A portfolio of technologies

Baseline emissions 57 Gt

CCS 19%
Renewables 17%
Nuclear 6%
Power generation efficiency and fuel switching 5%
End-use fuel switching 15%
End-use fuel and electricity efficiency 38%

BLUE Map emissions 14 Gt

WEO 2009 450 ppm case
ETP 2010 analysis

Technology Roadmap
Carbon capture and storage

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An ambitious growth path

- **2015**
  - 18 projects
  - OECD (72%)
  - Non-OECD (28%)

- **2020**
  - 100 projects
  - OECD (50%)
  - Non-OECD (50%)

- **2030**
  - 850 projects
  - OECD (49%)
  - Non-OECD (51%)

- **2040**
  - 2,100 projects
  - OECD (40%)
  - Non-OECD (60%)

- **2050**
  - 3,400 projects
  - OECD (35%)
  - Non-OECD (65%)

**Technology Roadmap**

Carbon capture and storage

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Legal and Regulatory Actions and Milestones

• Existing legal and regulatory frameworks should be reviewed and adapted for CCS demonstration by 2011 in OECD countries and by 2015 in all countries.

• International legal issues need to be resolved by 2012.

• All countries should have a legal and regulatory framework suitable for large-scale CCS deployment by 2020.
CCS law and regulation today

- IPCC 2006 Inventory Guidelines
- London Protocol & OSPAR Treaty
- EU CCS Directive
- EU ETS Directive
- National and Regional Legal & Regulatory Developments
  - Europe, Australia, US
IPCC Guidelines for GHG Inventories - 2006

- Establishes accounting guidelines for CCS
- Provides a methodology for project development and operation
- Provides framework for a monitoring plan
- Based on site specific requirements
- Annex 1 – Description of monitoring technologies

“For appropriately selected and managed sites, supports an assumption of zero leakage unless monitoring indicates otherwise”
London Convention and Protocol

- Global agreement regulating disposal of wastes and other matter at sea
- Convention 1972 (86 countries)
- Protocol 1996 – ratified March 2006 (38 countries – including China)

CCS
  - 1) Prohibited some configurations of CO$_2$ storage below the subsurface
  - 2) Prohibits the trans-boundary transfer of CO$_2$
London Protocol Amendments

• Amended to allow all configurations of CCS
  Entered into force – 2007

• Article 6 prohibits export of waste, including CO₂ – Transport or migration
• Amendment proposed and passed by vote - 2009
• Adoption needs two thirds of all Parties ratifying
OSPAR Treaty

- OSPAR amendments for CO$_2$ storage
  - OSPAR Guidelines for Risk Assessment and Management of Storage of CO$_2$ in Geological Formations
    - Includes a Framework for Risk Assessment and Management (FRAM)
    - Requires use of Guidelines when permitting. Including risk assessment and management process
  - Adopted 2007 but need ratification by 7 parties
EU CCS Directive

- Enabling regulatory framework to ensure environmentally sound CCS
  - Follows IPCC GHG Guidelines and OSPAR
  - Objective is permanent storage
  - Permits will be required for CCS - exploration and storage
  - Storage permit only if “no significant risk of leakage”
  - Emphasis on site selection, characterization, risk assessment, monitoring plan
  - Corrective measures plan, and provisional post-closure plan
EU Emissions Trading Scheme

• **Phase II from 2008 - 2012**
  - Monitoring and reporting guidelines
  - CCS able to be “opted in”

• **Phase III from 2013 - 2020**
  - CCS fully included
  - Installation will need to comply with CCS Directive
  - No free allocation to CCS (same as electricity)
  - If any leakage – surrendering of allowances
  - Biomass and CCS can be opted in
  - NER 300
Regulatory developments in other regions

• **Australia**
  - Offshore Petroleum and GHG Storage Act 2008
  - Victoria and Queensland GHG Storage 2008/9

• **USA**
  - US EPA have developed Federal level regulations “Draft Rule” for CO$_2$ storage (Jul 08)
  - State CCS Legal and Regulatory Developments
Regulatory developments in other regions

• **Canada**
  - Canada – acid gas injection and CO2-EOR already permitted in states like Alberta

• **Japan**
  - Adapted marine laws

• **UK**
  - Mandatory CCS demonstration on 300MW of all new coal plant

• **South Africa**
  - CCS-ready on new plant
IEA CCS Programme of Work

• IEA CCS Regulators’ Network
  – 1000 members

• IEA Model CCS Legal & Regulatory Framework
  – 28 key issues addressed

• IEA CCS Legal & Regulatory Review
  – 17 countries involved
The next 10 years are critical.

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