CCS in Clean Development Mechanism

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IEA Greenhouse Gas R&D Programme

CCS Opportunities in CCOP Region

CCOP-EEPM Workshop (Indonesia)

September 2012

CCS in CDM
Feedback & Work Ahead

CMP7/COP17 Durban:

- Milestone for climate agreements
- Milestone for CCS
- IEAGHG role

UNFCC and CCS

- ***Five negotiating bodies relevant to CCS:***

- ***UNFCCC:***
  - COP – Conference of the Parties to the UNFCCC (194 Parties)
  - AWG-LCA – Ad Hoc Working Group on Long-term Cooperative Action

- ***Kyoto Protocol:***
  - CMP – Conference of the Parties serving as a Meeting of the Parties to the Kyoto Protocol (191 Parties, 37 ‘developed‘ countries)
  - AWG-KP – Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (Post 2012)

- ***SBSTA – Subsidiary Body for Scientific and Technological Advice***

Kyoto Protocol and CCS

Considering CCS in CDM since 2005

- 2005 CDM Executive Board (EB) considered two PDDs for CCS
  - Vietnam (White Tiger Project) & Malaysia (Bintulu – Petronas LNG Project)
- 2005 CMP1 Montreal - referred to SBSTA
- 2006 SBSTA Technical workshops in Bonn
- On agenda of each SBSTA meeting
- 2007 and 2008 Submissions from Parties and NGOs – two synthesis reports
- 2008 Decision due at CMP4/COP14 Poznan – failed
- 2009 EB commission 'Experts Report'
- 2009 Decision due at CMP5/COP15 Copenhagen – failed

IEAGHG contributions

- **'Reports: '*Use of CDM for CCS*' 2004; '*ERM – CCS in CDM*' 2007; '*CCS in CDM: Market Effects*' 2008**
- **Two IEAGHG workshops**
- **Contribution to UNFCCC 'Experts Report'**
- **Numerous presentations in Side Events and Support to members' negotiators**

Kyoto Protocol and CCS.....

- Considering CCS in CDM since 2005
  - 2010 CMP6/COP16 Cancun - CCS is eligible provided that certain ‘issues’ are addressed.
  - IEAGHG decided to use its storage Research Networks to address Cancun issues (Modelling, Monitoring, Risk Assessment)
  - 2011 Technical Workshop in Abu Dhabi

Technical Workshop, Abu Dhabi 7-8 Sep 2011

Science Intersects with Policy

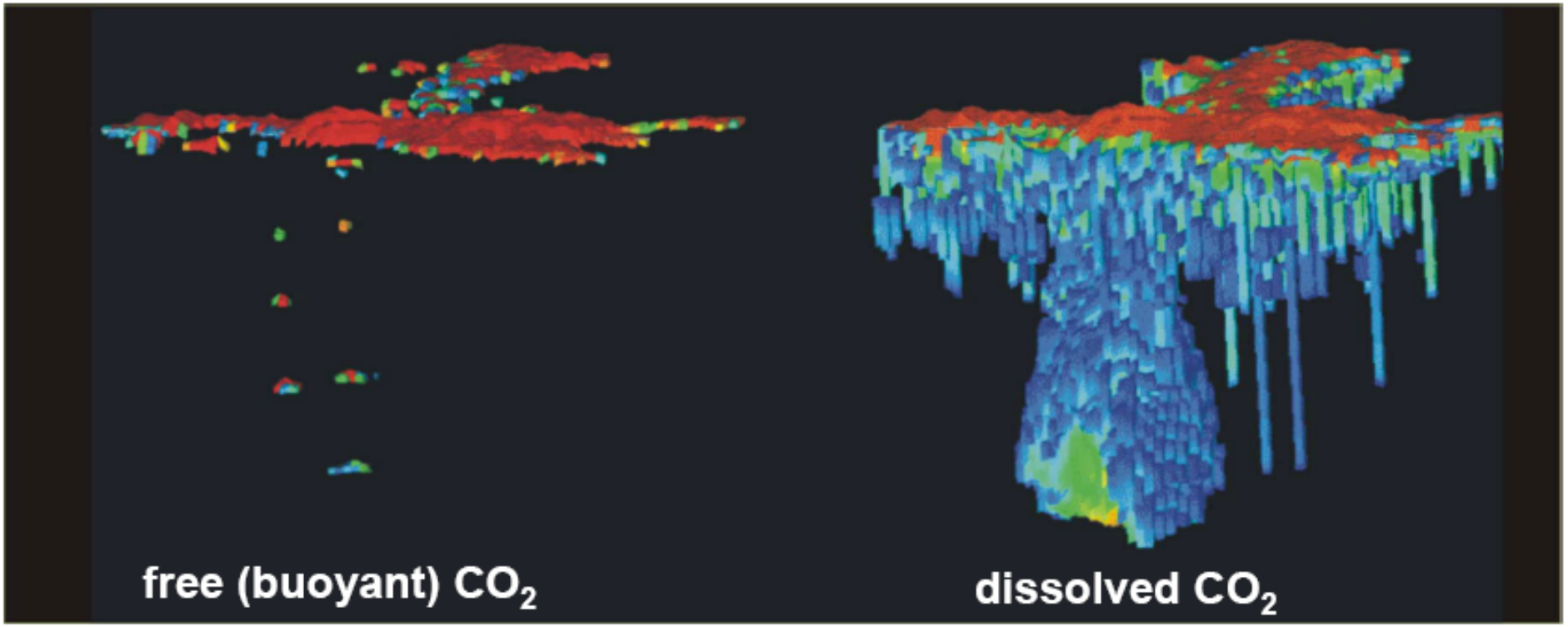
- Brought technical expertise to UNFCCC negotiators
- Technical experts on site selection; modelling; accounting; project boundaries; transboundary; risk assessment; environmental impacts; monitoring; liability (28 talks, several members of IEAGHG Networks (arranged and briefed by IEAGHG), results from IEAGHG Networks).
- Results and experiences from real projects and natural systems, to support modelling and risk assessments
- Good Q&As from CCS negotiators and others

This meeting allows the negotiators to be in touch with experts to clarify questions et. al. that are relevant to CCS and CDM

Courtesy A.Chadwick 2011

Sleipner predicted stabilization

(250 years after injection)

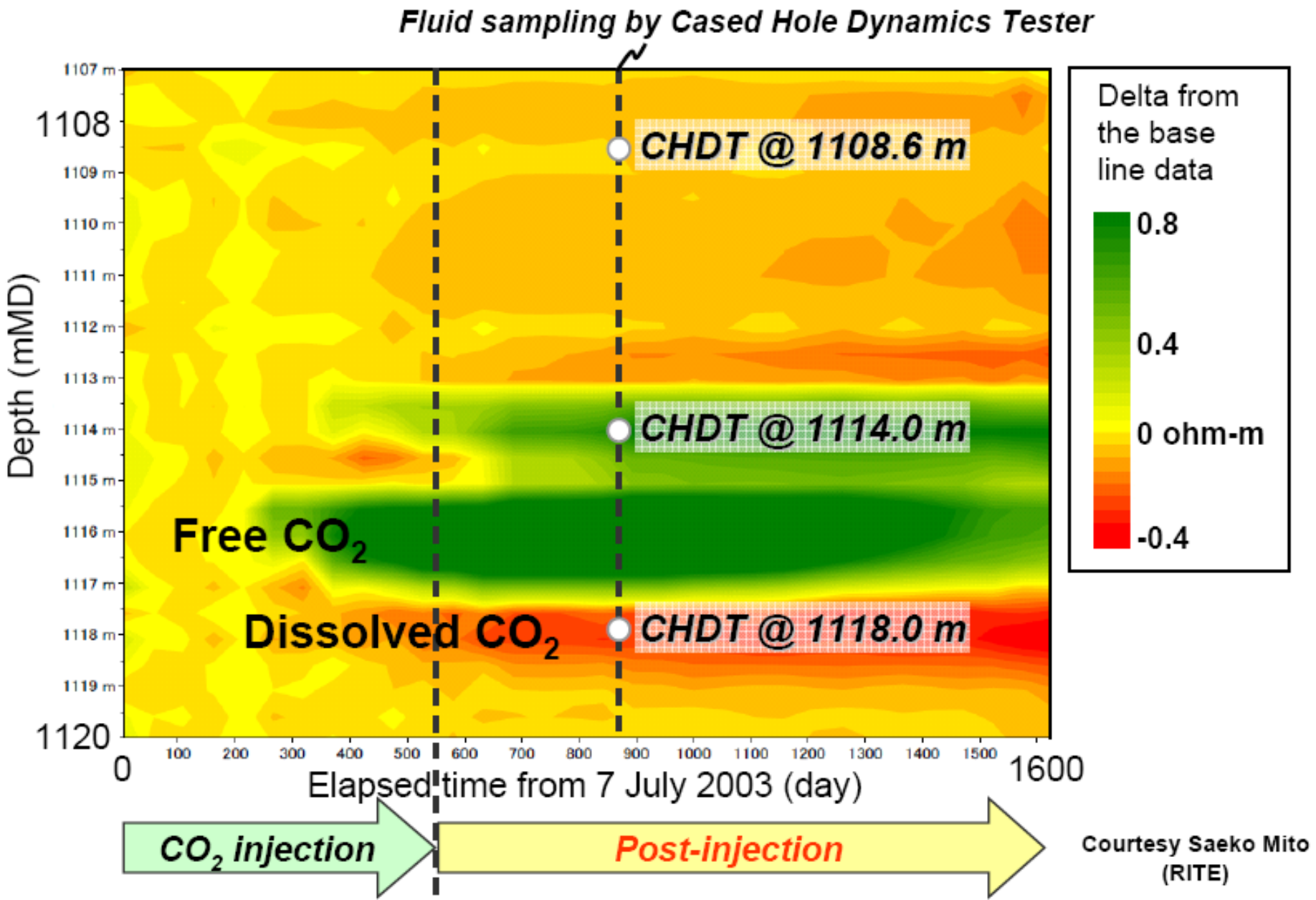


[Courtesy Erik Lindeberg]

Onset of dissolution: gravitational stabilization

Post-injection monitoring at Nagaoka (Japan)

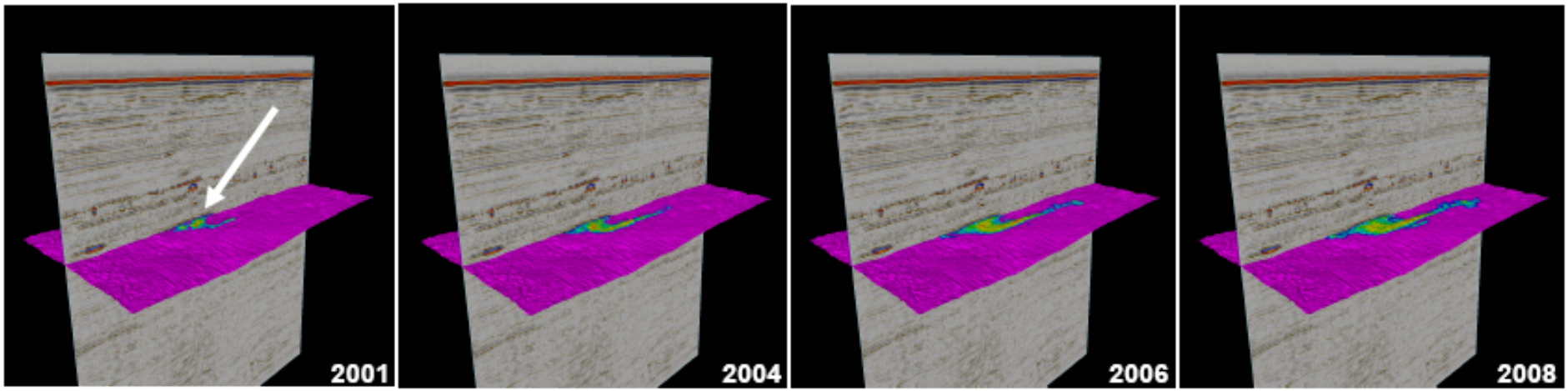
Courtesy A.Chadwick 2011

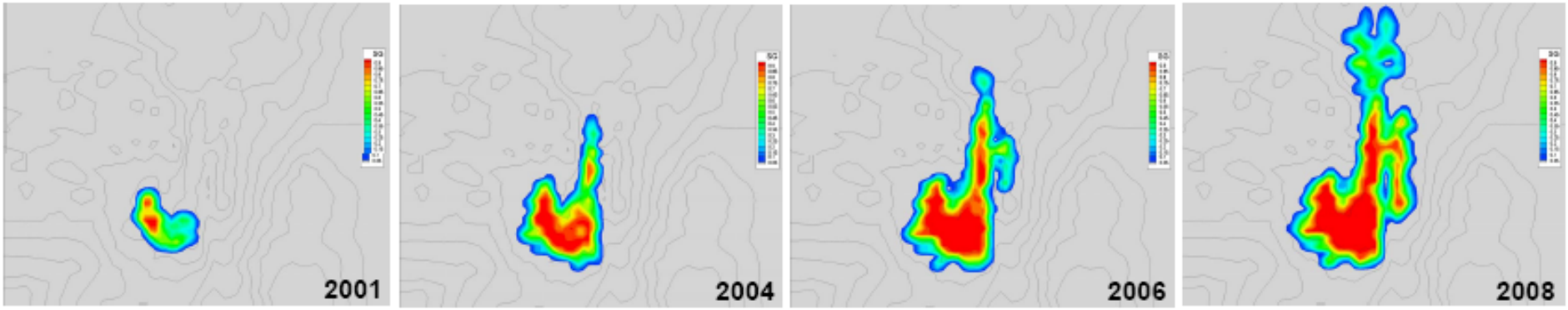


History-matching plume migration at Sleipner (3)

Courtesy A.Chadwick 2011

observed layer growth





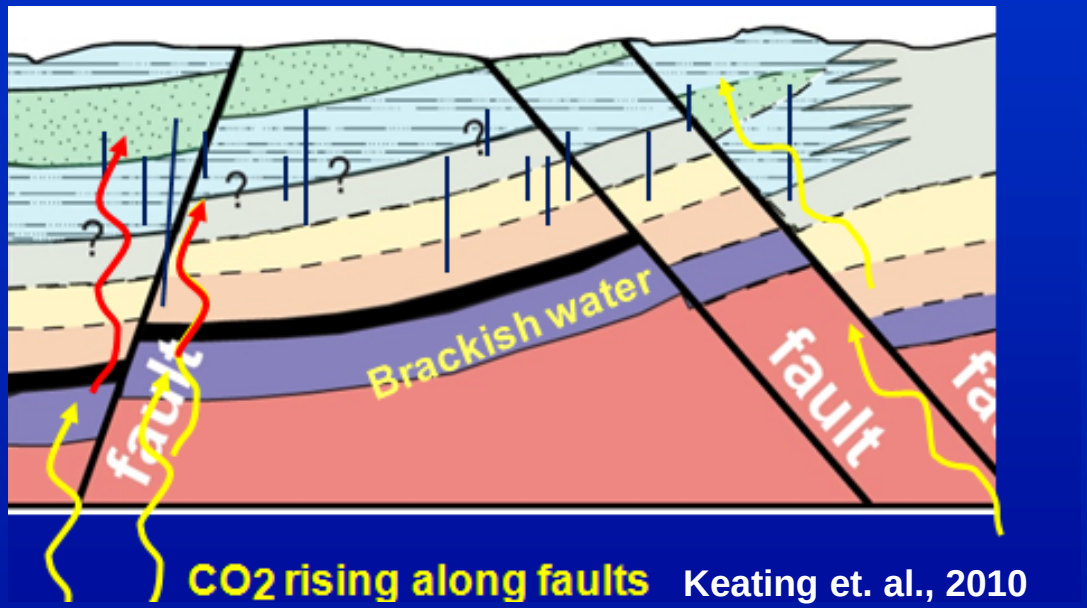
numerical flow simulation of layer growth

Match imperfect but sufficient to prove understanding of process

Scope for divergence in long-term predictions is limited

Courtesy K.Romanak 2011

Brine Impacts: Natural Analog Chimayo, New Mexico, USA



Keating et. al., 2010

- Integrated field, lab and modeling.
- Trace elements are strongly associated with brackish water; in-situ mobilization is negligible
- Mineral precipitation decreases metal concentrations

Impact of Technical Workshop

Technical Workshop, Abu Dhabi, 7-8 Sep 2011

Outcomes:

- Number of issues of concern shrunk considerably
- Liability remained as genuine concern – part technical, part policy issue
- UNFCCC then produced draft Modalities and Procedures (M&Ps) drawing upon the workshop and synthesis report, 20 pages of detail, the basis for negotiations in Durban

CMP7/COP17 Durban 2011 Negotiations on CCS CDM

- Over 32 hours of formal negotiations
  - "Do we have technology to monitor groundwater impacts?"
    - An example of <u>questions</u> from delegate who have not attended the Technical Workshop in Durban
  - "Definition of seepage should include CO_2 dissolved in groundwater migrating to ocean or atmosphere"
    - An example of questions from delegate who have attended the Durban workshop

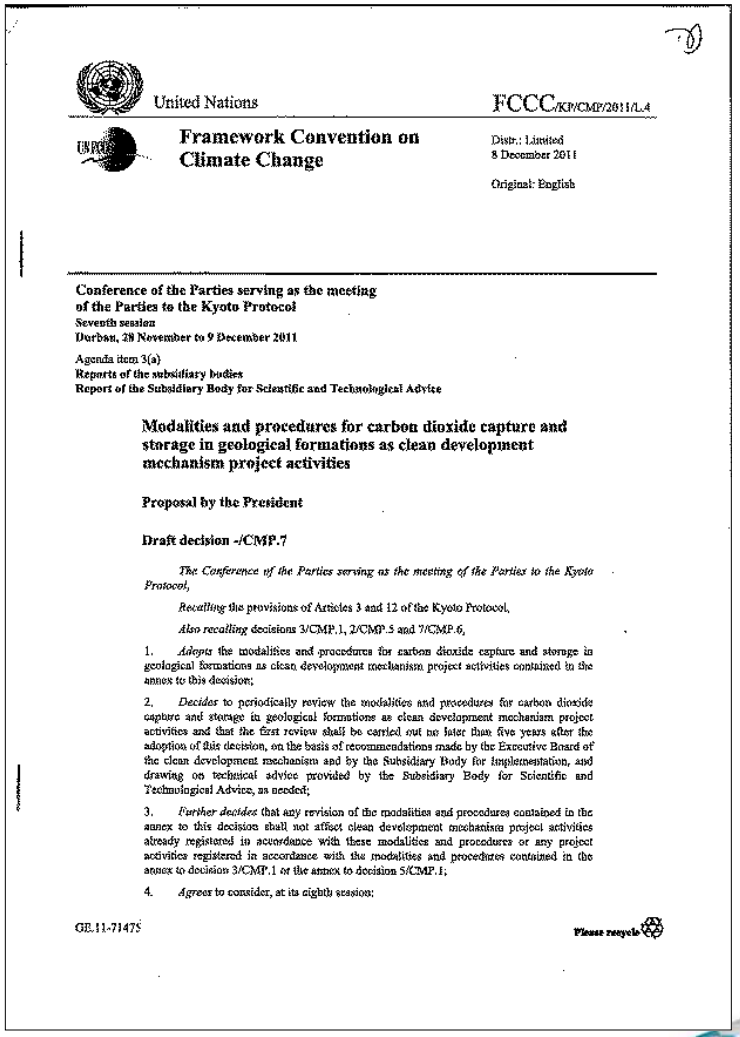
Courtesy H.Olson UT

Information into UNFCCC

- SBSTA work (including occasional workshops)
- Side events (official, unofficial)
  - One official Side event in Durban on CCS (CCSA with IEAGHG)
- Booths

Modalities & Procedures for CCS in CDM

- **Agreed and adopted Modalities and Procedures !**
- Decision 10/CMP.7 (final draft was FCCC/KP/CMP/2011/L.4)
- http://unfccc.int/2860.php



United Nations FCCC/KP/CMP/2011/L.4

Framework Convention on Climate Change

Distr.: Limited
8 December 2011

Original: English

Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
Seventh session
Durban, 28 November to 9 December 2011

Agenda item 3(a)
Reports of the subsidiary bodies
Report of the Subsidiary Body for Scientific and Technological Advice

Modalities and procedures for carbon dioxide capture and storage in geological formations as clean development mechanism project activities

Proposal by the President

Draft decision -/CMP.7

The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol,

Recalling the provisions of Articles 3 and 12 of the Kyoto Protocol,

Also recalling decisions 3/CMP.1, 2/CMP.5 and 7/CMP.6,

1. *Adopts* the modalities and procedures for carbon dioxide capture and storage in geological formations as clean development mechanism project activities contained in the annex to this decision;

2. *Decides* to periodically review the modalities and procedures for carbon dioxide capture and storage in geological formations as clean development mechanism project activities and that the first review shall be carried out no later than five years after the adoption of this decision, on the basis of recommendations made by the Executive Board of the clean development mechanism and by the Subsidiary Body for Implementation, and drawing on technical advice provided by the Subsidiary Body for Scientific and Technological Advice, as needed;

3. *Further decides* that any revision of the modalities and procedures contained in the annex to this decision shall not affect clean development mechanism project activities already registered in accordance with these modalities and procedures or any project activities registered in accordance with the modalities and procedures contained in the annex to decision 3/CMP.1 or the annex to decision 5/CMP.1;

4. *Agrees* to consider, at its eighth session:

GE.11-71475

Please recycle

Modalities & Procedures for CCS in CDM

CDM Modalities and Procedures (M&Ps)

- Apply mutatis mutandis (use existing as much as possible) with the addition of the CCS-specific M&Ps

Definitions:

- Seepage – transfer of CO_2 ultimately to atmosphere or ocean
- Net reversal of storage – seepage exceeds emission reductions during operational period, or seepage after project close

M&Ps - Requirements

DOEs – CCS expertise

Participation Requirements

- Host to establish regulations to control and permit CCS. To include site selection and characterisation, storage rights, redress for affected entities, remediation, liability.

Validation by DOEs

- Site characterisation, risk and safety assessment, environmental and socio-economic assessment, liability provisions, financial provision.
- Host country has to agree to financial provision and liability
- Whether host country agrees to responsibility for net reversal of storage

M&Ps - Liability

- **Treatment of local liability** - *health, safety, environmental impacts*
  - Participation requirement; host party establish national laws and regulations that address local liability
- Liable entity identified for each phase of project lifecycle
  - Project participants liable from operation phase until transfer of liability
  - Transfer of liability to host party after monitoring period ends (20 yrs after crediting period)
- **Treatment of climate liability** - *obligations to surrender allowances for "net reversal of storage"*
  - Any CO_2 seepage results in retirement of credits equivalent to seepage emissions
  - Host party has 2 options;
    - Ultimate responsibility resides with the host party
    - Ultimate responsibility resides with developed country using the credits, i.e. a buyer liability.

M&Ps – Provisions

- **Financial provisions**
  - Project participants establish financial provision ahead of project proceeding
  - Host party agrees to the financial provision
    - Appears to provide the flexibility to choose the most appropriate instruments

- **CER Reserve Account**
  - 5% of issued CERs held in reserve account for the purpose of accounting for “net reversal of storage”
  - CERs released once the last certification report has been received, i.e. at least 20 years after crediting period

M&Ps – Project Closure

- CDM project closure when monitoring stops

- Monitoring stops when:
  - Not less than 20 years after last CDM crediting period
  - No seepage observed in previous 10 years
  - All available evidence from observations and modelling indicates CO_2 will be completely isolated from the atmosphere in the long-term
    - History matching of modelling and monitoring
    - Modelling confirms no future seepage expected
- Enables transfer of liability to host party
- Enables final certification report, which triggers release of CERs from Reserve Account to project participants

Significance of CCS M&Ps from Durban

- **Allows CCS to be CDM project activity and earn CERs**
- Create incentives / signal for CCS in developing countries
  - CDM key international mechanism supporting low-C technology in developing countries
- Legitimises CCS as valid technology for developing countries
- Establishes precedence-setting regulatory framework for CCS funded under international mechanisms

- **Assisted and enabled by getting science and technology into the UNFCCC negotiations**

Durban Outcomes CMP7/COP17

Durban Platform for Enhanced Action

- New negotiating process established (AWG on the Durban Platform for Enhanced Action);
- Recognises that current emission pledges inadequate <2°C
- Process to develop “protocol, another legal instrument or outcome…with legal force” for <u>all Parties</u>
- Timeline;
  - Process to completed no later than 2015
  - Implemented by 2020

Durban Outcomes CMP7/COP17

- **AWG KP: Parties agreed to have Kyoto Protocol 2nd Commitment period**
  - 2nd Commitment period commences 1st January 2013 and ends 31 December 2017 or 2020
  - Continued project-based mechanisms (CDM)

- **AWG LCA:**
- New Market Mechanism to be developed
- Technology Mechanism
- Green Climate Fund

Work Ahead

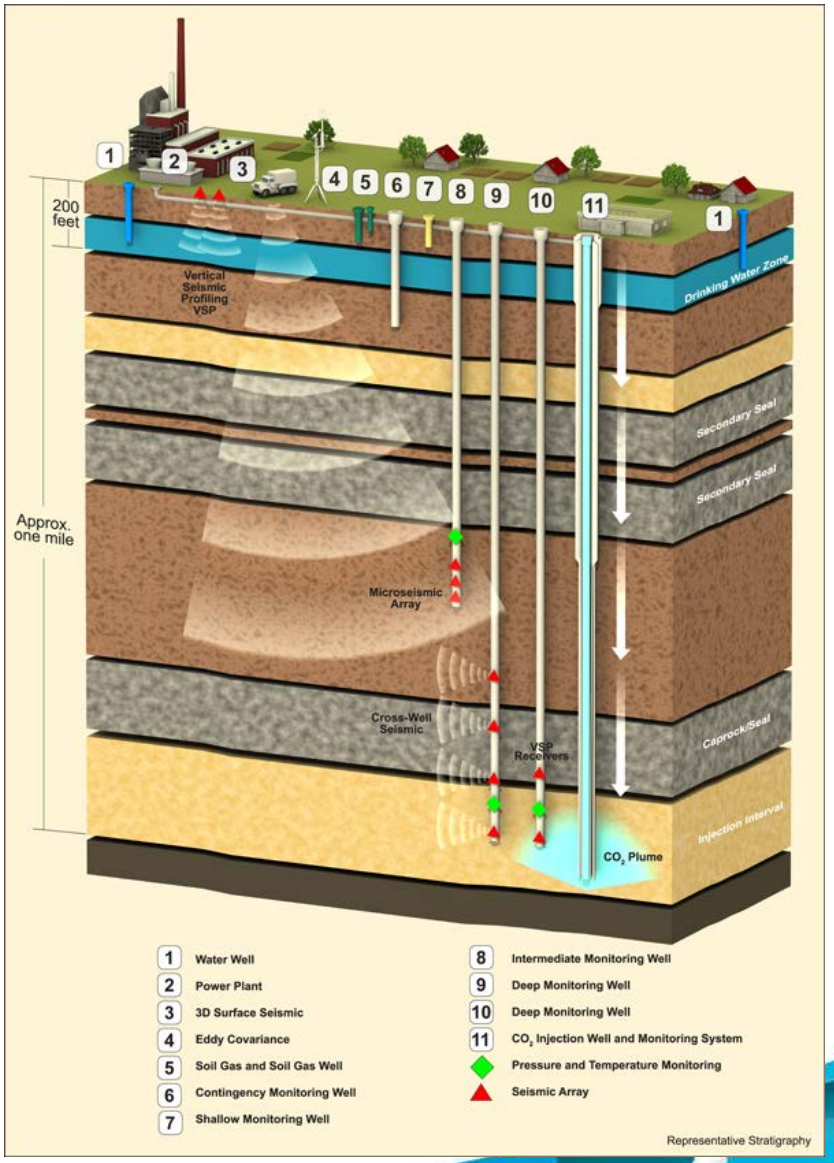
- UNFCCC work on CDM documents (Standards, Procedures, Guidelines, Forms) over 2012-13
  - Bonn Workshop 25 March – IEAGHG (T.Dixon) was invited to present on “Implementation of CCS CDM – Use of Best Practice from Both Guidelines and Recent Projects”
  - CDM EB – CCS Working Group of experts
- UNFCCC Negotiations:
  - Transboundary CCS
  - Global reserve of CERs
    - Submissions (by 5 March)
    - Consideration by SBSTA 36 (May 2012, Bonn)
    - Draft decision to CMP8/COP18 (Dec 2012, Qatar)
- IEAGHG will continue to contribute, via UK DECC and EU, and as IEAGHG with IEA, CCSA, GCCSI

Regulatory Developments in other Regions

- Australia
  - Offshore using Petroleum and GHG Storage Act (2008)
  - Onshore in Victoria, Queensland, WA
- USA
  - US EPA have developed Federal level regulations “Rule” for CO_2 storage and for Reporting of Emissions from Capture and Storage
  - Interstate Oil and Gas Compact Commission developed recommendations for regulations for CO2 storage at a State Level
  - Individual state regulation (KS, LA, TX, WY, ND, MT, etc)
- Canada
  - Canada – acid gas injection and CO2-EOR already permitted in states like Alberta
  - Alberta CCS Amendments Act 2010
- Japan
  - Adapted marine laws

Concluding Remarks…

- To implement CCS in CDM – a Regulatory Framework is essential.
- An important element of implementing CCS under CDM requires a good Monitoring, Verification and Accountability (MVA)
- Picture courtesy of FUTUREGEN2



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- IEA
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