Zero emissions platform

Business Models for CO_2 Transport and Storage

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Temporary Taskforce on CO_2 Transport and Storage

European Technology Platform for Zero Emission Fossil Fuel Power Plants

Project objective

Raison d'être

Attention to date has focused on the emitting part of the CCS chain (CO_2 capture), but large-scale CCS also requires CO_2 transport and storage infrastructure – ***at the right time, in the right place, at the right capacity***; and in the current policy environment, there is no indication this will happen.

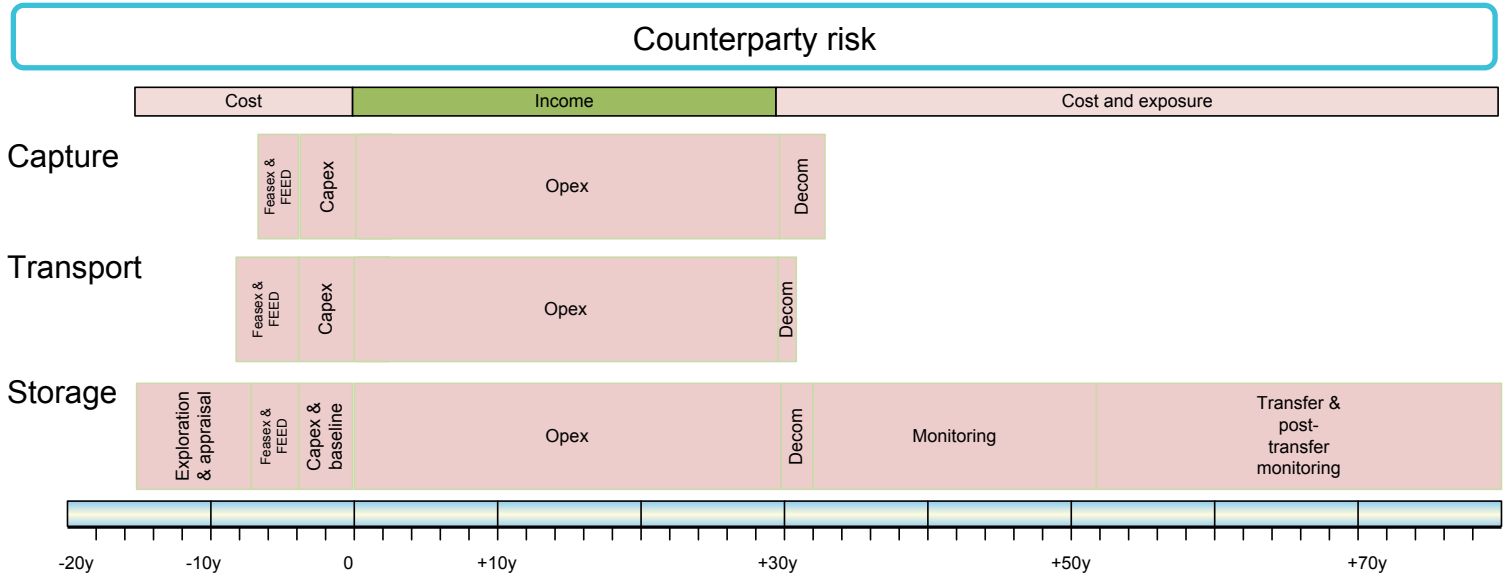
AC mandate

ZEP to prepare a report which:

1. Identifies key enablers (and barriers) for any potential operator to offer their services in storing captured CO_2 from 3rd parties on a commercial basis
2. Presents feasible business models for CO_2 storage covering the demonstration, pre-commercial and commercial stages, based on these enablers

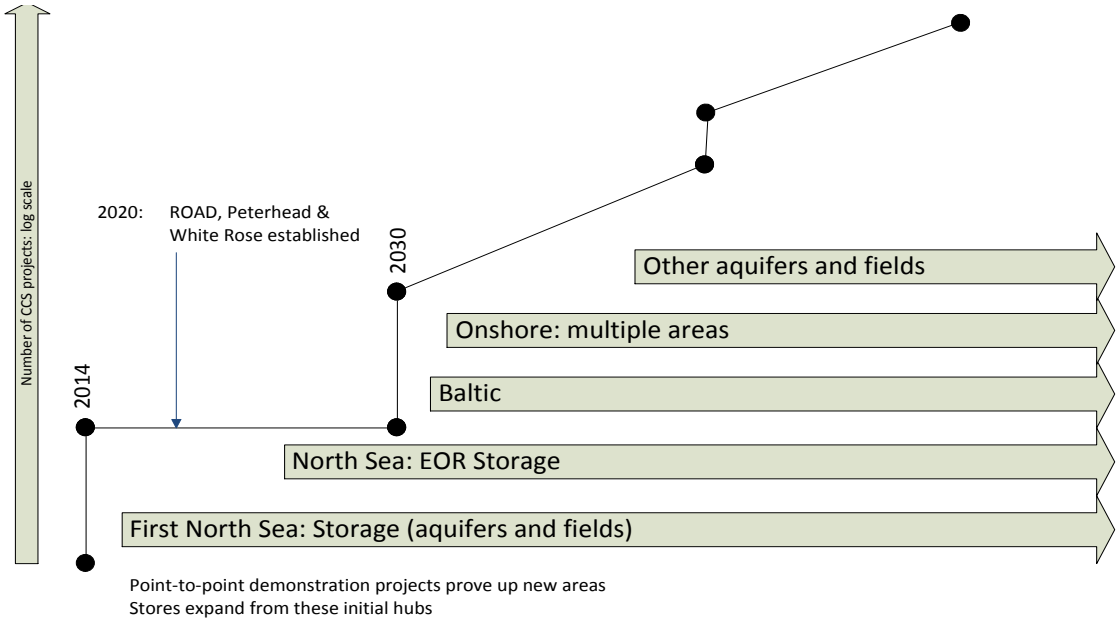
Key Findings (1) Funding mechanisms must give confidence in long-term T&S income

- Storage operators are exposed to uncertainty for a much longer time than capture operators.
- Policy instruments must facilitate capital provision and enable business models that support pre-investment and many decades post-closure.
- Storage cash flows will have to be underwritten in a similar manner to the temporary measures being seen for capture (point-to-point projects).



(2) Hubs are key to cost-effective CCS and require a clear policy framework to develop

- **Economies of scale in T&S are potentially enormous.**
- CCS will ideally develop as a staged roll-out of key hubs and connecting infrastructure, initially focused on North Sea.
- A policy framework for CO_2 transport and storage is critical to create market certainty and long-term secured cash flows needed for private sector capital and industry investment. ***Without it, a network will simply not materialise in time to deliver EU climate targets.***



(3) Reducing individual liability exposure can reduce costs

- UK Government has released a report showing that likelihood of a costly liability event is vanishingly small. But were such an event to take place, the cost could be very high.
- In an immature market, each project has to underwrite its own liability – and current MS interpretation of the CCS Directive makes this very costly
- This cost can be reduced in two ways:

  1. Establish a liability sharing/underwriting mechanism to reduce individual project risk premia
  2. Examine the possibility of reducing the magnitude and duration of the liability or provision requirements

(4)'Characteristic' business models identified – each suited to different development stages

Contractor to the State is effective before an established incentive mechanism exists and when market failure requires state support. *This model has already proved successful for the North Sea region and will be key to incentivising early movers in other regions.*

Enabled Market comprises state support in some parts of the market, managed competition in others. Consists of a regulated entity, 'Market Maker', which removes counterparty risk by :

a) Managing the development of primary infrastructure on behalf of the state
b) Having a duty to take all captured CO_2 and ensure corresponding storage is available

This model is ideal for growing storage volumes during pre-commercial phase.

Liberalised Market: private companies develop and manage pipelines, hubs and storage sites without specific state direction. *The CCS market is not yet sufficiently mature to move to this model*.

Four key conclusions

1. A policy framework for CO_2 transport and storage is critical to deliver EU climate targets
2. Transport and storage operators need market certainty + manageable risk – the more sources to a sink the better
3. A risk-reward mechanism is vital to realise storage potential – in the timeframe needed
4. Different business models are effective for different phases of CCS development

ZEP's recommendations

- **Establish a Market Maker** to accelerate the development of key hubs and deliver economies of scale.
- **Create a flexible funding mechanism** to develop storage and transport infrastructure.
- **Establish a liability management mechanism** to remove the heavy cost burden from storage operators.
- **Support a well-defined and predictable growth trajectory for CO_2 capture** in national plans.

Next steps – Phase II (before Paris)

Clear recommendations for implementation: what policies will be required to make T&S happen

1. Identify the critical success factors (CSF) that need to be present for successful development of hubs in an enabled market.
2. Explore CSFs from multiple view points and rank in terms of criticality.
3. Selected CSFs will then be explored and ideally described in terms of actionable policy/regulatory solutions
4. Determine key areas of action, by when and by whom. Create an aspirational road map to progress (a) T&S hub(s). The CSFs will ideally form the basis upon which MSs can create strategic T&S plans;

Throughout, reference will be made to best practice from existing and ongoing CCS cluster/hub developments (analogues); what CSFs have they overcome, using which policy instruments?

We are recruiting

Time line

- Establish team over next month
- Teleconference to approve draft TOR (Late May/Early June)

- Mix of teleconferences and face-to-face workshops

- Final report in September

Participants in phase I

First Name	Last Name	Affiliation
Gardiner	Hill	BP
Tim	Bertels	Shell
Owain	Tucker	Shell
Hervé	Quinquis	IFP EN
Andy	Read	ROAD2020
Dave	Mirkin	2CO
Jim	Lorsong	2CO
Kristofer	Hetland	Statoil
Lamberto	Eldering	Statoil
Ola	Sannes	Statoil
Chris	Gittins	TAQA
Mervyn	Wright	National Grid
Urs	Overhoff	RWE
Karl-Josef	Wolf	RWE
Keith	Whiriskey	Bellona
Harsh	Pershad	Element Energy
Joris	Besseling	Element Energy
Angela	Whelan	Ecofin Foundation
Praveen	Gopalan	Ecofin Foundation
George	Day	Energy Technologies Institute
Niels Peter	Christensen	Gassnova
Jason	Golder	The Crown Estate
Observers		
Christian	Bernstone	Vattenfall
Jeff	Haspels	Vattenfall
Gerdi	Breembroek	Agency NL
John	Hargreaves	Peak LTD
Richard	Vernon	SLR Consulting
Former members		
Clas	Ekström	Vattenfall

Key findings:
i) Counterparty risk dominates

- One key element was found to dominate the storage business and, to a lesser extent, transport: **counterparty risk**
- Can extend over a period of some 50 years
- Risk is amplified by overhanging costs: pre-investment in exploration, appraisal and [future sized] infrastructure; and post-injection liability which lasts for decades after the end of storage income
- The result: it is extremely challenging to move from single state funded point-to-point projects to a large network of CO_2 sources and sinks
- A key recommendation is therefore to reduce counterparty risk by separating capture (from power and industrial sources) from transport and storage businesses