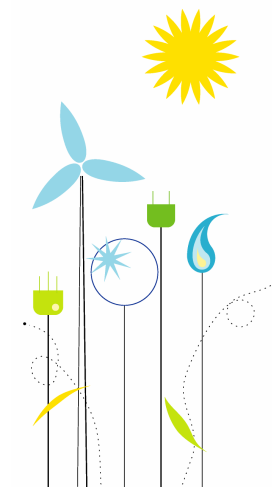


EU Regulatory Framework for Carbon Capture and Sequestration (CCS)

(Taken from the EU stakeholder consultation Mid May 2007)

Dr Ing Keith Harsham
Global HSSE manager, Hydrogen Energy



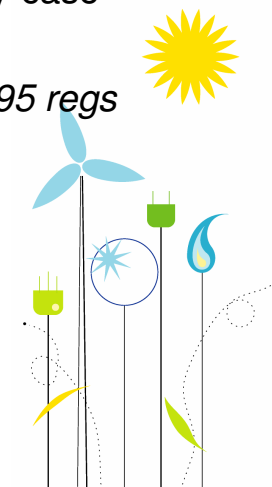
Risk Management Framework

Capture

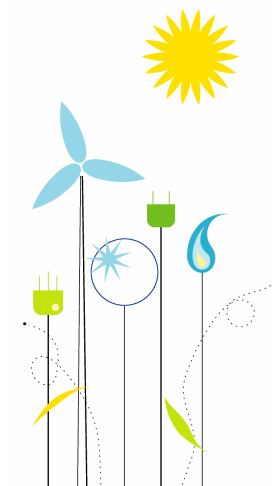
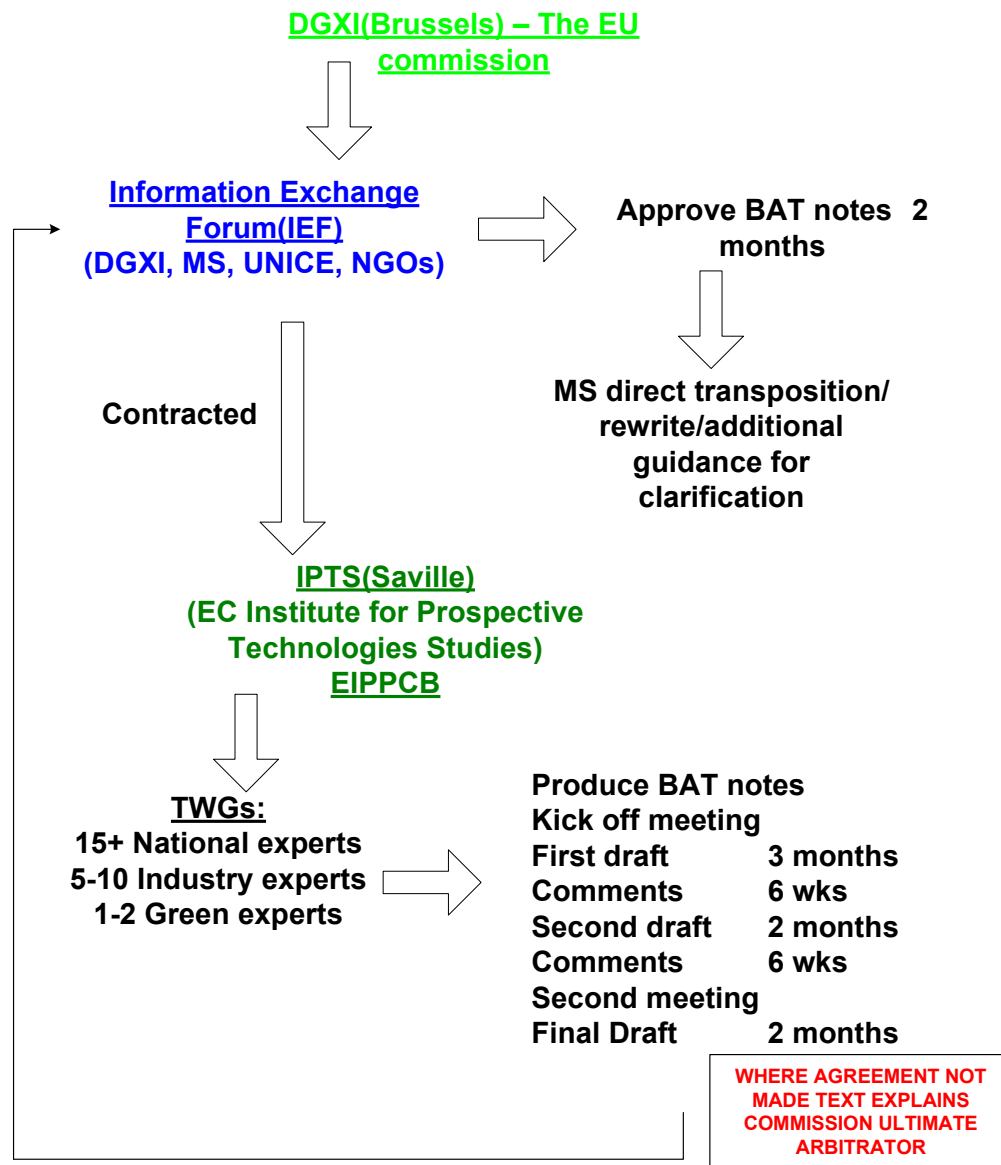
- Regulated and permitted under IPPC – no legal change required
- Update of BAT Reference Documents (BREFs) to specify requirements(technical guidance)
 - Large Combustion Plant
 - Cement and Lime Manufacturing
 - Mineral Oil and Gas Refineries
 - Possible horizontal REF on CO2 capture technologies?

Transport

- Currently regulated at MS level (for natural gas); relevant European and international standards
- apply (for instance for transporting gas under pressure)
- Large pipelines require automatic Environmental Impact Assessment, small ones on case-by-case
- Basis(However deficient from a RA perspective)
- TREN Working Group on safety of oil and gas pipelines; *could also look at reviving 49CFR195 regs*
- Conservative approach: no risk differences CO2/NG justifying a different approach.



EU BAT Organisation

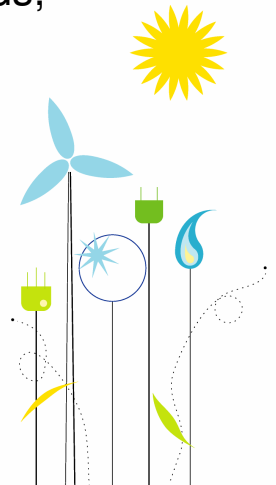
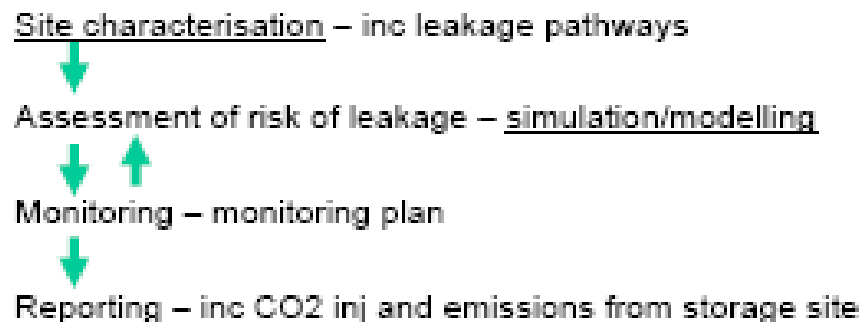


Impacts and risks to be managed

Storage

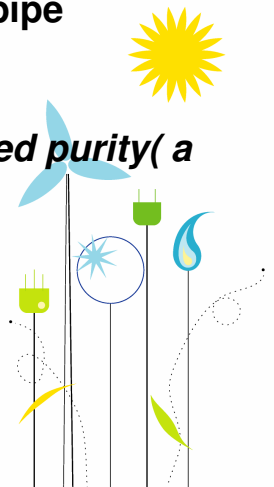
- Adopt framework approach similar to IPCC guidelines
- Model expected behaviour of CO₂, and **use site only if have demonstrated** expected permanence of storage(See EU mapping as well)
- Monitor site after use to confirm that CO₂ behaving as expected(*appropriate*)
- Decommission and close, with monitoring period after closure(*2-3 yrs*)
- Centralised verification of safety in the initial phase(*EU or MS?*)
- **Transfer of responsibility to state on condition that risk of future leakage is demonstrated to be insignificant (*may be some scope for limited monitoring liability provision eg payment to do – KH*)**
- Provisions on composition of the CO₂ stream
- Financial provisions for insolvency of operators before site is safely closed(Bonds, guarantees etc

Methodology



Purity of CO2 stream

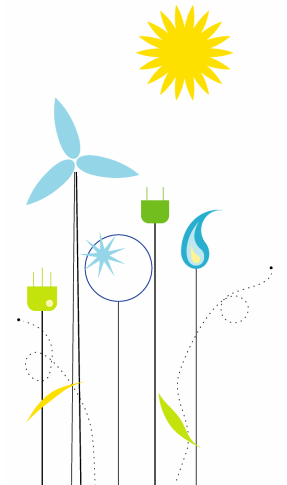
- Stakeholder concern that CCS may be used as alternative disposal technique for conventional air pollutants
- Debated in London Convention (percentage limitations) eg 1% H₂S etc
- Alternative approach in OSPAR: effectively to apply the same de-NO_x(SCR) and de-SO_x(Claus, double Claus) technology approaches
- ‘However, CO₂ streams may contain incidental associated substances derived from the source material and the capture, transport and storage processes used.
- Concentrations of substances related to the Best Available Techniques (BAT), to European standards for atmospheric emissions and/or for discharges to the marine environment (subject to concentration differences due to the specific CO₂ capture process), and to their possible impact on the integrity of the relevant transport infrastructure and storage site.’ eg pipe corrosion(dry etc)
- *BREF will also look at optimisation of additional energy required to achieve increased purity(a trade off – defeats the object!)*



Management options for storage

Regulate under Integrated Pollution Prevention and Control Directive?

- Include under Annex I
 - Detailed guidance on site characterisation, selection, operation, closure and post closure in BREF on CO2 storage sites
 - Comitology(expert committee; MS regulators) for verification of safety of storage
 - Requirements on financial provisions for insolvency; *eg Bonds, guarantees, insurance*
 - Requirements on transfer of installation to state eg reservoir, aquifer
 - Requirements on composition of CO2 stream
-
- **Free-standing legal instrument?**
 - **In any case, confer Environmental Impact Assessment/Strategic Impact Assessment, mainly to ensure public consultation**



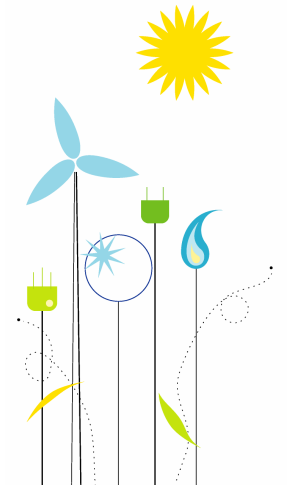
Rights for prospection and exploration

Hydrocarbons Licensing Directive 94/22/EC

- Member States have to follow when issuing authorisations granting exclusive right to prospect or exploration for hydrocarbons in a geographical area
- Member States have right to determine what areas in their territory to be made available
- Must ensure no discrimination as regards access to and exercise of activities
- Authorisations granted only after procedure in which all interested entities may submit applications

CCS

- Confer 94/22 onto prospection and exploration for CO₂ storage sites
 - le same model(cf Australian approach)
- R&D program underway to establish appropriate locations



Removal of barriers

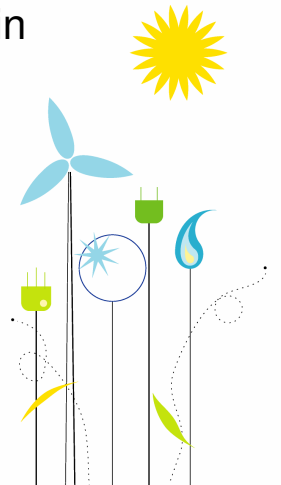
Water (Water framework directive covers groundwater)

- Directive 2000/60/EC, inserted
 - injection of CO₂ streams for storage purposes into geological formations which for natural reasons are permanently unsuitable for other purposes, provided that such injection is authorised under eg IPPC directive”

- **Waste**

- Examination in Impact Assessment
- Propose to remove CCS (as regulated elsewhere) from waste legislation

“CO₂ streams that are transported for the purpose of storage, injected or stored in accordance with the provisions of Directive XX/XX/EC are not considered to be waste”

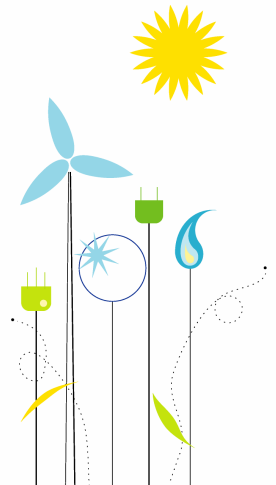


Liability for leakage from storage site

Local damage to health and property: leave to MS level; Strict Liability and Negligence

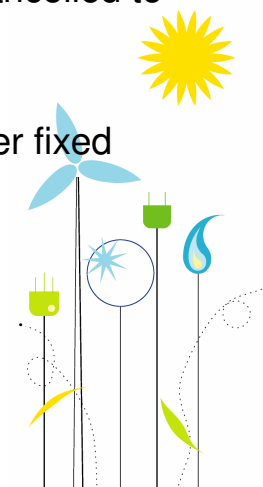
Local damage to the environment

- Confer Environmental Liability Directive (automatic under IPPC route)
- On analogy with landfill, applies to incidents during:
 - Full operational phase
 - Post-closure phase where monitoring is required
 - The phase where monitoring has ceased and site has been abandoned
 - The basic requirement will be strict liability.
- **Non-local damage (i.e. climate implications) covered by inclusion in ETS (see below)**
- **Financial provision for future liability**
 - Environmental Liability Directive Article 14; *Up to MS to require financial provision*
 - For non-local damage, see options under ETS Directive
 - Residual Liability eg Petroleum Act UK.
 - Liability for what, Monitoring, well leaks(easy to prove), site leaks(difficult to prove)



Treatment under European Trading Scheme (EUETS)

- **Basic framework:**
- Phase II (2008-12): CCS can be included without legislative modification, but capture, transport and storage must be opted in together ('bubble' approach)
- Phase III (2013 onwards): looking at amendment to make it possible to opt in also separate installations, and to opt-in a class of installations for all Member States
- Conditions:
 - rules on risk management followed
 - Monitoring and reporting guidelines proposed by opting-in state and adopted by comitology
- **Surrender of credits for leakage from storage: two options**
- Simple: allowances surrendered for any monitored emissions
- Precautionary;
 - Provisional allowances surrendered for percentage of emissions stored. Would be cancelled to cover any monitored leakage.
 - Any monitored leakage above 1% covered by additional surrender of allowances.
 - Non cancelled allowances may revert to operator under specified conditions (e.g. after fixed period).



Making CCS mandatory post-2020

Target in Communication on Sustainable Power Generation from fossil fuels communication

- All new Power plants post-2020 must use CCS
- All new Power plants prior to 2020 must be capture-ready and retrofit rapidly after 2020
- What would we regulate: coal, gas, all fossil fuels, only large installations?
- Optimal retrofitting schedule for capture-ready plant
 - Effect on structure of energy market
 - Advantages
 - Clear long-term signal which would stimulate deployment
 - Capture-ready at risk of operator: what investment to make now to make retrofit in 2020 easier

