



International Regulatory Developments for CCS

Tim Dixon

IEA Greenhouse Gas R&D Programme

Wellington, New Zealand

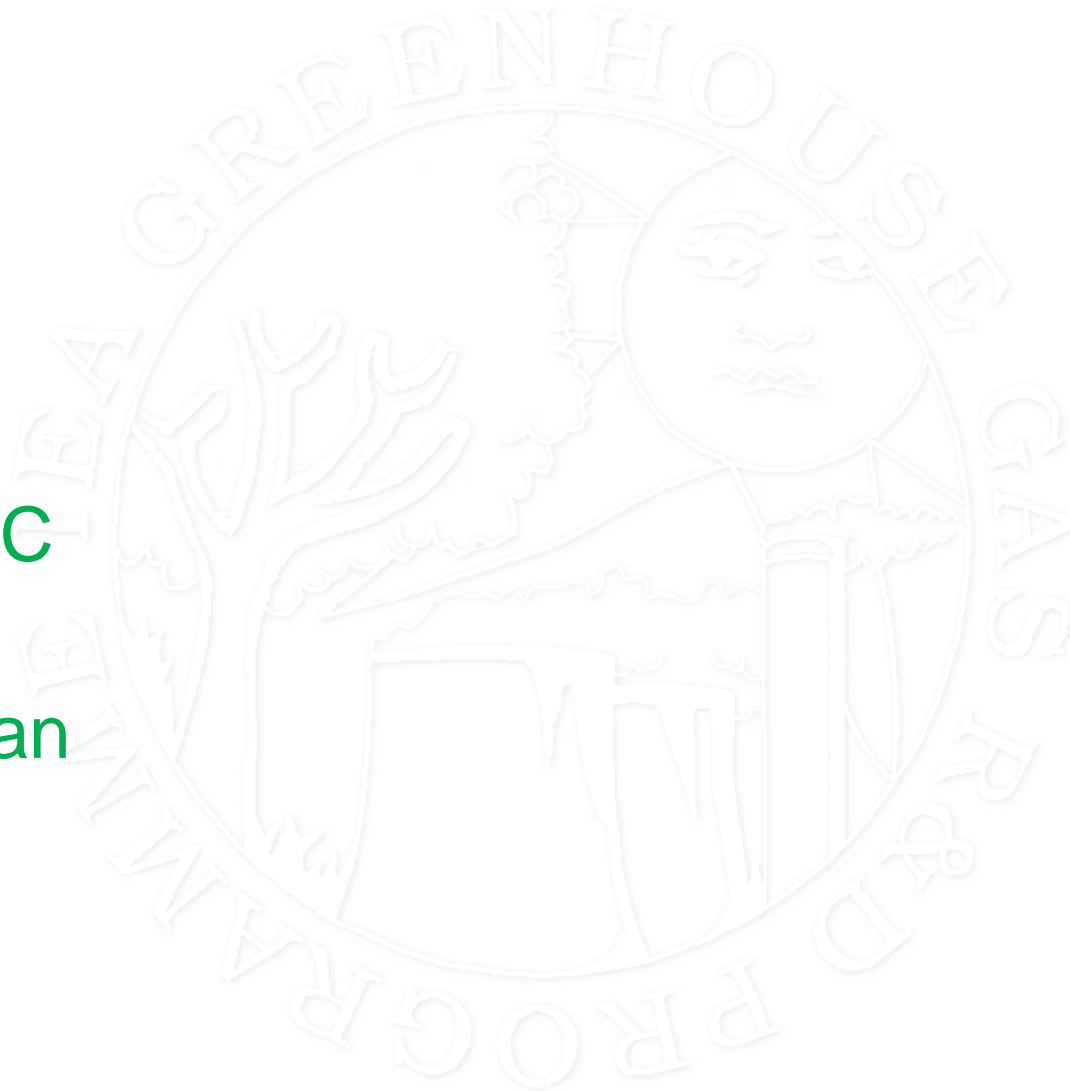
27 April 2009



IEA Greenhouse Gas R&D Programme



- IPCC
- Marine
- EU
- UNFCCC
- UK
- Australian
- Other





IPCC Guidelines for GHG Inventories



- Apr 2006
- Vol 2 Energy, Chp 5 - *CO₂ Transport, Injection and Geological Storage*
- Each site will have different characteristics
- **Methodology**

Site characterisation – inc leakage pathways



Assessment of risk of leakage – simulation / modelling



Monitoring – monitoring plan



Reporting – inc CO₂ inj and emissions from storage site

- For appropriately selected and managed sites, supports **zero leakage** assumption unless monitoring indicates otherwise

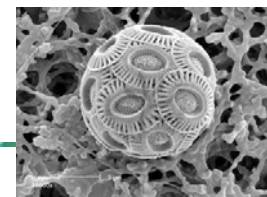


London Convention and Protocol

- Marine Treaty - Global agreement regulating disposal of wastes and other matter at sea
- Convention 1972 (83 countries), Protocol 1996 – ratified March 2006 (35 countries)
- Prohibited some CCS project configurations

CCS work

- Assessed by LC Scientific Group
- 2006 - Risk Assessment Framework for CO₂
- To allow prohibited CCS Configurations - **amendment adopted** at 28th Consultative Meeting, 2 Nov 2006 - came into force 10 Feb 2007 **to allow disposal in geological formations**
- CO₂ Specific Guidelines





Unresolved issue – Transboundary transport

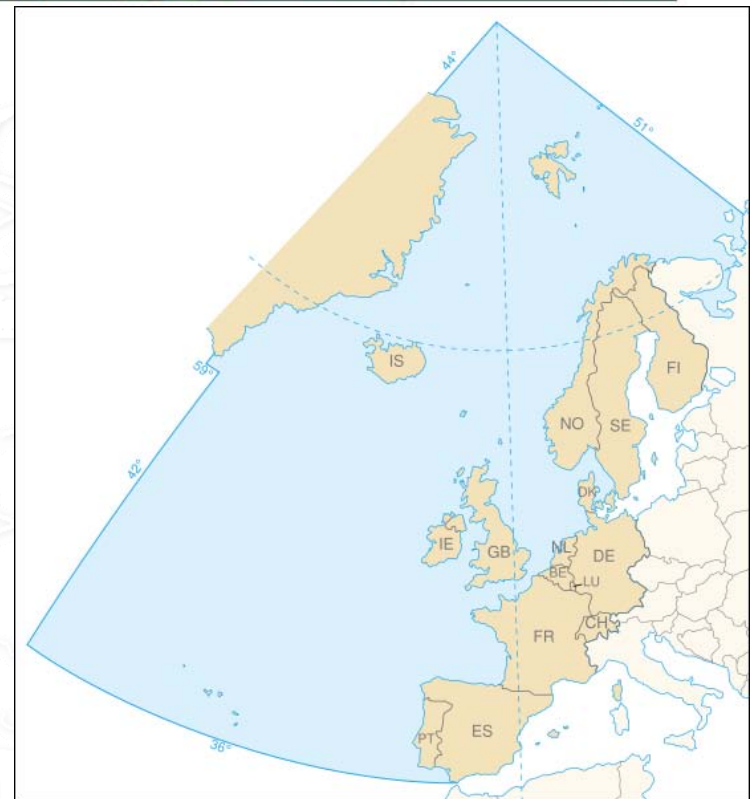
London Protocol

- Article 6 prohibits export, including CO₂
- Working Group (Feb 08, Germany) – covering transport and subsurface migration
 - Agreed amendment Article 6 necessary – drafted:
- Amendment not proposed yet
- Adoption needs two thirds majority voting and then two thirds all Parties ratifying – will take some time!
- Implications for CCS
- Annual meeting Oct08 considered further. Some against, some for. Agreed plenary statement to give a political message that “***LP should not create barrier to transboundary transport of CO₂ for CCS***”.
- Further Working Group in 2009 to take forward legal questions



OSPAR

- Marine Treaty for NE Atlantic
- 15 nations and EC
- Prohibited some CCS configurations
- Considered CCS and CO₂ impacts on seas
- To allow prohibited CCS configurations - **OSPAR amendments** (to Annexes II and III) for CO₂ storage **adopted June 2007** - but need ratification by 7 Parties
- **OSPAR Decision** – requirement to use Guidelines when permitting.
- **OSPAR Guidelines** for Risk Assessment and Management of Storage of CO₂ in Geological Formations – includes the Framework for Risk Assessment and Management (FRAM)
- Storage in water column prohibited





CCS Directive and ETS Directive

Launched 23 Jan 2008

Agreed 12 Dec EU Council and 16 Dec EP !

Issued 6 April 2009



EU CCS Directive (1)

Enabling regulatory framework to ensure environmentally sound CCS (23 Jan 2008)

- Follows IPCC GHG Guidelines and OSPAR
- Objective is permanent storage
- Ocean storage prohibited
- Permits will be required for CCS – exploration and storage
- Storage permit only if “no significant risk of leakage”
- Emphasis on site selection, characterisation, risk assessment, monitoring plan
- Corrective measures plan, and provisional post-closure plan



EU CCS Directive (2)

- Permits - EC has right to review permit decisions – non-binding opinion
- Permits – review by authority after 5 years and then every 10 years
- CO₂ stream acceptance criteria - “overwhelmingly CO₂” – may contain impurities, levels based on risk assessment of integrity – no wastes to be added
- Monitoring plans to include ETS monitoring. Update every 5yrs. Leakage triggers ETS monitoring.
- Reporting and inspections at least once a year



EU CCS Directive (3)

- Financial security required from operator
- After closure, liability transfer to competent authority “when evidence indicates completely and permanently contained”. >20 yrs. EC will review. Monitoring will continue but reduced to detect irregularities .
- Financial security – from outset, to cover liabilities including closure, up to transfer of liability. Financial contribution to Competent Authority to cover long-term monitoring for 30 years
- Access to transport networks and storage, unless technical issue or lack capacity
- Removes barriers in other Directives – IPPC, Waste, Water, EIA, ELD, LCPD - Capture-ready



EU CCS Directive (4)

- Capture-ready in LCPD
- Definition was based on IEA GHG report (TR2007/04) for IEA – G8
- > 300 MW, from date of CCS Directive:
- Assessed availability of suitable storage sites
- Assessed transport is technically and economically feasible
- Assessed technical feasibility of retrofitting capture equipment
- If so, then space for capture equipment



EU CCS Directive (5)

- Annex 1 - Site characterisation
 - Data collection
 - Static Simulation
 - Dynamic simulation - security characterisation (ie performance assessment)
 - Risk assessment
- Annex 2 – Monitoring plan criteria
 - Criteria, coverage, updating (non prescriptive on techniques or timescales)
- MS bring into force in 2yrs
- Review Directive in 2015 – include mandatory EPS?



EP Amendments to CCS Directive

Included:

- CO₂ stream >95% CO₂, with no H₂S or SO₂
- Responsibility for storage sites post-closure to remain with operator for at least 50 years,
- Storage operators to pay into a fund to cover authorities' responsibilities after transfer, for all CO₂ stored ie an additional charge on CCS, level not indicated.
- EPS – 500 g kWh
- Exclude EOR
- **Not successful**



EU Emissions Trading Scheme

- EU ETS 'Cap-and-trade' scheme. Phase I from Jan 2005 – Dec 2007. Phase II 2008-2012. Phase III 2013-2020
- Phase II - EC MRG Guidelines 2007 - CCS via amendment of ETS Directive or by Article 24 'Opt-in'
 - Article 24 – procedure for country to 'opt-in' to ETS an activity or installation or GHG not listed in ETS Directive
 - Article 24 requires :
 - inclusion in country's National Allocation Plan;
 - project specific application by gov'n to EC, containing:-
 - activity/installation definition,
 - effects on market,
 - distortions of competition,
 - environmental integrity of ETS,
 - and specific MRG for the activity/installation



ETS Directive

Proposed 23 Jan 2008 - to strengthen, expand and improve the ETS from 2013. Now agreed.

CCS

- CCS fully included from 2013
 - Site and operation will need to comply with CCS Directive
 - Needs monitoring and reporting guidelines - underway
- No free allocation to CCS (same as electricity)
- Separate permitting of capture, transport and storage
- If any leakage – surrendering of allowances
- If leakage from storage suspected from monitoring under CCS Directive, then trigger ETS monitoring to quantify
- Biomass and CCS can be opted in



EP Amendments to ETS Directive

- Concern that ETS on its own was not enough for early CCS projects
- ETS Directive amendment (Avril Doyle) – 500 million EUAs from New Entrants Reserve, for EU CCS demonstration projects
- Agreed at 300 million = 3-9 billion Euro
- 2013-2015



UNFCCC – Clean Development Mechanism

- CDM – Policy mechanism for rewarding CO₂ reduction in developing countries. Project-based carbon credits.
- Considering CCS since COP/MOP1 Montreal 2005:
 - EB to consider new methodologies
 - Capacity building workshops
 - Technical and Policy Issues
 - Submissions from Parties and NGOs – 2 synthesis reports
 - Decision due at COP/MOP4 Poznan (Dec08) – nearly but blocked



UNFCCC - Future work on CCS

- SBSTA to continue on CCS in CDM at SBSTA30 (Jun 09)
- Further Guidance on CDM – EB to assess implications of CCS in CDM, report to CMP 5 (Dec 09)
- Post 2012
- AWG KP – Mechanisms – Annex 1 - issues to be considered, include future CDM, includes options on CCS inclusion – Annex 1 to be discussed in AWG KP in March/Apr Bonn
- AWG LCA – Technology research needs – much on CCS by several countries



UK

- Offshore storage
- Energy Act - Enabling powers to control CCS
 - Assert UK right to store beneath seabed to 200nm
 - Assigns ownership to State
 - Requirement for lease
 - Requirement for licence
 - Provision for regulation of site after closure
 - Extend Petroleum Act to cover decommissioning
 - Passed on 26 Nov 2008 – now Act of Parliament – law from 6 April



UK

- BERR Consultation (Jun 2008) on regulatory details (deadline was 22 Sep 08), including:
 - Capture Ready – what does it mean
 - Space for capture equipment (+40% land, £0.7-1.25M per plant)
 - Assessment of available storage, transport, technical feasibility
 - Lease and licence periods
 - OSPAR requirements
 - De-licensing / termination – transfer to State
 - Financial security for obligations and contingent liabilities
 - Licensing authority
- DECC response due soon



Australian Legislation

- **Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Nov 2008)**
- Access and property rights for waters under Commonwealth jurisdiction
- Site Plan – site characterisation, predictions, operations, monitoring, risk assessment and management, remediation
- Requires operators to bear the Commonwealth's costs of post-closing monitoring and verification
- 20-year limit following project closure on common law liability (5 +15). After this time, the Federal Government assumes long-term liability
- “No significant risk of significant adverse impact” (petroleum and ghg)
- Regulations and Guidelines under development.
- Release of 10 areas for exploration applications 27 Mar 2009 – incl access to CO2 supply



Australian Legislation

- **Carbon Pollution Reduction Scheme (CPRS) – ETS proposed in White Paper Dec 2008**
- Cap and trade scheme
- Operational 2010
- CO₂ transferred to CCS counts as not emitted
- Obligations for emissions from capture, transport and storage



Australian Legislation

- **Victoria Greenhouse Gas Geological Sequestration Act 2008**
- **Queensland Greenhouse Gas Storage Act 2009**
- Onshore
- State owns rights to storage reservoir
- GHG Substance = “overwhelmingly GHG included related substances”
- Exploration, Injection and Monitoring permits
- Injection and Monitoring Plan, Leakage pathways, impacts, probability
- Costs of monitoring after licence surrender – licensee to pay (Vic)
- Surrender of License – State owns CO₂, only if no risk to env and risk man plan OK (Vic).



Australian Legislation

- **South Australia:** CCS activities are regulated under the Petroleum Act 2000 (SA).
- **Western Australia:** The Western Australian Parliament has passed project-specific legislation to regulate CCS activities associated with each particular project.



Regulatory developments in other regions

USA –

- Existing Underground Injection Control programme for ground water protection adapted for Pilot projects
- US EPA have developed Federal level regulations “Draft Rule” for CO₂ storage (Jul08)
- Interstate Oil and Gas Compact Commission developed recommendations for regulations for CO₂ storage at a State Level

Canada

- Canada – acid gas injection and CO₂-EOR already permitted in states like Alberta
- Federal /Alberta Task Force recommendations for CCS regulations (Apr08)

Japan

- Adapted marine laws



Regulatory lessons learnt

Regulatory principles for CCS to ensure environmental integrity:

- Site-by-site assessment
- Risk assessment
- Site characterisation and simulation, supported by monitoring
- CO₂ stream impurities determined by impacts on integrity

Development of regulation:

- Use the technical and scientific evidence base
- Learn from existing regulatory developments
- Benefit of having real projects to drive and test regulations



IEA Greenhouse Gas R&D Programme

- General - www.ieagreen.org.uk
- CCS - www.co2captureandstorage.info

