they are more willing to accept perceived risks.	Local Publics

Table 9 Aspects of the CCS chain and potential issues which might arise.

Box 8 Media Engagement

What is the media? Those organisations involved in preparing, presenting and broadcasting or otherwise disseminating written, audio-visual (TV and radio) and web-based communications.

Why does the media matter? Media representation has become pivotal in many public debates on contemporary issues and frequently 'shapes' events as well as responding to external pressure-groups and 'spin-doctors'. The theory of risk amplification posits that the media is a key agent in the escalation of the perceived risks associated with certain technologies or issues.

What media should be engaged? The local and regional media can have a very important role in influencing perceptions of proposed and planned new development and infrastructure. The local media has had an important role in a number of CCS case-studies examined in this report (e.g. Barendrecht, Greenville). National media obviously has a wider coverage and will sometimes pick-up on local disputes (e.g. this happened in the case of Barendrecht, which attracted widespread national attention in the Netherlands). Large companies and environmental NGOs are well versed at providing information in a media-friendly format and/or at staging events to attract media attention (the Climate Camp being a good example). All levels and types of media are, therefore, important in devising an engagement strategy.

How should a developer communicate with the media? Most major companies have professional communication managers and offices which plan and undertake public relations and external communications work. It is also common for major companies to out-source communications work to specialist PR / communications companies. In some cases, it may be more effective for an umbrella organisation to undertake the lead role in public relations work – e.g. the Carbon Capture Project or the CCSA. In other cases, an NGO such as Bellona or Greenpeace might lead a media campaign that is directly relevant to companies' CCS policies and activities and a developer might wish to have capacity to consider, respond and react if appropriate. A CCS media engagement activity should take account of the existing media work of the organisation, while recognising the distinctive features of CCS and other engagement work by umbrella organisations.

How should a CCS press release be written? NETL has provided some useful guidance on writing press releases (NETL, 2009, page 47). Amongst the key points: keep it short, using the Associated Press Style Guide; write a strong opening and lead-off with a 'capsule' of the most important information (who, what, where, when, why) then elaborate in subsequent paragraphs; write a complete story as you want it told (it may be used almost without alteration); write in a direct, plain style that avoids jargon, clichés and hyperbole; spell out acronyms; use active verbs where possible; provide concise explanations of unfamiliar terms and concepts; consider using direct quotes from reputable sources to provide a first-person point of view; get several people to proof read carefully; check any images to ensure they do not contain any unintended visual messages (some without a hardhat on at a drill site, for example); get permission to use outside sources; include brief background on the organisation(s) behind the project or event; gain exposure for the press release by posting on websites, alerting media contacts and potentially interested parties, etc.

How long does media engagement take? It depends on the case, but a media engagement activity may proceed concurrently with the different phases of a CCS project. It is worth while cultivating good relations with key media organisations and personnel and to try and encourage journalists to take a personal interest in the project. Invite journalists to visit the company and (some aspect of) the planned CCS project-site: this can make all the difference to a journalist's understanding of what is being proposed.

Be proactive! Don't wait for others to be the first to publicise the proposal or development. Rather plan to work with the media from an early stage and develop the key messages that the developer wishes to convey. Ensure that sufficient resource is available for the activity.

3.3.2 **Engagement Techniques**

Engagement is a *two way* flow of information between publics/stakeholders and developers/experts/proponents. The goal is that publics' and stakeholders' support for the project is built by asking questions they may have, giving input to decisions and improving their sense of empowerment and trust in the project; and for the developer to better understand the publics and stakeholders, in order to improve the project and /or engagement strategy. A list of methods and explanations is given in Table 10.

Method	***Brief Description***	***Strengths***	***Weaknesses***	***Examples in the CCS field***
Surveys / questionnaires Useful for information gathering, theory / hypothesis testing and applied research Cost: £5K - £20K	Structured set of questions 15 mins to 1 hour Sample size depends on target population size Typically 100 to 1000s	A large sample can be surveyed Lends itself to quantification Can be designed to test hypotheses and to be statistically representative Online polls now available using pre-arranged samples Can use more complex strategies, such as MADA, conjoint analysis, analytical hierarchy process, etc.	Usually only short time window available for response Can be undermined by poor design Hard to get a good understanding of the underlying reasoning (cognitive and other thought processes) behind the responses Hard to know whether the respondent really understands the question or	*Public* Curry et al. (2005) De Best-Waldhober et al. (2009) Dammen et al (2006) Ha-Dong et al. (2009) Itaoka et al. (2009) Johnsson et al. (2010) Reiner et al. (2006) Shackley et al. (2005) Sharp et al. (2009) Terwel et al. (2009 a &b) *Stakeholders*

			whether they interpret it in the way intended	Gough (2008) Shackley et al. (2007) Shackley et al. (2009)
Interviews Useful for information gathering, theory / hypothesis testing and applied research Cost: £2K - £20K	Structured or semi-structured set of questions Face-to-face Telephone 15 mins to 2 hours Sample size depends on target population size Typically 10's to 100	Allows issues to be dealt with considerable depth Allows questioner to ensure that the respondent understands the question Allows questioner to understand the reasoning behind a response and to follow-up a response Allows respondent to clarify issues and ask their own questions Can collect quantitative as well as qualitative data	Resource intensive – the best interviews are face-to-face hence require travel time Because of resource requirements, unlikely that a statistically representative number of interviews can be undertaken Likely to be more valuable for qualitative data collection than for quantitative data	*Public* Palmgren et al (2004) Wallquist et al. (2009) *Stakeholders* Fishedick et al. (2008) Gough et al. (2008) Hund and Judd (2008) Shackley et al. (2005) Wong-Parodi et al. (2008)
Workshops Useful for information gathering, applied research and during an engagement	Range of formats possible Usually focused around a topic guide	Interactive and participative Agenda can be reasonably open-ended Efficient use of resources – can liaise with a wide range	May be somewhat unstructured Membership not always clearly demarcated Representativeness of	Ashworth et al. (2008) (small group) Ashworth et al. (2009) (large group) Stephens et al. (2009) UKERC CCS Roadmap process

campaign Cost: c. £3K each	Number of participants limited by what is a manageable number Typically 5 to 100	of individuals cost-effectively	participants frequently unknown and/or questionable Too lacking in structure for use with most public samples – better suited for stakeholder work	
Town Meetings Useful for an engagement campaign Cost: £2K each +	Typically a panel of representatives present and comment on the project and answer questions about it in front of a public audience Needs careful design and facilitation to ensure that it is not perceived as biased or run incompetently. Number of participants limited by what is a	Allows the full scope of a project to be presented and discussed in open. Allows a wide range of participants to have a say and to provide feedback. Allows independent experts and stakeholders to be given a 'voice' in responding to and commenting on the project. This can (potentially) increase the credibility of the project by establishing the views of key opinion-formers.	Sometimes hard to structure and requires very good facilitation to ensure that the key issues are covered and the meeting not side-tracked. The process is quite vulnerable to vocal minorities and opposition groups. It is unlikely that the meeting could succeed in its aims if a group of participants is determined to derail it. It may be difficult to cover the full set of issues that need addressing in a single town meeting, so a series may be required. Getting	Total (2008)

	manageable number Typically 5 to 100		across technical, potentially complex, material rapidly and understandably can be challenging.	
Focus groups Useful for information gathering, theory / hypothesis testing, applied research, and testing ongoing reactions to an engagement campaign Cost: c. £3K each	Semi-structured 1 -3 hour discussion Number of participants limited by what is a manageable number Typically 5 to 15	Interactive and participative Focused and facilitated discussions around topic guide Allows participants to create collective understandings and interpretations Well designed to address specific research questions	Groups work best with small numbers (<10) so hard to make representative Resource intensive - payment for participating is usual Groups receive information in such a way that they are no longer representative of the community or sub-group from which they are recruited	Bradbury et al. (2009) Gough et al. (2002) Instructions in NETL:(2009) pp.54-58.
Citizen Panels In-depth Discussion Groups Useful for information gathering, , theory /	Semi-structured Similar to focus groups but discussions continued over a number of sessions – typically 3 to 10	Allows much more in-depth analysis of issues than most other methods Allows detailed and structured information to be presented to groups in prescribed order	Very resource intensive Very difficult to make representative of a target population Delineation of groups usually and unavoidably quite crude	CASSEM project (not publicly available) Shackley et al. (2005)

hypothesis testing, applied research and during an engagement campaign Cost: c. £10K +	Number of participants limited by what is a manageable number Typically 5 to 15	External experts can speak directly to the participants Participants in groups can engage in a direct dialogue with external participants Allows participants and the facilitator to follow-up questions and seek for specific information in between meetings Allows groups to formulate their own ideas and recommendations Groups can assess material developed for a communications or engagement plan	(e.g. based on gender, socio-economic group, place of residence, etc.) The representativeness of the group as an indicator of initial public perceptions of a project decreases as more information is provided and as participants themselves seek-out additional information. Responses may be quite dependent upon the particular individuals involved. The small number of groups typically held means that bias can be introduced by dominant individuals.	
Citizens Jury Useful for information gathering, applied research and during	Various designs possible, from an extended citizens panel to an extended town meeting. Meetings	Due to the fact that a citizens jury has some decision-making power, it has more credibility and status than other methods. The public may, therefore,	It can be difficult to manage a citizens jury and it may require significant administrative support. A well-trained facilitator is	None as yet

an engagement campaign Cost: c. £50K +	occur over an extended period of time, as necessary to reach a decision. Usually has some decision-making power, such as influence upon legislators or the public in an open ballot. The 'Planning Cell' model used in Germany typically involves 300 individuals, whereas the UK citizen jury typically involves 10 to 15 individuals.	come to trust in, and take note of, its deliberations more than is the case for focus groups, citizen panels, or other methods. The jury itself should be self-organising and managing to a large extent, which reduces the ability of other interest groups to introduce bias.	required, as is a 'go-between' the jury and the sponsors of the project. This is a costly exercise compared to other methods.	

Table 10 Engagement techniques.

Nb: cost estimates do not include the cost of the time of staff from organisations that are promoting / advocating the project. The lead time on all these methods is a minimum of one month. Some methods by their nature continue for a longer period.

3.3.3 **Communication and Outreach Techniques**

A *one-way* flow of information from developers/experts to publics, stakeholders and media. Communication alone is not enough to satisfy most people – questions will be asked and should be answered, therefore engagement is also necessary. Communication materials are essential, however, and can convey a wide range of useful information. Issues identified during early engagement should help design communication materials and topics, and popular wider issues should be included even if they seem to be not directly relevant to the particular project. A neutral tone presenting factual information is generally preferred to self-promotion or a persuasive tone, and communication materials can lose their credibility if the developer is perceived as untrustworthy or dishonest. A full list and explanations are given in Table 11. Those methods which include face to face contact offer the potential for engaging in dialogue – thus may become engagement activities.

Method	***Brief Description***	***Strengths***	***Weaknesses***	***Examples in the CCS field***
Printed Materials	Leaflets Fact sheets Posters Newsletters	Can reach a wide audience. Can convey a lot of information on a wide range of topics Hard copies are somehow more 'real' than computer	May not be read, or not read in detail Poorly designed printed media may be misunderstood and have adverse effects.	CO_2 Capture Project's s 'In-Depth' Leaflet http://www.co2captureproject.com/reports/In-depth_brochure_2_page.pdf ZEP's 'The Hard facts behind CCS' http://www.zeroemissionsplatform.eu/component/downloa

		information Regular newsletters can build a sense of inclusion in project		ds/?id=450 HECA's newsletters for Kern County http://archive.constantcontact.com/fs068/1102686630376/archive/1103119523975.html Guidelines for producing materials NETL (2009) pp.48-50
Internet Resources	Project website	Easy access for publics and stakeholders Allows for regular updates All relevant information can be kept in one place Can link to independent sources of supporting information, or similar projects Potentially can included blogsites or 'webinair' type real-time discussions to allow a dialogue to occur	Not accessible to those without computer access	Gateway Gas Storage (very good website, but not CCS) http://www.gatewaystorage.co.uk/ Total's Lacq project http://www.total.com/en/challenges/carbon-dioxide-capture-and-geological-storage/lacq-project-940768.html

Videos	May be short or long depending on topic May be specially developed for a project, or be generic dealing with general issues	Once developed can be reused many times Can use computer graphics to show sub surface or proposed developments	May not be able to go into much detail without losing narrative structure	Film by Shell: http://www.shell.com/hom/content/innovation/managing_emissions/ccs Animation by ZEP: http://www.zeroemissionsplatform.eu/safe-storage.html/closing-the-carbon-loop-reducing-co2-emissions
Lectures, Presentations	Can be an open event, or invitation only May be a small or large number of attendees Could be at an existing event (e.g. a rotary club meeting) or a specially organised event	Allows the full scope of a project to be presented and discussed Allows attendees some interaction with a representative of the developer Allows questions to be asked Can be made specific to the	Overly technical presentations will not be understood May become a forum for criticism if public feel they have no other route to express themselves	Battelle presentation for Greenville, Ohio http://216.109.210.162/userdata/whatsnew/public_meeting_8-13-08.pdf

		project		
Exhibitions	An open event with information about a project, and opportunity to talk with representatives of the developer May last for a few hours to a few days, or even longer May travel to various locations	Many different types of media can be held in one event – e.g. can include written, poster, video and presentation Offers opportunity for face to face discussions Can be repeated to update on progress	Only lasts for a short time – some may not be able to attend. Resource intensive if one or more persons are manning the exhibition desk	Gateway organised successful exhibitions. SCCS has exhibited at the Edinburgh Science Festival
Site Visits	A group of invited or interested people can be shown round a site in development or operation May be offered regularly, or to mark particular developments.	Offers participants direct experience of CCS Opportunity for questions Media can be involved	Relatively small numbers can attend Resource intensive if one or more persons are required to host visits (sometimes ex-employees will do this on a voluntary basis)	Guidelines in NETL (2009) pp.51-53
Information Centre	Can be organised by the developer and on developer's site - or be	Permanent location offers good access to information	Under trained staff can give a bad impression.	Scottish Power has a visitor centre at Longannet

	funded in part by the developer but organised by an independent third party	May be used to host events Opportunities for questions, and range of other media to be available.	Potentially resource-intensive	
Media Statements	Press releases TV, radio or newspaper interviews Local media or national media	Messages reach a wide audience Media coverage will be in some cases inevitable, so proactive engagement may be preferable Positive interpretations may become amplified	Loss of control over the messages. Negative interpretations can become amplified	Guidelines in NETL (2009) p.23, 47.

Table 11 Communication and outreach techniques

3.3.4 **Materials for use in Outreach and Communication**

Quite a number of examples of outreach materials have been produced, mostly focussing on the justifications for CCS, the various capture processes and the how storage works. Although some new materials have been developed since, David Reiner (2008) comprehensively reviewed publicly available outreach materials. Materials are of variable quality; the better materials are listed here, and it has been mentioned where the materials are especially good.

Developer	***Materials***	***Source***
Zero Emissions Platform (ZEP)	Three animations dealing with the reasons for CCS, the capture process, and the storage process. Fact Sheets and publications in the information section. Background information on various projects, and links to other resources. The resources are of high quality. The website is also accessible and useful to a lay audience or audience with knowledge of CCS	http://www.zeroemissionsplatform.eu/
CO_2 Capture Project (CCP)	A factsheet called 'In-Depth' is of particular interest – to scale, it conveys the depth to which CO_2 is injected. A streaming video introducing CCS.	http://www.co2captureproject.org/

	Various images and diagrams taken from reports. A more technical report aimed towards the media and stakeholders who would like a deeper understanding.	
Bellona Foundation	Website which details arguments for, and explains CCS. Provides links to various other NGO websites. An 'interactive' presentation, which has animated slides and info boxes. A video is also available on youtube.	http://www.bellona.org/ccs/index_html http://www.youtube.com/watch?v=lH3hgqLM94U
Shell	One good video explaining CCS. Three animations: 'Is this a new idea', the capture process and the storage process.	http://www.shell.com/hom/content/innovation/managing_emissions/ccs
CCSA	Three pamphlets of increasing length to suit more or less interested audiences. Describe CCS and the reasons behind it.	http://www.ccsassociation.org.uk/index.htm
Statoil	Some videos of the Statoil offshore rigs give an interesting impression of the location of offshore storage Videos and animations explain CCS at the Sleipner and Snovit sites.	http://www.statoil.com/en/newsandmedia/multimedia/filmsandvideos/pages/default.aspx
Scottish Power	A large collection of videos and animations, explaining how CCS works, the arguments for it, and advocacy from politicians, NGOs, and Scottish Power themselves. Of good quality.	http://www.scottishpower.com/carbon_capture_storage/default.asp

	Three powerpoint presentations are on the site. Rolling videos are available at CCStv website.	http://www.scottishpowerccs.tv/
IEAGHG	Seven factsheets and one full length report for a lay audience on the various aspects of CCS	http://www.ieaghg.org/index.php?/20091218110/what-is-css.html
CO_2Net	Five powerpoint presentations available for download Pamphlets in many European languages Useful links to many other ongoing CCS projects	http://www.co2net.eu/public/downloads.asp
Masdar and Hydrogen Energy	A video which clearly explains EOR.	http://www.youtube.com/watch?v=Il0Dw3vfjZk&feature=related
UNEP	A simplified version of the IPCC special report on CCS, designed for an interested lay or stakeholder audience.	http://www.unep.org/dec/docs/CCS_guide.pdf
CO_2CRC	Eleven factsheets Thirteen posters Five videos Image Library	http://www.co2crc.com.au/
CCS Education Initiative	A video explaining CCS Links to a lot of presentations given by a range of people and organisations.	http://www.ccs-education.net/index.html

Table 12 Materials to be used in communication and outreach campaigns

References

Arnstein, S. (1969). 'A ladder of citizen participation', *Journal of the American Planning Association*, 35(4), 216-224.

Ashworth P., Melissa Mayhew, Frances Millar, Naomi Boughen. (2007). An Integrated Roadmap of Communication Activities Around Carbon Capture and Storage (CCS) in Australia and Beyond. CSIRO, Australia

Ashworth P., Pisarski, A., Thambimuthu, K. (2008). 'Public acceptance of carbon dioxide capture and storage in a proposed demonstration area'. *Proc. IMechE Vol. 223 Part A: J. Power and Energy,* 299-304

Ashworth P., Simone Carr-Cornish, Naomi Boughen, Kelly Thambimuthu. (2009). 'Engaging the public on Carbon Dioxide Capture and Storage: Does a large group process work?' *Energy Procedia* 1, 4765-4773

Bellona Europa (2009), Guidelines for Public Consultation and Participation in CCS Projects, Brussels, Belgium

de Best-Waldhober M., Dancker Daamen, Andre Faaij. (2009). 'Informed Public Opinions on CO2-Capture and Storage Technologies'. *Energy Procedia* 1, 4795-4802.

Bielicki J.M. & Jennie C. Stevens. (2008). *Public Perception of Carbon Capture and Storage Technology*. Harvard University, Cambridge, Mass.

Bradbury J., Isha Ray, Tarla Peterson, Sarah Wade, Gabrielle Wong Parodi. (2009). 'The Role of Social Factors in Shaping Public Perceptions of CCS: Results of Multi-State Focus Group Interviews in the US'. *Energy Procedia* 1, 4665-4672

Burgess, J. & J. Clark. (2009). 'Practitioner evaluations of participatory processes in environmental decision making'. In N. Adger & A. Jordan (eds.), *Governing Sustainability*, Cambridge University Press, Cambridge, 159-190.

Cash, D. W., W. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, L. Pritchard, and O. Young. (2006). 'Scale and cross-scale dynamics: governance and information in a multilevel world'. *Ecology and Society* 11(2), 8. [online] URL: http://www.ecologyandsociety.org/vol11/iss2/art8/

Chiavari J., Schiellerup P., Bünner N., Lewis M. (2009) *Review of the regulatory context for public participation*. Near CO 2 Deliverable 1.1.

Climate Change Central. (2007). *Carbon Capture and Storage Communication Workshops, Final Report*. Climate Change Central

Curry T., D. Reiner, S. Ansolabehere, H. Herzog. (2005). 'How aware is the public of carbon capture and storage?' In E. Rubin, D. Keith and C. Gilbroy (eds.). *Proceedings of 7th International Conference on Greenhouse Gas Control Technologies* (GHGT-7), September 5-9, 2004, Vancouver, Canada, volume 1, 1001-1010.

Daamen D., de Best-Waldhober M., Damen K., Faaij A. (2006). 'Pseudo-opinions on CCS technologies', Paper presented at GHGT-8, Trondheim, Norway.

Desbarats J., Upham P., Riesch H., Reiner D., Brunsting R., de Best-Waldhober M., Duetschke E., Oltra C., Sala R., McLachlan C. (2010). *Review of the Public Participation practices for CCS and Non-CCS projects in Europe.* NearCO_2 Deliverable 1.2.

DECC. (2009). *A framework for the development of clean coal: Consultation response.* Department of Energy and Climate Change, UK Government. Available at: http://www.decc.gov.uk/en/content/cms/consultations/clean_coal/clean_coal.aspx

Divine-Wright P. (2009). 'Rethinking NIMBYism: The Role of Place Attachment and Place Identity in Explaining Place-Protective Action'. *Journal of Community & Applied Social Psychology* 19 (6), 426-441.

Fischedick, M., K. Pietzner, et al. (2009). 'Stakeholder acceptance of carbon capture and storage in Germany'. *Energy Procedia* 1 4783-4787.

Gibbins J. & Chalmers H. (2008). 'Preparing for global rollout: a 'developed country first' demonstration programme for rapid CCS deployment'. *Energy Policy* 36, 501-507

Gough, C., I. Taylor. & S. Shackley. (2002). 'Burying carbon under the sea: an initial exploration of public opinions'. *Energy & Environment* 13(6), 883-900.

C. Gough. (2008). 'State of the art in carbon dioxide capture and storage in the UK: an experts' review'. *International Journal of Greenhouse Gas Control* 2, 155–168.

Gough, C., I. Mander, S. & Haszeldine, S. (2010). 'A roadmap for carbon capture and storage in the UK'. *International Journal of Greenhouse Gas Control* 4, 1–12

Greenberg, S.E., Leetaru, H.E., Krapac I.G., Hnottavange-Telleen K., Finley R.J. (2009). 'A multi-level approach to outreach for geologic sequestration projects' *Energy Procedia* 1, 4707-4713

Ha-Dong M., Alain Nadai, Ana Sofia Campos. (2009). A survey on the public perception of CCS in France. *International Journal of Greenhouse Gas Control* 3, 633–640

Heiskanen et al 2008: *Factors influencing the societal acceptance of new energy technologies: Meta-analysis of recent European projects*. Create Acceptance deliverables 3.1, 3.2 and 4.

Held, D. (1987). *Models of Democracy*, Blackwell, Cambridge

HM Government. (2010). *Clean Coal: An Industrial Strategy for the development of carbon capture and storage across the UK*. UK Government. Available at: http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/ccs/occs/occs.aspx

Huijts, N. M. A., (2003). Public perception of CO_2-storage, the role of affect and trust. Master Thesis, Department of Technology Management, Eindhoven University of Technology

Huijts, N. M. A., Midden, C. J. H., Meijnders, A. L. (2007) Social acceptance of carbon dioxide storage. *Energy Policy,* 35, 2780-2789

Hund, G., Judd, K., (2008). Stakeholder Acceptance Issues Concerning CCS — Lessons Learned from FutureGen, paper presented at the Ninth International Conference on Greenhouse Gas Control Technologies, Washington, DC, USA.

IEA. (2009). *Technology Roadmap: Carbon Capture and Storage*. OECD/IEA, Paris.

IPCC. (2001). *Climate Change: Mitigation*, Cambridge University Press, Cambridge.

IRGC. (2005). *Risk Governance: Towards an Integrative Approach*, Renn, O., International Risk Governance Council, Geneva, Switzerland. www.igrc.org

Itaoka K., Yuki Okuda, Aya Saito, Makoto Akai. (2009). 'Influential information and factors for social acceptance of CCS: the 2nd round survey of public opinion in Japan'. *Energy Procedia*, 1, 4803-4810.

Johnsson F., David Reiner, Kenshi Itaoka, Howard Herzog. (2010). 'Stakeholder attitudes on carbon capture and storage - an international comparison'. *International Journal of Greenhouse Gas Control*, 4, 410–418.

Leiss, B. (1996). 'Three phases in the evolution of risk communication practice', *The Annals of the American Academy*, 545, 85-94.

Loring J.M. (2007). 'Wind energy planning in England, Wales and Denmark: Factors influencing project success', *Energy Policy* 35(4), 2648-2660.

Malone E.L., Bradbury J.A., Dooley J.J.(2009). 'Keeping CCS stakeholder involvement in perspective'. *Energy Procedia* 1, 4789–4794

Malone E.L, Bradbury J.A., Dooley J.J. (2010). 'Moving from misinformation of public attitude surveys on carbon dioxide capture and storage toward realistic stakeholder involvement'. *International Journal of Greenhouse Gas Control*, 4 (2): 419-425

NETL (2009), *Best Practices for: Public Outreach and Education for Carbon Storage Proejcts*, First Edition, National Energy Technology Laboratory, US Department of Energy

OCCS (2010), *Office of Carbon Capture and Storage Web Page*, available at: http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/ccs/occs/occs.aspx. Accessed 06/05/2010.

Oltra C., R. Sala, M. Di Massa, R. Sola. (undated). 'Public perception and communication of CCS in Spain'. Publisher unknown

Owens, S. (2004). 'Siting, sustainable development and social priorities', *Journal of Risk Research*, 7(2), 101–114.

Palmgren, C, M. Granger Morgan, W. Bruine de Bruin, D Keith (2004), 'Initial public perceptions of deep geological and oceanic disposal of CO_2', *Environmental Science and Technology* 38, 6441-6450.

Raven R.P.J.M., Eric Jolivet, Ruth M. Mourik, Ynke C.F.J. Feenstra. (2009). 'ESTEEM: Managing societal acceptance in new energy projects - A toolbox method for project managers'. *Technological Forecasting and Social Change*, 76 (7), 963-977.

Raven R.P.J.M., Mourik, R.M., Feenstra C.F.J., Heiskanen, E. (2009). 'Modulating societal acceptance in new energy projects: Towards a toolkit methodology for project managers'. *Energy* 34, 564–574.

Rayner, S. (2009) 'Empowered or reduced? Reflections on the citizen and the push for participation', in *The Future of Public Dialogue with Science*, ed. J. Stilgoe, Department for Innovation, Universities and Skills, London.

Rayner, S. (2003). 'Democracy in the age of assessment : reflections on the roles of expertise and democracy in public-sector decision making', *Science and Public Policy*, 30 (3), 163 – 70.

Reiner, D., T. Curry, M. de Figueiredo, H. Herzog, S. Ansolabehere, K. Itaoka, F. Johnsson, M. Odenberger. (2006). 'American exceptionalism? Similarities and differences in national attitudes toward energy policy and global warming'. *Environmental Science and Technology* 40(7), 2093-2098.

Reiner, D.M. (2008). *A Looming Rhetorical Gap: A Survey of Public Communication Activity for Carbon Dioxide Capture and Storage Technologies*. Electricity Policy Research Group, University of Cambridge, Cambridge, UK.

Riesch, H. & Reiner, D. (2009). 'Public participation practices and onshore CCS: Lessons from the Milford Haven – Gloucestershire Gas Pipeline' in Desberats et al (2010). *Review of the Public Participation practices for CCS and Non-CCS projects in Europe.*

Roberts T. & Mander S. (2010). *Findings of CASSEM project*, Tyndall Centre, University of Manchester.

Rowe, G. & L. Frewer. (2000). 'Public participation methods: a framework for evaluation'. *Science, Technology and Human Values* 25, 3-29.

Scottish Government and Scottish Enterprise. (2010). *Carbon Capture and Storage – A Roadmap for Scotland.* Available at: http://www.scotland.gov.uk/Publications/2010/03/18094835/0

Shackley S., McLachlan C., Gough C. (2005). 'The public perception of carbon capture and storage in the UK: results from focus groups and a survey'. *Climate Policy* 4(4), 377-398.

Shackley, S., Waterman, H., Godfroij, P., Reiner, D., Anderson, J., Draxlbauer, K. and Flach, T. (2007). 'Stakeholder perceptions of CO_2 capture and storage in Europe: Results from a survey', *Energy Policy*, 35(10): 5091-5108.

Shackley S., Reiner D.. Upham P, de Coninck H., Sigurthorsson G., Anderson J., (2009). 'The acceptability of CO_2 capture and storage (CCS) in Europe: An assessment of the key determining factors: Part 2. The social acceptability of CCS and the wider impacts and repercussions of its implementation', *International Journal of Greenhouse Gas Control* 3, 344–356.

Shackley, S. and Thompson, M. (forthcoming), *Lost in the Mix: Will the Technologies of Carbon Dioxide Capture and Storage Provide us with a Breathing Space as we Strive to make the Transition from Fossil Fuels to Renewables?* Available from simon.shackley@ed.ac.uk

Sharp J.D., Mark K. Jaccard, David W. Keith. (2009). 'Anticipating public attitudes toward underground CO_2 storage'. *International Journal of Greenhouse Gas Control*, 3, 641–651.

Sharp J. (2008a). *Carbon Capture and Storage: The Views of the Canadian Public*. Pembina Institute and ISEEE

Sharp J. (2008b). *CCS Thought Leader Opinion Surveying Conclusions*. Pembina Institute and ISEEE

Simpson P., Peta Ashworth. (2009). 'ZeroGen new generation power - a framework for engaging stakeholders'. *Energy Procedia* 1, 4697–4705

Singleton G., Herzog H., Ansolabehere S. (2008). 'Public risk perspectives on the geologic storage of carbon dioxide'. *International Journal of Greenhouse Gas Control*, 3(1), 100-107.

Stephens J.C., Jeffrey Bielicki, Gabriel M. Rand. (2009). 'Learning about carbon capture and storage: Changing stakeholder perceptions with expert information'. *Energy Procedia* 1, 4655-4663.

Terwel B.W., Fieke Harinck, Naomi Ellemers, Dancker D.L. Daamen. (2009a). 'How organizational motives and communications affect public trust in organizations: The case of carbon dioxide capture and storage'. *Journal of Environmental Psychology* 29, 290-299

Terwel B.W., Fieke Harinck, Naomi Ellemers, Dancker D. L. Daamen, Marjolein De Best-Waldhober. (2009b). 'Trust as predictor of public acceptance of CCS'. *Energy Procedia* 1, pp. 4613-4616

Toke, D. (2005) 'Explaining wind power planning outcomes, some findings from a study in England and Wales' *Energy Policy*, 33 (12) 1527-1539

Toke, D., Breukers, S., and Wolsink, M. (2008) 'Wind power deployment outcomes: How can we account for the differences?' *Renewable and Sustainable Energy Reviews*. Vol 12, 1129–1147

TOTAL (2008). *Lacq Basin CO2 capture and storage pilot project: Results of Stakeholder Consultation*

US NIST, (2002). *Communicating the Future: Best Practices for Communication of Science and Technology to the Public*. National Institute of Standards and Technology, Gaithersburg, MD.

Wade S. and Greenberg S. (2009). 'Afraid to start because the outcome is uncertain?: Social site characterisation as a tool for informing public engagement efforts'. *Energy Procedia* 1, 4641-4647.

Wallquist L., Vivianne H.M. Visschers, Michael Siegrist. (2009). Lay concepts on CCS deployment in Switzerland based on qualitative interviews. *International Journal of Greenhouse Gas Control*, 3, 652–657.

Ward H., Norval A., Landman T., Pretty J. (2003), 'Open Citizens' Juries and the politics of sustainability', *Political Studies* 51, 282–299.

Weingart, P. (1999), 'Scientific expertise and political accountability: paradoxes of science in politics', *Science and Public Policy*, 151-61.

Wilson E.J., Jennie C. Stephens, Tarla Rai Peterson, Miriam Fischlein. (2009). 'Carbon capture and storage in context: the importance of state policy and discourse in deploying emerging energy technologies'. *Energy Procedia*, 1, 4519-4526.

Wong-Parodi G., Isha Ray, Alexander E. Farrell. (2008). 'Environmental non-government organizations' perceptions of geologic sequestration'. *Environmental Research Letters* 3, 024007

WRI. (2009). Engaging Communities in Energy and Infrastructure Projects. World Resources Institute, Washington DC., USA.

Yearley, S., Cinderby, S., Forrester, J., Bailey, P., Rosen, P. (2003) 'Participatory Modelling and the Local Governance of the Politics of UK Air Pollution: A Three-City Case Study' *Environmental Values,* 12, (2), 247-262.

van Zwandenberg P. & Millstone, E. (2005). *BSE: Risk, Science and Governance*, Oxford University Press, Oxford.

Annex 1: Selected CCS and Gas Infrastructure Case Studies

The details in these case studies have been compiled through website searches, developers' websites, opposition group websites, media reports and in some cases, published accounts (Total 2008; Desbarats et al 2010; Bradbury et al 2009; Greenberg et al 2009).

Case Study	Barendrecht, Netherlands
Type of project	CCS demonstration project, onshore.
Developer	Shell
Project Developer's Vision	Capture CO_2 at the gasification plant in Pernis, which produces hydrogen from oil refinery heavy residues. The CO_2 is transported for 17 km in existing low pressure pipeline, injecting 300,000 to 400,000 t CO_2/year into depleted gas fields. The first of two fields is under Barendrecht and a neighbouring town with a 3 year capacity at 1,700m depth; the second is under Barendrecht, with a 20 year capacity and at 2,700 m depth. This would be one of two demonstration CCS projects in the Netherlands, each attracting €30m subsidy. The other project is in Geleen.
Story	In 2007 Shell started with small scale, low key one on one engagements with local stakeholders (e.g. representatives of local welfare organisations, shop owners); they found no signs of opposition. The first larger scale presentation to a general audience was in February 2008 which generated little public debate. After an initial presentation to the Municipal council in early 2008, Shell conducted a second public information meeting in April 2008 further explaining and announcing the project. Some concerns about safety and why the project was located where it was were raised by both the municipal council and by the public. These concerns took a long time to address, in some cases up to a year. These delays were viewed as obfuscation and suspicious by some media reports and commentators, although Shell state the delays were because they desired to follow the standard procedures concerning EIA's in the Netherlands. National government endorsement arrived too late in November 2008 to be of much use. In the mean time negative media reporting and local political opposition quickly snowballed. Shell

	provided technical information and dismissed continued concerns as 'irrational' or 'emotional'. Despite various independent sources of information and independent assessments, damage to Shell's credibility had been done and the municipality's position had become entrenched. They rejected the project in May 2009. In November 2009 the national government overturned this decision. In December 2009 strong public opposition to the project was voiced on the grounds of undemocratic decision making. In November 2010 the Dutch Ministry of Economic Affairs, Agriculture and Innovation announced the decision to cancel the project. The delay of the CO2 storage project for more than 3 years and the complete lack of local support were given as the main reasons to stop.
Stakeholders involved	Project developers (Shell, NAM, OCAP) – seek to promote project. TOC – research organization providing underground expertise. Supported project. (Also called TNO) Ministry of Economic Affairs, Ministry of Environment and Spatial Planning – implicit support, but officially endorsed project, 1.5 years after project was announced. Eventually overruled the municipality's rejection of project. Environmental Protection Agency of Rijnmond. An organisation with three different roles: 1. Permitting agency 2. Consulting agency for local governments 3. Supporter of CCS via Rotterdam Climate Initiative Provincial Executive, Provincial Council – unformed position, willing to engage in debate. Municipalities of Barendrecht – strongly against, have led the opposition. Municipality of Albrandswaard – officially support municipality of Barendrecht, but little action. Environmental Protection Agency of Rijnmond Public of Barendrecht – seemingly against (e.g. 900 signed petition, 300-400 marched, >600 opposed in final public meeting), although no survey work has been done.

	Media, national and local – served to further polarise stakeholder positions National NGOs (Greenpeace, SNM) – have stayed out of the debate. Independent scientists – those who opposed to the project have received a lot of attention.
Engagement and communication processes	Engagement with municipal council was slow to respond to their concerns. Two public meeting raised many public concerns. Concerns regarding risk perception and long term liability were never dealt with adequately and from this point on the municipal and public support were never recovered. The choice of Barendrecht as a location also remained poorly understood, and there was a perception that the community were being 'experimented upon'. The media amplified this problem with negative and reporting often not based upon scientific opinion. Despite attempts by Shell and by national government to ensure independent information and expert advice, their efforts were perceived as partisan. Government communication regarding onshore CCS came late into the project and as such was not much help. The information centre did not prove popular, perhaps due to lack of involvement from all stakeholders, and perhaps because the centre opened over a year after the initial controversy over the project. At the second public meeting (180 participants) there was agreement that the municipal council could speak for the public on this issue. However this should not account for the lack of timely public engagement from Shell, which was compounded by the lack of timely support from state or national government. By far the strongest public outcry was when the municipality's decision to deny the project was overturned by the national government. The relevant ministers held a public meeting and were roundly booed, and strong opposition on account of the undemocratic decision making process was avowed.

Location analysis	Barendrecht is a town of 44,000 people, in west Netherlands, close to Rotterdam and to the Rijmond industrial area, the largest in the Netherlands. Barendrecht is however an area popular with middle class families and house prices are high. The town has recently been hemmed in on two sides by a large motorway, a high speed train line, and a freight rail line, all possibly contributing to public discontent about increasing development (development fatigue).
Outcome in terms of project developer's aim	In November 2010 the Dutch Ministery of Economic Affairs, Agriculture and Innovation announced the decision to cancel the project. The delay of the CO2 storage project for more than 3 years and the complete lack of local support were given as the main reasons to stop.
Outcome in terms of communication and engagement	The local municipality, and seemingly the local public, strongly rejected the project, but were overruled by the national government. This is likely to cause long lasting resentment. Local, national and international reporting of the resistance to the project may have negative repercussions on future developments.
Lessons	Early impressions are very important for building trust. Once a lack of trust has been established it is very difficult to regain it, for example independent information will be viewed as partisan. Public or stakeholder meetings should not be entered into without initial preparation (e.g. focus groups or available information on risks etc.) and necessary information ready and to hand. Technical explanation of risk is not sufficient – although public/stakeholder concerns may be emotional or social in origin that does not make them invalid.

	There may have been other factors influencing the community's desire to object – for example, although there were objections in Albrandword and Geleen they were less pronounced. It was never evident to some stakeholders opposed to the project why this site was chosen compared to other sites. Shell assumed a level of knowledge about climate change and energy security which was not shared by the publics. Some external factors amplified problems, often quoting inaccurate information: NAME (Not According to My Expert), media, individual 'crusaders'. Some use of diagrams such as maps showing storage sites overlaid on the town (showing people's houses) and a diagram showing CO_2 stored approximately 3 tree lengths below the surface caused concerns.
Detailed Summary	*2006* Shell began preparations for the Brendrecht project *2007* Shell approached council *2007* Shell approached municipality and conducted small scale, low key stakeholder engagements. *2008* Shell presented plans to council *February 2008* First public meeting – 60 participants. Little debate. *One week later* Shell updated the council, was asked for all supporting documentation pertaining to EIA but took one year to deliver as this information was to be prepared for the EIA. Although the council was fully involved in drafting the EIA, the relevant information did not reach the dissatisfied parties. *February 2008* National newspaper article "Not under my backyard" *April 2008* Second public meeting – 180 participants, huge amount of debate. *Mid 2008*, National, provincial and municipal government stakeholders formed a discussion platform (called

	BCO_2), and a communication workgroup was created with all stakeholder invited. *June 2008* the municipal council agreed to speak with one voice on the subject, but the green/left party (Groenlinks) organised a march and petition against the project. *October 2008* meeting in Albrandswaard, with little opposition. *November 2008* €30m subsidy delivered (1.5 years late), along with official government endorsement. *January - March 2009* BCO_2 compiled a question checklist the municipality wanted answered, and organised four independent expert meetings discussing the environmental impact assessment. All of the checklist questions were answered, but not all to the satisfaction of the municipality. During this period municipal political parties continued active opposition and three national newspapers and one magazine negatively reported the project. *February 2008* BCO_2 organised a public meeting with 1000 attendees. Shell lost credibility by claiming that the project was not profitable and that they would take into account public opposition. Neither of these sentiments were believed. *March 2009* An independent website offering neutral information on climate change and CCS was launched by MileuCentraal (www.co2afvangenopslag.nl) but was considered to be Shell propaganda. *March 2009* A project information centre was opened in Brendrecht, funded by national government with contributions from Shell, and designed to be neutral and independent with all stakeholders invited to participate. However NGOs, the local municipality and local political parties refused to take part leading to public perceptions of bias. The visitor centre attracted approximately 7 visits per day.

	April 2009 The 'national coordination regulation' was passed, meaning that final decision for the project lay with the national government. *May 2009* Shell and NAM gave lectures and Rotary and Lions clubs, and organized two public excursions to injection sites. The excursions were poorly attended and reported in a local newspaper as telling only 'half the truth'. *27th May 2009* the municipal executive board took the decisions to decline the project. *9th June 2009* the municipal council reconfirmed its decision to refuse the project. *September 2009* 'CO_2 is nee' a citizen action group was formed. *18th November 2009* National government ministers announced decision to overrule the municipal decision, stating that the project was safe and necessary. *December 2009* Both the ministers who took the decision to go ahead with the project visited Barendrecht to explain their decision. A local theatre was filled to capacity with 600 people and more watched on televised screens at the town hall. The entire audience was strongly opposed, interrupted the Ministers and delivered well received speeches stating that the decision made was undemocratic and the project would not be allowed to continue.

Case Study	Carson, California, USA
Type of project	CCS (onshore) and Hydrogen power station from petroleum coke.
Developer	HECA (Hydrogen Energy California) – a joint venture between BP and Rio Tinto
Project Developer's Vision	Industrial scale demonstration project, 500 MW, 4 Mt CO_2/year for EOR. Project costs $1bn. Will provide Planned to start 2011. Plan to inject CO_2 at the Wilmington oil field.
Story	There was local resistance to the project citing health and safety risks in a densely populated area, including the explosion of hydrogen stored on site and the leaking of CO_2 into the Los Angeles valley with its notorious smog problems. The opponents did not believe that the safety concerns had been properly investigated or that the developers were capable to ensure the safety, citing a fire at a previous BP site. The developers cited 'geological reasons' for deciding not to inject CO_2 in the Wilmington oil field. HECA decided to move the whole project to Kern County, and the storage site to the Elk Hills oilfield. This decision has set back the project by four years, which aims to complete permitting by 2011 and begin full operation by 2016.
Stakeholders involved	HECA – developer Wilmington Coalition for a Safe Environment – the plant posed a health and safety risk in a heavily populated area.
Engagement and communication processes	*January 2010* Early engagement is currently under way in Kern County, including a first public meeting of 100 people organised by the (independent) California Energy Commission.

	A visitor centre was opened, and HECA donated $20,000 to various local good causes to demonstrate its commitment to the community. Job creation is stressed.
Location analysis	Although the original Carson site was on brownfield land, it is an urban area, and the Wilmington oil field is under very densely populated areas of Los Angeles. Buttonwillow, Kern County, is an agricultural area with low population density.
Outcome in terms of project developer's aim	The project is still going ahead, although three to four years behind schedule.
Outcome in terms of communication and engagement	Although the project was cancelled in its original location and there was a popular opposition campaign, it does not seem to have developed into a full blown anti-CCS movement.
Lessons	The social fit with site selection appears to be better second time around. By cancelling the Carson site, HECA avoided a high profile battle which could have tarnished the reputation of the development. It is strange, however, that the developers did not openly acknowledge the opponents role in their decision to move elsewhere.
Detailed Summary	

Case Study	FutureGen
Type of project	CCS and hydrogen from coal at the commercial scale
Developer	Futuregen Alliance
Project Developer's Vision	A public-private partnership to build the first commercial scale CCS coal fired power plant (also using a 275 MW integrated gas combined cycle (IGCC) system). The plant will also produce hydrogen and by-products for possible use by other industries. Planned sequestration of 1 Mt CO_2/year for four years. Cost $1.8dn, 74% of which from US Department of Energy (DOE), with plans to recoup costs by selling experience to other national governments. Full scale operation planned to begin in 2012.
Story	Following initial excitement from the political figures and publics of Mattoon, Illinois in 2007 the project was put on hold while the USDOE pulled out of the project and Futuregen Alliance searched for new partners. This prompted accusations from Illinois actors that the USDOE had vested interests in Texas and that was the real reason for the pull out. Whilst it now looks like the USDOE will re-join the project, a final decision has not been made but is expected by April 2010. Political and council figures in Mattoon are impatient to go ahead with the project and there is some evidence that the publics are doubting that the project will occur.
Stakeholders involved	Futuregen Alliance USDOE Municipality of Mattoon

	Public of Mattoon (initially very strong support) West Virginia Highlands Conservancy, Friends of the Mountains – interest groups opposed to coal mining. A local newspaper, the Journal-Gazette Times-Courier, has been supportive of the project and is proud to have world leading technology in their area.
Engagement and communication processes	National competition launched to 'win' the development in a community. Website and factsheets created. >200 informal stakeholder meetings across the four finalist communities before holding public meetings – 84 in Mattoon. Main interests were in jobs, origin of coal (local preferred), water implications (farmers especially), cost of power and a visitor centre. Some concern over long term monitoring and liability. The following public meetings went smoothly as a result of the preceding informal meetings, as difficult questions had already been raised and the early engagement helped to build trust. Emphasis was put on the novel nature of the whole technology chain, not just the CCS element. The media praise the FutureGen selection process as scientific and transparent.
Location analysis	Coal has been an important part of the Illinois economy and there is a certain amount of pride in this project as it is seen as world leading and an opportunity for job and skill development.
Outcome in terms of project developer's aim	The project was supported strongly, but it is still unclear if the project will go ahead because of funding troubles.
Outcome in terms of communication and	The engagement process, and possibly the self selecting competition aspect, led to strong public support for the project.

engagement	
Lessons	Launching the project as a competition may have encouraged communities to accept the project and led to finding locations with a good social fit as well as geological fit. Early informal stakeholder meetings allowed difficult questions to be asked early on and contributed to trust levels, so that public meetings ran more smoothly. The delaying of construction has been damaging to Illinois stakeholder trust in USDOE and may lead to increased suspicion about the project in general.
Detailed Summary	*2003* The project was announced and a competition launched to find the right host community. *December 2007* Mattoon Township, Coles County, Illinois was chosen from a shortlist of four (in Illinois and Texas). A state law was passed giving Illinois the long term liability for the gases below ground. A study by Southern Illinois University showed there would be 1,300 'direct jobs' and 3,250 'indirect jobs' from construction of the FutureGen plant on about 600 acres west of Mattoon. *January 2008* USDOE pulled its funding from the project, citing increasing costs, but prompting accusations that the DOE had vested interests in Texas and would not allow the project to go ahead because it had been located in Illinois. The Futuregen alliance decided to go ahead with the project, searching for other sources of funding, and attempting to bring DOE back. *Throughout 2008 and 2009* efforts were made to regain DOE funding and following the election of Obama this began to look increasingly likely. *March 2009* auditors determined the DOE had calculated the costs wrong, overestimating by $0.5bn.

	July 2009 A 'record of decision' was released by the USDOE promising support for Futuregen. A final decision is expected in spring 2010, whilst the project has been delayed by 18 months. *March 2010* An online poll at the Journal-Gazette Times-Courier shows that 48% of people believe the project will be delayed again and 44% believe that it will never happen. The public may be losing faith in the process.

Case Study	Greenville, Darke County, Ohio
Type of project	Corn ethanol
Developer	Battelle, The Andersons Marathon Ethanol LLC,
Project Developer's Vision	Part of the Midwest Regional Carbon Sequestration Partnership, the aim was to capture 1 million tons of CO_2 over four years from a corn ethanol plant and store it in a saline aquifer at 1,000m depth. This was part of a series of projects (the regional partnerships) to demonstrate the full CCS chain at large scale. Total cost $93m, USDOE to front $62m.
Story	Six months after the first public information meeting about the project, a citizens group called 'Citizens Against CO_2 Sequestration' formed of a dozen people. Their objections centred around perceived threats to their safety and the notion that they were being experimented upon and taken advantage of. The citizens group gained popular, political and local media support and by August 2009 the project developers announced they would not go ahead with the project, citing 'economic considerations'. The project was still in an early stage, and regulatory permits had not yet been applied for. There are early reports of opposition movements in the neighbouring county of Indiana against as-yet-unconfirmed CCS plans. One of the opposition groups (Citizens Action Coalition) helped Citizens Against CO_2 Sequestration organise. This is an example of how opposition may spread, and groups mutually reinforce each other.
Stakeholders involved	Battelle – developing the project. Judith Bradbury worked on communications. Andersons Marathon ethanol plant – willing to go ahead once convinced by safety of project. Andersons Marathon

	were new to the area and may have been greeted with suspicion. Citizens Against CO_2 Sequestration – their views on CCS may be summarised from their website: "Unproven technology, ridiculous risk, exorbitant cost". An influential critical group who united the community in opposition to the project. Darke Journal – views climate change as 'sloppy pseudo science', and CCS as the same. Other local media are critical of the project, but not in such extreme terms. Mike Bowers, mayor of Greenville – initially trusting of Battelle's competence, but later against this and other CCS projects. State representative Jim Zehringer 'bitterly against' project. Other influential locals opposed include a state civil engineer and a municipal judge. "I have rarely seen a community that well organized and that strong," said Nolan Moser of the Ohio Environmental Council, which supports the project. Ohio Environmental Protection Agency – approved the project.
Engagement and communication processes	It has been difficult to find full details of the engagement process, although it is stated that continued and coherent outreach activities were conducted, involving stakeholder research, formation of an outreach team, message and materials development, proactive/targeted engagement, and a response/feedback process. Two focus groups were conducted in Columbus, Ohio and yielded information highly relevant to the case in Greenville – namely that lack of trust in government or industry to keep the population safe was the prevailing factor.

	One public information event was held in August 2008. A number of informal meetings were conducted. *May 2009* Battelle & MRPCS brochures on display in pubic library (source: citizens against co2 seq) MRCSP produced plenty of text heavy but readable documents explaining different points (e.g. climate change, geological sequestration, likelihood of seismic activity). Citizens against CO_2 Sequestration are critical of attempts to engage public, viewing it as manipulative.
Location analysis	The public opinion in this town appears to be that climate change does not exist, and therefore the rationale for CCS does not exist. There is a strong sense that federal governments and corporations take advantage of people such as themselves, and that if CCS was a good thing it would be done 'under the state capital'. The regions only water supply is from a sole-source aquifer, fuelling concerns that if the aquifer were to become 'contaminated' there would be no safe water. There was no history of oil or gas exploration in the area.
Outcome in terms of project developer's aim	The project was called off before the regulatory phase was completed.
Outcome in terms of communication and engagement	Citizens against CO_2 sequestration now enthusiastically support any other CCS protests around the world. Any CCS development (or EOR) in Darke county may now be very difficult to undertake. There are initial signs that opposition has spread to CCS projects in neighbouring states.
Lessons	The lack of belief in the science behind climate change or the science of CCS, coupled with the lack of trust in

	government and industry led to very strong opposition. The belief that the population was being experimented upon was problematic. The concerns about ground water contamination, and increased earthquakes could not be placated by scientists, because the community did not have any faith in scientists. Initial social survey work may have highlighted these potentially insurmountable issues. Difficult to draw lessons about engagement techniques used as little information on what was used has been available, although it was said by Bradbury to be thorough.
Detailed Summary	*2007* Preliminary briefings on the project between Battelle, Darke County and Greenville officials *6 May 2007* Project announced to public (Battelle already on board) *13 Aug 08* Public meeting (Battelle organised) *March 2009* : Citizens against co2 sequestration are formed, and develop arguments against CCS project, such as safety, risks, being experimented upon, distrust of energy companies, feeling of being taken advantage of by powerful (government, industry), CO_2 reductions possible in other ways, waste of tax payer dollars, ground water contamination, inconvenience (e.g. road closures), who assumes long term liability, seismic testing using explosives, potential for causing earthquakes, potential decrease in property values, lack of future economic development as may be perceived as an experimental zone, safety of supercritical CO_2, Other pollutants resulting from increased coal burning a concern. Express discontent about lack of publicity for planning meetings, discussion of job opportunities and lack of transparent decision making. Do not appreciate public perceptions,

	literature on CCS viewed as schmooze, scam or manipulative. Take offence to CCS in less densely populated areas 'our lives are less important?' *June 2009* several dozen people march and promote campaign. *June 2009* Ohio EPA approve project *June 2009* "No drilling in Darke County" yard signs (900 up by August) *July 2009* Protest meeting, 700 - 1,000 attendees. Speakers include Municipal court member, Country civil engineer as well as Citizen action groups and green action groups. *July 2009* (test) Drilling to begin *July 2009* Darke county journal poll shows 97% opposition to CCS in county. (387 respondees via internet). Advocate poll showed that 74% thought the project was dangerous, 65% thought it was not a good idea and 73% thought there should be a public vote on the topic. *July 2009* – House hearing on water safety. Various expert witnesses assured safety, but those opposed to scheme were not convinced. *4 August 2009* – County commissioners formally ask project developers to stop project. *11 Aug 2009* – At council meeting, all councillors put on spot and asked for personal opinion on project. It appears there was mostly either denouncement of the project or no opinion given, but no support. *12 Aug 2009* – Faith into action meeting -400 people prayed together against the project. *15 Aug 2009* State representative Jim Zehringer opposes project *15 Aug 2009* – Neighbouring village of Arcanum, Ohio start their own chapter of citizens against co2 seq *20 Aug 2009* – Battelle announce that they will not go ahead with the project.

	Little action on blog following, some articles criticising CCS, one doubting relationship between CO_2 and climatic temperature increase. *19 Sept 2009* – Battelle apply for permits in another area of Darke county for EOR project, blog greets them with suspicion.

Case Study	Ketzin, Germany
Type of project	CCS pilot
Developer	The German Research Centre for Geosciences (GFZ); operated by Verbuntz Gas (VNG)
Project Developer's Vision	Also called the CO_2SINK project, this is a scientific research project to gather further information about CO_2 storage, funded by the EU Commission, the German government and industry partners. The aim is to sequester 60,000 t CO_2
Story	Research into CO_2 storage has been conducted in Brandenburg in Ketzin, near Potsdam, since 2004. It is primarily a research operation by the GFZ, and is operated by VNG. Eighteen industrial partners and scientific institutions from nine European countries are involved in the EU-sponsored project CO_2SINK. Vattenfall is one of the industry partners. Since the summer of 2008, CO_2 has been injected into a saline aquifer in Ketzin, Brandenburg with no public opposition.
Stakeholders involved	GFZ/VNG Mayor of Ketzin Public of Ketzin Local and National Media
Engagement and communication processes	Although not required by law, the local council and local public were informed of the project through a series of presentations and site visits, right from the start. Media reports have all been positive.

	Local council and publics profess to be satisfied with the level of information received. Local publics state that because it is a research project there are no vested interests and so the information they receive is unbiased.
Location analysis	Like Schwarze Pumpe, Beeskow and Neutribbin, Ketzin is also located in Brandenberg. In contrast to Beeskow or Neutribbin, Ketzin has a long history with the gas industry; and despite a leak which occurred in the 1960s (people had to be permanently relocated) there is a good level of local public and political trust in the gas industry in general.
Outcome in terms of project developer's aim	The project has gone ahead as planned.
Outcome in terms of communication and engagement	All stakeholders appear satisfied with the outcomes, and media coverage has been positive.
Lessons	A clear and early engagement policy with local authorities and publics. Social fit with the area – an existing history of natural gas industries. High trust in scientific research institutions helps public groups believe the information regarding the project.

Case Study	Lacq, France
Type of project	CCS, oxyfuel.
Developer	Total, with Air Liquide, French Petroleum Institute (IFP), the French Bureau of Geological and Mining Research (BRGM), and Alstom.
Project Developer's Vision	Europe's first end-to-end carbon capture, transportation and storage demonstration facility began injecting CO_2 in January 2010, one year behind schedule. The 35 MW oxyfuel boiler will capture and store 75,000 t CO_2 per year over a two year period. The CO_2 is pumped through an existing 27 km low pressure pipeline to the Rousse gas field where it is sequestered at 4,500 m depth. Goals for the project are to increase knowledge of the oxyfuel process, reduce the costs and demonstrate the larger scale reliability of CCS.
Story	The project went ahead as planned, with an engagement strategy integrated into the technical and regulatory project activities leading to public support for the project. Much has been made of this as an example of a successful stakeholder engagement strategy leading to public acceptance. Whilst the engagement process was well run and well planned from the start, there are also other factors which helped lead to the success of the project (the 'social fit') and some criticisms to make of the engagement process.
Stakeholders involved	Total and other developers The Lacq public Local NGOs – e.g. France Nature Environment

	Independent associations – e.g. the French Petroleum Institute French Environment and Energy management Agency
Engagement and communication processes	Total recognised early on that transparency and trust levels were important in stakeholder approval, and accordingly published a consultation charter stating their intentions for the consultations. Total committed to transparency, to answer every question asked (and anticipated that every question would be asked), and to take into account stakeholder concerns. Early informal engagement with approximately40 local people prepared for the later public meetings (>300 attendees). Involvement and support from independent groups (local NGOs, experts and government agency) was useful in establishing the credibility of the information. High ranking employees of Total attended the meetings, which also added to the sense that the public were taken seriously. Total state that all participants in the final (project) decision must take place in all public dialogue events. High quality printed resources, maps and diagrams, were produced, as well as a 3-D model demonstrating how the facility would operate. Despite Total's successful engagement campaign, only 32% of people surveyed believed they had received enough information, and 51% thought that it was still necessary to negotiate on the conditions of the pilot plant. Although 40% of people knew about the public meetings, only 13% of people attended. This implies that although the engagement was of good quality, if it had run over a longer time period perhaps more people could have taken part.

Location analysis	The region has the most underground gas fields in France and as such is both used to this type of industry and reliant upon it for the local economy. The industry has been successfully operating in the area for over 50 years. These factors help to increase local trust levels in industry and government regulation, as well as imply a fit with the local place identity.
Outcome in terms of project developer's aim	The project went ahead, supported by most stakeholders.
Outcome in terms of communication and engagement	The engagement process worked very well, with most stakeholders supporting the project and feeling that their questions had been answered satisfactorily.
Lessons	A consultation charter setting out intentions, a well planned strategy, high levels of transparency, early informal engagement with key stakeholders, and public meetings attended by independent parties as well as high ranking employees of Total all contributed to this successful engagement campaign. Willingness to answer all questions and address all problems enhanced trust levels, and although the project was delayed by one year the delay could have been much longer and the outcomes much worse had problems not been dealt with. Public meetings held over a longer time period may have allowed more people to attend. The social fit with the site was favourable – people were familiar with the type of industry, the project developer and the regulatory systems in place.
Detailed Summary	*2006* – Preliminary Studies

	December 2006 – Project Approved by French Government *February 2007* – Project Announced to public *June – September 2007* – Meetings with 40 key local people *November 2007* – Outreach campaign began with print, web and three public meetings *April 2008 onwards* – The CLIS formed and met regularly. The CLIS (Local information and surveillance commission) is a board with legal powers to ask the developer to provide further evidence or investigations on certain topics, and makes public their independent assessment of the project. The board was made up of made up of 4 state representatives, 9 locally elected, 2 from unions, 4 from associations, 5 experts and 4 from Total. *July to September 2008* – Survey of public opinions regarding the project and the outreach activities. *May 2009* – The project received authorization to go ahead.

Case Study	Peterhead, Scotland
Type of project	CCS, pre-combustion, EOR, offshore
Developer	BP, Scottish & Southern Energy
Project Developer's Vision	Extract CO_2 from gas landed at St Fergus terminal, pump CO_2 240 km back out to the Miller oil field where it could be used for enhanced oil recovery, as well as long term sequestration. Costing £500m, the project could have been running by the end of 2009.
Story	The Miller oil field was nearing the end of its useful life and was not economical to keep open without the EOR project. When the UK government announced that the competition to win CCS funding would be launched in November 2007, BP decided that the timescale was too long, and pulled out of the project. Despite this, engagement and consultations with local stakeholders had taken place during the pre-planning phase. The response had been overwhelmingly positive, and many were disappointed when the project was cancelled. The Scottish First minister, Alex Salmond, angrily criticised the UK government for acting too slowly. The project was announced in June 2005 and cancelled in May 2007.
Stakeholders involved (and expectation)	BP, Scottish & Southern Energy (project would be valuable) Scottish Government (project would bring income and world leading technology) UK Government (the best project should be picked in a considered way) Local Authority (the project would bring jobs) Community Councils (the project would bring jobs)

	Local publics (the project would bring jobs) Media (the project would bring jobs and world leading technology)
Engagement and communication processes	Consultations had occurred between members of the local authority, representatives of community councils and the general public, and other interested parties. These consultations were generally meetings of 20-30 people, and allowed discussion and questioning of the project developers. The local media portrayed the project in a positive light, and high level Scottish Government advocacy may have raised the profile and added to the credibility of the project. There was very little criticism or scepticism however, which was put down to the long running relationship between Scottish & Southern and the local community – Peterhead power station has been operating safely and providing employing for over 30 years. The visual and physical extensions to the site were minimal, and the storage site was offshore. Stakeholders expressed curiosity about the storage element, but not misgivings. The main benefit was perceived as increased employment, and lengthening the economic life of the oilfield.
Location analysis	Peterhead is a small town in a fairly remote region whose main income is through the oil business, part of which was threatening closure and could have been extended by the EOR element of this project. Relationships with the developer were good, having been built up over a 30 year period.
Outcome in terms of project developer's aim	The project was cancelled, because of a lack of external funding.
Outcome in terms of communication and	The stakeholders were keen for the project to go ahead.

engagement	
Lessons	High trust in the developer led to minimum of local concerns. Economic opportunities were perceived as a key local benefit. Despite public support and a viable project, external forces made the project impossible.
Detailed Summary	

Case Study	Schwarze Pumpe, Germany
Type of project	CCS on shore pilot, oxyfuel coal fire power station
Developer	Vattenfall
Project Developer's Vision	Use the knowledge gained from the 30 MW pilot plant to build a demonstration plant (10 times larger) and to validate the whole chain technically and economically, as well as to boost public confidence in the technology. Vattenfall have a long term strategy to develop CCS. Inject the CO_2 into the Altmark gas field, enhanced gas recovery (EGR), 100,000 t CO_2 to be injected over 3 years (2010-2012) at 3000 m depth. CO_2 transport by truck. The next phase of the project plans to inject CO_2 into the Neutrebbin and Beeskow gas fields. Want to increase local trust and develop models for co-ownership.
Story	Pilot plant built 2007, began operation mid 2008. September 2008 Project officially launched March-April 2009 – planned beginning of injection of CO_2 but this did not occur because of hold ups in the permitting process due to public concerns over safety. Permits may be obtained by Spring 2010. Explorations of the Neutribbin and Beeskow gas fields for the next phase (the much larger demonstration) have met strong opposition from local publics and from local politicians.
Stakeholders involved	Vattenfall – project developer.

	German national government – decisions are made at national level for these types of projects. Spremberg council – good relationship with Vattenfall Spremberg public – good relationship with Vattenfall Altmark, Neutribbin and Beeskow publics – concerned about safety of CO_2 sequestration Environmental NGOs – opposed to CCS on the grounds that it is a fig leaf for fossil fuel consumption and renewable energy is a better option.
Engagement and communication processes	Very little communication or engagement was performed for construction of the oxyfuel plant, manager was confident public would learn everything they needed to from the media. Communication with municipal council is very low as well, but neither sees this as a problem as decisions are made at national level. ENGOs also communicate via the media, receiving adequate attention. It has not been possible to obtain information about Vattenfall's outreach campaign at the storage site, but a higher level of engagement than in Spremberg would have been necessary. Indeed the manager stated that regarding storage "People are very, very sceptical." In Beeskow public groups and local politicians of every party are opposed to storage, believing leakage inevitable and possibly dangerous to human health or groundwater. The opposition groups would prefer information to come from independent scientists rather than from Vattenfall, who has is perceived as having a vested interest in convincing the public to permit the process. Trust in Vattenfall and in the authorities who grant permits is low.
Location analysis	Spremberg, the location of the oxyfuel plant permitted the development. The storage of CO_2 under the Altmark gasfield has not (yet) been permited due to local public resistance.

	Spremberg requires employment, and is used to the large Schwarze Pumpe development, therefore neither the council nor the public were concerned about the oxyfuel plant.
Outcome in terms of project developer's aim	The oxyfuel plant was built on schedule, and is now operating. The storage component of the study has not yet gone ahead, and is at present delayed by public opposition.
Outcome in terms of communication and engagement	The low level of engagement and communication when building the oxyfuel plant satisfied all stakeholders, perhaps because of the high trust levels and familiarity with the type of development. The level of engagement at the storage site is unknown, although after the public protest, Vattenfall sees public acceptance as a major topic for their work.
Lessons	In the construction of the oxyfuel plant, there was little communication or engagement, but a high level of trust in project developer. This led to satisfactory outcomes for all parties (except ENGOs, who oppose all CCS projects) The storage element was far more contentious, and resulted in delays which are as yet unresolved. Exploration for large scale storage in Beeskow or Neutribbin has met strong opposition. The German system whereby local authorities are involved very little in decisions for this type of project may lead to decreased levels of trust where there is not already an established industry.
Detailed Summary	

Case Study	Weyburn-Midale, Saskatchewan, Canada
Type of project	CCS on shore storage demonstration
Developer	Petroleum Technology Research Centre, supported by a consortium of industry and government partners.
Project Developer's Vision	A large scale research project integrated into an existing EOR project, launched in 2000, first phase 2000-2004, final phase 2005-2011. 1million t/yr CO_2 stored. 330km pipeline runs from the Beulah Dakota Gasification plant to Cenovus' Weyburn and Apache's Midale oilfields. An EOR project operates at Midale, into which the first phase of the research project was integrated. The goal of the project is to test predictions of the reservoir to sequester CO_2 both safely and economically, producing a very thorough dataset for scrutiny. In previous EOR projects, the fate of the CO_2 has not been studied as a desired outcome. The project cost is $80m.
Story	It has been impossible to find any details of the engagement process entered into by Petroleum Technology Research Centre (PTRC) and other developers.
Stakeholders involved	
Engagement and communication processes	There has been little research on public outreach, as this is planned in phase 2. Phase 1 focused more on the technical side of the project; phase 2 aims to also do work on public outreach, regulation and business models. Two surveys have been conducted (in Toronto and Edmonton) to assess public attitudes to CCS.
Location analysis	Weyburn itself has population of 9,500 over 15 km^2. Saskatchewan has a very low population density of 1.6 inhabitants per km^2 (compared to 400 people per km^2 in Holland). This implies a very different type of outreach strategy – in the case of Weyburn it seems that almost no outreach was done.

	The Weyburn oilfield covers 70 sq miles
Outcome in terms of project developer's aim	The project has been going on successfully, and is set to continue with no signs of opposition.
Outcome in terms of communication and engagement	There have been no records of opposition. The area in is however very remote.
Lessons	A number of implications may be drawn as to why the project succeeded, but cannot substantiated and as such are speculative. That there are very few people living in the area makes communication and engagement simpler. The area has a history of oil extraction, and this project sets up to continue that industry.
Detailed Summary	

Case Study	Gateway, Rampside, Cumbria, England
Type of project	Offshore Gas Storage
Developer	Gateway, Stag Energy
Project Developer's Vision	Gateway Storage Company Ltd plans to build an underground natural gas storage facility at 1 km depth in the East Irish Sea, approximately 25 km offshore, south west of Barrow-in-Furness. Storage caverns will be developed in a natural salt structure below the seabed, and be fed by an onshore gas compression station. The caverns will have a working capacity of 1.512 billion standard cubic meters adding nearly 30% to the current gas storage capacity in the UK. Construction is planned to commence 2010 and operation in 2015.
Story	Gateway gas storage consulted widely before making planning requests, and resolved local concerns about noise, visual impact and traffic issues, as well as about safety. Fishermen were the least satisfied group, but willing to accept some compensation for lost business. The region has plans to become "Britain's Energy Coast", and the Gateway project was at the start of this scheme. All local and national planning applications went well, and construction will soon begin.
Stakeholders involved	Gateway and Stag (project will be safe and provide benefits) Local publics (concerns included noise, visual impact, traffic and safety, but where mostly allayed by exhibitions and discussions) Local fishermen (that they will lose fishing grounds) Local Authority (good economic opportunity)

	Regional Fishing organisations (that local small scale fishermen may be adversely affected) Marine and Bird conservation organisations (satisfied that impacts will be minimal) DECC (satisfied that issues have been satisfactorily dealt with)
Engagement and communication processes	Gateway has an avowed "philosophy of open communication" and are "wholly committed to wider public consultation". This seems to have been followed in practice by early engagement with a wide range of organisations and councils, and pre-planning application seminars, discussions and exhibitions for local publics. Gateway have proactively engaged with the local media, mostly to positive results. The director of the company has taken an active role in engagement. Media has mostly focused on the employment opportunities, and the satisfactory level of public engagement provided by gateway.
Location analysis	The onshore element compression station is situated near to Barrow-in-Furness, an industrial coastal town which specialised in ship and submarine building. The compression station itself is situated next to an existing Liquified Natural Gas (LNG) terminal. The pipeline then runs through a bay and straight out to sea. Five offshore wind farms are proposed for the area, however, none have yet been constructed so the locals have not had a chance to feel 'hemmed in' by new developments (if indeed they ever do). The offshore elements are not expected to seriously impact fishing or shipping activities. A further two gas storage projects have been proposed, and local residents are showing signs of development fatigue.
Outcome in terms of project developer's aim	The project is going ahead as desired by the developer, with minimum delays.
Outcome in terms of	It seems that all stakeholders were satisfied with the engagement process, with only the unresolved matter of

communication and engagement	compensation requests from five local fishermen. The tone of acceptance may change if two more gas storage projects are built, five offshore wind farms and increased LNG capacity.
Lessons	The offshore storage was much less contentious than onshore, although fishermen and marine conservation must be considered. A good social fit led to a good project, in an area with industrial and fossil fuel history, with minimum interference to local activities. The project came before a flurry of other energy projects, of which residents are now become weary. Early and wide consultation, as well as active involvement from senior staff helped allay public concerns.
Detailed Summary	*April 2005* – Initial consultations with organisations and authorities on the proposed project. *February 2006* – A press release announces the project. *October 2007* – Public exhibitions and discussions. *Late October 2007* – Gateway begin the process of applying for planning permission from DECC. *May 2008* – Further public exhibitions *June 2008* – Local planning approval for onshore compression station. *November 2008* – planning permission granted from DECC. *February 2010* – Gateway secure gas storage licence.

Case Study	Milford Haven to Gloucester Gas Pipeline
Type of project	Liquified Natural Gas (LNG) Pipeline
Developer	National Grid
Project Developer's Vision	Two LNG terminals were planned by Dragon LNG and South Hook LNG for Milford Haven to process gas imports, requiring new connecting pipelines to run the length of length of South Wales to Tirley in Gloucestershire (a total of 316km), for which National Grid was responsible. The pipelines are designed to run at high pressure (a maximum 95barg) and are buried at a minimum of one metre underground. For several kilometres, the pipeline runs through the Brecon Beacons National Park. Most of the pipeline construction took place during 2006 with its official opening in November 2007 prior to commissioning in early 2008, with some reinstatement continuing after this. Imported gas is now supplied across South Wales and into England through this route. However, the pipeline is currently unable to run at its maximum capacity due to planning issues for the Pressure Reduction Installation (PRI) at Tirley in Gloucestershire.
Story	The LNG terminals in Milford Haven caused well reported controversy because of public fears over safety, which was not helped by the harbour authorities refusing to hand over risk assessment documents. This controversial reputation was transferred to the pipeline, and proved difficult to completely shake off, although National Grid made good efforts to engage the many stakeholders along the route of the pipeline. Three sites along the pipeline sparked opposition: Trebanos, Cilfrew and Brecon. Where the pipeline had to

	pass through the Brecon Beacons National Park there was public concern. Local opponents (concerned primarily about safety) and national campaigning groups (concerned primarily about climate change and the use of fossil fuels) joined forces, and took on each others' concerns. This resulted in two protest camps which were forcibly evicted, leading to negative (mostly local) media coverage. Local politicians, and some Welsh Assembly representatives, actively opposed the project. Political support was an important contributing factor to successful opposition. The project was portrayed by many Welsh stakeholders as benefiting the English at risk to the Welsh. Citizens petitioned, taking a planning decision to the High Court where it was overturned, and another court battle was fought and lost by the protestors. In Trebanos, where explosives were to be used, citizens commissioned a professional geological survey to provide evidence for their concerns about landslides and earthquakes - National Grid acknowledged the local residents' concerns and used alternative mechanical digging to undertake the work. Despite all this, National Grid did enjoy quiet support from landowners and some residents. National Grid conducted an extensive dialogue with statutory stakeholders, and local relations were helped by its policy of employing local Welsh-speaking staff to facilitate communication work and by careful planning and engagement over the route of the pipeline. The pipeline was completed on schedule.
Stakeholders involved	National Grid 835 Landowners, all of whom must give permission. Local residents Local Campaigning groups ("Safe Haven", "Cilfrew Residents Association", "Cwmtawe Residents' Association")

	National global warming protest groups “Climate Camp for Action” and “Rising Tide” Local Media National Media Local Authorities National and local politicians including Welsh Assembly members
Engagement and communication processes	During the route planning phase, extensive consultation was conducted between key stakeholders including landowners, the Environment Agency (Wales), local authorities, members of parliament and the Welsh Assembly, and national park authorities. National Grid considers that a good relationship with landowners is essential to its business and early engagement important. Following a route decision, public consultations and meetings with communities and their local elected representatives commenced.
Location analysis	Wales has a strong independent cultural identity separate to England. The pipeline was portrayed by some local media sources and by some Welsh politicians as an English project providing little benefit to the Welsh themselves. The devolved Welsh parliament gained new powers around the time of this project, which could have encouraged the parliament to be more active in its protest. South Wales has high unemployment and a lot of closed coal mines, implying an ambivalent relationship to industry. Milford Haven is one of the busiest ports in the country
Outcome in terms of project	The project was build on time and pretty much as planned.

developer's aim	
Outcome in terms of communication and engagement	Much of the media coverage, especially print, was negative, with the pipeline portrayed as controversial and sometimes as dangerous. A Guardian quote which gained popularity amongst some circles was "it wouldn't be built in Surrey!" The protests also received a lot of media attention.
Lessons	Once a bad reputation was established it was hard to shake off - the bad reputation earned through the LNG terminals transferred onto the pipeline. Poor engagement and decisions by developers of the LNG terminals and by some local authorities reflected badly upon National Grid, even though the issues were out of its control. Local and national protest groups joined together, taking on each others' causes. The joining of citizen protest groups, national campaigning groups and local and regional politicians contributed to the limited success of the opposition. The issue occurred in the political context of Wales' feelings of subjugation by the English, and Welsh Assembly resistance to the pipeline served partly to reinforce the status and power of the Welsh Assembly. National Grid's careful planning and early engagement with stakeholders and local communities about the pipeline routeing was important to project success, and the employment of local staff who spoke Welsh, helped improve trust levels.

Note: This case study draws heavily on work by Riesch and Reiner in the NearCO_2 publication (Desberats et al 2010).

Case Study	Rossport, Count Mayo, Ireland
Type of project	Gas pipeline, onshore gas processing terminal
Developer	(Enterprise Energy Ireland (EEI) 1996 – 2002)Shell (from 2002 – present), StatoilHydro and Marathon Oil.
Project Developer's Vision	Shell planned to build a high pressure pipeline from the Corrib offshore gasfield, transporting 'raw' gas for processing on shore in Bellanaboy. The pipeline would run 80 km offshore and 9 km onshore, maximum design pressure of 345 bar offshore and 144 bar operating pressure for the onshore section of the pipeline. The project is expected to deliver 60% of Ireland's gas requirement during peak production. The project was originally planned to be operational by 2010/2011.
Story	This is a worst case scenario for any project. Stakeholder relations became completely oppositional, resulting in prison sentences, violence, escalating project costs, long delays and extremely bad media coverage. Over 30 protest events were held most of which halted work temporarily and involved police and private security personal. At least 50 arrests have been made to date. In 2000 the project was announced by EEI but the local community felt they had not been adequately consulted about the development, and that it posed risks to their health and land. Twice they appealed to the planning board, and some changes were made but it seemed to objectors that the issue was of national strategic importance and was pushed through with inadequate attention paid to their concerns. Compulsory purchase orders were signed for 34 residents, 28 of whom were in favour of the project. When, in 2005, five local people ignored a court injunction and interfered with preparatory works, they were jailed for 94 days. Throughout 2005

	and up to the present day direct actions – i.e. picket lines, protests, occupations, disruptions and more – have disrupted the construction phase of the project. Although protesters have been largely peaceful, the Gardaí have broken up protests using force, which became an issue for national debate revolving around the right to protest versus the right to go to work on a site where all the appropriate permissions had been granted. There have been allegations of violence and of invasive and intimidatory behaviour by security staff employed by Shell although none of the complaints have been upheld by the Private Security Authority of Ireland and no public prosecutions have been brought against the security company. Tens of arrests have occurred over the time period, two further prison sentences delivered, and it has been alleged by well known elements within the protestor community that masked men attacked and hospitalised one key protestor, and boarded and sank a protestor's fishing boat. It was suggested by protestor groups that the masked men were from Shell's private security firm. Initially the opponents' concerns were about risks to health and land, but they broadened out to include environmental impacts, an economic critique of the licensing terms of the deal between Shell and the Irish government and about alleged human right abuses of campaigners. Independent safety reviews and mediation proceedings as well as community engagement from Shell came too late to mitigate the disastrous turn this project took.
Stakeholders involved	Shell (and other developers) Local protest group – Shell to Sea Rossport residents Gardaí

	Local Media National Media Planning board Local Politicians Minister for the Communications, Energy and Natural Resources
Engagement and communication processes	Shell is committed to employing local people wherever possible, and estimate that the project will bring 1500 construction jobs and 130 long term operating jobs to the area. A local grants program has funded more than 200 community groups up to €10,000 each. Community Liaison Officers meet with members of the community on a daily basis and their role is to listen to community concerns and ensure that they are addressed. A dedicated Social Investment Advisor works closely with local community groups and organisations to help deliver the Corrib Natural Gas "Investment in the Community" initiatives. Site visits are available and almost 2000, mostly local, people took part during 2008/09. A bi-monthly newsletter is published and quarterly stakeholder update letters are sent out. Besides these events, independent consultations and mediations took place. Shell stress that most of the people in the Mayo area are supportive of the project, but none of these activities has helped them engage with the people who are vehemently opposed to the project.
Location analysis	A remote and rural area of Ireland, which may have felt that it was being taken advantage of by the 'higher

	powers' of industry and government. Locals are mainly farmers and fishermen.
Outcome in terms of project developer's aim	The project has raised in cost, and is now expected to be delayed by three years.
Outcome in terms of communication and engagement	The case is infamous, with local, national and international reporting, (in 2005-2006) most of it negative, some of it neutral. The image which Shell gained as a result of the jailings has not been favourable. Greater community engagement since 2006 has ameliorated some of the negative reputational damage to Shell. Future operations in this area will be tarnished by the historical legacy of strong community dissent by very vocal and committed project opponents.
Lessons	Lack of early engagement with locals led to the whole affair. Better understanding of the local area, its cultural heritage and more flexibility and responsiveness to the locals' concerns in the early years of the project, could perhaps have saved the process, and resulted in probably the same outcomes, notably that working gas pressure is reduced and the pipeline re-routed to be further from habitations and environmentally sensitive areas. Government interventions attempting to push through the project decreased local faith in the democratic process. The use of large numbers of police and of prison sentences further polarised the positions of opponents, and raised local national and international media attention.
Detailed Summary	*April 2000*– Project announced to public. *July 2000*– Government passes Gas (Amendment) Act of 2000 *November 2000- August 2001*– Planning permission is applied for, denied, reviewed and accepted. Planning

	permission is immediately appealed to An Bord Pleanála by residents and environmental groups. *October, 2001*– The Minister for the Marine denies claims made in the Dáil by Mayo Fine Gael TD, Michael Ring, that he has been interfering in the planning process in relation to the Corrib project. *April, 2003*– An Bord Pleanála overturns Mayo Co. Council's decision to grant planning permission for the gas terminal, following the second longest oral hearing in the board's histroy. Shell expresses disappointment with the outcome and announces that it is now considering the future of the Corrib gas project. *December, 2003*– A new planning application is submitted by Shell. *April, 2004*– Mayo County Council grants planning permission subject to a total of 75 conditions. Objectors immediately indicate that they intend to appeal the decision to An Bord Pleanála. *October, 2004*– Shell is granted planning permission by An Bord Pleanála for the Bellanaboy gas terminal. The company announces that work will commence immediately. *April, 2005*– Proceedings are instituted in the High Court to prevent residents obstructing the construction of the gas pipeline at Rossport. The High Court grants Shell the right to access private lands in the village for the installation of the pipeline. *June, 2005*– Five residents from Rossport are jailed for contempt of court for refusing to obey the High Court order not to interfere with the construction of the Corrib gas pipeline. The men vow to stay in prison until they get justice. *August 2005*– Marine and Natural Resources Minister, Noel Dempsey, granted Shell permission to lay the 75 kilometres of pipeline from the Corrib Field to the North Mayo coastline. Shell suspends construction work on the pipeline for one year. The government announces an independent

	safety inquiry and appoints an independent mediator to facilitate and assess local views and concerns. *October 1st 2005*– Thousands rally in support of Rossport Five in Dublin. *October 12th 2005*– A two-day public consultation organised by the Department of the Marine is held in Geesala, Co. Mayo. *February 2006 – March 2010* The Shell to Sea protest campaign begins direct action against shell construction. Over a four year period, at least 30 protests occured halting work and sometimes resulting in use of force by police. Over 50 arrests were made, with much discussion in national media. Some of the more extreme examples are given below. *May 2006* The Advantica Independent Safety Review published, mostly supportive of the project, but makes recommendations including halving the pressure of the onshore pipeline to 144 bar. *July 2006* – Independent mediator Peter Cassells' report is published, concluding that the majority of people in Rossport, the wider Erris area and Co. Mayo are in favour of the project *September 26th 2006* – Protestors form picket lines outside the Bellanboy refinery construction site, preventing workers access. The first attempt by Garda to break pickets fails. *October 3rd 2006* –Some 170 Gardaí are deployed to police the protest at Bellanaboy, at the cost of millions of euro. *November 10th 2006* – Injuries as Garda baton charge protesters to allow Shell convoy through. Press coverage is not positive of violent police intervention. *January 2007* – Alternative pipeline routes are investigated. *14th June 2007* - Following several years of campaigning with Shell to Sea, Green Party TD Eamonn Ryan is

	appointed Minister for Communications, Energy and Natural Resources with responsibility for the Corrib Gas project. This is the only supportive political involvement that the opposition campaign received. *April 2008* – A new pipeline route is announced, doubling distance from households and decreasing pressure. *September 2008* – The shipping vessel Solitaire arrives to lay the offshore pipeline – Maura Harrington begins hunger strike, and local fisherman Pat O'Donnell arrested to prevent him obstructively (but legally) fishing in the bay. Device found outside Shell HQ in Dublin is detonated by the Army. (19th September) Maura Harrington ends her hunger strike. *April 13th 2009*– Prominent anti Corrib protestestor Willie Corduff alleges that he was attacked and hospitalised by several masked men in the dead of night while taking part in a protest at a Shell compound. The Irish Director of Public Prosecusions subsequently found that the security company against whom the allegations were laid had no case to answer. *April 16th 2009*– An employee of IRMS, the private security firm hired by Shell, was shot dead in Bolivia by special forces, accused of involvement in a coup plot. Four other members of IRMS were reputed to be with Michael Dwyer prior to the time he was killed in Bolivia. This added further speculation as to the legitimacy of the IRMS. *June 11th 2009*– Pat O'Donnell's boat the 'Iona Isle' was boarded by four masked men and sunk out at sea. *November 2009* – The planning board says a section of the revised pipeline route is unacceptable because of its proximity to housing. Another route must be found for the pipeline. Some high level mainstream politicians voice approval that the opponents 'have been listened to'. *February 11th 2010* – Pat O' Donnell was jailed for 7 months for breach of the peace and obstructing a garda,

	during the 2008 protests against the Solitaire offshore pipeline vessel. *February 2010* – Shell apply for permission to conduct site investigations in Sruwaddacon estuary as part of its research for an alternative route for the pipeline. One hundred and thirty letters of opposition are received by the planning board. The deadline for the next pipeline planning application is 31st May 2010.

Case Study	Saltfleetby, Lincolnshire, UK
Type of project	Onshore Gas Storage
Developer	WinGas
Project Developer's Vision	WinGas plan to convert the Saltfleetby gasfield into a gas storage site with 700 million m³ capacity. Gas would arrive in the coastal village of Theddlethorpe, be pumped under low pressure to Saltfleetby where three compressors would compress the gas and inject it 2.5 km underground. WinGas originally planned to be operating by 2009.
Story	After the project was announced in 2006, the project was opposed by the local authority, and by local publics including the Residents Association. This led to planning permission difficulties, and finally in 2008 an application was made to DECC for a Storage Authorisation Order and Compulsory Purchase Orders; both of which were perceived as an attempt to overrule local opposition. The outcome is still pending, and a public inquiry underway. Locals objected on the grounds of dis-amenity including noise from compressors and the industrialisation of a greenfield site; insufficient road access and visual impact; safety, proximity to a local school and insufficient emergency services. The main request was that the compressors be sited in Theddlethorpe which has existing industrial developments, and high pressure gas be transported by pipeline to Saltfleetby. WinGas object to this because of logistical difficulties, cost and increased risk, although the numbers have not been made public. There have also been suggestions that offshore storage may be preferable.

Stakeholders involved	WINGAS Storage UK (project will be safe and beneficial) Local Publics (project will intrude and may be dangerous) District and Parish Councils (inappropriate and possibly dangerous) Lincolnshire County Council (inappropriate and possibly dangerous) Environment Agency (potential for flood risk) DECC & BERR (project may be of national importance, and central government may have the right to impose the project)
Engagement and communication processes	Thorough engagement strategy, including informal face to face meetings, drop-in surgeries, public meetings, parish council meetings, workshops, a citizens' panel and a consultation panel; as well as independent assessments of geological viability. However, it is not clear whether engagement was early and proactive. Print and electronic information was provided, and local media engaged. Despite this, it seems that local publics do not want the project. Interestingly, it seems that local groups believe the developer's explanation of likely impacts and risks, and as such trust relations have not broken down; but where the developer considers these acceptable, the locals do not.
Location analysis	A rural and picturesque region, very flat, and generally in a good economic state. Tourism provides some income, and there is scepticism that gas jobs will go to locals. Locals perceive the place as an escape from modern or industrial pressures, and feel that the gas extraction, along with two wind farms, has been enough development.
Outcome in terms of project	The project has been delayed by approximately three years, and is still not guaranteed to go ahead.

developer's aim	
Outcome in terms of communication and engagement	A good engagement strategy has not led to a breakdown in relations or trust between local stakeholders and the developer, although the decision to go to national government may have strained this. Despite the good engagement strategy, WinGas has not taken sufficient account of stakeholders' concerns to placate them.
Lessons	The onshore project is contentious because of proximity to habitation, and the dis-amenity this creates. Risk is also a primary concern, and decreases in house value. Offshore storage was suggested as preferable. Poor social fit with area – residents to not want more industrial development in their rural area, and do not need or see benefit in the jobs. Indeed, it was thought that the project could damage the local tourist economy. Even without a breakdown in relations between developer and local stakeholders, agreement was not forthcoming: the engagement strategy did not result in satisfactory re-visioning of the project to resolve the dispute.
Detailed Summary	*Late 2004* – WinGas purchased the Saltfleetby gas field from UK ROC oil. *January 2006* – WinGas announced its intention to convert the gas field to a storage facility. *May 2006* – The proposal was objected to by the local authority. *2007* – During this year the project began to be held up by local planning objections. EIA published. Independent review of geological viability by independent experts – including the British Geological Survey at the request of the local council. *February 2008* – Earthquake in Market Rasen (15 miles from site). *October 2008* – Submission of to DECC for a Storage Authorisation Order, permitting WinGas to store natural

	gas. This included responses to public and statutory consultees. *December 2009 – January 2010* Public Inquiry held, to investigate the storage authorisation order (2008) and the compulsory purchase orders (2009). The outcome has not been published yet.

www.sccs.org.uk