Carbon Sequestration leadership forum

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Report from the Financing CCS Task Force

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Beijing, September 18-24, May 7- 8h , 2011

: Key Financing Challenges to be Addressed

Projects are fundamentally uneconomic	■ **EOR provides the only positive cashflow to the Projects – no alternative market for product** ■ Where is the value if no EOR? ■ How to recover significant investment on the CCS infrastructure – particularly for "multi-user" schemes ■ **Economic subsidy and/or guarantee will be required for the Project to be bankable**
Risk Allocation & Interdependent Infrastructure	■ Integration of this Project with several independent operating businesses give challenges to risk allocation ■ Failure in any part of the chain may have knock on effect to the whole Project ■ **Emission level of the flue gas / processing gas is outside the control of the Project** ■ Termination Regime to be considered carefully due to single ender user for the Project
Technology	■ CCS technology has not been tested for large scale commercial use – Particularly Post Combustion ■ Construction and operation experience is limited ■ **Difficult to find a traditional EPC Wrap with warranty and damages provisions at economic cost** ■ **Lenders likely to require higher performance guarantees on early projects due to uncertainties**
Environmental Compliance	■ **CCS technology to be used for enhanced oil recovery could become NGOs' target** ■ Questioning of benefits of new coal fired generation even with CCS ■ **Credible monitoring and certification of sequestration crucial**
Un-tested in the Finance Market	■ Large financing needs call for diverse funding sources to secure largest possible financing component ■ Lenders have not been tested on the above risks ■ **"First of its Kind" risk** ■ **Until there is confidence in Government policy and technology there will be no project finance**
Key Message	■ **Currently no comprehensive legal and regulatory framework exists for CCS** ■ **Legal issues (CO_2 network and storage liabilities & monitoring are not clear** ■ **Policy and regulatory framework remains unclear** ■ **NO LONG TERM CLARITY = NO PROJECT FINANCE**

CSLF Financing CCS Task Force

- The CSLF Task Force on Financing CCS was created in June 2009.
- The Task Force focuses its work on financing CCS **at commercial scale in both developing and developed countries.**
- The Task Force has recently contributed to the organization of four successful roundtables and workshops in London (Linklaters), Washington (Hunton & Williams, World Bank) , Singapore (ADB) with representatives of Banks, Insurances, Government, Industry, Research.

Findings

- CCS is predicted to be cost-competitive with other sources of low-carbon power such as on-/offshore wind, solar power and nuclear in the EU in the early 2020s
- In Financing Task Force activities funding models in different parts of the world were presented in particular by ADB, WB, Alberta, Japan CCS, and several private companies (GDF-Suez, Conoco, Duke Power, Shell).
- Each example shows the value of adapting tools to regional strengths and weaknesses and project features

No single incentive is sufficient. Regulatory frameworks are essential.

Alstom activity on pilots and demonstrations 1st and 2nd generation CCS

ALSTOM

Operating

Vattenfall Schwarze Pumpe
Germany - 30 MWth
Oxy - Lignite

AEP Mountaineer
USA - 58 MWth
Chilled Ammonia - Coal

DOE/Alstom Windsor
US – 3 MWth
Chemical looping - Coal

Dow Chemical Co.
USA, West Virginia
Advanced Amines - Coal

Total Lacq
France - 30 MWth
Oxy - Gas

Alstom BSF Windsor
US - 15 MWth
Oxy - Coals

RFCS EU - Darmstad
Germany – 1 MWth
Chemical looping - Coal

Coming

TCM Mongstad
Norway - 40 MWth
Chilled Ammonia - Gas

EDF – Le Havre
France – 5 MWth Adv.
Amines - Coal

Pre-commercial Projects

Drax - Selby
UK - 426 MWe
Oxy – Hard Coal

Vattenfall Jänschwalde
Germany - 250 MWe
Oxy - Lignite

Transalta
Canada - >200 MWe
Post - Coal

PGE Belchatow
Poland – 260 MWe Adv.
Amines - Lignite

AEP Mountaineer
USA – 235MWe
Chilled Ammonia - Coal

CET - Getica (Turceni)
Romania – >250MWe
Chilled Ammonia - Lignite

Selected for receiving EEPR funding

Selected by Alberta and Federal Canadian funding

Selected by US DOE to receive CCPI Round 3 funding

Considerable progress has been achieved in the last five years

IEA, GCCSI, ADB, WB have analyzed in depth the situation. Various models and roadmaps have been presented and discussed in the Financing Task Force meetings.

CCS is an expensive technology, but without CCS, energy costs to reach carbon emission goals run even higher. Economic development is also important.

Rather than waiting for the perfect first step on CCS, it is critically important to launch CCS demonstration projects and build confidence in the technology and improve the understanding of its value.

General Consensus: Progress is too slow

Costs are considerable. Rewards not clear. Public has mixed feelings with regional variability.

High risks. All risks need to be addressed. Liability is a major issue.

Market uncertainties, emissions regulations and subsurface rules must be addressed as well.

Problems and solutions differ from one region to the other

The proposed solutions are not yet attractive for investors

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Success implies changes

Regional development is the preferred way for accelerating deployment of CCS

Sharing experience with CCS, across stakeholders and industrial sectors, will promote best practices, knowledge sharing and regulatory insights including risk-sharing

Regulatory clarity, characterization and infrastructure must be in place **FIRST** to mobilize investment

Projects in developing countries enhance engineering, system experience for global industries.

EOR helps first plants

- **Several projects put a priority on fossil intensive industries using EOR. Electric utilities could be brought on board later, or could play a role as off-takers for electricity co-generated from industrial projects, at say, refineries or chemical or steel plants.**
- **The use of CO2 from emitting facilities for EOR would increase the production of oil while reducing CO2 emissions.**
- **But, obviously EOR is not enough by itself.**

Perspectives

Strong coherent support at the regional scale is essential (Governments, Industry, Stakeholders, Investors, Public, etc.

Clear regulatory guidance for land use, injection, storage, groundwater protection, and stewardship and long term liability. **CLEAR POLICY IS NEEDED**

Projects with CCS must earn revenues, and attract private investment by offering competitive returns.

The biggest difference in moving from demonstration to deployment is there are no “CCS projects”; instead, there are industrial projects and power plants with CCS that must compete for capital globally.