

Clean Development Mechanism (CDM) as a Real Option for CCS - How do we get there?*

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Abstract

It is safe to say that Carbon Capture and Storage (or Sequestration) (CCS) is an essential part of the climate change portfolio. It is also safe to say that the vast majority of those in the CCS industry believe that use and acceptance of CCS has to be expanded. Enhanced Oil Recovery (EOR) is leading the way in the short term doing the early heavy lifting. The early entry of CCS by EOR is limited however to the EOR producing regions of the US and Canada. EOR is also limited to funding or economics that make the use of CCS possible - better put - in the short term, CCS can't exist without EOR.

In order to expand the acceptance, and more importantly the deployment of CCS beyond EOR, pilot, and first of a kind installations – and more importantly to deploy CCS in developing economies – CCS needs some help. I just returned from the Tenth Annual Carbon Capture & Sequestration Conference in Pittsburgh, PA where we celebrated the conference's 10th anniversary. The conference was aptly titled: Building on a Decade of Progress to Assure Commercial Deployment. Many in attendance suggest that CCS's much needed assistance may come in the form of CCS as part of a Clean Development Mechanism (CDM).

The UNFCCC Cancun meeting included discussion of inclusion of CCS as part of the CDM and it is likely that those same discussions will be carried over to the Durban, South Africa meeting as well. Most of the CCS roadmaps generated by the CCS NGO's all acknowledge the need to expand CCS.

If most agree that CCS is needed and CDM is a viable option to allow needed financing for developing countries to implement this “required GHG portfolio technology”, why hasn’t it occurred yet? Stuart Dalton, Director of Generation for Electric Power Research Institute (EPRI) summed it up very eloquently in his plenary presentation at the CCS Conference. He suggested that one of the many causes for the delay in international movement of CCS is a result of very difficult and sometimes protracted international agreements. In the present economic climate of government budget cuts, there are questions of funding and timing. He concluded his opening remarks with the following hierarchy, “Policy trumps funding and funding trumps technology”.

So how do we get there?

While Mr. Dalton’s comments certainly were not meant to apply exclusively to CCS as CDM, it is clear that the issue of CCS as a CDM is not a technological one. It is partially a financial issue and partially a political issue. As such, CDM would address some issues of funding and access of funding to developing economies.

So again I ask myself, why hasn’t this happened yet? A closer review of the body of evidence will reveal a host of issues – both nuanced and overt – that to date have kept CCS out of the CDM arena. One step in the right “policy” direction is an acceptable international standard for commercial geological storage of CO₂.

In late November 2010, a group of two dozen experts from the US and Canada met for two days in Calgary, Alberta to begin “a first step” in the international standardization of geological storage of CO₂. The plan is to produce the world’s first formally recognized CCS standard for commercial deployment. CSA Standards, a leading developer of standards, codes and personnel certification programs, and the International Performance Assessment Centre for Geologic Storage of Carbon Dioxide (IPAC-CO₂) have partnered to develop a bi-national American-Canadian carbon capture and storage standard for the geologic storage of carbon dioxide.

IPAC-CO₂ Research Inc., the International Performance Assessment Centre for Geologic Storage of Carbon Dioxide, is an environmental non-government organization committed to providing independent risk assessments to governments, industry and the public. IPAC-CO₂ Research Inc. was established in 2009 with \$14 million in funding from the Government of Saskatchewan, Royal Dutch Shell and the Government of Canada. The secretariat or administrative offices are located at the University of Regina and IPAC-CO₂ Research Inc. has established a global network of regional centers in eight countries on six continents.

CSA Standards is a leading standards-based solutions organization serving industry, government, consumers and other interested parties in North America and the global marketplace. Focusing on standards and codes development, application products, training, advisory and personnel certification services, the organization aims to enhance public safety, improve quality of life, preserve the environment and facilitate trade. CSA Standards is a division of CSA Group, also consisting of CSA International, which provides

testing and certification services for electrical, mechanical, plumbing, gas and a variety of other products; and On-SpeX, a provider of consumer product evaluation, inspection and advisory services for retailers and manufacturers.

CSA Standards and IPAC-CO₂ assembled this group and have drawn from experts with full GSC project life cycle knowledge and experience and will represent a balance of stakeholder interests. These experts come from government, industry, consulting, NGO's, and academia. Their areas of expertise cover management, siting, engineering, risk, closure and operations and are member of the Technical Committee. They will lead working groups of matrix managed skill sets to create the standards and CSA Standards will manage the process and shall be responsible for maintaining the standard.

As a first step prior to the November kick-off meeting in Calgary, the committee members reviewed existing “seed documents” that consisted of existing industry guidelines, best practices, and related standards. The Committee, with process and editorial support from CSA Standards, will be completely responsible for the content of the final standard. When complete, the bi-national American-Canada Consensus Standard will address the full geological carbon dioxide storage project life cycle including: site selection, operation, closure, and post-closure stewardship. The Standard will specify requirements for a commercial geological CCS project and will enable an organization/operator to:

- Follow best management practices and present-state knowledge to effectively select, design, construct, and manage a CCS project.
- Establish protocols for the quantification of and reporting on geological carbon storage consistent with industry and international norms and regulations.
- Evaluate the adherence of a project to best management practices and present-state knowledge throughout the life cycle of a CCS project.

The standards will provide guidance for site selection and development, operations, closure, and post-closure stewardship for CCS projects in geological formations that include enhanced oil recovery (EOR), gas or oil fields, saline formations, and enhanced coal bed methane recovery (ECBM).

Additionally, the standard will provide technological and associated infrastructure solutions for geological assessment, well construction, operation and maintenance, and well abandonment. The management systems framework for CCS projects will address risk and quality management, public and worker health and safety, public consultation and comment, and environmental health and other impacts. Finally the standard will deal with quantification and definition of methodology, validation and verification, permanence and leakage, and reporting.

Subject matter experts act as leads on six committees that are broken down into the major categories of:

- Management
- Site Selection Characterization
- Risk assessment
- Development and Operations
- Monitoring and Verification
- Closure

Each of the technical leads also serve as committee members on other committees to ensure a cross pollination of the required subject matter. Many hours meeting, calling and writing have occurred since the Calgary kick-off meeting. Many more are expected. The full committee plans to meet this June in Denver, Colorado to begin the next round of review and revision.

Summary

EOR will continue to lead the way as an early entrant into the CCS project world. EOR provides an opportunity to address both climate and energy security. The role of government in the world-view of CCS is very important. Without the financial incentives provided by the governments around the globe, the rollout of numerous large-scale CCS projects is not likely.

It is expected that this standard is completed sometime in late 2011. It is intended that the new standard will be used as a basis for the promotion of international standards through the International Organization for Standardization (ISO). Is the development a bi-national American-Canadian carbon capture and storage standard for the geologic storage of carbon dioxide the answer? It is at least a good first step toward that end.

References

Advanced Resources International, 2010, U.S. Oil Production Potential from Accelerated Deployment of Carbon Capture and Storage, Ari CCS-CO₂-EOR White Paper Final: Advanced Resources International, Inc. (ARI), prepared for the Natural Resources Defense Council. Web accessed 19 October 2011, <http://www.scribd.com/doc/28164570/Ari-Ccs-co2-Eor-Whitepaper-Final-3-10-10>

Sa, H., and Nell, L., 2011, Making the case for CCS in the CDM: Carbon Capture Journal, January 10, 2011. Web accessed 19 October 2011, <http://www.carboncapturejournal.com/displaynews.php?NewsID=713>

Zakkour, P., E. King, G. Cook, N. Maruyama, and S. Rana (principal researchers), 2008, Carbon Dioxide Capture and Storage in the Clean Development Mechanism: Assessing market effects of inclusion: Internal Energy Agency Greenhouse Gas R&D Programme (IEAGHG), November 2008, Technical Study Report Number: 2008/13. Web accessed 19 October 2011, http://www.ieaghg.org/docs/general_publications/2008_13.pdf



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The Case for CCS as a CDM

Outline

2 Background CDM CCS Progress

1. Brief Background
2. What is a CDM?
3. Why CCS?
4. Progress



Why are we here- Carbon Cycle

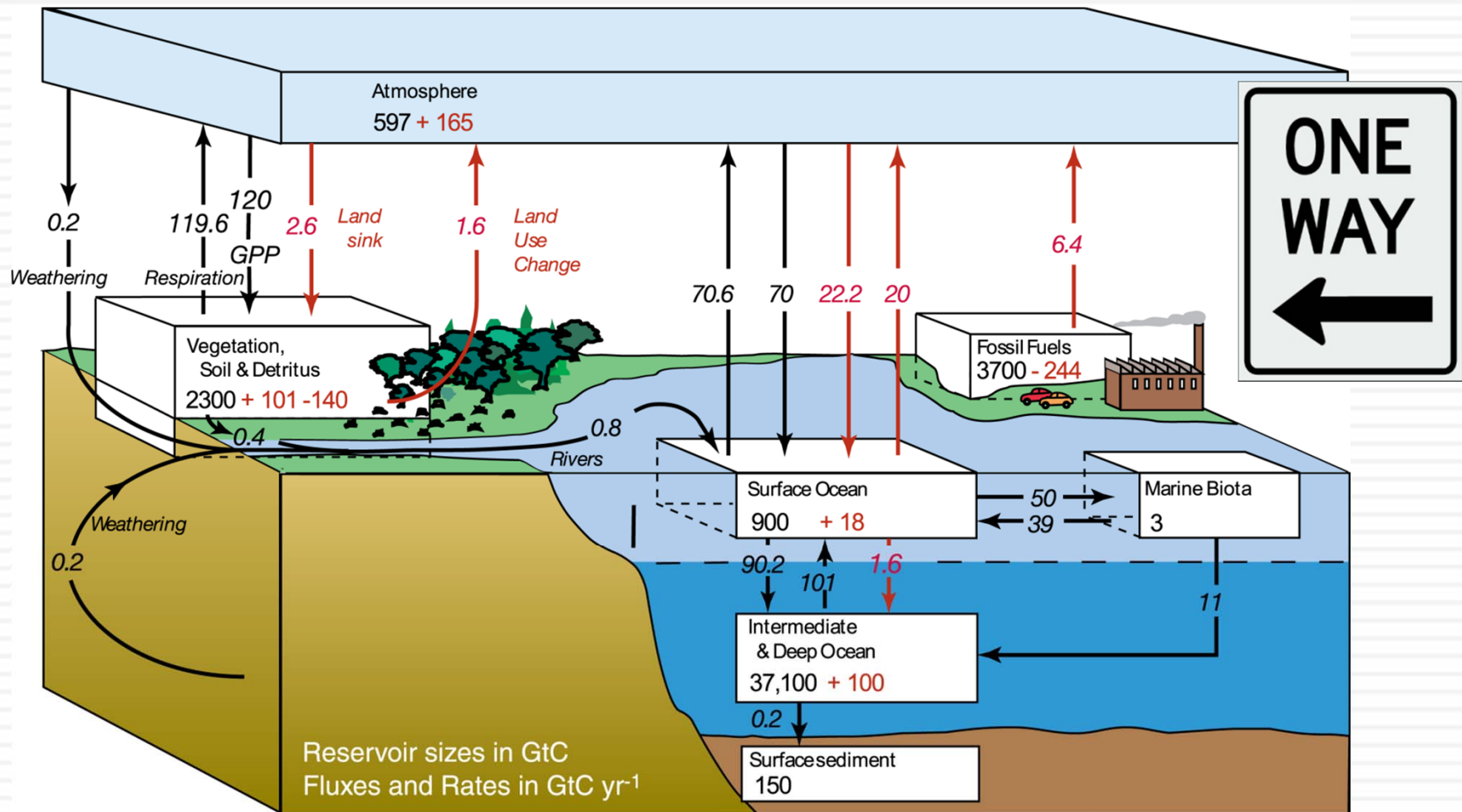
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Background

CCS

Regulations

Path Forward



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What and how do we count?

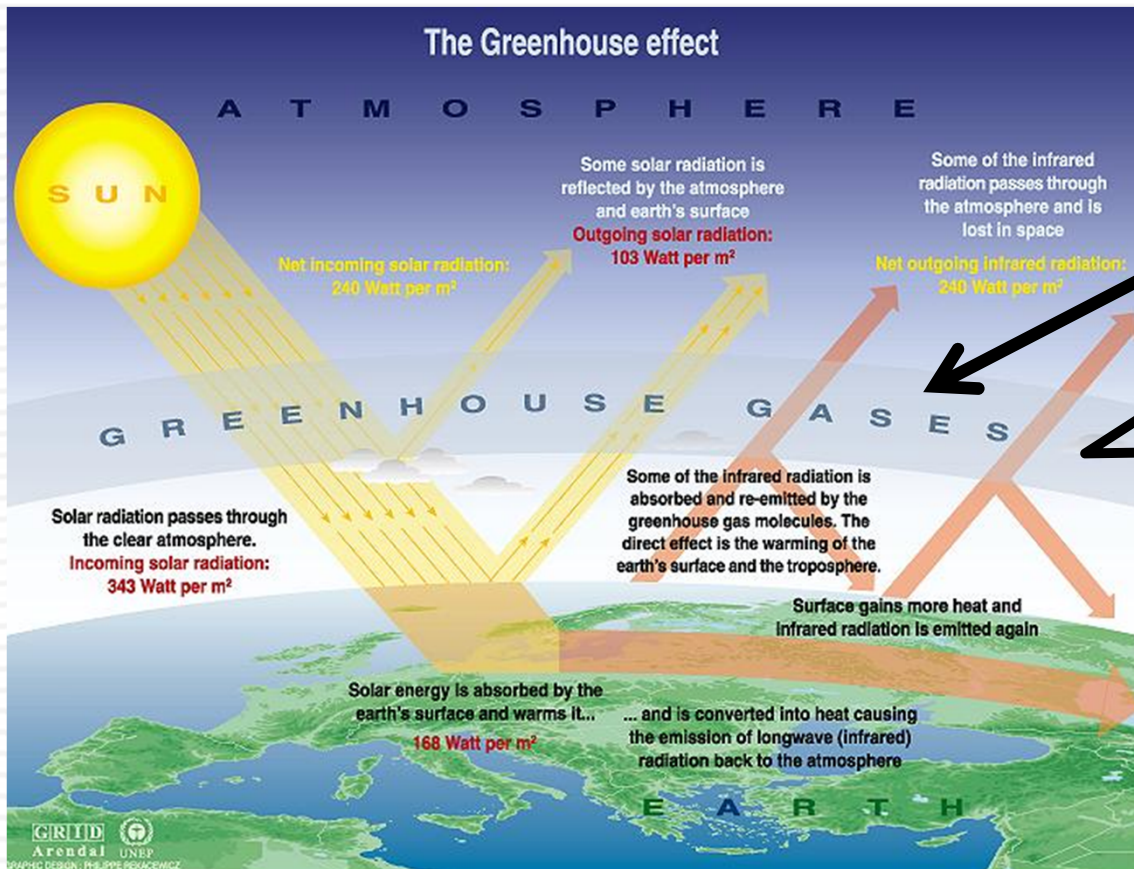
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Background

CCS

Regulations

Path Forward



Greenhouse Gas	GWP (SAR, 1996)
CO ₂	1
CH ₄	21
N ₂ O	310
HFC-134a	1,300
HFC-125	2,800
SF ₆	23,900

The GHG's cause heat build-up and it's ability to do so is relative to the GWP compared to CO₂ as a constant of 1.

*Therefore: 1+1+1 ≠ 3
= 332 CO₂e*

Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

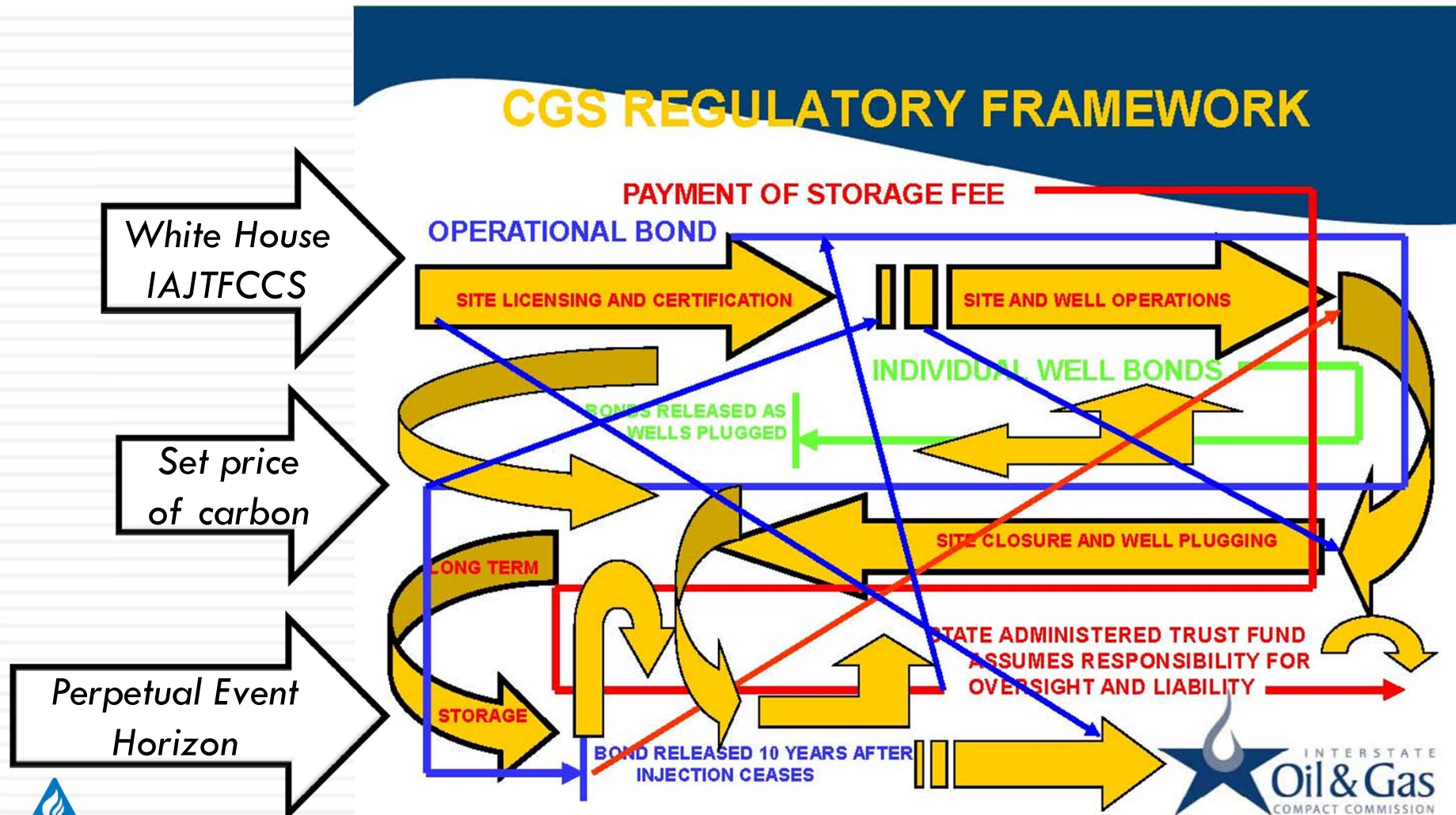


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CCS Road Map = Political Mechanism

5

Background



DOE – NETL 10th Annual CCS Conference

6

Background

“Building on a Decade of Progress to Assure
Commercial Deployment”

Stuart Dalton, Director of Generation, EPRI concluded
his plenary presentation discussing EOR as it relates to
CCS...

*“Policy trumps funding and funding
trump technology”*

...CCS as a CDM is not a technological issue!



What is a CDM?

7

Background

CDM

CCS

Progress

- ❑ Established under the Kyoto Protocol
- ❑ Managed by the United Nations Framework Convention on Climate Change (UNFCCC)
- ❑ Primary International Offset Program for GHG reduction in developing countries
- ❑ Generates Certified Emission Reductions (CER) or “carbon credits” = financial mechanism for implementation



GHG offset under CDM must be:

8

Background

CDM

CCS

Progress

1. Additional(ity) – in addition to BAU
2. Measurable – MVA, MMV, MRV
3. Independently Audited – 3rd party, no OCI
4. Unambiguously Owned – based clearly on domestic and international law, no double counting
5. Address/Account for leakage – outside of the project boundary – MVA, MMV, MRV
6. Permanent – non-reversible



Types of CDM Projects

9

Background

CDM

CCS

Progress

- Afforestation
- Electric generation fuel switching
- SF₆ emission reductions
- Landfill methane (CH₄) collection
- CMM
- VAM
- Manure management



Why CCS?

10

Background

CDM

CCS

Progress

- ◆ >50% Base load power comes from coal/fossil fuel
- ◆ Fossil fuel power generation won't occur without CCS
- ◆ 87% of all CCS projects are in NA, Europe & Australia
- ◆ NA, Europe & Australia are NOT developing economies
- ◆ USA is NOT a signatory the Kyoto Protocol



Progress:

11

Background

CDM

CCS

Progress

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How do you bring these together?

12

Background

CDM

CCS

Progress

- ☑ UNFCCC
- ☑ Canadian Provincial Govt's
- ☑ ISO
- ☑ DOE
- ☑ DOI – MMS, BOEMRE, BOEM
- ☑ EPA- UIC, MRR
- ☑ State, County and local laws



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World's first formally recognized CCS standard – Geologic Storage

13

Background

CDM

CCS

Progress

- ✓ International Standards Organization - 31000, 17024, 14064, 14065
- ✓ International Performance Assessment Centre for Geologic Storage of CO₂ – Seed document
- ✓ Canadian Standards Association - ISO Secretariat, standards developer
- ✓ Bi-national agreement between USA & Canada



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Voting Technical Committee Members

14

Background

CDM

CCS

Progress



Denbury Resources Inc.



IEA GHG
WEYBURN-MIDALE
CO₂ MONITORING
AND STORAGE PROJECT



HALLIBURTON

Solving challenges.™

Schlumberger



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TOC and Working Groups (4.0-9.0)

15

Background

CDM

CCS

Progress

- 1.0 *Scope*
- 2.0 *Reserved*
- 3.0 *Reserved*
- 4.0 ***Management Systems***
- 5.0 ***Site screening, selection & characterization***
- 6.0 ***Risk Management***
- 7.0 ***Site Development***
- 8.0 ***Monitoring, verification and accounting (MVA)***
- 9.0 ***Closure***



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Must INCLUDE any and all...

16

Background

CDM

CCS

Progress

- *UNFCCC - IPCC*
- *ISO*
- *EU European Directives*
- *CSA*
- *DOE*
- *WRI*
- *IPAC-CO2*
- *Federal, Provincial, State regulations*
- *Future expected directives*

All-Inclusive



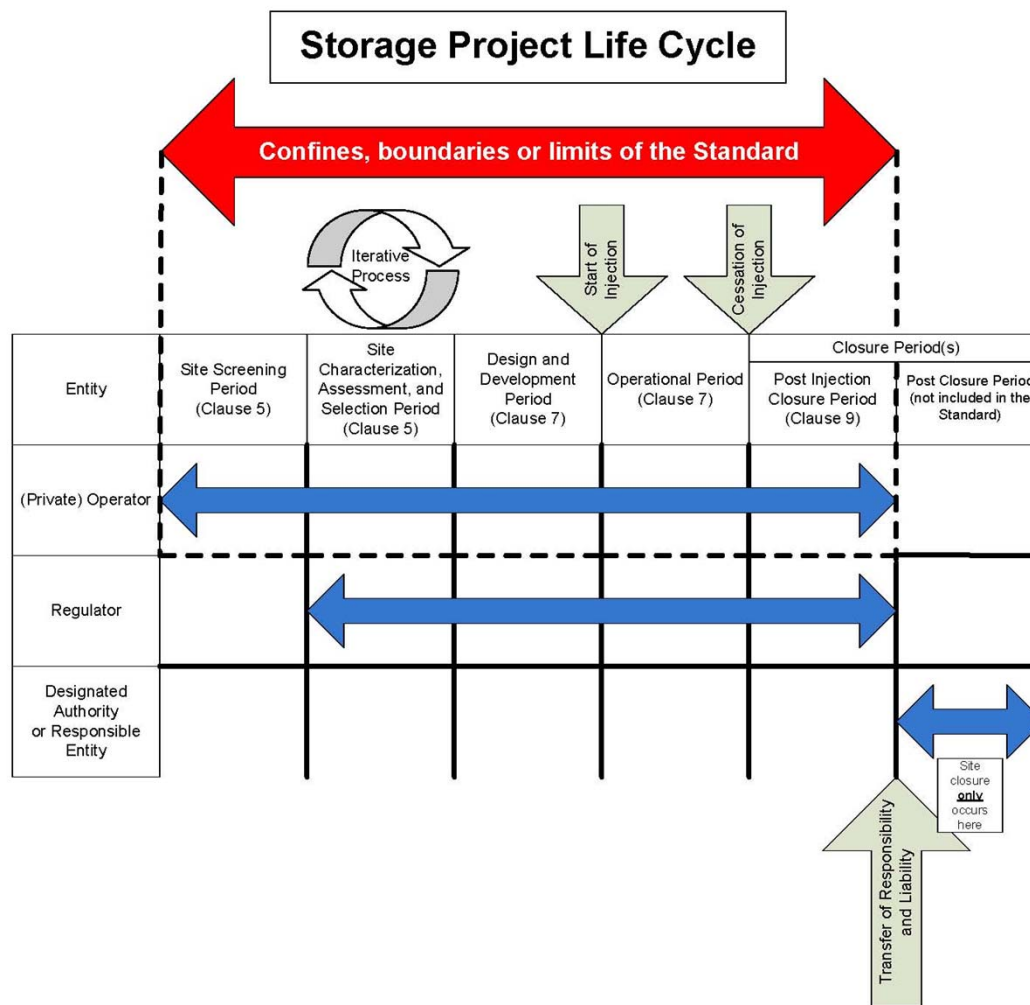
Club Viva Fortuna



40 people, beer, pizza & hockey

17

40 = 52 = 47



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Schedule & Participation

18

Background

CDM

CCS

Progress

- *December 2010 – Calgary, KO meeting*
- *January to May 2011 - Monthly CC*
- *June 2011 – Denver full committee meeting*
- ***September 2011 – public comment***
- *November 2011 – incorporate public comment*
- *January 2012 – issue to ISO for review*



Questions, Comments, Concerns...

19

Background

MRR

PSD

Others



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