Financing CCS Task Force Report

Bernard Frois, Chair and Andrew Paterson Vice-Chair

CSLF Meeting, Perth Australia, 25-26, October 2012

Actions

The Finance Task Force has organized two Roundtables in 2012

1. Commercial and Financial Structuring of Industrial Scale Projects with CCS:

   " What Will it Take to Turn Ambition into Reality".

2. Lessons from First Movers in CCUS".

SOCIETE GENERALE
Corporate & Investment Banking

GLOBAL CCS INSTITUTE

carbon sequestration leadership forum

"Commercial and Financial Structuring of Industrial Scale Projects with CCS, What Will it Take to Turn Ambition into Reality"

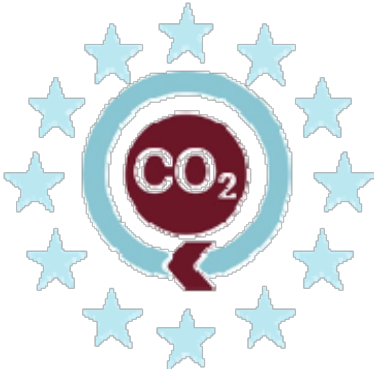
20 January 2012, Société Générale, Paris, La Défense 7, France.

Paris Roundtable

20 Jan. 2012

1. The meeting was hosted by Société Générale and GCCSI
2. 50 Participants: mostly banks and industry.
3. Significant Bank Representation: Asian Development Bank, European Investment Bank, Lloyds Banking, The Bank of Tokyo Mitsubishi, Royal Bank of Scotland, Société Générale, World Bank,etc.
4. Banks said that they are ready to finance large scale projects provided there is a solid business plan.
5. CCUS: Poly-generation projects with EOR emerged as the way to go now.
6. Electricity lacks enough value alone to be the most important driver.
7. Situation is different in Europe and USA. Value for GHG savings needed.

EU Energy Roadmap 2050



"CCS will have to be applied from 2030 onwards in the power sector"
Majority of Member States with CCS demos in preparation have transposed EU CCS directive (8 to date)

UK relaunches CCS demo competition + CCS roadmap

Financial/political support from Member States essential

Global CCS knowledge sharing takes 1st step (USA - May)

Confidence in CCS remains high – but weak carbon price threatens

EU demonstration and deployment:

- No long-term business case? No demos
- No demos? No commercial deployment

Onshore CO2 storage remains key

Zep
Zero emissions platform

From G. Sweeney 2012

US perspectives

- 8 projects, currently under operating conditions, provide for the sequestration of 25 Mton/year. This is more in terms of CO2 than the impact of the whole renewable program of countries such as the UK or Australia
- CCS costs are lower than renewable (especially offshore or taking into account impacts of intermittent production) and associated with EOR or fuels and chemicals provide for accrued domestic oil production
- In the US, several large scale CCS projects to come to operating conditions in next 3 to 5 years (2015-1017). CCS stakeholders are already considering next generation of capture technology.

CSLF Finance Roundtable,
"Lessons from First Movers in CCUS"
20 September, Washington D.C.

carbon sequestration leadership forum

Washington Roundtable

- The meeting was hosted by the Atlantic Council and CCS Alliance at Hunton & Williams in Washington D.C.
- Presentations from first movers were from Summit in Texas, Leucadia in Louisiana, Shell in Canada, SCS in Ca, Air Liquide and GDF-Suez + E-ON in the Netherlands.
- Successful projects are proceeding via Business Case (economics of CCUS and fuel prices), not via a forcing Climate Regulatory driver (CCS), as in Europe
- In North America and in Asia, a binding carbon cap is seen as disruptive of needed development for populations without energy.

EOR has significant advantages

- CO_2 is used as a “simple solvent” for EOR, it doesn’t use water resources or fracturation.
- EOR has a capacity of up to 100 to 150 years for CO_2 storage
- Additional oil production is expected from 5% up to 40%.
- EOR is expected to provide particular value in Middle east and in China, as a significant source of oil production.

CCUS at Large Scale is possible

- Capturing large volumes of CO_2 at a power plant is feasible
- Where to put the CO_2 – and how to pay for its capture?
- US is not ready to provide new financing programs with $Billions. The only way for CCS to further develop is with clear business plan involving EOR or fuels and chemicals.
- Building long new CO_2 pipelines eats up the revenue
- Today, EOR and Poly-generation is the sole source for substantial CCS revenues

From Eric Redman, CSLF 2012 Paris Roundtable

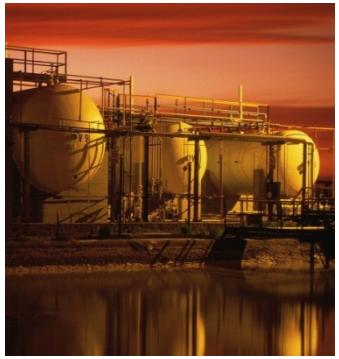
Texas Clean Energy Project (TCEP): A "polygen" IGCC plant

Coal
2mm tpy

Steam

Non-drinkable Water

Coal Gasification and Gas Cleanup



Coal and Steam Input, Main Outputs are Syngas (Hydrogen and Carbon Monoxide) and Pure CO2

2/3 of Syngas

High Hydrogen Power Turbine

195 MW low carbon power delivered to City of San Antonio (30% of revenues)*

1/3 of Syngas

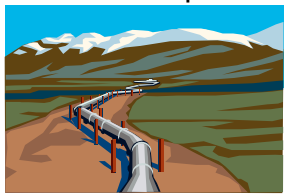
1/6 of CO2

Ammonia/Urea Complex

710,000 tons/yr delivered to Fertilizer Company (45% of revenues)*

5/6 of CO2

CO2 Delivered to Oil Fields via Pipeline



2.5mm tons per year delivered to Oil Companies (20% of revenues)*

** Remaining 5% of revenue from other byproduct sales*

Successful Projects

- Poly-generation (e.g.: long term contract for decarbonized power + contract on CO_2 for EOR + contract for chemicals)
- Incremental cost and of strategic nature for future of oil & gas.
- These projects required some equity financing as first of a kind.
- Negotiate and tailor funding and incentives to projects are preferable to offering a fixed grant amount or a set tax credit at projects generically.

Successful projects

- Government support for early plants is crucial, because first plants are first of a kind, inherently riskier, and not bankable.
- CCUS projects provide public goods beyond single projects.
- Early money is the best money, offering the best leverage.
- Natural gas price strongly influences investment decisions.
- In the power sector, the power loss (15%-30%, depending on scale) of carbon capture on power plants remains a severe handicap.