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FENCO workshop "CCS and public engagement"

When Science and Reality Meet

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2 Introduction

Agency NL (former SenterNovem) organised the FENCO ERA-net workshop "CCS and public engagement" in Amsterdam on May 19th, 2010. Seventy one people attended the workshop. This document represents the proceedings of the event.

By all accounts, public engagement is a core issue in the implementation of Carbon Capture and Storage (CCS) demonstrations. This was recognised earlier.

Now that the first demonstrations at a reasonable scale are starting up, the unfolding of reality shows us that public engagement is indeed a crucial issue. Much more than before, the field is being observed by CCS-independent people from outside and by the media. In many cases, these observations are made from a greater distance and with more detachment. Thus these observations concern the real interaction occurring between the different stakeholders - the process.

The purpose of the workshop was to:

- review studies and investigations in the fields of social awareness, public acceptance, etc. that were carried out in the preceding period
- review current real public commitment situations
- learn lessons for all by confronting stakeholders' theory and practice
- investigate the linkage of public commitment on efforts different levels: local, national, EU-wide.

Chapter 5 (Appendix) shows the list of participants. Chapters (Appendices) 6 and 7 provide summaries of the presentations and discussions.

Back-to-back in the same venue the FENCO ERA-project "Scrutinising the impact of CCS communication on the general and local public" organised on May 20th, 2010 the workshop "How to communicate CCS". Communication concerning the outcome of this workshop is in the hands of the project consortium. These two events enhanced each other.

3 Conclusion

[1]The main conclusion arising from the workshop was that public awareness, engagement and acceptance is an important hurdle that is hampering Carbon Capture and Storage project implementation. This is mainly caused by sending out misinformation or even not communicating at all. An example of being misinformed is that most Europeans believe that CO_2 is toxic and forms a danger to the planet. Europeans have to be informed that if we do not interfere in climate change, the eventual costs of mitigation will become much higher.

For the same reason, it can be concluded that a large majority of Europeans do not know what CCS is about; the link to CO_2 and climate change is not present. They do not have a clue that CCS could provide a solution in tackling the climate change problem. A message should be sent that in the short and medium term, energy production based on renewable sources alone is not sufficient to achieve the reduction of CO_2 emissions that is required.
Due to this current information vacuum on CCS, the general public are still in the process of making up their minds.

The public opinion that is already set is generally biased due to the provision of misinformation. With regard to communication, it is important to emphasise that CCS is a necessary part of all available types of solutions to handle climate change. For example, CCS is needed to gain more time for the much-needed market introduction and large-scale implementation of renewable energy sources, and can also be used to realise negative carbon solutions through co-conversion.

[1] The conclusions and recommendation are not necessarily a reflection of the opinion of Agency NL, the partners or the management of Fenco ERA-NET

It is commonly concluded that "*whoever delivers the message*" is a key success factor. At this point in time, industry (i.e. business interests) is the primary messenger on CCS, and this has brought failure. The general public do not trust businesses, in the sense that they feel that environmental NGOs and scientists are more trustworthy. Those last organisations are not joining in the public CCS debate in a very active way.

Looking at the issue, it is also recognised that hardly any funds were invested into understanding public opinion, designing information appropriate to the public or in engaging with the public over the past decade. This was also witnessed in the development of pilot projects at Barendrecht and Beeskow (Greenville, Ohio, etc.). The sense of urgency felt by project owners or governments of the purpose in addressing public acceptance was subordinate to the project implementation.

Recent pilots have shown that, if projects are implemented, the public will become engaged very quickly, and the outcome is uncertain. Before presenting implementation plans, the locals are not interested at all. The locals who become involved feel that CO_2 storage underneath their homes is a considerable burden. Several pilots showed that people involved are not actively searching for information, websites etc. Television is seen by the target group as the most favourable source of information.

When a project starts to become implemented the costs-to-pay and the needed investments increase rapidly. The financial risks will increase if there is a lack of public acceptance. It makes positive decision-making a lot harder. This is a pity because experts all over Europe believe that the failed attempts to gain local community support could become a commercial show-stopper for CCS.

It sounds obvious, but projects are more accepted in rural areas and offshore, than in urban areas.

Finally, it was noted that NGOs are essentially not against CCS. Probably, no NGO would fight CCS if subsidies were not involved. Most of the NGOs see CCS as the governments' excuse to build new coal-fired power plants, without CO_2 capture.

4 Recommendations

[2]One of the main conclusions was that communication failures hamper public engagement. Not only is the lack of communication a threat to successful implementation, but also aids the transmission of misinformation.

The public needs to be engaged and informed without delay, so they can make up their minds and come to right conclusions using facts, and not fiction.

The recommendations are made in the form of three questions.

How to communicate?
In order to be successful, communication should be transparent and clear. The current information vacuum on CCS means that the public are still making up their minds. They need to be engaged and informed without delay, so they can decide using facts, and not fiction. Therefore it is important that trustworthy information is provided that is backed-up by scientific debate, safety research, the quantification of risks, and insight into *what-if scenarios*. Do not use kids talk (i.e. talk down to people) and everything that is communicated concerning risks and safety should be substantiated with proven data.
Besides, safety debates must be implemented in a practical way, and should involve all target groups and stakeholders.

What to communicate?

[2] The conclusions and recommendation are not necessarily a reflection of the opinion of Agency NL, the partners or the management of Fenco ERA-NET

On a local level, public engagement can be gained if a package of individual benefits is offered. People experience underground storage underneath their homes as a burden. The individual benefits for the community should be made clear, if people agree with CCS in their area.
“What's in it for me/us?”

On a more regional and national level, overall benefits should be defined such as the creation of jobs.

Another aspect of “what to communicate” deals with increasing the knowledge on climate change aspects in general, and their relation to CO_2 and CCS. The public need to know that doing nothing with respect to climate change, means that the eventual costs of mitigation will become much higher. CCS is namely one of the necessary and bridge-building solutions to deal with climate change, next to renewables, energy efficiency, etc. Specifically, it should be made clear that the technology is not only an end-of-pipe solution for Coal-Fired Power Plants. For example, CCS is also needed in the process to create and produce renewable energy conversion technologies (cement and iron/steel), as well as products or chemicals in general. It is even possible to realise negative carbon solutions with CCS.

Who communicates?
At this point in time, industry is the main sector communicating on CCS. The messengers are as important as the message. The general public experience different levels of trustworthiness. They find that Environmental NGOs and academics are the most trustworthy, followed by governments, with industry lower down the list. To create more public engagement, it is important that the scientific debate is initiated, and the environmental NGOs get involved.

The public debate is not mature yet. There is a considerable gap between trustworthy opinion leaders, actors, national authorities and the European Union. It is therefore advisable to leave the acceptance and awareness development to local authorities.

5 Appendix, list of participants at the FENCO workshop

Name		Organisation	
Akemu, A. Onajomo	NL	SLB	X
Best de, Marjolein	NL	ECN	X
Bickert, Stefan	DE	Forschungszentrum Jülich GmbH	X
Blaker, Anne	NO	Gassnova	X
Brunsting, Suzanne	NL	ECN	X
Chatzinicolaou, Panagiotis	GR	General Secretariat for Research and Technology	X
Daamen, Dancker	NL	Leiden University	X
Daw, Briony	UK	Department of Energy and Climate Change	X
Dessens, Stan	NL	Taskforce CCS	X
Dijk, Jan Willem	NL	Dconsult	X
Dille, Liv Lønne	NO	Gassnova	X
Dravnieks, Dainis	LV	Ministry	X
Dröge, Gijs	NL	Public Green	X
Drosin, Eric	EU	Technology Platform for Zero Emission Fossil Fuel Power Plants (ETP-ZEP)	speaker
Dudu, Alexandra	RO	GeoEcoMar	X
Dupont,	DE	E.ON Gas Storage GmbH	X
Dütschke, Elisabeth	DE	Fraunhofer Institut für System- und Innovationsforschungl	X
Egmond, Sander van	NL	Utrecht University	X
Engelenburg van, Barend	NL	DCMR, The Netherlands	X
Gemeni, Vassiliki	GR	Centre for Research and Technology Hellas	X
Görner, Klaus	DE	Universität Duisburg-Essen	X
Ha-Duong, Minh	FR	CIRED	speaker
Harris, Meade	FR	Global Carbon Capture & Storage Institute	X
Hoff, Eivind	NO	Bellona Europe	speaker
Höwener, Hubert H.	DE	Forschungszentrum Jülich GmbH	X
Jaspers, Arnout	NL	Natuurwetenschap en Techniek	speaker
Kalesi, Poppy	BE	European Commission	X
Kessels, John	UK	IEA Clean Coal Centre	X
Kinger, Gerald	AT	EVN	X
Kley, margitta	DE	RWE DEA	X
Kock, Jesper	DK	Dansk Energi	X
Koning de, Saskia	NL	SHELL	X
Koukouzas, Nikolaos	GR	CERTH/ISFTA	X
Kruizinga, Eelco	NL	DNV Knowledge Management	X
Kuckshinrichs, Wilhelm	DE	Forschungszentrum Jülich GmbH	X
Loveridge, Ross	UK	Scottish Government	X
Mills, Katie	UK	World Coal Institute	X
Modder, Hans	NL	ETP-ZEP Secretariaat/Triarii	X
Oltra, Christian	ES	CIEMAT	X
Paukovic, Mia	NL	ECN	X
Prazak-Reisinger, Helga	AT	OMV Power International GmbH	X
Ramirez, Andrea	NL	University Utrecht	X
Reiner, David	UK	University of Cambridge	speaker
Riesch, Hauke	UK	University of Cambridge	X
Riley, Nick	UK	BGS	X
Robinson, Steven	FR	Augure	X
Sage, Peter	UK	AEA Technology	X
Schoenmakers, Hans	NL	EON	X

Name		Organisation	
Schreurs, Harry	NL	Agentschap NL	X
Schumann, Diana	DE	Forschungszentrum Jülich GmbH	speaker
Siemons, Jaap	NL	Provincie Groningen	X
Slihta, Gunta	LV	Letland Institute of Physical Energetics	X
Slobbe, Paul van	NL	Ministry of Economic Affairs	X
Stead, Rowena	FR	BRGM	X
Stuij, Bert	NL	NL Agency NL Energy and Climate Change	chair
Swiderska, Malgorzata	PL	National Centre for Research and Development	X
Swoboda, Jan	DE	IZ Klima	X
Thomeczek, Margit	DE	EnergieRegion.NRW	X
Thon, Steinar	DE	DNV Cleaner Energy and Utilities	X
Torp, Tore	NO	Statoil	X
Torvatn, Hans	NO	Sintef	X
Tvedt, Sturle D.	NO	Sintef	X
Upham, Paul	UK	The University of Manchester	X
Versteegh, Peter	NL	Agentschap NL	X
Warren, Luke	UK	The Carbon Capture & Storage Association	X
Wees van der, Reinier	NL	DCMR, The Netherlands	X
Zhang, Ting	NL	ECN	X
Ziogou, Fotini	GR	Centre for Research and Technology Hellas	X

6 Appendix overview of presentations

6.1 Introduction

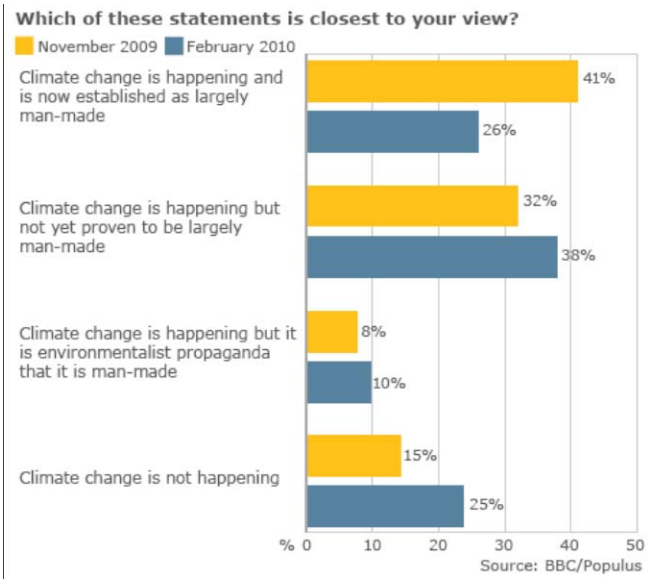
The workshop dealt with public involvement concerning CCS. The table below summarises all presentations.

Title	Presenter
"No way!" - The challenge of communicating CCS	Mr Eric Drosin, Director of Communications ZEP
The Public(s) and CCS: An Overview	Mr David M Reiner, Judge Business School
Social aspects of carbon capture, transport and storage: Total's Lacq project	Mr Minh Ha-Duong CIRED
Unspeakable risk, Dealing with the possibility of disaster in the Netherlands	Mr Arnout Jaspers, NWT
Developing public support for CCS	Mr Eivind Hoff, managing director Bellona Europa
The detached view from the gallery, public engagement in a multi-level policy: the example of CCS Implementation in Germany	Ms Diana Schumann KV Jülich

The following sections contain a short summary of each presentation.

6.2 "No way!" - The challenge of communicating CCS

Mr Eric Drosin, Director of Communications for the Zero Emissions Platform explained that his organisation is one of the EU's CCS advisors and facilitators on technological, policy, commercial and other CCS-related issues. The organisation was established in 2005 and has over 200 members from 19 countries. The goal of both the organisation and the European Commission is to enable commercial availability of CCS by 2020 and kick-start widespread deployment.



Mr Drosin explained that 86% of Europeans are concerned about climate change. According to the Euro Barometer, environmental awareness and consciousness are growing, and will continue to do so throughout the upcoming years.

However, views can change in a short space of time, as can be seen in the figure on the right. Science needs better marketing. The science of climate change has been made political, and is not really objective.

People have heard of CO_2, but do not know what it is. Surveys show that 3 out of 4 people in Germany think that CO_2 is toxic and dangerous. A 2009 survey in Germany by Izklima found that only 1% of respondents had heard of CCS. It was also concluded that insufficient public awareness and understanding will lead to the rejection of CCS. In the Netherlands, the situation is very similar. The Dutch figures show an increase in awareness of CCS between 2004 and 2008 of 0%. Most of the public believes that enough renewable technology is available to tackle the climate change problem. This is not the case and it is also not realised that it is more expensive to delay action.

Safe storage of CO_2 is counter-intuitive i.e. "how could CO_2 storage become safer over time?" "What's the benefit for me?!" There is a gap between local realities and support for combating climate change.

The current information vacuum on CCS means that the public are still making up their minds. People need to be engaged and informed without delay, so they can make their decisions based on facts, and not fiction. It is important that benefits are made clear:

- Individual benefit (locals)
- Overall benefit (opinion leaders) e.g. 100,000 jobs

The source that delivers the message is just as important as what they're saying. At this point in time, industry (business interests) is the primary messenger on CCS. However, the most accepted sources of information by the general public are NGOs and scientists. But those institutes also have the least resources.

Addressing the CCS communications gap requires appropriate and significant resources for those groups.

6.3 The Public(s) and CCS: An Overview

Mr David M. Reiner from the Judge Business School, University of Cambridge, explained that an "issue-attention cycle" exists, which consists of:

- A pre-problem stage - expert/IG attention
- Alarmed discovery and euphoric enthusiasm
- Realisation of the costs of significant progress
- Gradual decline in intense public interest
- Post-Problem Stage - "twilight realm of lesser attention or spasmodic recurrences"

It is misleading to speak of 'public' attitudes, because the overall CCS awareness is very low. Besides, public CCS communication is virtually non-existent. If communication activity is conducted, different target groups must be taken into account:

- Decision-makers
- Stakeholders
- Relatively small attentive public (AP): high level of interest, feels well informed, reads newspapers on a daily basis
- More diffuse "interested public" (IP): consists of those who claim to have a high level of interest, but do not feel well informed
- Residual Public (RP): consists of those who are neither interested in, nor feel very well informed
- Local Publics (many drawn from RP)

<table>
<tr>
<td>According to 88 UK stakeholders, the four most important challenges that could prevent the implementation of CCS in the UK are:
1. lack of short-term policy framework
2. costs
3. international regulatory framework
4. public opinion</td>
<td rowspan="2">511 EU-based CCS stakeholders believe that the important factors in the development of CCS in their own country are:
1. price of carbon under the EU ETS
2. reduction in costs of CO_2 capture
3. development of the research and technological base for CCS
4. availability of suitable geologic storage sites
5. a post-Kyoto phase with tighter national emission reduction requirements
6. development of legal and regulatory basis for CCS (e.g. accounting, monitoring, liability)
7. public perceptions of CCS</td>
</tr>
<tr>
<td>Who do you communicate with, and implications:
1. Need to focus message initially on those that pay attention to an issue, as well as opinion leaders and policy leaders
2. Be aware that as an issue moves closer to the community concerned, more of the non-attentive public will become engaged
3. There are numerous resources where the attentive (and interested) public can learn and gain additional information</td>
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<td></td>
<td>Dialogue with Project Developer:
1. Both Shell and Vattenfall make strong claims about safety
2. Shell: "We have done this before, we have experience, our research shows it is safe"
3. Public and political response: You can't claim previous experience because this is new and different, and since this is new you can't guarantee us 100% safety either</td>
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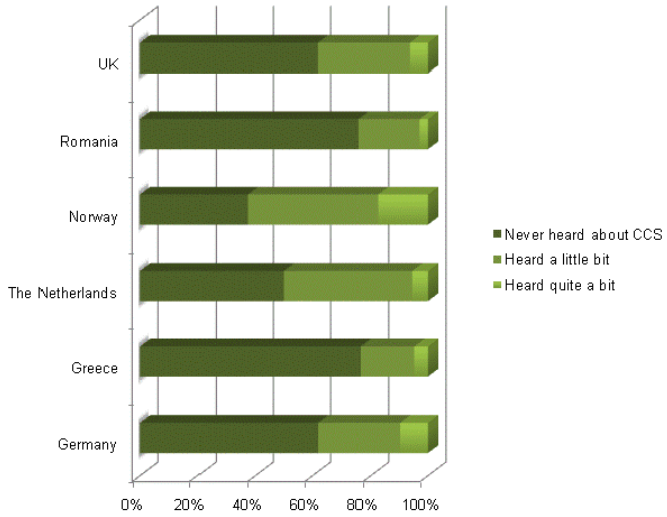
How the World's Oil Giants Are Selling the 'Captured Carbon' Dream: Within a global effort to convince the public, an unproven technology will let us have our fossil fuels and a cooler planet, too:

- crafting strategies to convince the public that carbon capture and storage is a promising technology, even as that dream of a solution to global warming is battered by mounting expert opinion that it won't work.
- Just how much time, money, and coordinated effort has gone into selling the carbon capture and storage dream was on full display last November in Paris, France, as nearly 100 international delegates attended a conference hosted by the Global CCS Institute.
- For delegates, the stakes were high. Speakers noted several failed attempts to gain community support for local projects. "It is apparent that this issue could become a commercial show-stopper for CCS," the report read. It painted a portrait of a public distrustful of their governments and big oil firms, slow to believe CSS was a real, or even necessary, solution.

CCS public awareness

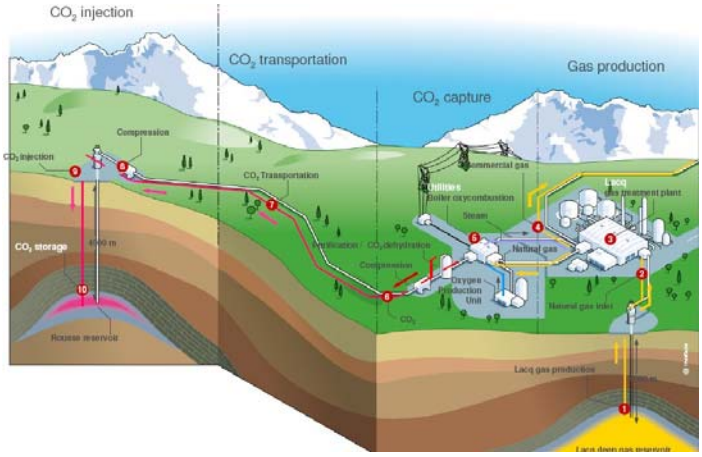


Concluding remarks:

- In spite of rhetoric, there has been minimal investment of resources in understanding the public(s), designing information appropriate to the public(s) or engaging with the public(s) over the past decade
- Problem: Governments and Industry are not trusted and are not well placed to engage with the public
- As projects move towards reality and costs rise, public(s) will become more engaged
- In spite of public engagement failures, we have already witnessed in Barendrecht, Beeskow (Greenville, Ohio, etc.), there still appears little seriousness of purpose in addressing public acceptance

6.4 Social aspects of carbon capture, transport and storage: Total's Lacq project

Mr Minh Ha-Duong, CIRED described the Lacq project. The Lacq project is implemented by Total. The company sees carbon capture and storage as one of the solutions to reduce CO_2 emissions, and is therefore demonstrating CCS at the Lacq field.



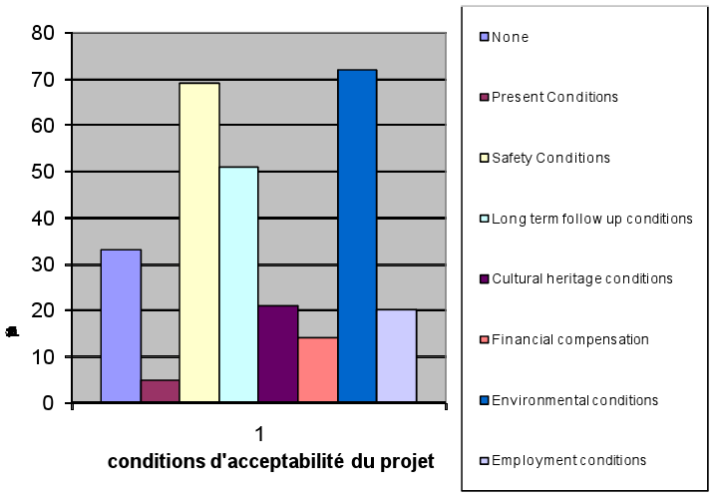
The Lacq field is situated in the south-western part of France, near Bordeaux, and has been in production since 1958. It contains 16% H_2S, 10% CO_2 and there is a very high pressure of at least 650 bar. The figure on the left shows Total's Lacq-integrated-CCS-project. Approximately 120,000 tCO_2 have been captured, transported, and injected into a depleted gas field over the past two years. For capturing the CO_2 they use a special oxy-burner upscaling programme, which should result in a "n x

30MW", the first-of-its-kind industrial oxy-boiler after 2010 (oxy-combustion technology). Another major goal is to prove that CO_2 can be stored safely and permanently in the Rousse reservoir.

The licensing procedure took 27 months, from initial public announcement to permit completion:

- Total press conference (Feb. 8Th 2007)
- 40 key local actors meeting (Jun-Sep/07)
- Public consultation rounds: web, paper, 3 public meetings (Nov. 07, help from C&S Conseil):
  - Topics were risks, transparency, control, economic interest, the platform's future
- CLIS: local information and surveillance commission meetings (April 08 - present)[3]
  - A legal organisation was established, mandatory in some cases
  - Several opinion leaders were involved: 4 State officials, 9 locally elected politicians, 2 union members, 4 representatives of associations, 5 experts, 4 employees from Total
  - The organisation was started in April 2008, and has met 8 times since
- Administrative public survey (July - Sep 2008):
  - A survey was conducted amongst 4 cities. Two types of questionnaire were used: Capture (hardly any response); Transport & Storage (90% response at Jurançon)
- Authorisation (May 13th, 2009)

With respect to the opinion of environmental NGOs, two were highlighted by Mr Ha-Duong, namely SEPANSO Béarn (federation affiliated to France Nature Environment) and Côteaux du Jurançon (local opposition). The NGOs found the CCS scenarios over-optimistic and as far as they were concerned, strategic decisions were not made yet. They stated that Total and the government were not really interested in public acceptance. It was just a one-way communication and not a public consultation. Besides, expertise was not independent.



The Jurançon public consultations showed that the respondents had the most faith in information from scientists and secondly from environmental NGOs. Nearly 2/3 of the respondents believed that the pilot project could harm the region. The respondents were also asked under which conditions they would agree with the implementation of the project. The outcomes are presented in the figure on the left.

One of the most important lessons learnt by Total was that people do not actively look for information. The website was hardly used.

Mr Ha-Duong concluded that the Lacq project had good social and technical conditions. It was situated in a rural area, where a lot of people lived who were involved in the gas and oil industry. Besides, the regulation was developed in co-creation. Therefore on a local level the CCS project was supported. He also recognises that people always want more consultation. On a national level, more problems are expected. The discussions with the NGOs on a national level have not yet been finalised.

The most important element to gain public acceptance is the answer to the following question: "what's in it for us?"

[3] Public reports and documents can be found at: http://www.pyrenees-atlantiques.pref.gouv.fr/sections/actions_de_l_etat/

6.5 *Unspeakable risk, dealing with the possibility of disaster in the Netherlands*

Mr Arnout Jaspers is a journalist working for the "Natuur Wetenschap & Techniek (NWT)" Journal. He wrote a provoking article on CCS in NWT because he did not believe that the risk calculations were being carried out properly. He became suspicious due to the fact that, in the Barendrecht case, the contour of the risks was just outside the residential area. When he investigated the outcomes of the risk analyses he believed they were under suspicion.

The cover of the magazine showed a Photoshop picture of a total blowout. Shell was very angry and said, "it only charges up emotions", "it unfounded suppositions", and it was "unworthy of a science magazine".

According to Mr Jaspers, the computer model (Safeti-NL[4]) for external security risk analyses used in the Netherlands cannot really accommodate the Barendrecht case because:

- the wind speed < 1.5 m/s (2% of the time in Holland)
- the horizontal ejection into vertical profile (buildings, dikes)
- risk above ground level (vertical ejection, high-rise buildings nearby)

He also did not understand why there was:

- no push to develop true 3D-model,
- no plans for experiments, either at laboratory or on a larger scale
- no risk analysis for terrorist attack or sabotage

The problem with Safeti-NL is that it is seen as a legal 'golden standard'. What happens is that the national government and commercial stakeholders dismiss risks that are not addressed by Safeti-NL as unscientific and unfounded. Of course, actual risk might be very small but, as yet, no data to substantiate this has been made available.

Many errors were made in the Netherlands relating to public communication. Mr Jaspers explained that, in his view, former Minister J. Cramer also made some mistakes. The minister said: 'CO_2 is completely harmless'. She looked neither credible nor well-informed in TV-interviews. The public worries and is also not well-informed. The information is communicated badly. Politicians talk to people as though they are twelve years old. One could say, for example, that CCS is as safe as flying twice a year. Shell also communicated in an improper way. They stated that "if Barendrecht fails, CSS in the Netherlands is doomed". The expert organisations were also not very critical with regard to each other's work. TNO, RIVM, MER-consultancies had a common interest, namely funding. There was also no public debate, and experts were very reluctant to discuss each other's research.

The linkages between national, local stakeholders:

- Commercial stakeholders (Shell, etc.) primarily deal with national governments and institutes (TNO, RIVM, VROM, Economische Zaken), because these are the organisations that issue the permits.
- The public only starts to take notice when the national media cover the plans and possible risks
- Local population starts asking specific questions to local politicians

[4] SAFETI-NL is a Dutch computer model for calculating the external security risks of a facility with hazardous substances. The results of the calculations can show whether a facility meets the risk standards for External Security, as defined in the Decree External Security Devices (Bevi).

- Local government has nothing to offer in terms of benefits for the perceived 'in my backyard' burden.
- Local government tends to cave in to opposition, turns around and opposes plans.
- National government overrules local government, so projects continue
- Citizen's perception: again we have been bypassed, cheated etc.

The national government has declared the project 'completely safe', and therefore granted the permit. The inhabitants of Barendrecht are worried, angry, and opposed to CCS. The municipal council voted against the project, but the national government overruled this decision. It remains uncertain whether the installation will be built.

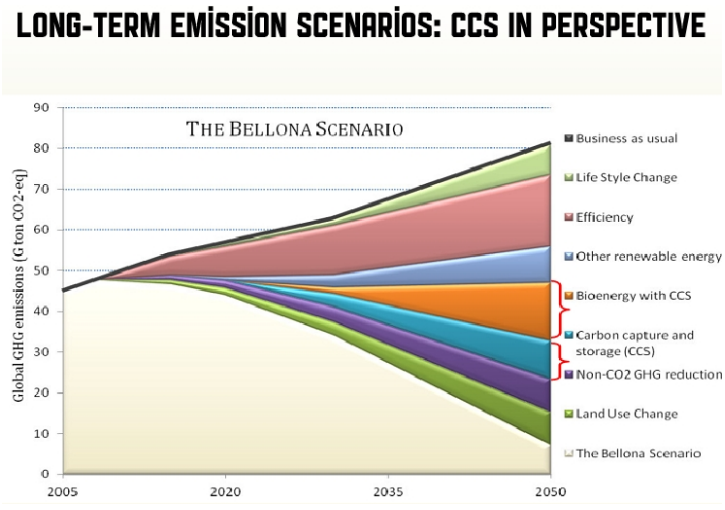
Mr Jaspers gave some tips to improve CCS-communication to the public:
- provide good information, do not look for incantation (encourage scientific debate, quantify risks, discuss what-if scenarios)
- do not use kids talk (some adults in the region have PhD's)
- acknowledge: only experiments give hard evidence
- discuss practical safety measures at local level
- accept that sometimes things must get worse before they get better

Finally, Mr Jaspers suggested testing the breakage of a transport pipeline.

6.6 Developing public support for CCS

Mr Eivind Hoff, from Bellona Europa gave a presentation on the development of public support for CCS. He asked the audience "Why doesn't CCS get the support it deserves?". There is a low support for CCS because most NGOs fear the fact that CCS stands for investments in new coal plants. Greenpeace, for example, opposes CCS but does not put a lot of effort into it. CCS is seen as 'business as usual'.
According to Mr Hoff, subsidies are the main problem for CCS. NGOs would probably not oppose CCS if subsidies were not involved. Bellona Europa believes that there is too much carrot and too little stick.

What is needed? First of all you need a plan, explains Mr Hoff.



Secondly, in communication one must show that CCS is a necessary part of all different types of solutions. CCS is needed to create renewable energy technology, and can also be used to realise negative carbon solutions.

CCS is also needed to create products.

But how do we get there? It starts with the development of policies. In the UK, the following were defined:
- (….) a requirement for any new coal-fired power station to demonstrate the full CCS chain on a commercial scale
- (….) demonstration plants will retrofit CCS to their full capacity by 2025, with CCS incentive able to provide financial support
- (….) in the event that CCS is not on track to become technically or economical viable, an appropriate regulatory approach for managing emissions from coal-fired power stations will be needed

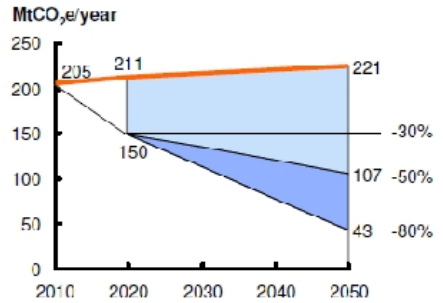
A VISION: "LARGE SCALE ROLL OUT SCENARIOS FOR CCS IN THE NETHERLANDS: 2020-2050"

An additional 90 to 180 million ton CO2 abatement per year is required to make the -80% target in 2050

INDICATIVE

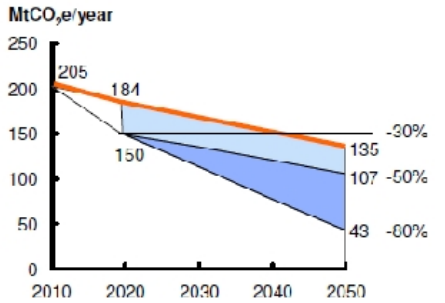
CO2 emissions without CCS

Baseline scenario
CO_2 equivalents emissions, Mton/yr



- Based on "Verkenning S&Z" 2009 and WLO Global economy scenario
  - 2.5% GDP growth, annual improvement of 1% in efficiency and 0% in transport and built environment
  - Power generation mix 2050: 35% non-fossil fuel, 25% coal, 50% gas, 10% export
- An additional 180 Mton/yr abatement is needed to make the 2050 target of -80%

Green scenario
CO_2 equivalents emissions, Mton/year



- Based on WLO Strong Europe scenario and Green4Sure scenario
  - 2% GDP growth, annual improvement of 2% in efficiency, 0.6% in transport and 1.6% in built environment
  - Power generation mix 2050: 60% non-fossil fuel, 15% coal, 25% gas
  - 10% penetration electric vehicles in 2050
- An additional 90 Mton/yr abatement is needed to make the 2050 target of -80%

SOURCE: ECN-E-09-022 April 2009, Green4Sure, McKinsey analysis

6.7 The detached view from the gallery, public engagement in a multi-level policy

Ms Diana Schumann from KV Jülich conducted some research into public support for CCS. This study focussed on several directions in assessing public acceptance:

- Attitudes regarding CCS in general
- Attitudes regarding a CCS demonstration plant
- Willingness to engage against a CCS demonstration plant

Awareness of CCS is an important precondition for attitude formation. The following tables show the most important outcomes of the surveys.

Self-reported awareness of CCS in Germany in comparison to other European countries

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Awareness of CCS			GR	RO	NL	UK	NO	DE	Total
Have you ever heard about CCS?	No, never heard	Number	765	759	555	644	374	630	3727
		%	76.5%	75.7%	50.0%	61.9%	37.4%	61.9%	60.4%
	A little bit	Number	187	214	493	331	452	288	1965
		%	18.7%	21.4%	44.5%	31.8%	45.2%	28.3%	31.9%
	Yes, quite a bit	Number	48	29	61	65	174	99	476
		%	4.8%	2.9%	5.5%	6.3%	17.4%	9.7%	7.7%
Total		Number	1000	1002	1109	1040	1000	1017	1017
		%	100%	100%	100%	100%	100%	100%	100.0%

Source: Pietzner et al. 2010

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Attitudes regarding CCS in general in Germany in comparison to other European countries

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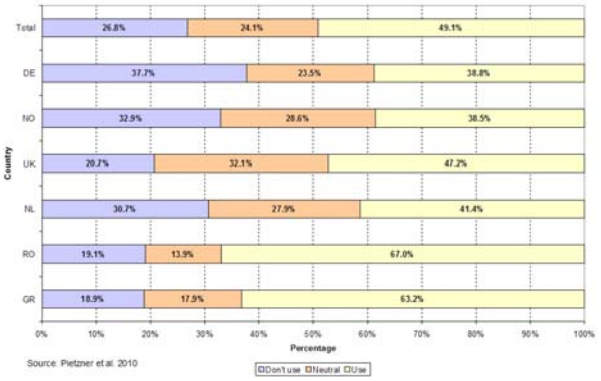
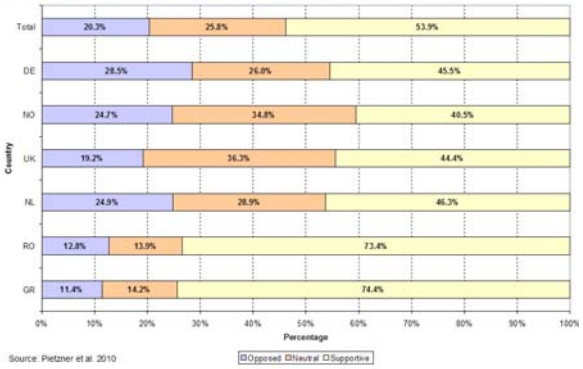


Source: Pietzner et al. 2010

Attitudes regarding a CCS demonstration plant in Germany in comparison to other European countries



Source: Pietzner et al. 2010

Willingness to engage against a CCS demonstration plant in Germany compared to other European countries

		No	Neutral	Yes	Total
GR	Number	41	20	53	114
	%	**36,0%**	**17,5%**	**46,5%**	100,0%
RO	Number	69	11	48	128
	%	**53,9%**	**8,6%**	**37,5%**	100,0%
NL	Number	110	65	101	276
	%	**39,9%**	**23,6%**	**36,6%**	100,0%
UK	Number	61	56	83	200
	%	**30,5%**	**28,0%**	**41,5%**	100,0%
NO	Number	126	63	58	247
	%	**51,0%**	**25,5%**	**23,5%**	100,0%
DE	Number	111	67	112	290
	%	**38,3%**	**23,1%**	**38,6%**	100,0%
Total	Number	518	282	455	1255
	%	**41.3%**	**22.5%**	**36.3%**	100,0%

Source: Pietzner et al. 2010

CCS is no longer an unknown quantity in European countries. However, the studies show that the awareness is not the same in all European countries. The self-reported awareness of CCS in Germany is higher compared to countries where the implementation of CCS are less advanced (Greece, Romania), but lower in comparison to countries where the implementation is more advanced (the Netherlands, the UK, Norway).

There are also differences at the local level in Germany regarding the self-reported awareness of CCS. Research shows that awareness is highest in the region where the sites for CO_2 storage are located (Schleswig-Holstein).
Regarding the use of CCS in general and local demonstrations in particular, German citizens are the most sceptical compared to other Europeans.

The willingness to protest against a CCS demonstration plant in Germany is lower than in Greece and the UK, but higher than in the Netherlands, Norway and Romania (caveat: small number of respondents).

Public engagement in Germany is expressed mainly in citizens' initiatives, demonstrations and petitions against CCS in general and against CO_2 storage in particular, but also in policy programmes by state governments.

The real public opposition to CCS in Germany differs regionally, with the strongest opposition in the regions where sites for CO_2 storage are planned (Brandenburg, Saxony-Anhalt, Schleswig-Holstein).

The local opposition against CO_2 storage was one of the main reasons why the first version of the German draft carbon storage law has failed.

7 Appendix (panel) discussions

7.1 Overview of the discussions

In total 3 (panel) discussions were conducted:

- *Exchange of views with Ms Poppy Kalesi, programme manager CCS, European Commission DG ENER*
- *First Panel discussion. Issue to reflect on: the relationship between studies and investigations in earlier periods and the actual CCS situation as it has developed on the ground*:
  - Moderator: Peter Sage.
  - Panel: Barend van Engelenburg, Ross Loveridge, Meade Harris, Stan Dessens
- *Final Panel discussion. Issue to reflect on: the linkage of public engagement efforts on different levels: local, national, EU-wide*
  - Moderator: Tore Torp.
  - Panel: Minh Ha-Duong, Arnout Jaspers, Eivid Hoff.

7.2 Exchange of views with CCS programme manager EC

Ms Poppy Kalesi, programme manager CCS of the European Commission exchanged views with the chair, Bert Stuij from Agency NL and with the audience. Ms Kalesi explained that 6 CCS projects are currently under development. An important issue that is taken into account is public awareness and acceptance for transport and underground storage. The European Commission is working on several documents and directives and these aspects were mentioned in all documentation.
She asked the audience what else was needed.

One of the workshop participants pointed out that the language used should be handled with care, because the past has shown that sometimes things can get out of control. The public debate should indeed be handled with care, this was her answer.

A lot of renewable technologies compete with CCS, where they unfortunately do not need to. For example, technologies such as sun (silicon), wind, electric cars, hydrogen, etc., are favoured by the public. But it is important that people must understand that if those types of energy generation have to be built then lots of CO_2 will need to be emitted. It is therefore crucial that CCS be linked to the production of industrial products or even to negative carbon solutions. CCS is connected to coal and, for the anti-coal lobby, this makes it very easy to get rid of CCS. It makes the debate biased. There is a strong call to link industrial products to CCS as well.

The public debate is not mature enough. It was suggested that the acceptance and awareness development should be left to the local authorities in the EU Member States. They should organise it by themselves. Some Member States always provide the same information. There is a considerable gap between trustworthy opinion leaders, actors and the European Union. European NGOs have withdrawn from the debate, and therefore creditability is difficult to establish. The actors generally come from the less trusted parties.

Ms Kalesi explained that all CCS information has been made available in 7-8 relevant European countries. There are a lot of differences between the information provided by the EC, national governments or regional authorities. One participant pointed out that the EC information is too broad. More circumstantial information is required at regional level. You require regional customised information. The problem is that, at a regional level, there are not enough budgets available to set up large campaigns.

The issue discussed concerned the fact that local communities should benefit from underground CO_2 storage.

7.3 Comparison between research and actual CCS acceptance

[5]During the first panel discussion the participants discussed whether the outcomes of research on public engagement differ from the actual situation.

The discussion showed that public engagement is one of the key success factors in order to get a project implemented. It was also concluded that not enough research has been conducted into this area. The panel explained that different types of public engagement exist. Awareness and acceptance can be found at European, national/regional, and local levels. The local level forms the biggest risk. For example, if a project is implemented offshore, nobody cares.

Whether or not a project is successful depends on a group of (local) stakeholders and (local) opinion leaders sending out a positive message. Attention to public engagement is therefore an integrated part of the project. National governments should be aware of this and should support local engagement initiatives.

Several pilot projects have shown that the public's knowledge level on CCS is low. For example, the Scottish public has some concerns on risks, but overall they do not really understand CCS. In some cases regulatory authorities have even rejected initiatives due to lack of knowledge.

The Barendrecht case in the Netherlands has shown that communication should not be focused on convincing but on consulting the public. The initiators were not really listening to the opposition. Strangely, the national environmental NGOs have not become involved in this discussion. The Dutch learnt from the Barendrecht case that it was too rushed. It started too early and was not fully backed-up by the Dutch government.
The initiators are convinced that, next time, they must consult with experts, thus allowing a lot of more knowledge to be communicated to the general public.

The learning effects of the Lacq case dealt with the fact that acceptance and awareness studies were not conducted properly. More data is needed to realise more impact. According to the executors this would have definitely enhanced public engagement. A strange observation was the fact that the French NGOs also did not join in the CCS debate.

Another element that is also important but generally goes unmentioned, deals with the fact that CCS could mean an economic impulse for a region.

7.4 The linkage of public engagement efforts on different levels

During the final panel discussion the participants reflected on the linkage of public engagement efforts on local, national and EU level. The discussion was initiated with a comparison between the storage projects in Lacq (France) and Barendrecht (The Netherlands).

[6]One of the main differences with the Lacq project is that the Barendrecht project is situated in a densely populated area, while Lacq is located in a rural area. It is therefore difficult to compare both projects. What is learnt from both projects is that the creation of public support should be established parallel to the implementation of the actual project - so start communicating as soon as possible.

Another element that also supported the Lacq case was the fact that almost everyone who lives in the area is involved or depends on the oil industry. They understand the project and its consequences. This can be illustrated by the fact that a pensioned guy was asking technical questions concerning the Lacq project, which Total personnel could not answer.
The panel concluded that people who work on injection sites could act as ambassadors.

[5] The conclusions and recommendation presented in this paragraph are not necessarily a reflection of the opinion of Agency NL, the partners, or the management of FENCO ERA-NET

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There is another aspect that could create more acceptance. One of the major focal points to create more acceptance concerns defining clear benefits for the locals. It is negotiable for local people. The government should select several benefits, and then ask the locals *what do you want to have*?

Finally, it was clear that the public do not know a lot about CO_2 storage in gas fields. A lot of misinformation was also spread and Greenpeace forms part of that. Among the general public, there is a perception that everything you put under the ground will come out. People do not realise that natural gas has been stored there for millions of years. Natural gas is more dangerous than carbon dioxide.

The question was also raised: what is the most risky part of the CCS chain. Is capture, transport, or storage hampering public engagement? The experts discussed this, but did not agree as to which one has the most influence on the lack of public acceptance.