Public communication of CO$_2$ storage site risk

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Covering: CCS and CO\textsubscript{2} storage risk

- CCS deployment at large
- The EEPR initiative
- Potential CO\textsubscript{2} storage risks
- Public communication of storage site risks
- Lessons learned
The issue of time

EEPR* – Large-scale CCS demonstration

- **2007**: the European Council agreed on a stimulus package for the construction and operation of CCS demonstration projects by 2015.
- **2009**: the European Commission selected six large CCS demonstration projects to be funded through the EEPR with a total contribution of 1 billion Euro in grants.

**Strategy**: by 2020 (or soon afterwards), to declare CCS economically viable within a system driven by emission trading.

**Impact**: The verification of efficient, safe and successful operation of large demonstration projects is a precondition for commercial deployment of CCS in Europe and elsewhere.

* European Energy Programme for Recovery
The EEPR Network secretariat (CCS-PNS)

- A not-for-profit independent entity. Global members include 350 government, industry, academia bodies. Focuses on knowledge sharing and assisting projects.

- A public-sector research, industrial innovation and training centre active in the fields of energy, transport and the environment.

- A major independent research institute, focusing on power generation and energy conversion technologies, distribution and end-use.

- Applying scientific knowledge aimed at strengthening the innovative power of industry and government.
3) EEPR projects' status

After the second year of implementation, the European Commission summarised in 2012 the status of the demonstration projects as follows(*):

"Good progress was achieved in finalising detailed technical studies for capture units and, to a lesser extent, validation of storage sites."

- The six EEPR projects have concluded the Front End Engineering Design (FEED) studies for the capture unit including pre-selection of the equipment supplier which is the last technical step before commissioning.
- None of the EEPR projects has yet adopted a final investment decision (FID).
- Two EEPR projects have been cancelled.

Discussions regarding CCS projects from the second round of the NER300 to be included in the EEPR Network are going on.

The portfolio of EEPR projects (2009)

Don Valley, UK. Power sector 650 MW, pre-combustion IGCC, 5 Mtpa CO₂ Storage offshore, EOR/saline 175/425 km

ROAD, NL. Power sector 250MW, post-combustion 1.1 Mtpa CO₂ Storage offshore (depleted gas reservoir) 26 km

Compostilla, ES. Power sector 330MW, oxy-coal CFB, 1.6 Mtpa CO₂ Storage onshore 120 km

Porto Tolle, IT. Power sector 250MW, post-combustion, 1 Mtpa CO₂. Storage offshore 100-150 km

Belchatów, PL. Power sector 260MW, post-combustion 1.8Mtpa CO₂. Storage onshore 140 km

Jänschwalde, DE. Power sector 300MW, post-combustion & oxy-lignite, 1.7Mtpa CO₂. Storage onshore 52 km
The portfolio of EEPR projects (2013)

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Sleipner, NO
NG sweetening. 1 Mtpa CO₂
Offshore processing and storage
New 2011

Bełchatów, PL
Power sector 260MW, post-combustion
1.8Mtpa CO₂.
Storage onshore 140 km
Apr. 2013

Jänschwalde, DE. Power sector 300MW, post-combustion & oxy-lignite, 1.7Mtpa CO₂.
Storage onshore 52 km
Dec. 2011
4) Perceived storage site risks

- **Geologic risk:** Caprock failure – seepage
- **HSE risk:** Non-toxic gas ➔ may displace oxygen and cause suffocation ➔ monitoring
- **Liability issue:** slow decanting process making the storage site gradually more stable – mitigating risk
- **Unresolved dilemma:** indefinite liability to carry the cost of environmental damage caused by released CO$_2$, including the groundwater if affected

Risk = Likelyhood x Consequence
Communicating CO₂ storage site risk

**Don Valley:** IGCC with offshore storage. Hardly any public concern on storage site. Two storage options: 1) saline, 2) EOR.

**ROAD:** post combustion with offshore storage. If nitrosamine turns out to become a problem, the operator is committed to stop capturing/storing. Otherwise few public concerns have appeared regarding storage. Technically, storage is a challenge due to low storage capacity and very low pressure (20 bar).

**Compostilla:** oxy-coal CFB with onshore storage. Isolated instances of negative press coverage on storage. Numerous issues have been raised by the public, such as the risk of: leakage, toxicity, explosions, long-term security of the storage site, and groundwater pollution. Large, open formation without pressure build-up. Combined terms like underground, super-critical and vast quantities appear to be scaring buzzwords. Lack of high-quality information is considered a main reason for opposition to CCS. Early storage exploration activity, prior to public engagement, created public concerns that almost killed the project.
Communicating CO$_2$ storage site risk

**Porto Tolle:** post combustion with offshore storage. Few objections to CCS in general. The issue is burning coal in replacement of oil, and assumed environmental impacts on vegetable crops in the region. Opponents are Greenpeace, WWF and Lambiehte. Public understanding of CCS is quite low in Italy. Communicators had to start with basic information: *what is climate change?* And *why is it necessary to reduce CO$_2$ emissions?* CO$_2$ storage suffers from the nuclear waste debate. However, as the planned storage site is offshore, it does not represent a public issue. On the contrary: the Veneto region relies on imported electricity, so the new plant would offer jobs and economic benefits to the region.

Porto Tolle also made specific seismic investigation in order to ensure safety with regard to earth quakes in the area of its storage site.
Communicating CO₂ storage site risk

Jänschwalde: oxy and post combustion with onshore storage. A severe mistake by the project was to underestimate the local opposition within the region of the candidate storage site. That region had no coal production, contrary to the area around the power plant. Furthermore, Vattenfall was just one of four – not well trusted – utilities in the area. Within federal Germany there was a swing against CCS, and the political support gradually faded. In the end there was no support at the political level and the Chancellor decided not to support the proposed CCS Law. The impression is that most of the debate on the safety of CCS was driven by those who opposed coal-fired electric power.

In December 2011, Vattenfall made a statement that the Jänschwalde project was cancelled, mainly due to political impasse in Germany.
Jänschwalde 2011: Put in jeopardy due to regional opposition against onshore storage, and political impasse failing to implement a German CCS law.
Communicating CO$_2$ storage site risk

**Belchatow** – post combustion with onshore storage. The perceived risks relating to storage were considered to constitute the most difficult challenge. Most communes affected by the storage were reluctant to take part in organised discussions with the operator (PGE). Communes along the pipeline corridor were more relaxed about the pipelines crossing their territory. A far more challenging problem was the possibility of compensation for the local communities and what they might, or might not, expect.

A major obstacle in Poland is that CCS is considered to constitute a new, complicated and undemonstrated technology. Hence, the general attitude is that Poland should rather use its already scarce resources to invest in known and already demonstrated technologies. In early April 2013, PGE announced that the project had been cancelled due to failure to obtain NER300 funding and the difficulties in overcoming the existing risks posed by the lack of appropriate regulations, particularly regarding transport.
Lessons learned

- Stakeholder mapping is required for the planning of a best practice approach to deal with each stakeholder.
- When engaging with the public, the audience must be understood and listened to.
- Projects must ensure that stakeholders have a reasonably good understanding so that they will not be surprised later on.
- Projects should help stakeholders to contextualise risks. They must address their concerns, e.g. why ROAD went offshore, and why Don Valley provides options for stakeholders.
- Using experts as messengers for a project may be important, subject to communicative training. (Communication experts were not trusted!)
- Info-graphics can be a good tool, but they should be checked for accuracy and scaling.
- Explain what CO₂ is right from the start. Do not use CO₂ and carbon dioxide interchangeably. Avoid terms like supercritical, and unfamiliar words (e.g. sequestration).
Conclusion

• Usually, perceived risks differ from actual risks, and the former risks may be rather scaring.
• Failing to convince the public about upcoming needs and the value of true options is another aspect of public communication of storage site risks.
• Mechanisms behind the climate challenge are complex, and few people (if any) may relate to the slow dynamics of climate change. This must be taken into account in the planning of public information campaigns.
• Policies must be followed up by communication strategies and proficient communicators and lobbyists to ensure that the message is properly conveyed, understood and taken into account by leading politicians and industrial players.
• Politicians in modern democracies must rely on public awareness and consent: the message must be brought to the wider audience – especially the younger generation.
• Most likely, a severe crisis must occur to make the public sufficiently aware of the emerging situation.
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