

Communications for Carbon Capture and Storage: Identifying the benefits, managing risk and maintaining the trust of stakeholders

A report by Max Prangnell

February 2013

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Acknowledgements

The author is indebted to all those who have given freely and patiently of their time to help compile this report. The wise counsel and contributions from the communications leads at the five projects reviewed have been invaluable as was the help and input from Gloria Popescu and Carmencita Constantin at the Getica Project. Lucy Almond, Oliver Pauley, Dr Viv Scott and Ric Redman deserve special thanks for putting up with last minute phone calls and emails. Rebecca Hildreth, Michael James, and Ryan at Monster Creative helped with the words and the graphics. Steve Whittaker, Sarah Mackintosh and Klaas Van Alphen of The Institute helped order and gave valuable advice on the contents. Chris James must also receive a special mention for his wonderful shots of Longannet in the snow which have been used on the front cover as well as further inside.

Finally I would like to give special thanks to Kirsty Anderson of The Institute for her extraordinary patience, general good humour and depth of knowledge on this subject, her contribution to this report is greatly appreciated.

Background and purpose of the report:

The Global CCS Institute's report, 'The Global Status of CCS 2012' highlights the growing recognition of communication and engagement activities as integral components of any CCS projectⁱ. Early demonstration projects are reporting that the risk of failing to gain public acceptance for a project is now moving up the ranks of their overall project risk registersⁱⁱ. Much has been written and learned from the high-profile public opposition to the Barendrecht CCS demonstration in Holland in 2010. Since this project's very public cancellation, there has been a marked increase in efforts to share good practice and to provide assistance to projects to improve their communication and engagement efforts around CCS.

Building on the success of previous case study reports from early CCS demonstrationsⁱⁱⁱ, this report sets out to explore the experiences and challenges currently being faced by those charged with the task of communicating the benefits and the risks of CCS and maintaining the trust of stakeholders in a number of current, or recently cancelled, CCS projects.

This report is in three parts; the first deals with the broad issues facing CCS communicators and suggest a series of measures to manage and mitigate risk. Part two profiles five CCS projects and the communications strategies adopted by developers, while the final part sets out a series of key recommendations for the future communication of CCS projects and will provide a starting point for future Global CCS Institute public engagement workshops.

The rich and diverse experiences of the communication and engagement managers interviewed for this report highlight the site specific nature of their work. This report could not and does not attempt to offer a template for successful CCS communications, but it does try to offer an explanation, in parts, as to why some approaches have worked in some situations, whilst others have not.

The one view common to all the projects interviewed was that while comprehensive communication and stakeholder management strategies were believed to be crucial to project success, their limitations should also be recognised. Amongst the interviewees, there was experience of challenges beyond the scope and control of a communication and engagement strategy. In the face of deep-seated mistrust of developers, financial challenges or design limitations, climate change scepticism and public opposition - that takes on a dynamic and sometimes unstoppable momentum - even the most intelligently planned and executed communication strategy can come unstuck. In other words, sometimes projects just fail because their construction is planned in the wrong place at the wrong time and the need for them is insufficiently explained to those whose explicit sanction or quiet acquiescence is needed.

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Foreword

Attend any one of the multitude of CCS conferences across the globe and the chances are, bulleted on the presenter's almost obligatory 'future challenges' slide, you will see some variation on the theme of 'public acceptance', 'social licence' or 'public permission'. The potential failure to gain 'public acceptance' regularly rubs shoulders with 'regulatory uncertainty' and 'funding challenges' when it comes to considering the key risks facing CCS demonstration projects.

Amongst the well-documented clamour regarding the many challenges facing CCS, it is easy to lose sight of the fact that the technology sits at the very heart of global strategies to reduce CO₂ emissions:

- The IEA's recent "Energy Technology Perspectives" report⁴ demonstrated the critical role for CCS in the portfolio of low-carbon technologies by highlighting it as the only technology currently available to meet emission reduction goals in the industrial sectors, and confirming that if CCS was excluded as a technology option for lowering CO₂ emissions in the electricity sector, investment costs over the period to 2050 would increase by 40% (around US\$3 trillion).
- The United Nations has formally recognised the importance of the technology as a major mitigation option by including CCS in the United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism (CDM).
- The Global CCS Institute reports that in 2012 there were already eight large-scale CCS projects operating and storing around 23 million tonnes of CO₂ each year. With a further eight projects under construction, there is the potential for that figure to rise to over 36 million tonnes per year by 2015⁵.

Yet, despite this global recognition and demonstration of the substantial CO₂ mitigation potential offered by CCS, communication and engagement experts working in this area are increasingly being faced with what's fast becoming known as the 'CCS image crisis'.

Max Prangnell

February 2013

Part One:

1.0 The scale of the challenge: the CCS image crisis.

First, we must recognise the scale and nature of the challenge facing CCS communicators. For a start, CCS doesn't fit neatly into any available template for infrastructure development – it is not a simple, single technology, but a novel combination of techniques and different industry practices which (much to the chagrin of communicators) lack any iconic visual elements. There are no friendly windmills or benign solar panels.

Unlike other methods of creating low-carbon energy, CCS struggles to be painted as distinctly 'kind to the environment' because, as many Environmental NGOs are quick to point out, it still relies on, and indeed prolongs the use of, fossil fuels. Perhaps most challenging of all, CCS has been developed to help solve a problem which many stakeholders simply didn't know they had, or more often than not, don't believe will ever affect them. And finally, because it offers little immediate or direct utility to consumers in the form of either a noticeably cleaner environment or lower energy prices, it can, in this age of economic austerity, quickly tumble down a list of national or regional investment priorities.

At a more granular level, the challenges facing CCS communicators become even more substantial. Few audiences have any meaningful knowledge of CO₂ and fewer still have any awareness of sub-surface geology. Why should they? Due to this inherent lack of knowledge, much of what a stakeholder is being told about CCS has to be taken on trust, but when developers and governments are setting out their stall to audiences – who are increasingly distrusting of big business and politicians - it is hardly surprising that projects can be met with suspicion, or as in the case of Barendrecht in the Netherlands or Jämschwalde in Germany, outright public opposition.

Yet, despite these two notable exceptions (and a few other less public CCS hiccups) projects *are* going ahead. Sometimes, not just with quiet acquiescence, but the active support and blessing of key stakeholders and communities living close to projects.

How then have project communicators squared that circle? Can widespread acceptance of CCS ever be obtained, in the same way that it has for comparable CO₂ reduction technologies such as wind and solar? How have current projects worked to reassure stakeholders of project safety and CCS's effectiveness despite a lack of tangible examples to point to? And how have projects attempted to encourage stakeholders to support a solution to a problem that many didn't even know they had?

1.1 First principles: communicating needs and benefits

“All the world is made of faith, trust and pixie dust”⁶

As all communications professionals know, gaining stakeholder approval is essentially a three-way balancing act. First, there must be an actual or perceived direct or indirect **benefit** to the individual or group – ‘What’s in this for me, my friends, colleagues or neighbours? Do we gain any tangible or potentially tangible advantage?’ Second, there must be **assurance** – ‘Is the advocate listening to my concerns, or will they listen to me and make changes if I voice concerns in the future?’ And third, the stakeholder must perceive that the advocate is being **truthful** – ‘Do I believe and/or trust the person or organisation making these claims?’

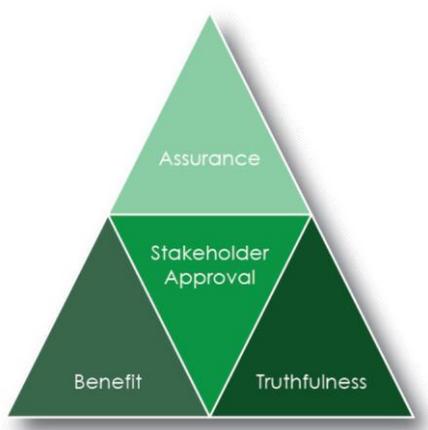


Fig 1: Balancing needs to obtain stakeholder approval

There is a delicate and dynamic interplay between these three elements. Different stakeholders will place emphasis on different aspects of the triangle. Some stakeholders will accept that while there may be little personal benefit to them in supporting a CCS project, they may well choose not to oppose it because they believe the project developer’s assurances that it will be operated safely. Other stakeholders may rank benefit more highly. If the project will create local jobs or improve the local economy they may be more trusting or more positively disposed towards the developer. Another group of stakeholders may not rank benefit or assurance at all. For them the decision to support or oppose a project will be wholly based on whether they think the developers are telling the truth and can be trusted.

All of the case studies analysed for this report revealed remarkably similar findings when it came to examining this triumvirate of benefit, assurance and truthfulness.

1.2 Benefit

CCS communications managers consistently found that ‘benefit’ in the context of local stakeholder groups invariably meant tangible benefit. *“The people who endorsed us talked about it being a vital tool in the battle against climate change. I don’t think that that kind of argument worked at a local level, within the local community, they didn’t care. We would bring it up and they would say ‘oh that’s nice for us’,”* says Norm Sacuta the communications lead at the Weyburn Midale project in Canada. He, as the case study at the end of this report reveals, found that what really mattered to the citizens of Weyburn and Midale was the economic opportunity associated with the Enhanced Oil Recovery aspect of the project. Other project developers agree that CCS’s role as an essential climate change mitigation strategy, while playing a substantial role at a regional and national level, hardly registered with stakeholders at a local level. What motivated communities geographically close to projects to support them were the prospect of jobs and economic opportunity first, while local pride in being associated with technical innovation often came second.

Assurance

Today’s more sophisticated project developers generally recognise the flaws in the ‘decide-announce-defend’ approach to stakeholder engagement. Often a country’s framework, as well as the planning and consents processes themselves, ‘force’ projects to take a more collegiate approach; enabling communities and individuals to feel enfranchised. Kirsty Anderson, knowledge share and communications manager for the Longannet Project in Scotland says it’s not enough to be seen to be listening or ‘going through the motions of listening’, developers must also be seen to be making changes in response to any stakeholder concerns. *“You must be seen to be acting in response to stakeholder concerns. People are cynical about big business, but they are also, by and large, rational. If you say ‘no’ to everything people will not feel assured that you are acting in their interests, and may ultimately exercise power by opposing your project. But if you say ‘yes’ to some requests you are much more likely to get buy-in, or tacit approval,”* she argues. This in itself suggests that at one level stakeholders want assurance that project developers are not intransigent or blind to criticism.

Truthfulness

Above all, project developers must be seen to be telling the truth if they are to gain the trust of stakeholders. Here the use of third-party endorsement or advocates has proved invaluable to project developers. It underpins arguments and helps stakeholders see that project proponents have support from individuals and groups who do not necessarily have any commercial interest in a development. Monica Lupion, who headed up the CIUDEN stakeholder engagement team at Hontomin in Northwest Spain explains, *“People don’t necessarily know what CO₂ is. They think it might explode. They don’t understand storage sites. It’s often just a lack of knowledge that breeds fear. Our job was just to explain the facts about CCS in a way that people can understand. For people that just objected to the project we always made sure we listened to them. We also made sure that we had plenty of third party advocates such as academics at the meetings who could explain things in everyday terms. The theory says you need everyone’s permission – you don’t. But you do need everyone to see that you are listening to their concerns.”*

If any of these three basic requirements is not fulfilled to some degree or is dramatically out of balance with the other two elements then a project is unlikely to obtain the essential early acceptance from local communities and individuals. CCS communicators should seek to emphasise that benefit, truthfulness and assurance are fundamental to a project's success.

CCS communicators often point to the ill-fated project at Barendrecht in the Netherlands as an example of a failure to effectively manage this nexus. Here, the “No2CO₂” became a classic example of the way in which a ‘coalition of the opposed’ developed with dramatic speed and effectiveness. Formed in 2009, at its highpoint the group counted over 1500 members opposed to CO₂ storage under the town. Some people joined initially because they were worried about the threat to the value of their homes, others because of concerns about CO₂ leaks, others because they simply didn't like the developers, or what was perceived as corporate arrogance. Some joined the campaign simply because their friends and colleagues joined. Whatever their personal reasons for signing up, it's hardly surprising that their unity of purpose – to stop the project, and their easily understood message – No2 CO₂, meant that in the end they carried the day.

1.3 Values based communication

“People don’t care how much you know until they know how much you care.”

This quotation, usually attributed to Theodore Roosevelt, lies at the heart of values based communication – a concept which builds on the benefit, assurance and truthfulness dynamic. And while no project proponents actually described their strategy as being ‘values based’ – it was in essence, the basis of all the successful engagement work being carried out by the projects reviewed here.

In short, it is founded on the premise that an enterprise, in this case a CCS project, operates in large part through ‘social license’ - that is where stakeholders give their consent for a project to operate, because they believe the developers share their ethics, values and expectations about behaviour. And while there are often safeguards or ‘*social controls*’ in place such as health and safety legislation or market sanctions - which will often compel an organisation to comply with stakeholder expectations, there is also an implicit acceptance by both sides that public permission via the social license needs to be granted too.⁷

It was this ‘permission’ which was so effectively withdrawn at Jämschwalde in Germany and Barendrecht in the Netherlands. Public demonstrations, banners wrapped around buildings and protest groups meeting in church halls are the manifestation of the removal of this social license by particular constituencies in democratic states. History is littered with examples of such protest. Sometimes those seeking this social license who are faced with opposition decide to ‘tough it out’ – occasionally they win. But, only occasionally, and often only for a short while. And, it must be said that governments have a far greater chance of getting their way through this process of attrition than commercial enterprises. For a CCS developer operating in a constrained political environment with even tighter financial parameters the ‘press on regardless’ approach to project development would fail.

The North American food and drink industry, faced with extensive criticism from NGOs for what it thought were unfair claims about farming and manufacturing practices has commissioned the lobby group, The Centre for Food Integrity to carry out extensive research into consumer trust in the last few years. Among the organisation’s many findings, three are directly applicable to CCS stakeholder engagement.

Three Principles of Values Based Communication

First, consumers or stakeholders have to believe that food manufacturers (or in this case, CCS project developers) share their values. In fact, research showed that confidence in organisations sharing the values of their stakeholders was three to five times more important than competence (skills and expertise) when it came to building trust.

Second, because NGOs are not motivated by profit they are *perceived* to be motivated by universal ethical principles. This ‘higher cause’ helps them achieve instant credibility with stakeholders. Some CCS projects have overcome this credibility deficit by emphasising the research or ‘public good’ aspects of their project and work hard to secure third party endorsement or advocacy.¹

Third, the strategy of ‘attacking the attackers’ does not work. It can if ‘bad science’ is rebutted with ‘good science’ but going head-to-head with opponents is a tactic that is often doomed because corporations are perceived to be bullying individuals. And, as this report shows – winning the scientific argument is only part of the challenge.

2.0 Tackling stakeholders' fears and concerns:

“There are known knowns; there are things we know that we know. There are known unknowns; that is to say there are things that, we now know we don't know. But there are also unknown unknowns – there are things we do not know we don't know.”⁸

For the projects reviewed in this report, stakeholders' fears and concerns, almost without exception, focused on the properties of CO₂. That is not to say that fear of CO₂ was the driver for opposition – which may be motivated by a range of factors such as worries about congestion on the roads caused by construction traffic or potential harm to wildlife from infrastructure development – but certainly concern about the perceived dangers of CO₂ has been how opposition to CCS projects has often manifested itself.

It is for this reason, CCS communicators, particularly during the early stages of a project's development, focus on explaining to communities and other stakeholders what CO₂ is and how it will be treated. As has been seen at a number of sites, this approach is not always successful.



Picture: courtesy of Jessica Donath⁹

Protestors from Beeskow in Germany preparing to fight Vattenfall's plans for a CCS demonstration plant at Jänschwalde in the summer of 2010. The project was abandoned 18 months later.

2.1 Is CO₂ dangerous – can it kill me?

When stakeholders from communities closest to a proposed project raise concerns about CCS, the focus is rarely on the full-chain process, or even CCS as a concept, but more likely, it is on the potential hazards of CO₂ or, more accurately, on the perceptions of the potential hazards of CO₂. While the perception of risk may not equate to the actual technical risk, it is still a key determinant of the likely acceptance or opposition to a project.

Here, the first challenge for communicators is to overcome common misconceptions about CO₂. An interesting and useful study conducted recently by the Commonwealth Science and Industry Research Organisation (CSIRO)¹⁰ found that audiences in Australia, the Netherlands and Japan only poorly to moderately understood the common properties of CO₂. A large proportion of those surveyed were uncertain of the difference between carbon dioxide, carbon monoxide and soot. In general people viewed CO₂ as dangerous, dirty, but perhaps also slightly useful. The majority could not clearly define CO₂. In the Netherlands, despite the extensive media coverage of CCS following the widespread reporting of the Barendrecht project, around one in five people believed CO₂ to be carcinogenic. Around half of all people interviewed were unsure whether humans exhale CO₂.

Although opposition groups at Barendrecht in the Netherlands and Beeskow in Germany – the town located nearest to the Jämschwalde, project – raised a series of objections principally arguing that they did not want to become ‘the CO₂ toilet’ for Germany, the underlying theme remained – a widespread fear of the risks associated with CO₂. Other, perhaps more realistic concerns about the effect on property prices or changes to a way of life were not at the centre of the protestors’ messaging. Unfortunately, the answer to the simple question, ‘Can CO₂ kill me?’ is not going to be a helpful one for those faced with the challenge of communicating the benefits of CCS. A quick internet search, frequently the first reference point for those facing a nearby CCS development or pipeline, reveals that exposure to more than 100,000ppm for no more than a few minutes will result in unconsciousness first and death soon after. But what is 100,000ppm? At that density, can you see it? Smell it? –this is unlikely in both cases.



Picture: courtesy of Jessica Donath¹¹

Communicators at the more successful projects have found that in dealing with difficult questions around CO₂, context is everything. In classical risk management theory, risk = hazard x exposure. In other words, 'risk' in the context of public perception should always be viewed as a relative term. One cigarette probably won't kill you, but twenty cigarettes a day for twenty years, will increase your chances of dying from cancer significantly. So the answer to the question, 'can CO₂ kill me?' can be a rather more nuanced, 'it depends'.

"It's like asking whether water is safe," says Kirsty Anderson. "Yes if it's in a glass on a table, no if you are drowning in the middle of the ocean. We must always be clear to differentiate between 'risk' and 'risky', which in the English language at least, are often used interchangeably."

Anderson cites stakeholders' abilities to do their own research as an important driver for an open and straightforward approach. *"Anyone can type the words 'CO₂' and 'danger' into any search engine and come up with facts that are frankly alarming. Our approach was to treat people with honesty, openness and respect, but also to make the things we were discussing as tangible as possible. In our public engagement programme, we first explained that CO₂ is one of the many gasses that we breathe out, that it's the stuff that makes the bubbles in fizzy drinks, and that yes, if you were exposed to very large quantities for a prolonged period of time then it could kill you. But the key point is to be able to reassure stakeholders that that kind of scenario is not an issue on your CCS project by setting these 'risks' in context. For example a discussion on CO₂ transportation would inevitably highlight that millions of tonnes of all sorts of gasses are transported around the UK by pipeline every day with minimal risk to human life, that all the main gas transportation pipes in the UK are checked by air at least once a fortnight, that the pressure in the pipes is monitored every second of the day and that the system shuts down automatically if there's the slightest drop in pressure."*

Anderson was quick to emphasise the importance of considering who was delivering this kind of assurance, *"...this kind of messaging only works if it is being delivered by someone credible that stakeholders can trust. When it came to discussion of health and safety aspects of our project, it was the domain of the relevant project expert. I've seen people get really tied up over the best possible language and word choices to use, but we found that with a trustworthy, credible spokesperson, issues around word choice became less important."*

Similarly, Marc Kombrink who is leading the communications for the ROAD project in the Netherlands has gone out of his way to make sure key messages in support of the project are simplified and useable. *"Brilliant experts are not always brilliant communicators,"* he says. Everybody speaking on behalf of the project at the two rounds of Town Hall events for the ROAD project had training in effective presentation and how to deal with emotional situations and irrational questions. *"We billed the sessions as informal 'info-markets' with people at stands rather than on a distant stage so that we could have easier one-to-one conversations. It was de-centralised so you avoided the risk of an entire audience's emotions being stirred up by one or two people, which is what happened at Barendrecht,"* he adds. It is perhaps a sign that only around 10 or 20 people turned up rather than the hundreds that would appear at similar meetings held for the Barendrecht project.

A further challenge for CCS communicators when dealing with issues of safety is to avoid what's known in political communications circles as 'overheating.' That is arguing on the one hand that something is 'perfectly safe', but on the other, confirming that additional levels of safety have been employed to ensure that even if the claim turns out to be wrong, then the system will cope in any

event. *“It’s a bit like saying we know the dragon is dead and can no longer attack us because we all saw the Prince kill it, but we will have extra dragon slayers on duty tonight just in case it comes back to life or there’s another one hiding in the cave,”* says Oliver Pauley, political strategist and advisor to the Longannet CCS project. *“With this in mind, it’s important to reassure stakeholders that CO₂ is being treated the same way you would treat any other gas. For this reason, claims that you are using thicker pipes, or burying them deeper underground could well be counter-productive, because it implies that you do not necessarily trust your own judgement,”* he explains.

And while engineers might well employ additional layers of safety, such as strengthened pipes or extra monitoring equipment; putting this at the forefront of the messaging is likely to be wholly counter-productive. *“It is important to have these kind of reassurances available and prepared in case you are pushed on an issue, but not necessarily put them out there as part of your general messaging because it raises more questions than it answers in the minds of stakeholders,”* says Pauley.

Key Points:

- Do not assume that stakeholders will understand the properties of CO₂.
- Care must be taken to separate the concepts of technical ‘risk’ from perceptions of ‘riskiness’. Where possible help stakeholders to contextualise ‘risks’ by drawing parallels to concepts they are familiar with such as the everyday uses of CO₂, the similarity between CO₂ pipelines and natural gas networks, putting CO₂ back where oil, gas and CO₂ were all stored safely for millions of years. Stakeholders respond well to rational conversations.
- Communicators should avoid the risk of ‘overheating’ responses on safety. Spokespeople should always be able to explain their ‘belt and braces’ approach to technical risk mitigation, but only when it is being asked for by stakeholders.
- Emphasising technical risk mitigation measures to stakeholders can be counter-productive because it will raise in stakeholders’ minds the idea that the risk of a leak or the dangers associated with CO₂ *must* be greater if the developers are putting in extra layers of safety.
- The most knowledgeable do not always make for the best advocates or communicators. Trust and credibility are just as important as depth of knowledge.

2.2 Onshore v Offshore storage

“People literally checked whether their house was located above the gasfields or not. If it was not, they were less concerned. This is supported by the findings of the people working in the information centre where the same image is shown to visitors. People first check if their house is above the gasfields and often feel relieved if it is not. The limited amount of concerns raised by the public and politicians in Albrandswaard can be explained by the fact that only a few houses in the municipality are located directly above the gasfields”¹²

With the fear and uncertainty around the perceived harm that CO₂ can do to humans well-documented, along with the general mistrust of hydrocarbon extraction companies in the wake of events such as the Gulf of Mexico oil spill in 2010, it should perhaps come as no surprise to project developers that communities can rapidly become highly vocal in their opposition. Especially if they come to believe they are faced with the prospect of actually living above a CO₂ storage site. Indeed the two most high-profile projects which have been abandoned due in part to public opposition, Barendrecht and Jänschwalde, were both to be onshore storage facilities. While it is difficult to quantify in any meaningful way the increased challenge that onshore storage brings, all anecdotal evidence suggests that this option brings an added layer of complexity to an already complex set of arguments. It is not insignificant that the ROAD project at Maasvlakte in the Netherlands is just 50km from Barendrecht, yet Marc Kombrink and his communications colleagues at the project have encountered remarkably little opposition, due in large part, he suggests to the project’s offshore storage option.

The debate around onshore and offshore CO₂ storage seems to be particularly sensitive throughout Europe, whereas the majority of North American CCS projects currently in operation involve onshore storage, usually as part of an enhanced oil recovery programme¹³. From a purely logical perspective it is perhaps difficult to understand why opposition to onshore storage can be so extreme, given that no developer would store CO₂ in a geological formation that is anything less than entirely secure. However human beings are not always logical, particularly when they are uncertain and as CUIDEN’s Monica Lupion points out there are so many unknowns for stakeholders new to CCS, *“You’re asking people to accept something they don’t know very much about, and that you yourself are saying is a new technology, so this will always, in the end, come down to a matter of trust.”*

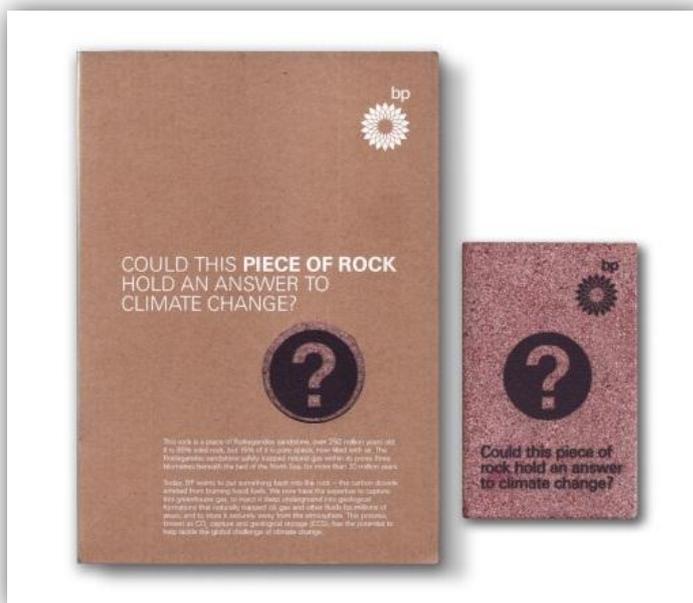
“People think there are these vast underground caves which we are going to pump gas into,” says Marc Kombrink. *“The idea that the rock is itself porous and will contain the gas is beyond most people’s understanding.”* Kombrink is not alone in this assertion. It is now universally acknowledged that one flaw in the communications for the Barendrecht project was to promote a simplified schematic of underground storage, not drawn to scale which made people feel that the CO₂ was literally beneath their feet and could therefore seep into their houses at any moment. However, accurately describing the depth of the storage strata alone is not enough.

The difficulty is further compounded by the notion that there are different types of geological strata – all with different levels of permeability. To suggest that the gas can be pumped deep underground and trapped safely and securely in layers of porous rock for millions of years, although technically feasible, can easily sound like science fiction to the lay person.

Dr Vivian Scott a geologist at Edinburgh University in Scotland points out that part of the problem is that ‘offshore’ is an unfamiliar world where unfamiliar things happen. By contrast, he argues,

“discovering’ that your ‘solid, familiar, good old terra firma’ is not so solid, has stuff in it and moving around it, and doesn't belong to you, is a bitter pill to swallow even without the added ‘someone's going to do something to it’ concern.”

One neat solution employed by BP for its CCS projects, was to have small presentation packs of North Sea sandstone made. This helped stakeholders understand the nature of porous rock formations and how CO₂ can be stored in what, to the uninitiated, looks and feels like solid stone.



Picture: courtesy of BP

Iain Wright, BP's CO₂ Project Manager, regularly took this rock in a box with him when he went to meet stakeholders. It went down well with politicians and regulators too. “The communications rock came from the same type of geological formation as found in the North Sea, and it proved to be an excellent, high-level tool to communicate CO₂ storage security to an un-informed audience.” He says. Edinburgh University's ‘Scottish Earth Science Education Forum’ use a similar kind of rock kit containing a small sample of sandstone (porous rock), shale (non-porous rock), a lump of coal and a small magnifying glass for their high school outreach activities. Communicators from the Weyburn-Midale in Canada have taken a more hi-tech approach – magnifying digital core samples to show the layers of porous and non-porous rock they are dealing with.

Key points:

- Use tangible examples wherever possible and make sure your graphics are to scale
- Assume your audience will have little or no basic knowledge of geology
- Remember that onshore storage adds an additional layer of complexity and challenge for project communicators and has been poorly received in regions where stakeholders are not closely connected with the oil and gas industry for economic reasons.

2.3 Enhanced Oil Recovery – commercial viability versus vocal critics

With cost reduction being one of the key challenges recognised by the CCS industry, the prospect of injecting CO₂ in to existing oil fields to help extract more of the fossil fuels we are reliant on would seem like a win-win. Not only does it bury large quantities of the greenhouse gas for good, but it extends the life of the field significantly – in some cases by up to a third. Develop that logic slightly further and it's easy to envisage a scenario where CO₂ – far from being a harmful by-product of power stations and heavy industry – one that requires tax incentives and regulation to achieve reductions, could, one day, become a valuable commodity which can be sold to oil and gas producers. Some CCS advocates argue that in the medium to long term, the technology that is currently struggling to justify its upfront investment cost could ultimately be at least self-financing, if not somewhat lucrative.

In the US there are at least five large-scale projects in an advanced stage of development¹⁴ focusing on Carbon Capture Utilisation and Storage (CCUS) as a way of making CO₂ emission reduction financially viable. One of these is Summit Power's Texas Clean Energy Project where Eric Redman, the company's President and CEO argues that the global development of CCS simply won't happen unless CCUS is delivered first. For him, any reticence by developers has long since gone. *"For us it's completely obvious you have to have carbon capture utilisation and sequestration [CCUS]. It's like saying if you drop an object off a table it will fall to the floor,"* he explains. *"But to get to that stage investors have to make decisions based on sound economics, this is especially true in the current economic climate. Yes CCS is nice to have, but it won't happen unless it's financially viable. If it takes CCUS to make it viable on the balance sheet then so be it. This is the reality in 2013".*

While this may be true in the oil rich regions of the West Texas Permian Basin or indeed at Weyburn Midale in Canada, CCUS appears to be less relevant in Australia and a more sensitive issue in parts of Europe. When the UK Government announced that it would negotiate with four potential CCS projects¹⁵ with the aim of supporting one of them to eventual construction, one of the project schemes came in for criticism in the press from an environmental group that takes a generally positive view on the importance of demonstrating CCS technology, precisely because of its Enhanced Oil Recovery [EOR] potential.

This view, that additional oil does nothing more than increase reliance on fossil fuels, is one that is shared in broad terms by Greenpeace, the largest of the Environmental NGOs at a global level. It claims CCS is a 'false solution' because it detracts from money that could be spent directly on renewables. There are though, indications that at a national level the view is more nuanced, even within Greenpeace itself.

Some ENGOs such as the Clean Air Task Force and the Natural Resources Defense Council take a more pragmatic view. In the recently released *"ENGO Perspectives on CCS"* report produced by the ENGO Network on CCS, the Clean Air Task Force recognised, *"...the significant potential for CO₂ EOR in the US provides a viable pathway for large-scale CCS deployment incentives"*¹⁶

It should be noted though, that local communities and stakeholders who are familiar with oil and gas technology are far more likely to support CCUS or CCS with EOR for the simple reason that it brings direct economic benefit. Norm Sacuta, of the Weyburn-Midale project, which is itself driven by EOR rather than the need to cut CO₂ emissions, reports that apart from one notable exception, local reaction to the scheme was overwhelmingly positive. He says that the Weyburn project's

information centre and website were set up largely in response to international opposition to CCS, not as a result of local concern.

Key points:

- There is a clear shift by project developers towards CCUS or CCS with EOR, driven in large part by the current economic climate.
- In areas or regions where stakeholders are well-informed about oil and gas technologies project developers have found that opposition to CCUS or CCS with or for EOR is almost negligible. It is noted that for technical and infrastructure reasons EOR operations are only likely to be undertaken in areas where there is a high degree familiarity with the oil and gas sector
- Some ENGOs are taking an increasingly pragmatic view of CCS with EOR and CCUS because they see it as a means of driving through policy designed to mitigate climate change. CCS can be viewed as a complimentary, supporting technology to renewables. In short, there is a realisation that the perfect should not be the enemy of the good.

2.3 The language of CCS

As any CCS communications practitioner knows – sometimes to their cost, CCS is a long way from being what could be described as ‘stakeholder friendly’ and yet, as discussed in previous chapters, establishing trust with stakeholders at the earliest opportunity is critical to the success of community and stakeholder relations throughout the life of a project. As described earlier, the very purpose of CCS – capturing CO₂ to reduce GHG emissions – is easily lost on the majority of audiences. Couple this with complex science involving chemistry, geology and geophysics, complex engineering challenges and downright mind-numbing energy economics and finance, and CCS begins to look anything but ‘stakeholder friendly.’

The language itself so often employed by project developers, regulators and academics adds yet another challenge to the CCS communicator charged with managing stakeholder relations.

Development teams will casually use words like; ‘risk’, ‘experimental project’ and ‘aquifer’ without a second thought. Outside the US even the words Carbon Capture and Storage have been known to present problems – ‘storage’ in some quarters having connotations of the nuclear power industry’s storage of spent fuel rods. Storage, in common parlance meaning ‘a quantity of something kept ready for use’ seems to contradict the claim that CO₂ is being put safely beneath the ground where it will stay for millions of years. The North Americans have solved the problem with the word ‘sequestration’ – which sounds altogether far more certain, bringing, as it does, the notion of ‘seclusion’ or ‘banishment’. It has a neat finality about it. A more recent trend is to avoid using the word ‘aquifer’ in relation to ‘saline aquifers’ as this word is commonly associated with fresh-water. Some UK CCS projects are using the phrase ‘saline rock formations’ instead, as are communicators from the CIUDEN project in Spain.

The fact is though, that CCS wasn’t invented with neat marketing campaigns in mind. Communicators have to work with what they have. There are, however, two simple steps that can be taken to reduce the risk of misinterpretation and help maintain trust with stakeholders.

First, the message must be managed. It is a fact that most stakeholder communications channels still rely on the printed word, whether that’s text for a website, a leaflet, or a pop-up banner stand. It is a generally accepted rule in journalism that all copy should be able to be understood by a bright, interested 14 year-old. This is not because newspaper readers are no more intelligent than fourteen year-olds. It is because audiences are busy, often distracted and do not necessarily have any specialist knowledge about the subject matter. The same then should apply to copy relating to CCS. If the words don’t make sense to the lay person or could be easily misinterpreted, don’t use them.

Second, the messengers should also be managed. It is an often quoted fact (although it may be something of an urban myth) that we are judged mainly by our appearance (52%) then by the audience’s preconceptions (41%) and only 7% by the words we are actually using - a fact drilled in to politicians in the early stages of their careers. Marc Kombrink at the ROAD project not only ensured that all team members underwent presentation skills training before being allowed to participate in public engagement sessions, he also recognised that engineers and scientists often don’t make the best communicators. Monica Lupion at the CIUDEN project in Spain tried to make sure that stakeholders were able to have conversations about the project with advocates who were of a similar age. At the Longannet project in Scotland, Kirsty Anderson was fortunate to have as a

colleague a chief technical officer who was very skilled at making complex science simple. *“He also had a natural enthusiasm about everything, so when he spoke it was impossible not to like him and get caught up in the excitement over the project,”* she says. In other words, if the messengers don't look and feel right for the project – don't use them.

And while it is easy to find iconic images for gas escapes or air pollution, it is less easy to find the iconic image that neatly represents CCS, despite the many thousands that exist online. The widely respected academic and CCS communications expert Ynke Feenstra makes the important point that when it comes to visuals, sometimes it's better to have none than to have wrong ones.¹⁷ In her blog post on the Global CCS Institute's she writes, *‘I often run into images in which different types of CO₂ storage are presented. Within one drawing, on- and offshore storage possibilities both in aquifers and depleted gas and oil fields including enhanced gas and oil recovery are explained. A legend, text (including difficult terms), colours (of underground layers) and numbers (depth) are added to the drawing. Someone who does not read these well, could interpret the image as a representation of CCS in real life. He or she thinks that the different storage possibilities always take place close to each other and at the same time. And because of the inconsequent scale used, that person can also think that the storage will be done at 100 meters deep.’*

Finally, don't forget too that campaign groups can be just as creative as corporations - often more so. Developers of genetically modified food in Europe have still to recover from the 'Frankenfoods' claim made by their opponents in the 1990s. The opponents of the Barendrecht project came up with a smart marketing move when they adopted a Guinea Pig as their mascot. It was device guaranteed to gain media coverage and elicit sympathy. Similarly at Beeskow in Germany opponents of Vattenfall's plans amended the 1980's campaign 'Atomkraft Nein Danke!' with a more straightforward 'Nein!' The subtle link was made between CCS and the anti-nuclear movement, which was reinforced with the word 'Endlager' – meaning 'final disposal' a word again borrowed from earlier anti-nuclear campaigns.

Key points:

- The language of CCS tends to be complex, technical and off-putting to the lay person. Communications should be the opposite of this. The '14 year-old' test should be applied to all text which is directed towards stakeholders.
- Messengers often need managing too. It is not always the case that the most effective advocates for a project are those who have the most technical knowledge or indeed are the most senior members of the team.
- Opposition groups are likely to have highly creative and emotive communication campaigns. They are often less bound by the constraints of factual accuracy and scientific evidence for their claims.

3.0 Stakeholder management: an overview

In view of the complex communications challenges outlined above, some say it's surprising that any CCS projects are able to obtain and then maintain the trust and acquiescence of stakeholders at all. Many, however, argue that the most essential element of effective stakeholder management is early engagement. While this is undoubtedly true in broad terms – what exactly does it mean?

When and how should project developers begin to talk to local, regional and national audiences? In what order should they be approached? And how should messages be conveyed?

Analysis of successful, stalled and failed projects point to three key determinants of a successful public engagement programme:

1. Social site characterisation must be part of any initial project planning, preferably during the 'identify and evaluate' stages.¹⁸ It should always be remembered that some projects can fail simply because they are inappropriate projects for their location. In the same way that a rational developer would not attempt to build a major piece of infrastructure in an area of outstanding natural beauty, consideration should be given to the likely sensitivities of key stakeholders from the outset.¹⁹ This activity is not just about understanding a local community. Wider socio-political and socio-economic conditions are also important – promotional campaigns should avoid conflicting with other external events such as local elections.
2. Engagement can't just be early. It has to be meaningful as well. Project developers need to be seen to be responding. Engagement with local communities should begin as soon as projects develop into their 'define' phase. That engagement should be based on the principal of a 'quality conversation'. Project proponents should be seen to be talking and more importantly, *listening* to their audiences. If it is practicable to alter plans to accommodate wishes and views, then this should be done.
3. All engagement should be proactive and carried out face-to-face where possible and practicable. Local stakeholders in particular, should not hear about a project for the first time via the local, or worse still, national media. It is worth remembering that in some areas of strategic communication, public engagement is also known as 'obtaining public permission'. It is almost axiomatic that stakeholders will be antagonised and therefore more likely to oppose a project, if they *feel* they are being presented with a *fait accompli* or a 'done deal'. Remember that people tend to live in an area because they like the area or have social or economic ties locally. Anything that could have the potential to change that relationship will inevitably be treated with suspicion.

As discussed elsewhere, public engagement is, at its heart, about showing sensitivity to those who, at the very least, need to accept the principal of a project's development in a particular location and at a particular time.

3.1 Stakeholder management: a phased approach

CCS projects should be no different to many other infrastructure projects in taking a phased approach to engagement. The Longannet project in Scotland took a two phase approach to their early engagement work. Phase one comprised informal soundings and a broad analysis of social, political, environmental and geographic considerations. It should be noted that this does not require significant resource or time and can be conducted on the basis of local knowledge and, as can be seen from the list below is based on not much not much more than common sense.

In Phase One, the following 75 questions should be addressed by developers from three separate perspectives:

The 'project-out' view:

1. What is this project?
2. Why do we need to build it here and why now?
3. When will it start?
4. How long will it take to build?
5. Who will it affect?
6. Are we likely to manage those people who are directly impacted successfully?
7. What built and natural environment will it have an impact on?
8. Are we likely to be able to manage those things which are directly or indirectly impacted successfully?
9. Will we compensate those affected by the project's long term operation?
10. What will be the specific nuisances to the community during construction?
11. What will be the specific nuisances to the community during operation?
12. How long will the project be operational?
13. Are we, the developers, trusted?
14. Is there anything we can point to as being a success locally?
15. What benefits will it bring to the local community when it is operating?
16. Will we compensate those affected by our construction work?
17. What benefits will it bring to the local community when it is being constructed?
18. Who do we think might object and why?
19. Is there a specific part of the chain that is likely to be an issue?
20. Have local people or organisations objected to other infrastructure development locally in the past?
21. Who from the local community might be on our side and why?
22. Would they speak up for us?
23. What are the local demographics?
24. What is the local socio-economic picture?
25. What is the local political landscape?
26. What is the local industrial landscape?
27. Are there any planned political events such as elections that we should consider?
28. Is there a local history of innovation or industrial development?
29. Will we get or do we need 'national' support and will that help us?
30. Do we have the capacity to change some aspects of the project if we meet objections?
31. Do we have the organisational and financial capacity to manage local stakeholders effectively?
32. Do we look and feel as if we care?

The 'community-in' view – how do we think this project will be perceived?

1. What is this project?
2. Why do they need to build it here and why now?
3. Is it safe?
4. Do we think it will happen?
5. When will it start?
6. How long will the building work take?
7. How will it affect our community, when it is being constructed?
8. How will it affect our community once it is operational?
9. How do we feel about it?
10. Do we like or dislike some or all of the proposals?

11. If we complain, will they (the project developers) do anything about it?
12. Can we be bothered to complain?
13. Do I care enough about these proposals?
14. Have we heard of them before?
15. Will they compensate us for any loss or any increased risk to our community?
16. Do we trust the developers? Are they being open and honest with us?
17. Will these people listen to us?
18. Have they done anything like this before?
19. Do they seem to know what they are doing?
20. What do our friends and people we respect or trust think about it?
21. Will it bring any benefits to our community?
22. Have we been here before with similar projects?
23. Have we accepted or fought similar projects locally?
24. Are we protected by law if anything goes wrong? Or might we have to take matters in to our own hands?
25. Does this development matter to us or shall we just wait and see what happens?
26. Would we be better off if this project was built somewhere else?
27. Would we be worse off if this project was built somewhere else?
28. How did we find out about it?

The ‘risk-mitigation’ view

1. Do we understand risk mitigation for stakeholder engagement? Are our processes correct?
2. Can or will we make changes²⁰ if we have to?
3. Why does this project need to be built here and why now?
4. Will the story make sense to our different stakeholders?
5. At this early stage, can we build and operate it sensitively?
6. Can we follow due process for all impact assessments?
7. Can we go beyond due process for all impact assessments?
8. Would we be prepared to compensate those impacted by the project?
9. Do we have the ability to force consent if required?
10. Do we have a convincing narrative which explains who we are and that we care?
11. Do we have the appropriate advocates for the project?
12. What would be the impact on the project of a delay if objections were raised?
13. Can we really fulfil the ‘assurance, trust, benefit’ nexus?
14. How do we tell our local stakeholders about the project and our plans for engaging with them?
15. Who should tell them and what messages should be landed?

In everyday language, the above is little more than a ‘sense check’. Only when all of the relevant questions above have been answered as fully as possible should the project begin with more formal public pronouncements.

Getting the Story Straight

In common with all major infrastructure projects, much is made of developing the clear, credible and compelling messages which are designed to win over stakeholders. The ‘message management’ is again more of an art than a science. Project developers should be aware that while the core narrative should always remain the same, different stakeholders will place different emphasis on different aspects of the proposal. Communities might be more concerned by environmental impact, local politicians may focus more on the potential economic benefits, while stakeholders operating at a regional or national level such as politicians or ENGOs may be more interested in export opportunities or climate change mitigation. This does not mean the story needs to be rewritten for every engagement – it is simply a matter of applying common sense. Developers should develop a suite of arguments and apply them accordingly.

In phase two, the communications specialists would then in consultation with other project leads, agree an engagement strategy and process to take the stakeholder management through the subsequent project stages (identify, evaluate, define and execute) to the operate stage. At this point, communications efforts can sometimes be scaled back.

It is important to recognise three points. First, in each of the successful projects reviewed in this report, the stakeholder engagement plan did not necessarily coincide with any project event, such as the release of funding or even the formation of a consortium. The ‘launch’ can and arguably should be ‘soft’ – with respected local figures approached and soundings taken on a ‘what if’ basis.²¹

The key objective of this kind of ‘soft launch’ is to make people aware of the project at a very high level, reducing the risk of any hardening of views at an early stage. Unlike the launch of an ‘exciting new product’ which people have a choice about whether they buy or not, the decision about the location of CCS projects often leave people feeling they have no choice.

This ‘soft launch’ approach, as many project developers have noted, has the added advantage of giving community leaders a sense of ‘ownership’ over the project’s future development. The second point is that the above checklist should be adapted and then adopted for both regional and national stakeholders. Inevitably the lists will be shorter, but the process along with an effective stakeholder map should be undertaken all the same.

And third, successful projects commonly ensure that the communications function sits firmly within the project’s senior leadership team from the outset. This has the effect of reminding the project’s commercial and technical leads that public acceptance of the project is an aspect that must be managed throughout the lifecycle. It also gives a more direct conduit for stakeholder concerns. It also, as Marc Kombrink from the ROAD project put it, *‘helps remind engineers that communications isn’t a linear process’*. The following flow chart sets out an overview of an effective stakeholder management process, based on the processes undertaken on the Longannet Project in Scotland.

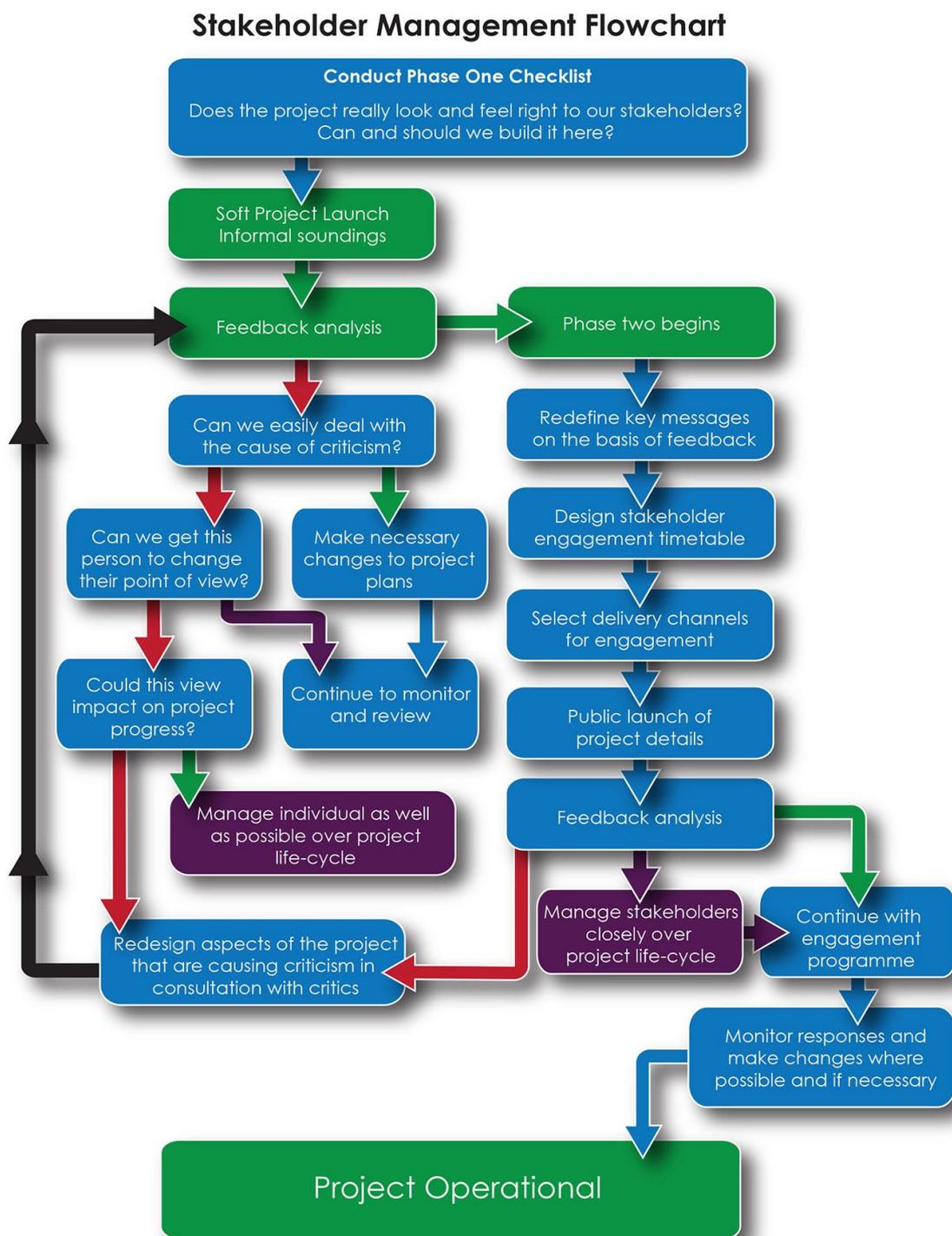


Fig 2: Stakeholder management flowchart

The flowchart above can be distilled to five basic steps:

1. Define the project
2. Explain the project
3. Respond to feedback
4. Monitor responses
5. Review regularly and frequently

It should be noted too that while the flowchart takes a somewhat mechanistic approach to stakeholder management, implementation should be viewed as an organic process. Views will change, unplanned events will occur and things will go wrong. The real challenge for the stakeholder or communications manager in this context is to be able to respond quickly and appropriately to mitigate those risks as they occur.

Key points

- Stakeholder managers should take a considered and phased approach to engagement. Communities will be wary of surprises and are more likely to oppose a project if it is presented as a 'done deal'. Communities are almost by definition conservative by nature.
- Engagement is best carried out on a face-to-face basis and for it to be successful it should be carried out early in the lifecycle of the project and must also be meaningful.
- Stakeholders' views, opinions and concerns must be listened to and acted upon wherever possible.
- Different stakeholders will have different concerns and views. Each should be listened to and given due consideration. Politicians are not necessarily more important than people
- The communications component of a project should be firmly embedded within the senior management team.
- Project managers should remember that communications is rarely a linear process where c follows b, which follows a.

4.0 What if it all goes wrong? – Managing a CCS communications crisis

Just as the term ‘risk’ is interpreted differently by project developers to the way it is used in every day conversation, so the word ‘crisis’ has developed a specific connotation in communications-speak. Indeed ‘crisis management’ has developed in the last two decades as a particularly specialised form of communications management. It is generally defined as; ‘the process by which an organisation deals with an unplanned or major event that will impact negatively on the organisation, its people, its stakeholders or its reputation.’

Every project reviewed for this report has had to deal in some form with a crisis. Some were more manageable than others.

Although it is the job of the communications or stakeholder management team to be constantly scanning for issues that might derail an objective such as project completion, as any crisis management expert will testify, a crisis can emerge from the most unexpected quarter.

There are broadly two types of crisis that affect organisations:

- The unplanned external event
- The unplanned internal event

In the first category a good example is the sudden emergence of a campaign against the Weyburn Midale project by an ENGO and a local couple who were convinced CO₂ was leaking from the ground below their farm. The second category might encompass a catastrophic technical failure which causes stored CO₂ to leak, or (arguably worse still) a whistle-blower who claims that the stored CO₂ *could* leak.

While it is impractical to provide a template for effective crisis management communications, the following seven basic rules are adapted from the handbook published by the London based crisis communications company, Millbank Media.

1. Don’t panic and certainly don’t be seen to be panicking.

In the first few minutes and hours of a crisis the pressure will be on. Internally, your work colleagues will want to know what went wrong, what stakeholders are saying, who was at fault and what the likely outcome will be for the organisation. Externally, the media, investors, trade associations and a range of stakeholders including other projects will be asking the same questions. In this crucial period the crisis manager will need to be seen to be responding, but, will need to buy time to understand the issues. They will need to take ownership of the issue and be seen to be doing so and crucially they will need to be seen to be taking a mature approach. A typical holding statement should be short and comprise three basic points.

- The incident/event is serious and we are taking it seriously
- We are working hard to establish the facts and resolve the issue
- If lessons need to be learned, we will learn them

Don't admit that any event is a blow to your reputation. The incident is not about your reputation it's about something that has gone wrong and your challenge is to understand what caused it to go wrong, put it right and make sure it can never happen again.

2. Don't speculate, don't attribute blame

If you don't know what happened then say so. The media will encourage you to do this simply because it makes for a better story. That's their agenda, not yours.

3. Be human, avoid corporate rhetoric

If something terrible has happened, then say so, but, avoid phrases such as 'our thoughts are with the family at this difficult time' or other clichés which can seem glib or not meant. If you're sorry, then say so. But, be aware that 'sorry' is a word that makes corporate lawyers particularly twitchy – coming as it does with a vague admission of liability and/or guilt. Many corporate spokespeople are more comfortable with the phrase, 'We really regret the fact that this has happened'.

4. Manage your messenger

During what became known as the 'Polonium incident' in the UK in 2006 when former Soviet KGB agent Alexander Litvinenko was poisoned in London after ingesting what appeared to be a lethal amount of radionuclide polonium-210 possibly at a London sushi restaurant, there were understandable fears by Londoners that this highly toxic chemical could be present in other locations. The UK's Health Protection Agency which is well-rehearsed in crisis communications, invoked its system of appointing two senior people to manage the crisis. One managed the team carrying out the investigation and liaised with other agencies the other shadowed her colleague, but undertook all media interviews. This successful system not only keeps the wider community informed of events, but it leaves the agency free to manage the crisis itself. Be cautious too about putting up your most senior member of staff for interview. During BP's handling of the Gulf of Mexico oil spill in 2010 which killed 11 workers, the company's Chief Executive gave interviews in which he made some well-publicised gaffes. Many commentators have since argued that while CEO did well to be on the scene so rapidly, he should have left local (American) managers to deal with the subsequent media storm.

5. Understand the media's agenda and the news cycle

The press and broadcasters are by definition highly competitive. They all want to be first with a story or a new development - partially to attract readers or viewers, but partially too, to avoid being seen to be behind the news. They will be considerably pacified if you are clear about your programme of communications activities. If you will have no more news for 24 hours – then say so. Accept too that speculation will be rife, particularly via the social media. Norm Sacuta from Weyburn-Midale took a seasoned approach to the blogosphere when managing his own CCS communication's crisis by ensuring that what was being said in the internet was monitored, but he did not engage directly with the people posting speculative allegations. When Marc Kombrink from the ROAD project was confronted by a negative opinion piece in a local newspaper, he immediately organised for a positive piece

to appear in the same paper the following day. If nothing else, this reinforces in stakeholders' minds the idea that there are two sides to every story.

6. Use your friends

If possible and practicable use supportive external advocates to help drive your message home. All journalists know that there are almost as many views as there are academics and it is relatively easy to find one who will criticise either your organisation in particular or CCS in general. You too should be pro-active in recommending experts to the media who can give background and context.

7. Take ownership of the long term response

It is inevitable that you will want to understand what went wrong so that you can put in place systems or technologies to prevent a re-occurrence. Frequently this will involve both an independent audit of processes or procedures and an often swifter internal review. Be open about this procedure and about what you will do in the meantime. That will almost certainly result in a pause in current operations. It will give you an opportunity to buy some time, to talk again to your stakeholders in a calmer environment and reset the conversation in a different context.

Finally, remember crises are rarely the fault of crisis managers (although it can sometimes feel that way) your overwhelming objective is to maintain the trust of your stakeholders. That will only happen if your organisation is seen to be putting the safety of people and the environment before any other considerations you may have.

Part Two - Case studies:

5.0 Case Study One: CIUDEN/Endesa also known as Compostilla

Phase One (Pilot Project), Phase Two (Permitting Process)

Phase one project proponents: CIUDEN

Capture type: Oxyfuel

Transport type: 30 km by road haulage in tankers to the Hontomin site

Storage type: Disused oil field

Phase Two FID expected in 2013

Phase Two project proponents: Endesa, CIUDEN and Foster Wheeler

Capture type: Oxyfuel (circulating fluidised bed)

Transport type: 120 km onshore to onshore pipeline to the Sahagun site

Storage type: Deep saline formation



Picture: courtesy of CIUDEN

5.1 Background

If there was a communications text book template for developing CCS, the CIUDEN Project in Northwest Spain, would surely come very close to matching it. Set up in 2006 under the auspices of the national City of Energy Foundation or CIUDEN for short, has three core objectives. First, to drive CCS forward by developing a range of clean coal technologies. Second, to provide social and economic regeneration in the El Bierzo region of Northwest Spain - in response to the collapse of the local mining industry in the 1980s. And third, to facilitate collaboration between state, academic and commercial institutions of any nationality. In other words, CIUDEN was conceived to get any organisation with an interest in CCS to work collaboratively. In this regard, CIUDEN does everything from training technicians to carrying out research. It even hosts a national museum of energy.

The pilot project, which took two years to construct, comprises an oxyfuel combustion test facility incorporating a 20MWe pulverised coal boiler and a 30MWe circulating fluidised bed. Situated adjacent to Endesa's planned Phase Two site at Compostilla Power Station, this highly flexible unit will capture, purify and compress the CO₂ before it is piped some 300km east to a disused oil field at Tierra de Campos, a vast plain in Castile y León. In the first phase, however, the CO₂ is being transported by truck to a site near the village of Hontomin in the Duero basin and injected in to a saline rock formation. Although the objective of this phase of the project was not primarily CO₂ storage, but to test injection and monitoring techniques, the stakeholder engagement programme was no less challenging.

5.2 Stakeholder Engagement for Phase One

Monica Lupion, who headed up CIUDEN's stakeholder engagement team, is candid about Hontomin. *"It's a typically Spanish rural community, by that I mean a large proportion of not very wealthy elderly people. Like much of rural Spain it has been hit hard by economic collapse, many of the young have left to work in the cities or even abroad. There are in fact only 86 people living in Hontomin itself. Our focus then had to be direct engagement."* Lupion accepts that there was some initial scepticism, but like colleagues at other successful CCS projects, she immediately points to early engagement as a key reason for overcoming local acceptance issues.

"We set up a communications panel which comprised not just communications specialists from CIUDEN, but also academics and journalists too. There were about twelve of us altogether and we met weekly and kept a very close eye on what was going on." Lupion knew that gaining the trust of the local community was essential from the start. She ensured that as much engagement as possible was carried out by people who lived locally and at the heart of their messaging was a narrative about advantages for the local economy and future prosperity. *"Global warming just doesn't matter to people in the middle of an economic crisis,"* she comments, adding, *"what really counts though is the possibility of jobs and a future for the coal industry in Spain."* Crucial too to the project's success was an opportunity to create some local pride. *"People really liked the fact that their little village was on the global map when it comes to this technology – that meant that people didn't just accept the project, they really wanted to get behind it and make it work."* Lupion believes that while the context for CCS is undoubtedly about tackling climate change, at a local level key messages have to be about jobs, skills and economic opportunity. *"We might talk about carbon reduction and climate change with politicians and academics, but on the ground, it's a very different story."*

From the outset the CIUDEN team knew they would not be able to convince everyone to accept the fact that CO₂ was going to be stored 1,500 metres below ground on land near to their homes. It was vital to ensure a dialogue between the developers and the local communities. Lupion says a major factor in their favour, and one which under-pinned the local pride and technological advantage arguments, was the fact that CIUDEN itself was seen not as an energy company or a faceless corporation, but as a research operation. In other words, the motivation for CCS wasn't about making profits but about doing good for the environment and bringing economic benefits to the area.

At the heart of the strategy was a pro-active approach which meant going out and actively engaging wherever and whenever possible. Lupion reports how one particularly well-attended event was held immediately after a Holy Mass during a local fiesta. *"If you don't go out and get people they'll just think you have something to hide,"* she says. *"So we took every opportunity and we made sure that we had the best communicators with us at the roadshows. That meant not necessarily taking the most senior people, but people who could be most empathetic."* Lupion recognised early that at the roadshows and tours, older women tended to ask questions of older women on the team, older men wanted to hear from older men, young people tended to ask questions of the younger people on the communications team. Psychology textbooks will show that this is known as the 'halo effect' – put simply, we tend to trust people more if they are like us.

5.3 Stakeholder Engagement for Phase Two

In June 2011 Phase Two's permitting process to carry out the geological survey of the deep saline formation at Sahagun was getting underway. Lupion noticed the first rumblings of discontent, when she and her colleagues started getting phone calls from journalists asking about 'the problem'. *"At Hontomin, in Phase One we had been very careful to start talking to people in Hontomin very early, certainly before any technical work was carried out. In Sahagun, it was a different story. There, geologists and seismologists had started work assessing the suitability of the deep saline aquifer formation before we'd done any really meaningful public engagement. So we had a real problem. Essentially we had rather more sophisticated sons and daughters returning to their family homes anxious to enjoy an unchanging rural life and we had a permitting process in full-swing which had prompted environmental campaigners to start issuing leaflets claiming that CCS wasn't safe. Some of the permit applications from land-owners for the geological surveys had also started to be denied. That combination of people with no particular interest in the local economy and environmental NGOs who will use scare tactics because they don't like fossil fuels or anything that can extend their use could have been fatal to the project."* Matters were made even worse by imminent national elections, says Lupion, *"If politicians sense there are some easy votes to be won in opposing something then they'll oppose it too. So we had a real problem."*

Lupion also says that the problem was further compounded by the fact that Endesa was leading the activities in the area. *"It's not there's anything wrong with Endesa,"* she says, *"It's simply that in the current economic climate there's a distrust of big business."* While at Hontomin, the CIUDEN team had presented themselves as scientists trying to develop a new technology which would bring local economic benefits in its wake, in Sahagun, it was one of Spain's largest utility company's fronting the project. *"You're asking people to accept something they don't know very much about and that you yourself are saying is a new technology. This will always, in the end, come down to a matter of trust,"* says Lupion.

Within days the CIUDEN communications group responsible for the successes at Hontomin had reconvened. This time the joint Endesa-CIUDEN defined and implemented a rapid public engagement and communication plan. *“We felt we still had time to undertake proper engagement and start winning back that trust - before opposition became too big to handle and people’s opinions became too entrenched. We needed to be dynamic and take an innovative approach, not just sit there and say ‘we’ll do it this way, because this is the way we’ve always done it.’”*

With Endesa agreeing to take a less of a front seat, the group quickly came up with an action plan to head off the discontent. As with Phase One at Hontomin, the team organised visits to the pilot facility and their Museum of Energy. Lupion hand-picked the guides for those tours and although she recognised that not everyone who was sceptical about the project would be converted to the cause of CCS, the mission was to explain the science. *“People don’t necessarily know what CO₂ is. They think it might explode. They don’t understand storage sites. It’s often just a lack of knowledge that breeds fear. Our job was just to explain the facts about CCS in a way that people can understand. For people that just objected to the project we always made sure we listened to them. We made sure too we had plenty of third party advocates such as academics at the meetings who could explain things in everyday terms. The theory says you need everyone’s permission – you don’t. But you do need everyone to see that you are listening to their concerns.”*

“We had about a thousand local schoolchildren visit the museum; we held roadshows at the local universities. We did everything possible to engage with people. To show we had nothing to hide.” Lupion says. She also points out the highest quality engagement is the face to face conversation with one or two people during or after a tour. These situations were often engineered by the offer of a snack or a glass of wine. *“We’d hold meetings and sometimes we’d get 20 people coming along, sometimes it would be a hundred.”* As before, Lupion was careful again to make sure she had the right mix of people in her team. Young and old, men and women. And again, with Spain in the grip of an economic crisis, the messages were about economic prosperity and keeping coal in the nation’s energy mix.”

Politicians needed ‘special handling’ as the campaigns for the national elections were getting underway. Lupion says they were specifically targeted with messages about the context of CCS being the need to tackle climate change, but also arguments about jobs, skills and local opportunities. Eventually politicians from all the main parties were convinced that CCS would be good for the region and its people. She concedes this engagement process took considerable time and effort.

As the summer months wore on and the intense campaign for the hearts and minds of the people of the region continued, Lupion began to notice a welcome change both in the nature of the media coverage they were receiving and the depth and tone of opposition. The environmental NGOs stopped leafleting after a while and what had been a somewhat febrile atmosphere in June calmed down significantly by late August. By September, as the summer visitors returned to their jobs and homes in the cities, the criticism of the project had all but disappeared.

Permits to restart the geological survey for Spain’s first full-chain CCS project were awarded at the end of 2011 and activities – after a short pause – were allowed to continue. The decision about the technical suitability of Sahagun for CO₂ storage is expected imminently, with a final investment decision for the entire Compostilla project due later in 2013.

6.0 Case Study Two: Jämschwalde

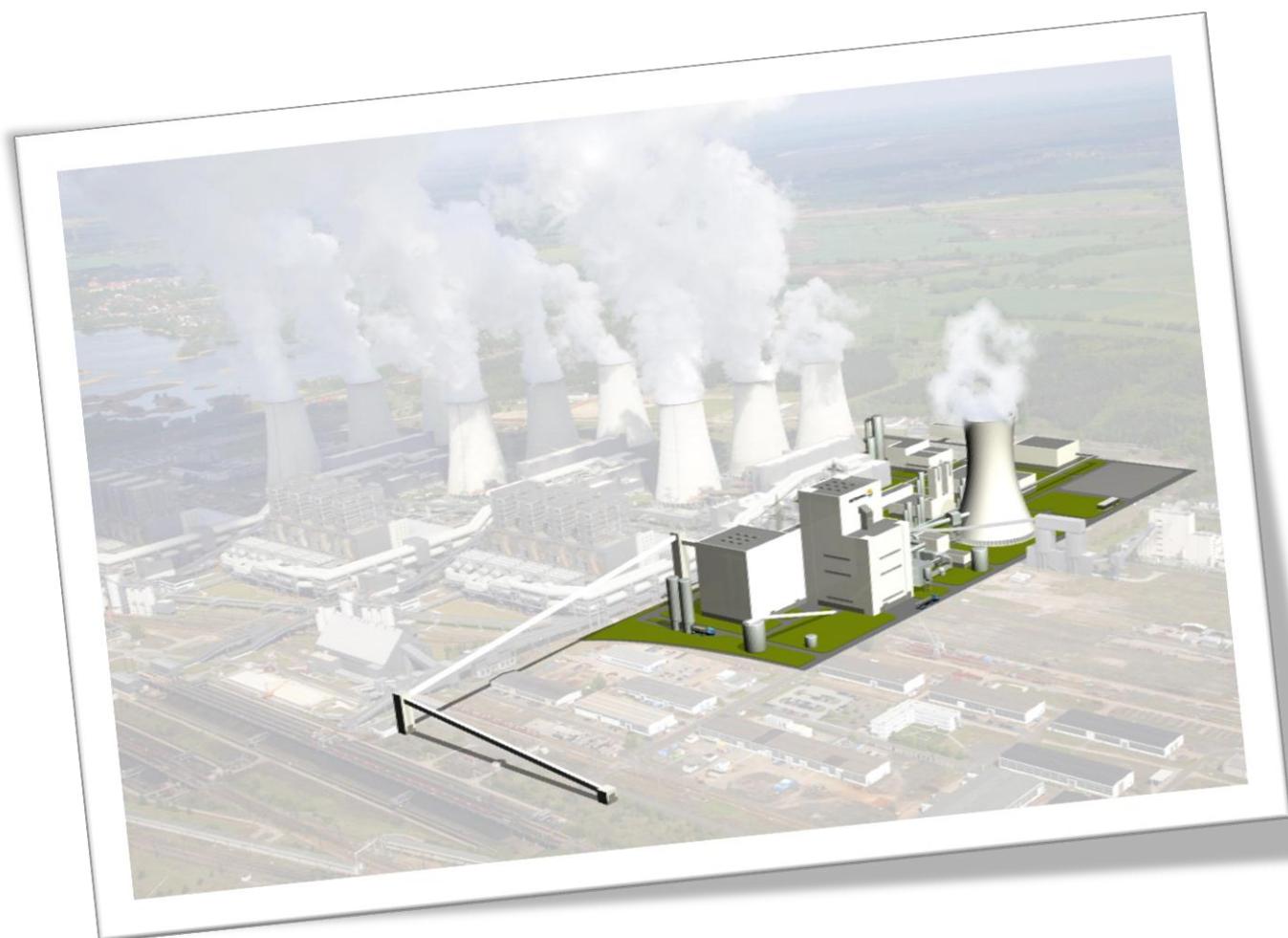
Project proponents: Vattenfall

Capture type: Two separate systems - Pre-Combustion Oxyfuel and Post-combustion (chilled ammonia) fitted in tandem to a 500MW existing coal-fired power plant

Transport type: 52 km onshore to onshore pipeline

Storage type: Saline formation

Project status: Abandoned



Source: Vattenfall

6.1 Background

Many argue that the Swedish energy giant Vattenfall has shown more commitment to CCS than any other utility company in Europe. As the region's fifth largest generator of electricity, it was unquestionably ahead of the pack when it commissioned the 30MW CCS pilot plant at Schwarze Pumpe in Brandenburg, Germany, in 2006. The €70m site became operational just over two years later and was regularly hailed by commentators as 'the future of cleaner energy generation.'

It came as little surprise then, that in 2009 the company announced plans to explore possible storage sites for the CO₂ being emitted from one of six 500MW units at its giant power station at Jämschwalde near the town of Pietz, close to the Polish border. The second largest coal-fired power plant in Germany, Jämschwalde can contribute up to 3,000 MW of electricity a day to Europe's most energy hungry country. So when in 2009, Vattenfall received €180m from the European Energy Programme for Recovery, most people in the global CCS community pointed to this high-profile project as 'the one to beat'. Jämschwalde, its proponents argued, was going to pave the way for a global roll-out of this vital technology once it was operational in 2015.

As far back as 2003 two promising saline formations had been identified in eastern Brandenburg as potential storage sites. The first, at Beeskow some 50km from the CO₂ source, the second at Neutrebbin. And while Jämschwalde itself can be characterised as a relatively industrialised area, where the local inhabitants are familiar with both lignite mining and energy generation, the storage sites – even though they were less than an hour's drive away – stood out as being markedly different in character. Both areas are predominantly agricultural, with people tending to live in small villages. The populations too, are likely to be older and with higher than usual rates of unemployment. The communications team at Vattenfall, charged with the successful delivery of public engagement for the project, also noticed that the inhabitants of both regions were tight-knit and well-organised through local societies and clubs. In short, the people of both Beeskow and Neutrebbin were proud of their communities, valued their traditional way of life and, as is common in much of rural Germany, were deeply conservative by nature.

6.2 Challenges from the start

With effective social site characterisation identifying challenges from the start, the seven strong communications team knew they had their work cut out for them. *"Large infrastructure projects in this sector generally do suffer from a lot of opposition in Germany, no matter if it is the building of wind farms or the construction of transmission grids. Therefore, gaining public acceptance for both the storage site exploration and for the eventual storage of CO₂ was a key target from the outset,"* explains Mareike Huster, who headed up Vattenfall's local communications efforts.

If the potential for well-organised local opposition wasn't enough, the Vattenfall team also recognised another significant problem which they were well aware could give them further difficulties. Huster suggests it isn't just opposition to CCS that causes so much anger in opposition groups. For her, there is a general distrust of big business; *"In Germany, CCS is not perceived to be a green technology but has the image that it simply serves as an excuse for utilities to carry on with their dirty coal business."* And although Vattenfall had worked hard in recent years, especially through its endeavours at Schwarze Pumpe, to portray itself as an energy company which was truly committed to carbon reduction, Environmental NGOs remained publicly sceptical.



Picture: courtesy of Jessica Donath²²

Nevertheless, the developers pressed on, confident that if they could present the arguments for CCS effectively, they could overcome the challenges and the embryonic opposition. In 2010 the company set about winning 'hearts and minds' in earnest. The key planks of a strong communications strategy were all there, *"We set out with an early, transparent and dialogue orientated approach. We tried to make the project touchable, by inviting people to the CCS pilot plant, we made sure opinion leaders such as politicians understood the technology and we got third party support from scientists,"* says Huster. To Vattenfall's credit, this also included a regional information campaign, opening up an information centre in Beeskow staffed by local people, and even the setting up of a telephone hotline to handle enquiries from concerned residents. *"We wanted to be seen as open and honest from the start,"* she recalls. However, by the Spring of that year, despite the Vattenfall communication team's best endeavours it was clear they had a fight on their hands – not least with a vocal group of opponents from Beeskow itself, the very town that would sit above the proposed storage site. Der Spiegel, the influential German current affairs magazine characterised the story as, 'The town that's taking on a utility giant'.

In scenes reminiscent of the anti-nuclear campaigns badged as 'Atomkraft Nein Danke' that featured heavily across Germany in the 1970s and 80s, signs saying 'Nein zum CO₂ endlanger in Beeskow' [No to CO₂ storage in Beeskow] sprung up on roadsides, front gardens and public buildings across the town. Most of the 8,000 residents were united in their opposition. Arguing the gas would escape from under their homes and turn their pretty and quiet town into the 'next Chernobyl', others argued it would contaminate local drinking water while many feared it would decimate tourism to the region. Even offers of compensation did little to calm fears. "If this technology is so safe, then why do we need to be compensated?" a local pub owner told Der Spiegel. In hindsight, Huster says she found the media's characterisation of the story as a 'David versus Goliath' battle particularly frustrating – especially when the Vattenfall team were doing everything they could think of to present the arguments around CCS fairly.



Picture: courtesy of Jessica Donath²³

Within months of the launch of the project, opposition on the scale that had been seen at Barendrecht in the Netherlands some two years earlier was repeated at Jänschwalde. The dynamics and imperatives were comparable too. An initial distrust of the developers resulted in formal complaints to regulators and consenting authorities. These concerns were not seen to be acted on effectively by opponents, which led to more organised protest. The resulting claim and counter-claim led to a further hardening of views and polarising of opinions. At this point, unless a project has the overwhelming support of another key stakeholder such as a government with legislative powers to over-rule opponents – it is almost guaranteed to fail. And as project developers often realise to their cost, opponents always have that most valuable of commodities – time.

6.3 Political Spaghetti

While the opponents of Vattenfall's CCS project at Jänschwalde could afford to play the long-game the project developers could not. A fact not lost on the local campaign groups. In the end though, it was not solely their opposition that condemned the project to failure. Instead it was the uncertain regulatory climate in which Vattenfall were trying to operate. And while local opposition and effective lobbying certainly drove delays at a political and policy level, in the end a string of botched political compromises, a General Election and the lack of a clear national strategy on CCS at first stalled, and ultimately stymied, Vattenfall's efforts; less than two years after its launch.

Jonas Helseth of the respected NGO, Bellona gets to the heart of what went wrong in his blog published on the Global CCS Institute's website. *"The 'political spaghetti' can be boiled down to this: "Niedersachsen and Schleswig-Holstein want to avoid any CO₂ storage within their territories. Brandenburg wants to see the EU-funded demo project at Jänschwalde happen, yet fears its voters' vengeance in the case that it, as the sole Bundesland, opens for deployment (effectively becoming the 'CO₂-loo' of Germany, to use a favoured slogan of the state's CCS opponents). Brandenburg, in the face of this pressure, has presented the federal Government with an ultimatum: either all Länder must be forced to accept CO₂ storage, or none will. Giving in to an ultimatum from a left-wing regional Government while ignoring the strong opposition from two Länder, ruled by its own party, turned out to be politically impossible for Ms Merkel."*

The project, once hailed as ‘the future of cleaner energy generation’ formally announced on the 5th of December 2011, what many in the CCS community knew had been coming for a long time. The headline on the press release said it all.

Uncertainties with CCS law stop Vattenfall investment in demo plant

Due to the ongoing impasse in the German CCS law, Vattenfall now sees itself forced to stop plans for its CCS demonstration project in Jämschwalde. The company today announced the termination of the planned EUR 1.5 billion investment.

The EU-supported project would have been operational by 2015/16, and would have demonstrated this climate-protection technology for the first time at a significant power plant scale. "We must unfortunately accept that there is currently insufficient will in German federal politics to implement the European directive so that a CCS demonstration project in Germany could be possible", said Tuomo Hatakka, Head of Business Division Production and Vattenfall's Country Manager for Germany.

The sense of frustration was almost palpable, as it is in Huster's analysis of what went wrong. *"I think we chose the one and only reasonable and feasible communication strategy. We were as open and dialogue orientated as we could have been. We needed to have a human face and be seen as a reliable and honest organisation. But CCS, especially the storage aspect affects people in an existential way. It meant discussions were always emotional – no matter what the theme and who was the referee. Even the politicians and scientists could not change people's minds. To sum up, we did the best we could but people weren't interested in climate change, science or technology. They just didn't want change."*

7.0 Case Study Three: Longannet

Project proponents: ScottishPower, National Grid, Shell UK

Capture type: Post-combustion (amine) retrofitted to a 330MW coal-fired turbine unit

Transport type: 300km onshore to offshore pipeline

Storage type: Depleted gas reservoirs under the Central North Sea

Project status: Abandoned (October 2011)



Picture: courtesy of Chris James²⁴

7.1 Background

Longannet Power Station sits on the banks of the Firth of Forth in Fife, in one of the most environmentally protected areas in Scotland. Operational since 1973 its four, 600MW generating units contribute just under 2,400 megawatts of electricity to the United Kingdom's national grid system. As an older coal-fired power station, it also emits around 8 million tonnes of CO₂ each year.

The owners, ScottishPower had invested heavily in emission reduction technology as a step towards bringing the station into line with European emission regulations, so when the UK Government announced the world's first competition to demonstrate full chain carbon capture and storage, in November 2007 it seemed logical to enter Longannet. Not only could it result in a significant life extension for the site, but it would also demonstrate the company's commitment to low carbon energy.

Engaging early in an uncertain environment

Kirsty Anderson joined ScottishPower's embryonic CCS team in late 2008 as the Communication and Knowledge Share Manager and immediately saw the communications challenges that lay ahead. *"We were starting from a pretty limited base in terms of stakeholder management,"* she recalls. *"There had been some initial engagement with Government officials and key internal parties to get the project up and functioning, but nothing really meaningful that was fully external to the project."* The bigger challenge, of course, was that it wasn't just communications for the project itself that were in their infancy, the very concept of CCS too was unknown to most people outside the energy sector, academia and those with a keen interest in environmental policy. On the one hand this offered the project the advantage of a blank sheet of paper when it came to developing a narrative, but, on the other, there was really no template for engagement activity. The communications landscape was further complicated by the fact that the Government funded competition came with strict rules about what project developers were allowed to say publically about the competition and their project plans.

With hindsight, many working on the project accept that the very nature of the competition, with its staged hurdles - knocking out various entrants at intervals - created a climate of uncertainty for communications in the early days. *"We knew we had to start speaking to stakeholders early, but it wasn't easy because everything we said back in late 2008 and 2009 had to begin with the words, 'if we win, or if this project goes ahead',"* says Anderson. *"I think this uncertain environment is something common to many CCS demonstration projects, it is definitely a challenge to know when is the right time to start engaging externally for your project - you are balancing the risks of not pro-actively informing important stakeholders, with the reputational risks, of claiming action before you have actually done anything of note, and peaking interest in your project before you are in a position to provide credible, accurate information with confidence."*

However Anderson is proud of the early achievements on the Longannet project, *"At Longannet I think we managed to turn a lot of the early uncertainty around our project, and CCS more generally, to our advantage by using it as a starting point to consult with trusted stakeholder representatives."*

Anderson holds that it was the 'consult' part of this statement that was the key to building strong trusted relationships with a small but powerful group of external stakeholders, *"In the early days of our project, we were by no means CCS experts. We put a great deal of effort in to identify key*

stakeholders who had existing knowledge and influence in this space, or who were likely to be key influencers if the project moved ahead. We looked in particular for key opinion formers, ideally those that we had some history with, who would agree to meet with us to share their thoughts on CCS and help us to define the best methods for engaging with, and sharing demonstration knowledge with, their specific community.”

These consultations proved not only useful for shaping the engagement and knowledge sharing strategies of the fledgling project; the very act of consultation itself turned out to be a great mechanism for creating a sense of ownership amongst key stakeholders.

To emphasise the power of this early consultation approach, Anderson cites an example from the environmental NGO community, *“We often get asked about how we managed to ‘win over the green groups’ – I hate these kinds of expressions! The Longannet Project enjoyed the public support of the CEO of WWF Scotland and a number of other respected environmental groups largely because the environmental arguments behind demonstrating CCS on an existing coal-fired power station were sound. There was no key learning about ‘winning over green groups’ other than basic principles of stakeholder engagement - identifying environmental groups that are willing and able to engage in a realistic and rational conversation around future energy needs, then early in a project’s planning stages, go and talk to them about what you are thinking of doing and respectfully listen to their advice.”*

“I was nervous the first time I went to speak to WWF about our plans for Longannet, but in fact, like the academics we consulted with early on, their challenges and advice were extremely helpful, as they were informed enough on the subject to be able to really articulate their perspective and help me re-think key areas of our project communication.”

Despite these positive experiences, Anderson is realistic about the challenges and risks involved in early engagement around CCS demonstration.

“The benefit of our early consultation with trusted stakeholders was felt throughout the entire life of the project, but I don’t want to give the impression that this approach is risk free. By raising awareness and understanding of our project we ran the risk of creating an army of well-informed protestors. Working in the power industry, I was only too well aware of the hugely damaging, time consuming and costly impacts that well organised protests and campaigns can have on project delivery, and the resulting fear that has grown up around interaction with environmental and community groups. That is why we invested the effort in early engagement with responsible and influential representatives from these stakeholder groups – we didn’t need everyone to publically endorse our work, but we wanted to ensure that we minimised the risk of misinformation and fear being spread.

“There was one other challenge with early engagement and inviting stakeholders to participate in some areas of project decision making, we had to work really hard to continuously manage the relationships we established early on and demonstrate that stakeholder opinions and advice were being considered, and where possible acted upon in our project decision making. It is relatively easy to establish trust, but much more challenging to maintain it throughout the life of a highly fluid project, with an intrinsically uncertain outcome due to the very nature of the competition.”

Although the project had managed to use the initial uncertainty surrounding the CCS demonstration programme as an opportunity to establish strong stakeholder relationships, the continued uncertainty around the project's future was creating high levels of frustration and to some degree, stakeholder fatigue.

“It was crucial during the long periods of uncertainty that surrounded our project that we maintained frequent and honest communication with our key stakeholders. When we were unable to build up confidence in our ability to deliver our project promises, we were at least able to build confidence in our personal relations with key stakeholders by keeping them informed – we would always try to avoid stakeholder or community groups reading or hearing project news for the first time from a media source. Even under the difficult situation of the project cancellation, we tried to get processes in place to inform key stakeholders as quickly as possible after the official announcement.”

Building and maintaining trusted relationships with a core group of key stakeholders, and ensuring that those with external influence had quick access to a project contact and accurate project information was fundamental to the Longannet team's strategy.

7.3 A flexible strategy

The project's communication and engagement strategy had many evolutions depending on the phase of the project and prevailing external influences.

“Being able to adapt quickly to changing situations was important” says Anderson, “There were a couple of real change points for me. The first was when we started our Front End Engineering Design (FEED) study, we made a conscious decision to pull back on a lot of the wider public and media communication that we had been involved in, as we were conscious that we had a 12 month study to get through where we would be unlikely to have any new announcements or learning to share until the end of the study, and we didn't want the tide of largely positive press that we had managed to amass to shift to more negative and challenging pieces that we were not able to adequately answer.”

The second significant change, which also resulted from the commencement of the FEED study, was the need to refocus messaging on the issues that really mattered to local stakeholders. *“Our early engagement had been very informal, consultative and our messaging had been pretty high level and contextual; what is CCS? Why is the UK well placed to demonstrate it? Why is the Government promoting it? And so on.”* She says. *“But, when we moved into direct, more formal community consultation, we had to tailor our messaging accordingly – this often meant a shift from the climate change mitigation context for CCS to the benefits (economic or otherwise) that a demonstration could bring to an area or set of stakeholders. Although, when you were dealing with communities with competing motivations this could become a pretty complex communication process.”*

The ScottishPower Consortium also inherited the positive legacy of an earlier public engagement programme that had been carried out locally at Longannet. Extensive redevelopment of ash lagoons adjacent to the power plant in recent years had embedded relationships with local community councils. To this day, Anderson is convinced that this was a major factor in the smooth relations that the CCS team later enjoyed with the people close to the plant. *“It wasn't as if we were talking to them for the first time. And we had in the past been shown to listen to the views of local people.*

When the ash lagoons were developed there was considerable consultation. Some things were changed because local people objected. It really helped.” She says.

Had the project gone ahead, Anderson is confident that the public engagement needed to deliver the project smoothly by 2015 would have passed without incident. *“Yes there were challenges but these were more internal than external often caused by the challenges of working within a consortium - and crucially we’d found a way to overcome them. So the piece of advice I’d give any other CCS consortium is to resolve the communications interface issues early. Don’t wait for a crisis. This approach may require more resources in the early stages of a project, but in the long run it’ll always pay off.”*

7.4 Project abandoned

On 19th October 2011 the UK’s Department of Energy and Climate Change announced that the Longannet Project would not proceed to the construction phase of demonstration. What would have been Europe’s first full-scale, full chain CCS project retro-fitted to a coal-fired power plant was cancelled after extensive talks between the UK Government and the Consortium failed to reach an agreement on what the scheme would ultimately cost. The UK Government has managed to preserve the £1Bn it had earmarked for CCS in the UK and has since launched a second competition. At the time of writing, four projects have passed the first hurdle in this new competition. The lessons learned from the first competition are publically available on the UK Government’s website²⁵.

8.0 Case Study Four: ROAD also known as Maasvlakte

Project proponents: E.On Benelux, GDF Suez Energy Nederland

Capture type: Post combustion from 1,100 MW coal-fired power plant

Transport type: 25km onshore to offshore pipeline

Storage type: Depleted gas reservoirs in the Southern North Sea

Project status: Awaiting FID



Picture: courtesy of Ivar Gosman

8.1 Background:

The developers of the Rotterdam Opslag and Afdwang Demonstratieproject or ROAD Project for short, knew they faced a serious communications challenge even before they started work on what is expected to be one of the world's large scale, CCS projects applied on a power station. Situated at Maasvlakte near Rotterdam, amidst a highly industrialised area close to the North Sea coast that has seen substantial infrastructure development over the last two decades, it is designed to capture around a million tonnes of CO₂ annually from a new 1,100MW coal-fired power station. Maasvlakte, however, is also just over half an hour's drive from a town that has become synonymous with and indeed a byword for unsuccessful public engagement for CCS. Barendrecht.

Much has been written about Barendrecht. It is frequently the example cited by communications practitioners to argue their case for more funding for public engagement activities on their own projects. This report does not revisit the Barendrecht project in detail as so much has already been written - suffice to say that in communications terms for CCS at least it was hit by a perfect storm; with the project being attacked by well-organised local opposition with an inherent mistrust of large industry corporations, differing local and national political agendas, and muddled messaging on the part of the developers themselves.

Marc Kombrink and his colleagues at ROAD were determined not to repeat the same mistakes as their near neighbour, even though they were developing their own project at much the same time as that and several other planned CCS projects at Eemshaven in the country's Northern Provinces were hitting the buffers. Indeed, Marc accepts that in some ways the lessons of Barendrecht have contributed to the success in delivering what has been so far a significantly less troublesome project from a public engagement perspective.

A comparison of the timelines for the two projects reveals that just as the ROAD Project was submitting its entry to the funding programme, one Dutch national newspaper was reporting claims that, 'the inhabitants of Barendrecht were holding the Government hostage.' This followed almost 18 months of intense local and national debate about the safety of CCS. So how then have the team at ROAD managed to succeed when the team just 50km away did not?

The answer, as with other successful CCS communications operations, is both simple and complex at the same time.

One strikingly simple move which helps to mitigate the risks associated with stakeholder engagement is to embed the communications function at the heart of the project's organisational structure. It has been this way since the beginning of the ROAD project for Marc Kombrink and his communications colleagues.

On paper, the director with responsibility for stakeholder management sits alongside the directors of the project office, capture and transport and storage. In real life, the team share the same open plan office as their technical colleagues. Answerable to a Board of Governors, every decision taken by the project team was and continues to be, looked at from a stakeholder management perspective. Within that stakeholder management workstream sit the sub-specialities of communications and public engagement, regulatory affairs, permitting, funding agreement management and knowledge transfer.

Kombrink and his colleagues spent a lot of time getting to know and understand the people of the local communities. Chief among these were the inhabitants of Westvoorne and Hoek van Holland - adjacent to the Maasvlakte site. The former he describes as having a love hate relationship with Rotterdam and industrialisation. *"It's quite a rural area,"* he says, *"this is the area for retired oil and gas company executives, so they understand the business, but that doesn't stop them campaigning hard if they think their local environment is under threat."* In the Hoek van Holland people are likely to have a closer economic relationship with the local industries such as refineries, chemical processing plants and transport. *"They're more likely to be Blue Collar,"* suggests Kombrink, *"with them what also matters is jobs and economic growth."*

And while there was an obvious disconnect between local and national political imperatives at Barendrecht, the ROAD team worked hard to ensure local political leaders were engaged from the start. *"Of course, the big advantage we had was that we plan to inject and store the CO₂ offshore so we can immediately avoid the claims that were being made about the sites at Barendrecht, where there were crazy claims about the risk of the gas seeping under people's homes and so on. That gave us a head start, but we also put a lot of effort in to engaging with local government and community executive members by giving them tours of E.ON's visitor centre at Maasvlakte. I really do think seeing is believing."* Says Kombrink.

While the ROAD team prioritised engagement with local politicians and opinion leaders from the start of their project, they did not lose sight of the environmental NGO community, in particular Greenpeace. At Barendrecht, the hugely respected environmental group with nearly 3 million members in 41 countries had not spoken out publicly on matters of safety, but had used the media furore to press home its opposition to coal or anything that could prolong the life of coal. However the battle Kombrink and his colleagues were expecting over the ROAD project simply failed to materialise. *"In our opinion Greenpeace were struggling with their position. They were fiercely against new coal-fired plants. But CCS technology could be important to abate emissions not just at power plants but also in energy intensive industry plants. They didn't have an intrinsic opposition to CCS per se, but they did oppose public funding of the development because it could compete with investment in renewables. We found out that was their bottom line. So there is an inherent tension in their basic position,"* says Kombrink. He points out that while the ROAD team had positive meetings with the Director and campaigners of Greenpeace NL, the group's interest in the project has become

almost non-existent today. Indeed, when the Environmental Impact Assessment was published in October 2011 Greenpeace did not even comment. *“It was pretty odd to see the NGOs fading away towards the background,”* he says.

Managing diverse opinions

It is a widely acknowledged fact in crisis communications that the greatest threat to institutions, individuals or entities such as CCS projects, occurs when disparate groups reflecting an often wide range of concerns coalesce around a single cause. The challenge, as any practitioner will explain, is to stop diverse opponents uniting and rallying around a single flag from the outset.

For those trying to defend the issue by winning multiple but distinctly separate arguments at the same time, the communications challenge becomes rather like a giant game of Whac-A-Mole. Defeat one negative assertion, and another immediately pops up somewhere else.

Of course, with the advent and widespread use of social media, the speed and ferocity of campaigns are multiplied many times over. The days of a semi-regulated media, legally obliged to at least attempt to balance arguments and ensure facts are accurate, may still remain, but in cyberspace, theories fast become facts, speculation can become certain knowledge in the time it takes to write 140 characters for a tweet.

The ROAD communications team were ready for just such a ‘coalition of the opposed.’ *“We saw at Barendrecht that they had contacts with the people who were objecting to CCS in the North of Netherlands – with social media and the internet it’s quite easy to advise other pressure groups. We also expected a link between The North Sea Foundation [another Environmental NGO] and Greenpeace because of our offshore storage proposals. But in the end nothing happened,”* says Kombrink. He could not afford to be complacent however. In Aug 2010 he was somewhat surprised to read an open-editorial in a local newspaper, in The Brielsche Courant by a Greenpeace NL campaigner entitled ‘CO₂ stored in your back garden.’ *“It seemed to us to be deliberately trying to worry the people of Westvoorne and Hoek van Holland. So to refute this adversary publication, we put the other side of the story in an open-editorial in the same paper the next day. In addition, we informed local representatives on this.”* The technique of instant rebuttal – countering ‘bad science’ with ‘good science’ – worked. Nothing more was heard on the matter.

By any measure Marc Kombrink and his colleagues have taken every step possible to ensure effective delivery of the communications to support the project. While the Barendrecht team fielded scientists armed with complex facts and figures at ‘Town Hall’ events, the ROAD team went out of their way to ensure messages were simplified and useable. *“Brilliant experts are not always brilliant communicators,”* he says. Everybody speaking on behalf of the project at the two rounds of Town Hall events for the ROAD project had training in effective presentation and how to deal with emotional situations and irrational questions. *“We billed the sessions as informal ‘info-markets’ with people at stands rather than sat behind desks on a distant stage so that we could have easier one-to-one conversations. It was de-centralised so you avoided the risk of an entire audience’s emotions being stirred up by one or two people, which is what happened at Barendrecht,”* he adds. It is perhaps a sign 10 or 20 people turned up rather than the hundreds that would appear at similar meetings held for the Barendrecht project.

Although the project's final investment decision is still pending, Kombrink is quietly confident that ROAD has overcome the threat of widespread objection to what could well be The Netherlands' first CCS project. And while there are undoubtedly some local concerns over the potential for noise pollution from the capture plant at Maasvlakte, and fears over the impact that nitrogen oxide deposits might have on the flora and fauna of the sand dunes at Westvoorne, these he says are manageable through normal environmental permitting procedures and a constructive stakeholder dialogue.

8.3 It's all about the people

The key to success according to him is to establish personal and genuine relationships with stakeholders. *"In the end it's about the people behind the monoliths. It's about personal contact, you have to be sensitive and that means you have to invest time and money and effort. In our experience if people get the impression you have good intentions and that you are willing to listen you will increase your chances of success."* He does, however, have one word of warning. *"The difficulty with CCS is that it's dominated by engineers and while they are really good at building things they are less experienced at putting that technology or plant in context. You always have to take an organic approach rather than a rigid approach. Communications isn't linear, it's fuzzy. It doesn't go from One to Two and then to Three, sometimes it goes from One to Two and then back to One again! It's much less predictable than an engineer would like to have it. Our job in communications is sometimes as much about managing and supporting our engineers as it is about managing our stakeholders."*

9.0 Case Study Five: Weyburn CO₂ EOR MMV Program

commonly known as Weyburn-Midale

Project proponents: Cenovus Energy (Weyburn Field) and Petroleum Technology Research Centre (PTRC)

Capture type: Pre-combustion

Transport type: 320km onshore to onshore pipeline

Storage type: Enhanced Oil Recovery and measurement, monitoring and verification programme (MMV)

Project status: Underway



Picture: courtesy of Petroleum Technology Research Centre

9.1 Background:

The Weyburn Oil Field is about 80 kilometres north of the Canadian/US border in south eastern Saskatchewan. Oil was first extracted from the Weyburn Field in 1954 and today covers an area of around 53,000 acres. It's no surprise then, that along with farming, it is oil extraction that's at the heart of the local economy. And for the 10,000 or so people who live and work in the area, anything that can increase production is going to be good news.

So when the idea of importing CO₂ from a gasification plant in Beulah, in the US state of North Dakota some 320 kilometres away and employing it to boost oil production at Weyburn came up in late 1997 few outside the local, close-knit petrochemical community paid very much attention. In October 2000 the first CO₂ began to be injected 1,500 meters below the ground at the Weyburn Field and within several years the production results fulfilled the field operators' expectations. Cenovus, which was operating the Weyburn field by 2004 saw an additional 20,000 barrels of oil per day improvement thanks to the CO₂ and water mix that was being employed to boost oil flows.

But, if few locally were that interested in what was to very soon be billed as a 'planet-saving' technology, the Weyburn-Midale project was rapidly establishing a renowned spot on the global CCS map. Within months of the pipeline being commissioned, the prestigious, International Energy Agency's Green House Gas research and development programme joined the project, hosting a workshop to discuss the research opportunities.

The IEAGHG were soon joined by a newly formed Canadian organisation, the Petroleum Technology Research Centre, (PTRC) based just 70 miles away at the provincial capital Regina. By late 2000 the two organisations had come up with a four year, \$40m research programme to monitor almost every technical aspect of the Weyburn programme. The arrangement allowed PanCanadian Petroleum (the field operator at the time) to take a step back and let the scientists from numerous agencies get on with the job of analysing and evaluating this new technology. The focus was almost exclusively on the technical aspects of the project - engineers still working at the site agree that few paid little if any attention to the concept of the management of public perception. The CO₂ storage operation was described to local communities but only in the context of Enhanced Oil Recovery.

By 2004 the EOR operation was delivering such production gains that another oil and gas company, Apache Canada embarked on a tandem operation at the Midale Field adjacent to the Weyburn Field. Further Provincial and National Government and Industry funding was granted to enable the PTRC scientists to look more closely at CCS and a year later Weyburn-Midale Phase II was born. *"Phase 1 was site characterisation. Phase 2 was monitoring, verification, risk assessment. It [the project] expanded to include engaging with elements of the populace, but surprisingly not the populace at Weyburn. We would do these dinners every six months, where we would show up with our displays and I would not be asked a single question, even though there were 300 people there. Nobody seemed to have a question about the CO₂ that was being stored,"* says Norm Sacuta, the straight-talking communications manager for the PTRC. *"The key messages were focused on oil production which went from 8,000 to 30,000 barrels a day in a very short space of time."* And while the project was growing its international reputation, Sacuta was careful to tailor his messages to suit his audience.

9.2 The curious case of the project ‘spewing dead animals’

Given the project’s warm reception locally and high profile on the global CCS stage, it is perhaps not surprising that little attention was paid to a written request in November 2010 from an Environmental NGO called Ecojustice. The letter seemed relatively harmless, asking for information relating to well-enclosures, but it was batted away on the grounds of commercial confidentiality. As staff prepared to go on Christmas break, Sacuta says little thought was given to why the project had popped up on the group’s radar. After all, this smart outfit, comprising predominantly scientists and lawyers, seemed to have as its primary concern an on-going battle with the Canadian Government and the oil majors to prevent operation of the Tar Sands project in Alberta.

With hindsight, it was the unhelpful timing of an extended Christmas break and the multi-layered management of communications which Sacuta and his colleague Steve Whittaker, the Project Manager at PTRC, both point to as jointly contributing to what they agree now was a serious communications crisis. One which was to send shockwaves through the global CCS community.

“I returned on the morning of the 10th of January, and then I get this call from a journalist saying, ‘so Weyburn’s leaking, what are you going to do about it?’ I went ‘what!’”, says Sacuta. The journalist went on to tell him that a local couple who owned a farm and land near the Weyburn site, Jane and Cameron Kerr, along with a representative of Ecojustice, were holding a press conference the following morning at which they would produce a report written by an independent geological engineer. This report, according to the journalist, would ‘prove’ that CO₂ was leaking from the ground at Weyburn. Worse still, the Kerr’s would say, the gas had been killing animals on their farm.

Sacuta did not attend the press conference. Neither did anyone else from PTRC. Instead he prepared key statements and messages in response; including working with the Project Manager to get the scientists involved with the project to review the leak allegations. The afternoon after the press conference Sacuta’s phones started ringing. The journalists, among them some high-ranking correspondents from the Canadian national press, as well as broadcasters from most of the main news channels, had been shown a PowerPoint presentation by Ecojustice representatives, illustrating what was claimed to be algal growth in water in a gravel pit on the Kerrs’ land. This was followed by a full colour menagerie of dead animals including the carcasses of a goat, a cat, a rabbit, a crow and a duck. *“We’d be out to the pond and notice a blue slick and go back three hours later and find a rabbit that had dropped dead,”* the Kerrs told excited reporters. CCS was in the dock and within hours the story had gone global.

Sacuta and his colleagues’ immediate strategy was to counter the evidence the Kerrs and Ecojustice had presented with firm science. *“We had not read the report, and we needed time to go through it,”* he says. *“Our holding statement pretty much said we’d look into the claims and report back in a week, but that ten years’ of research at the Weyburn-Midale fields had shown no evidence of a leak.”* The story, however, was, as journalists like to say, ‘growing legs’. Although Sacuta did not choose to engage directly with social media, he did keep a very close eye on what was being said in the blogosphere. *“Without doubt, the worst headline on the internet was, ‘carbon capture and storage project captures spews dead animals’, which didn’t even make sense in English. But that was the one that caught everyone’s attention. I was getting calls from Greenpeace Europe and that was the article they were quoting. And of course, I had calls from other projects saying ‘what is it exactly that’s spewing dead animals?’”*

It was a tough week for Sacuta and his colleagues who were working hard on a point by point rebuttal. However, just when he and his colleagues thought they were beginning to get a grip on the furor, and announce their findings – which of course showed the ‘Kerr Report’ to be erroneous, the PTRC team were hit by a second unplanned event.

An independent CO₂ storage performance and assessment team, also based in Canada announced it was to carry out its own investigation into the claims that Weyburn was leaking. *“Our report was going to be saying this is bad science, there’s nothing here to indicate a leak, so why are we even talking about it. Yet this group injected itself into the process, and said they were going to come out the day before our review of the Kerr’s claims with an independent study, effectively implying there was merit to the science when we knew there was none.”*

Sacuta and his colleagues had to sit tight for a further few days so as not to appear to be undermining the independent study announcement, before they could give their response to the Ecojustice claims. A process Sacuta to this day says was deeply frustrating, especially when the PTRC’s own evidence was backed by both French and British Geological Surveys of soil gas that had been completed earlier in the project.

By April the story had died down, but the PTRC team along with their colleagues from Cenovus and Apache had to wait a further eleven months before three different independent assessment teams officially confirmed what they had known all along - the CO₂ which was being stored 1,500 metres underground under at least 800 metres of impermeable cap rock from an injection point which was at least 2km from the Kerr’s land had not after all, leaked.²⁶ Animals had not died as a result of CO₂ asphyxiation after all.

True to form, Sacuta is disarmingly frank about the way the ‘Weyburn is leaking’ story was handled. *“I think we were dealing with two things. We were dealing with the local community and their response to this, and we were dealing with the national and international CCS community who were also looking at this as the largest storage project in the world and what was really going on there? The Kerr’s, in my view, were in essence, being used by outside organisations to further their own agenda which was to discredit carbon capture and storage globally.*

“People are still talking in Europe about the fact that Weyburn has leaked. It hasn’t leaked. But Ecojustice knew the media, and although we had three independent reports saying there’s nothing happening, those reports would never get the same kind of coverage as the initial claim of the leak. We could do nothing about that..

“In Ecojustice’s view I would think they’re thinking it’s ‘job done’ and they would be right to say that. The only way we might have undone some of the damage was if we had been aware of the press conference that was coming up and had a press conference eight seconds later in the room beside them to say this is a specious claim. We succeeded in terms of the scientific community and with the local community. The final score may be CCS 2 – Ecojustice 1, but that initial goal was a damaging one against CCS and it has stuck.”

Post-script

There is an interesting post-script to this tale. Researchers from one of the independent studies looking into the Kerr's claims of leakage found numerous leopard frogs at the site. Naturalists often describe these frogs as environmental 'indicator species' because of their particular sensitivity to air and water pollutants. In other words the flora and fauna around the Weyburn site is particularly healthy.

Part Three - Recommendations

The gaining and effective maintenance of stakeholder trust in CCS, and CCS project developers, can be a major challenge – but, as this report shows, it is possible. The wide-ranging experiences of the engagement and communication managers interviewed for this report is testament to the site-specific, fickle nature of their work. Yet closer analysis of their strategies which enable them to first understand and later to engage stakeholders, and then, if needs be to manage communication if a crisis emerges, reveal seven key learning points or recommendations for the future communications of CCS demonstration projects:

1. Appreciate the value of values based communication

Successful communication and engagement relies on much more than a well-proven argument, especially when the subject in question is complex and threatens to impact directly on peoples' lives or livelihoods. Each of the projects interviewed recognised the importance of adjusting messaging and messengers to suit different stakeholders. This kind of strategy relies first on a sound understanding of stakeholder needs, then on the availability of project representatives with the ability to empathise and build trust with stakeholders. Recognition too must be given to the idea that there will always be a range of drivers that motivate stakeholders to support a project. For some it might be the need to combat climate change, for others it might be the prospect of growth and economic opportunity. The converse is equally true. Some may oppose projects for one reason while others may object for different reasons. All these arguments must be accounted for as a project enters its 'define' stage.

2. Recognise the Benefit, Assurance and Truthfulness dynamic

Stakeholders must be assured of all three elements if they are to support a project either explicitly or implicitly. Although different groups will seek different levels of benefit, assurance and truthfulness – all groups will require a degree of all three. Remember 'trust' is an extremely valuable commodity and it has to be earned. If lost it can and probably will be impossible to regain.

3. Engage through uncertainty

Much is said and written about the importance of early engagement with stakeholders, but the reality for many CCS demonstration projects are long periods marred with uncertainty over project funding, storage site suitability, consortia and partnership configurations to name a few. This can make the decision about when to start formally engaging with key stakeholders fraught challenges. However, time spent researching communities and influential stakeholders is never a waste, and projects have successfully used periods of uncertainty to take a 'soft' or consultative approach to engagement – establishing trusted relations with key influencers by consulting with them on the likely responses of the stakeholder group they represent. This phased approach, allows projects to engage (and engage other key influencers) in early outreach activities, without pressure to confirm uncertain project details.

4. Remember - seeing is believing

The lack of iconic visual imagery for CCS is a well-recognised problem, this is further compounded by the relative complexity of the technology itself and why it is necessary. To combat this, it is critical for us to create tangible experiences of CCS in order to build stakeholders' belief in the technology and the teams responsible for delivering projects. From the interviewed projects, there were excellent examples of using tools like visitor centres, pilot plants, model visualisations, site tours and presentations from real project engineers. All these tools were used to reinforce the message that CCS is 'real' (not just a conceptual lab-based technology) and to put a human face on to projects.

5. Keep communications as a core activity

The developers of successful projects consistently embed the communications function alongside commercial and technical leads. And while communications shouldn't lead a project, practitioners should always be in a position to shape thinking. Communications cannot be viewed as a subset of the commercial or technical functions. If developers see it that way they will fail.

6. Fight confusion and conflated arguments with education and clarity

Opposition or the potential for opposition to CCS in general or a project in particular, must be constantly monitored by communications professionals. Where projects have encountered overwhelming opposition, they have been attacked on a range of fronts for a range of reasons; eventually coalescing into a cacophony of angry opponents. Early intervention is essential to combat this. Deal with arguments calmly – with logic, facts and patience. Educate, inform and if possible, enthuse. Accept too, that there will always be some opposition somewhere and opponents will always shout louder than supporters. The challenge is to prevent your adversaries carrying the day by dealing with them one by one – face to face if you can. Tackle misinformation with information, theories with facts and fears with empathy, hard evidence and honesty.

7. Be prepared

Crises can emerge from nowhere and must be responded to calmly, methodically and rapidly. This is sometimes very hard to achieve. But being perceived as 'slow to respond' is in many stakeholders' and audiences' minds, as bad as not responding at all. While attempts to plan for all communications crises are futile, preparing, agreeing and rehearsing crisis communication procedures and personnel, could mean the difference between being criticised in a niche special interest blog and facing a full-scale media storm. A similar approach should be applied to all stakeholder engagement – carefully selecting and training spokespeople, agreeing key areas of responsibility and procedures for handling issues outside those areas, rehearsing prepared Q&As, continually managing relationships with third-party advocates and independent commentators, monitoring 'chatter'. Ensure team members are abreast of current trends and developments in CCS globally as well as issues and situations locally.

And Finally

All these recommendations - particularly the last - come with caveat that even the best laid plans and preparation can never guarantee acceptance. Communication and engagement can only go so far when faced with entrenched opposition or the myriad of extraneous challenges common to fledgling CCS demonstration projects – although a comprehensive social site characterisation at the outset of a project can certainly be instrumental in ruling out such high risk developments before they begin.²⁷

The case studies and analysis in this report were provided to present a realistic picture of the challenges faced by communication and engagement managers on real CCS demonstrations. While there is no denying that the challenges are many, it is vitally important to share the many solutions which have been found. It is a fact that CCS has an essential role it has to play in a global low-carbon future. Despite not sharing the apparently elegant simplicity of wind or solar or other low carbon energy technologies, the CCS demonstrations that do exist that are not just tolerated, but celebrated. It is possible to communicate the benefits, manage the risks and effectively engage with CCS project stakeholders. In fact, if we are serious in our commitment to tackling climate change, it is not just possible, it is essential that we press on. In the end we should never lose sight of the fact that CCS is a good thing. A fact we should remember to tell ourselves from time to time too.

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²⁰ Either to the project, the story or the advocates

²¹ In this context a 'soft launch' can be defined as a release of information to a limited audience to test the viability or reception that a wider 'hard launch' would receive.

²² Courtesy of Spiegel Online. One German Town's Fight against CO2 Capture Technology <http://www.spiegel.de/international/germany/not-under-my-backyard-one-german-town-s-fight-against-co2-capture-technology-a-710573.html>

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²⁴ www.picturesbychrisjames.co.uk

²⁵ http://www.decc.gov.uk/en/content/cms/emissions/ccs/ukccscomm_prog/feed/scottish_power/lessons/lessons.aspx

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