Carbon Sequestration Leadership Forum
Technical Group Business Meeting

Washington, 16 November 2008

Update on IEA CCS Activities

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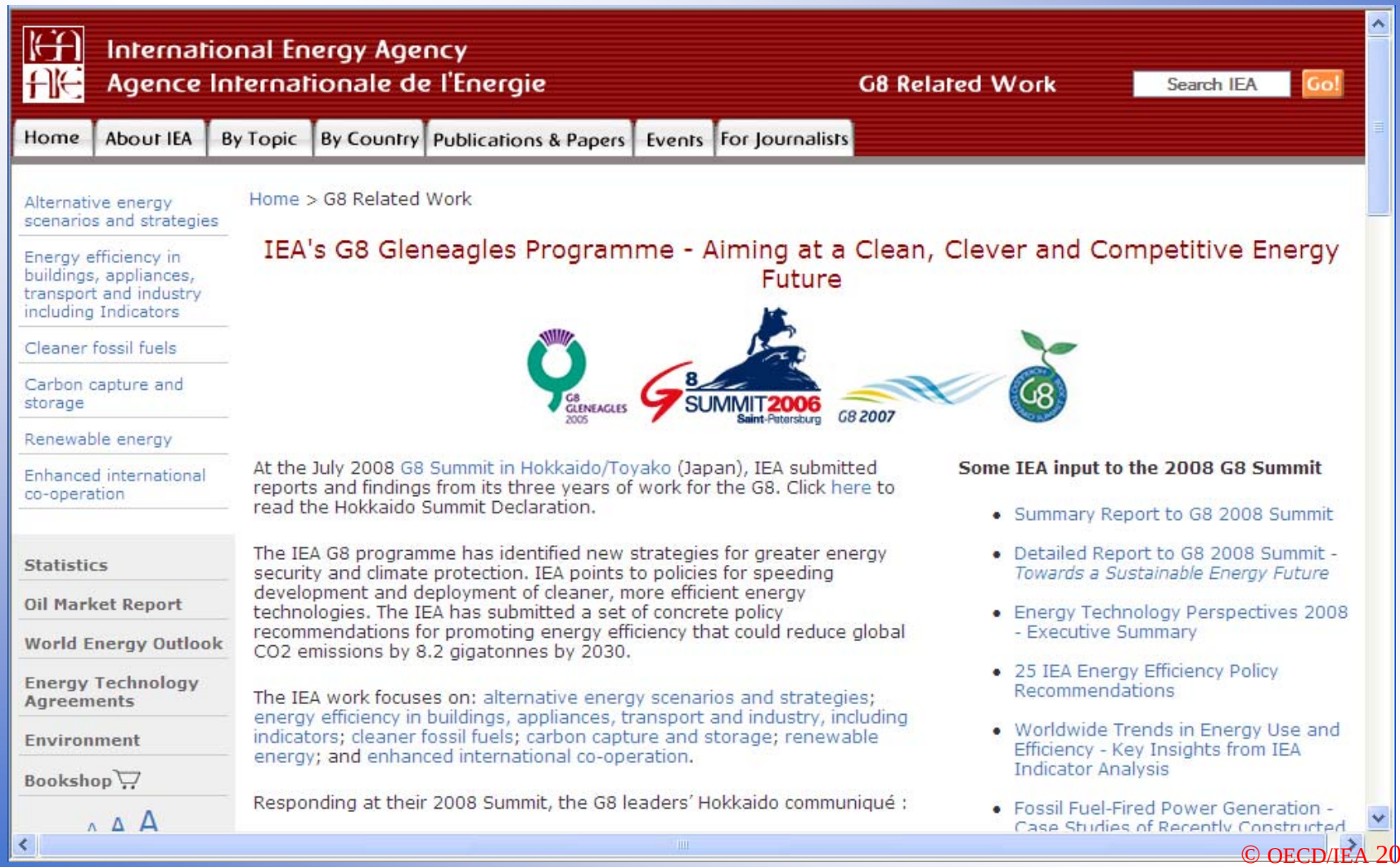
IEA and G8

www.iea.org/G8



Political Background

- **IEA Ministerial conclusions, May 2007**
  - **We will promote clean coal and press ahead through the IEA and the CSLF with the full scale demonstration and early deployment of CCS, paying due regard to regulatory and safety issues.**
- **G8 Gleneagles 2005**
- **G8 Heiligendamm 2007**
- **G8 Hokkaido 2008**

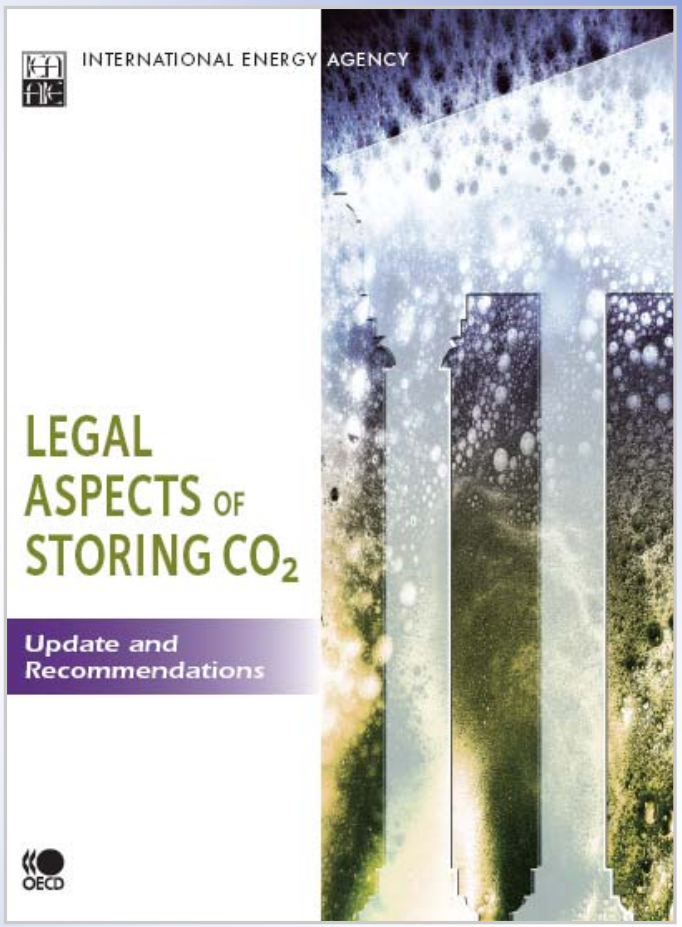
Joint Statement by G8 Energy Ministers Aomori, Japan on 8 June 2008

6. Critical role of CCS. Collective support of the recommendations developed by IEA and CSLF. 20 large-scale CCS demonstration projects by 2010, beginning of broad deployment of CCS by 2020.
7. Foster international action to accelerate large scale integrated CCS demonstration projects and deployment in developed and developing countries.
8. IEA/CSLF assessment by 2010 of the implementation of their recommendations, and assessment of progress towards accelerated deployment and commercialization of CCS.

Review of Activities

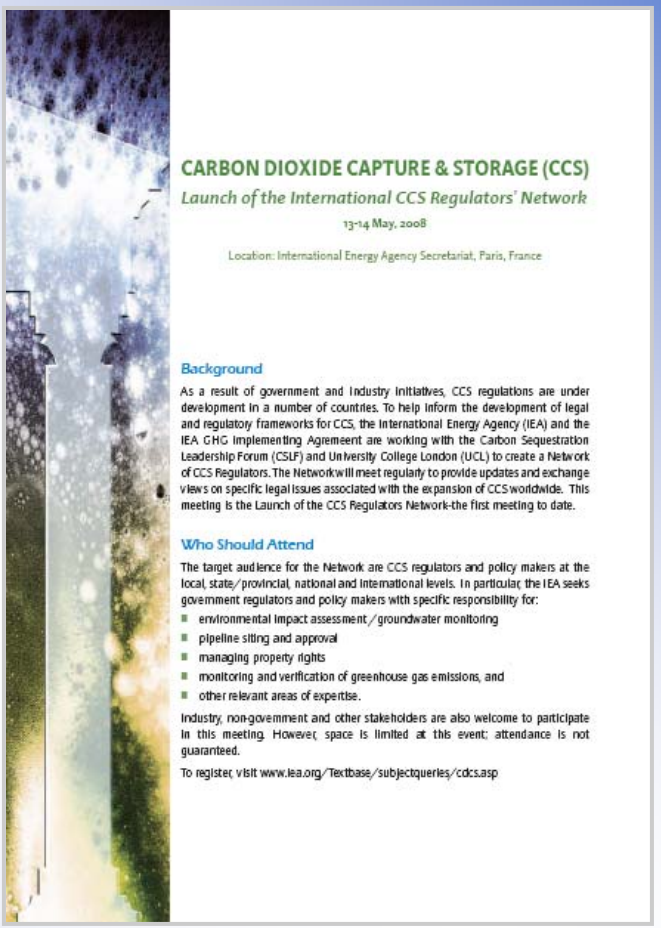
Legal Aspects of Storing CO_2

- **Launched 22 June 2007 in Oslo**
- **Assist in development of legal and regulatory framework(s)**



International CCS Regulators Network

- 13-14 May 2008, Paris (with more than 100 experts)
- Web conferences on specific topics, regular updates, annual meeting
  - CO2 transport, health and safety issues, 10 July 2008
  - Legal foundations for early CCS demonstration projects, 9 October 2008
  - More to come
- Where to sign up:
  http://www.iea.org/Textbase/subjectqueries/ccs_network.asp
- Do we need more in this area?



CARBON DIOXIDE CAPTURE & STORAGE (CCS)

Launch of the International CCS Regulators' Network

13-14 May, 2008

Location: International Energy Agency Secretariat, Paris, France

Background

As a result of government and industry initiatives, CCS regulations are under development in a number of countries. To help inform the development of legal and regulatory frameworks for CCS, the International Energy Agency (IEA) and the IEA GHG Implementing Agreement are working with the Carbon Sequestration Leadership Forum (CSLF) and University College London (UCL) to create a Network of CCS Regulators. The Network will meet regularly to provide updates and exchange views on specific legal issues associated with the expansion of CCS worldwide. This meeting is the Launch of the CCS Regulators Network-the first meeting to date.

Who Should Attend

The target audience for the Network are CCS regulators and policy makers at the local, state/provincial, national and international levels. In particular, the IEA seeks government regulators and policy makers with specific responsibility for:

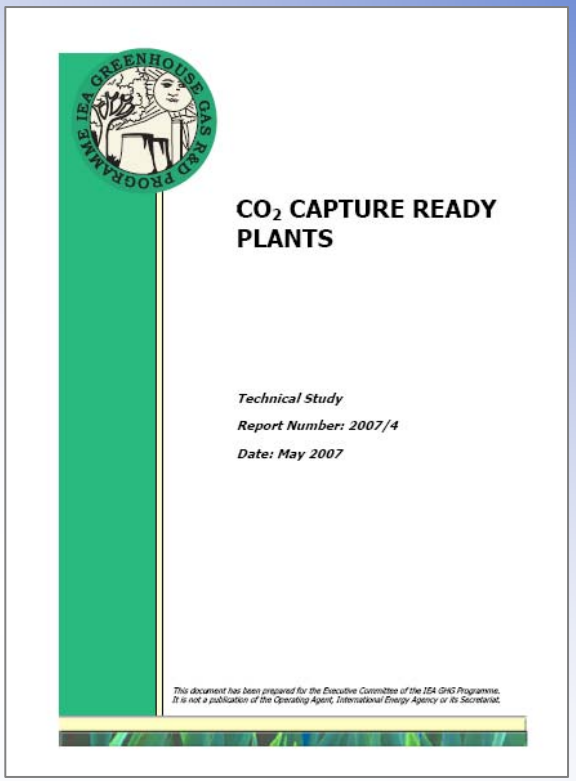
- environmental impact assessment/groundwater monitoring
- pipeline siting and approval
- managing property rights
- monitoring and verification of greenhouse gas emissions, and
- other relevant areas of expertise.

Industry, non-government and other stakeholders are also welcome to participate in this meeting. However, space is limited at this event; attendance is not guaranteed.

To register, visit www.iea.org/Textbase/subjectqueries/cdcs.asp

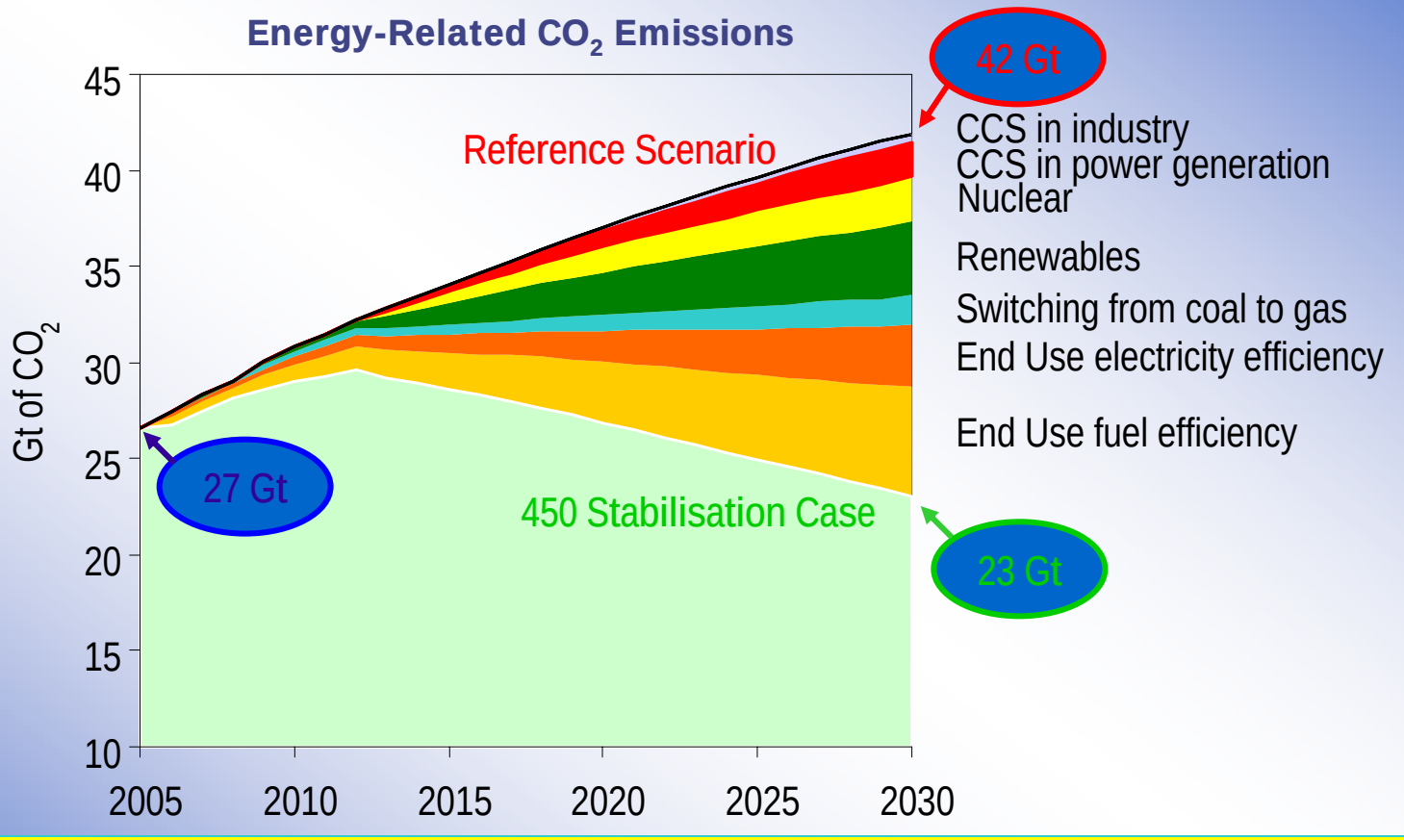
Technical Study on CO_2 Capture Ready Plants

- In support of the G8 Plan of Action
- Sponsored by the IEA Greenhouse Gas R&D Programme
- Prepared by leading manufacturers and academia in UK
- Reviewed by technology holders in US, UK, NL and IEA Secretariat
- Assist to avoid the risk that it is impossible to retrofit CO_2 capture in future
- Five leading power generation and CO2 capture processes
- CCS Recommendations have concluded that further discussion is needed on what is “capture readiness”
- International workshop and documentation of results



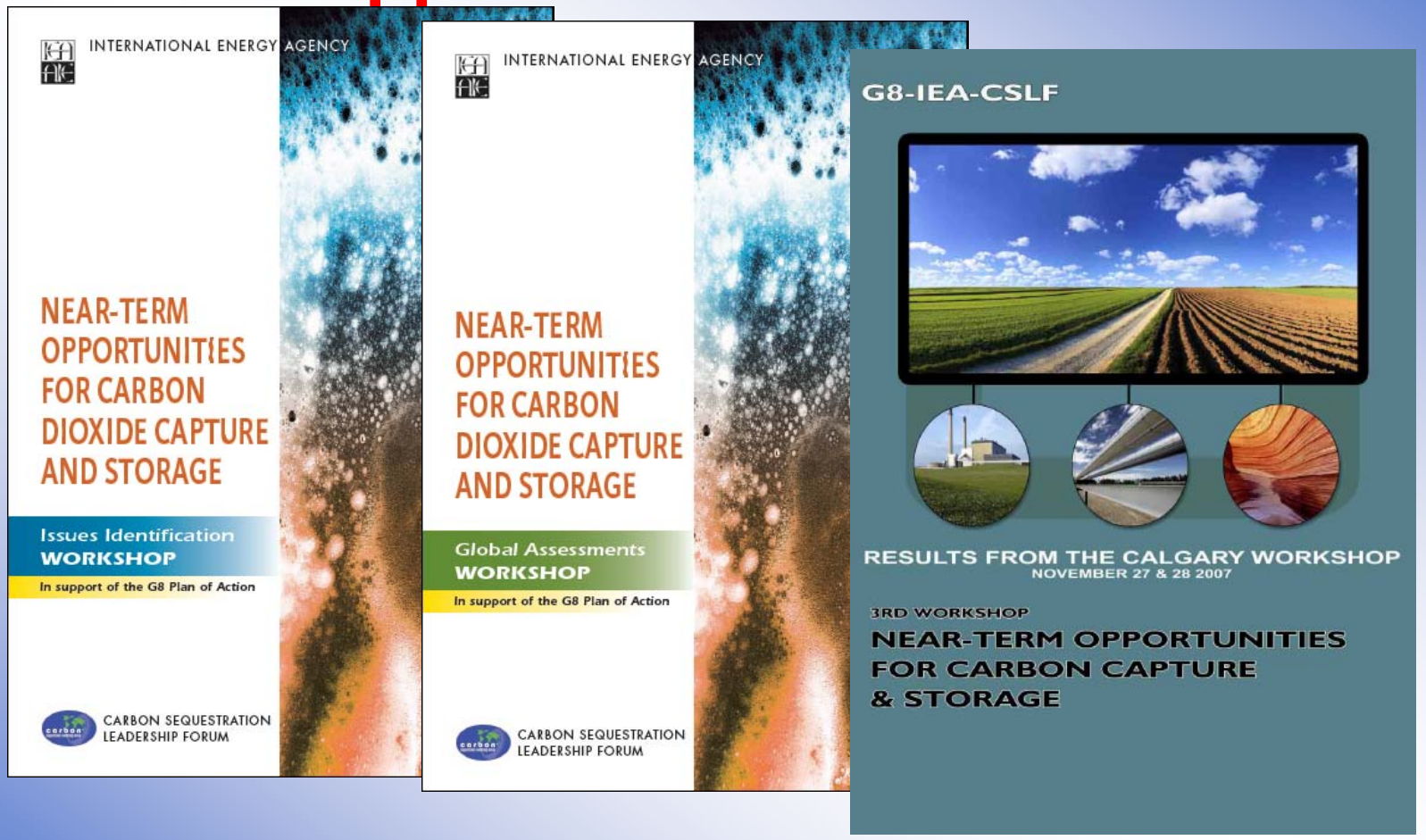
IEA World Energy Outlook 2007

CO_2 Emissions 450ppm Stabilisation Case



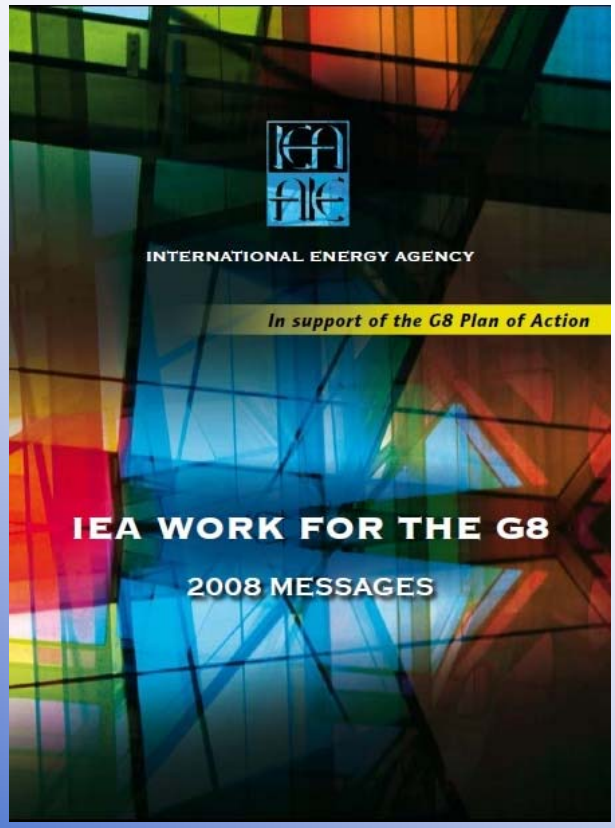
- For 50% CO2 reduction, virtually all coal plant must have CCS by 2050
- Comprehensive set of policy recommendations

3 IEA/CSLF Workshops on Near-Term Opportunities for CCS

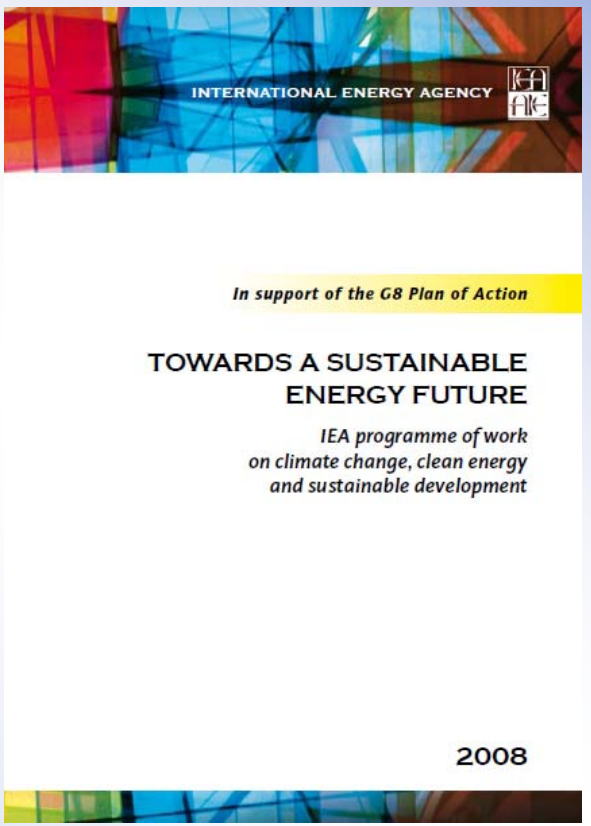


IEA Reports to the G8 in 2008, Hokkaido

Summary



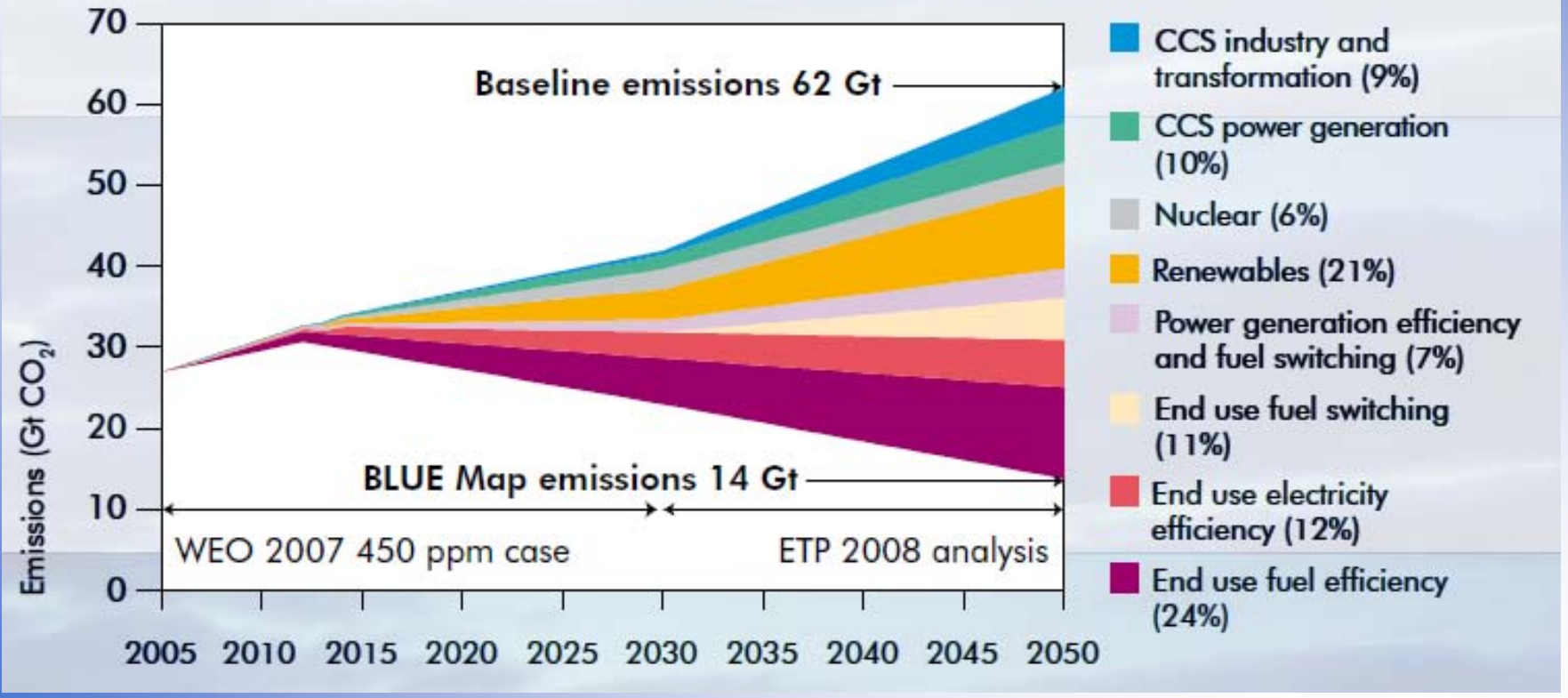
Full Report



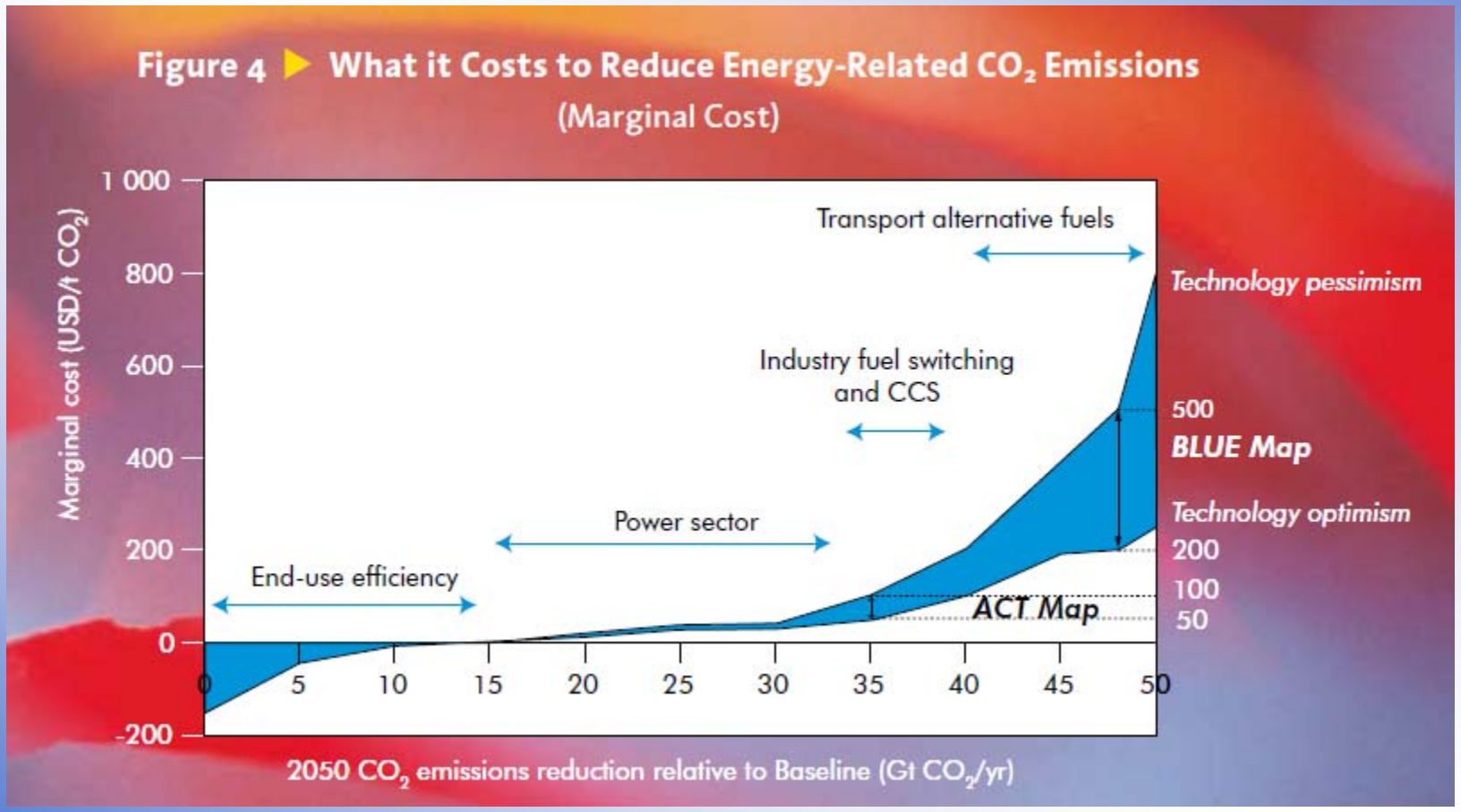
Scenarios

Figure 2 ▶ Reducing Global CO_2 Emissions by 50% by 2050

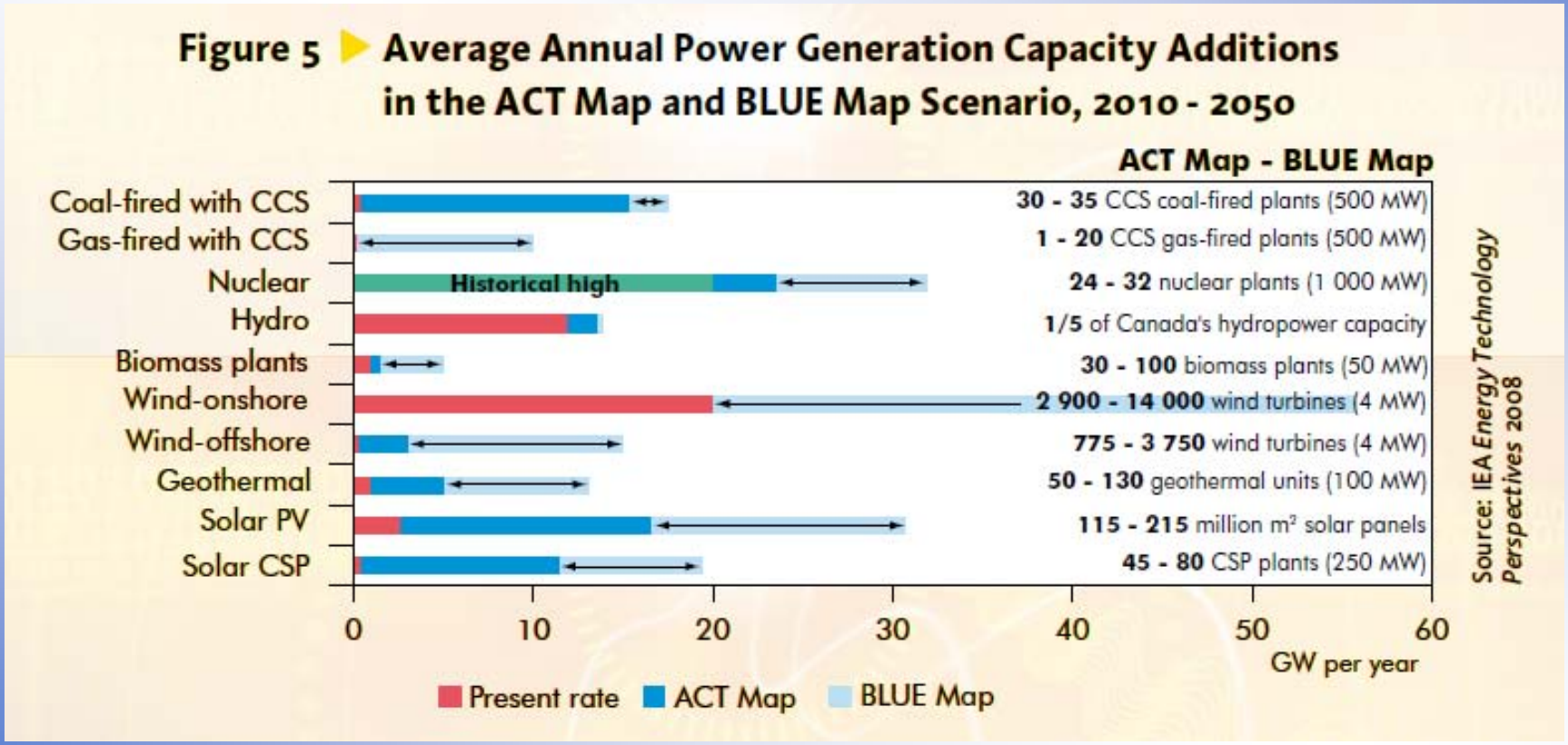
Contribution of Technology Wedges



Marginal Cost of Reducing CO_2 Emissions



Power Generation Must Be Cleaner

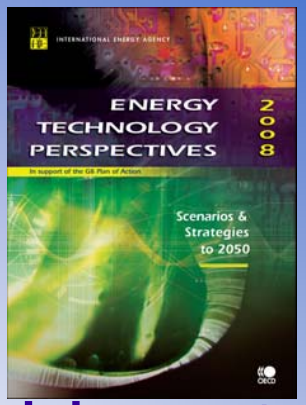


CCS will be essential in securing large reductions in coal power station emissions

Priorities for Advancing Deployment of CO_2 Capture and Storage

- Demonstrating CO_2 capture and storage and bridging the financial gap
- Taking concerted international action
- Creating a value for CO_2 for commercialisation of CCS
- Establishing legal and regulatory frameworks
- Communicating with the public
- Infrastructure
- Considering requirements for retrofit with CO_2 capture

ETP Scenarios and Strategies

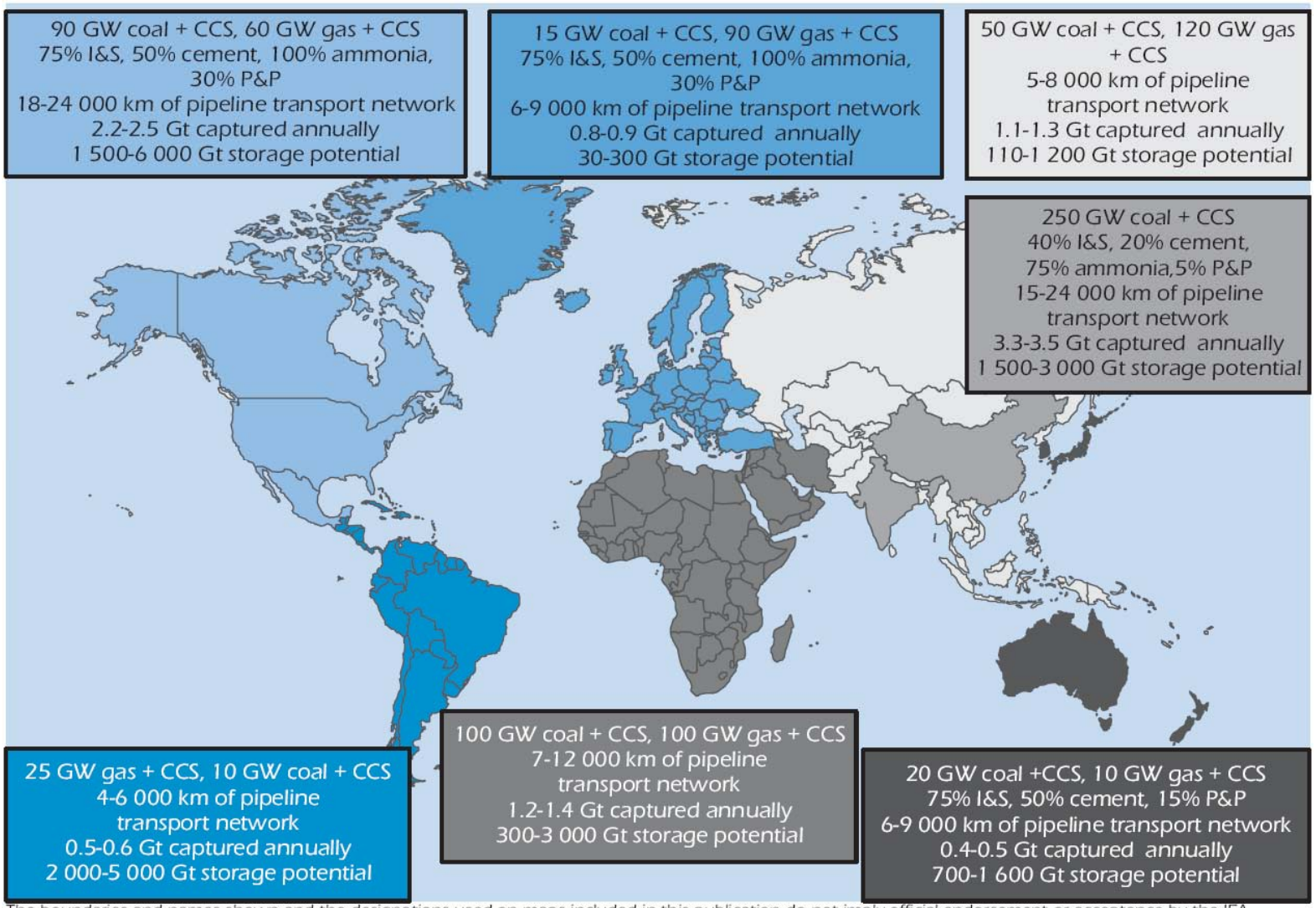


- **Key Conclusions**
  - A huge effort of research, development and demonstration will be needed. Initial roadmaps have been developed for 17 key energy technologies. International collaboration is essential to further develop these roadmaps and accelerate the development and global deployment of sustainable energy technologies.
- **Next Steps**
  - Helping to develop an international technology co-operation programme, building on existing networks and working with industry to further develop and implement the roadmaps for the 17 key technologies that have been identified.

The Case for CCS

- Climate change requires substantive efforts to reduce CO2 emissions
  (27 Gt / 2005 to 14 Gt / 2050)
- IEA has developed ETP BLUE Scenarios, to meet IPCC target
- In a set of least cost scenarios, CCS would contribute 10 Gt reduction compared to the base line scenario (10% power production, 9% industry)
- Without CCS either total cost would be 70% higher or 2050 emissions would be 70% higher
  (24 Gt instead of 14Gt)
- Can CCS deliver?
  - Regional storage potential estimates vary from 40-400 years to more than 2000 years of ETP BLUE Scenario emissions
  - Roadmaps should describe the way to get there

CCS Visions 2050



The boundaries and names shown and the designations used on maps included in this publication do not imply official endorsement or acceptance by the IEA.

Source: IEA, CO_2 Capture and Storage: A Key Carbon Abatement Option (2008).

What is a Technology Roadmap?

- Many countries use roadmaps as an energy policy tool
- Main goal: to *accelerate* technology development
- It is a dynamic set of technical, policy, legal, financial, market and organisational requirements
- Most effective when agreed on by involved stakeholders
- Also a *process* that leads to improved, transparent information and enhanced collaboration

IEA Technology Roadmaps

- Began in *Energy Technology Perspectives* 2008
- 17 technologies identified, including
  - CCS in power sector
  - CCS in industrial sector
- CCS one of 4 priorities for more detailed roadmaps
- IEA's recent book *CO2 Capture and Storage – A key carbon abatement option* - (Ch. 7) a starting point

Purpose of IEA Roadmap

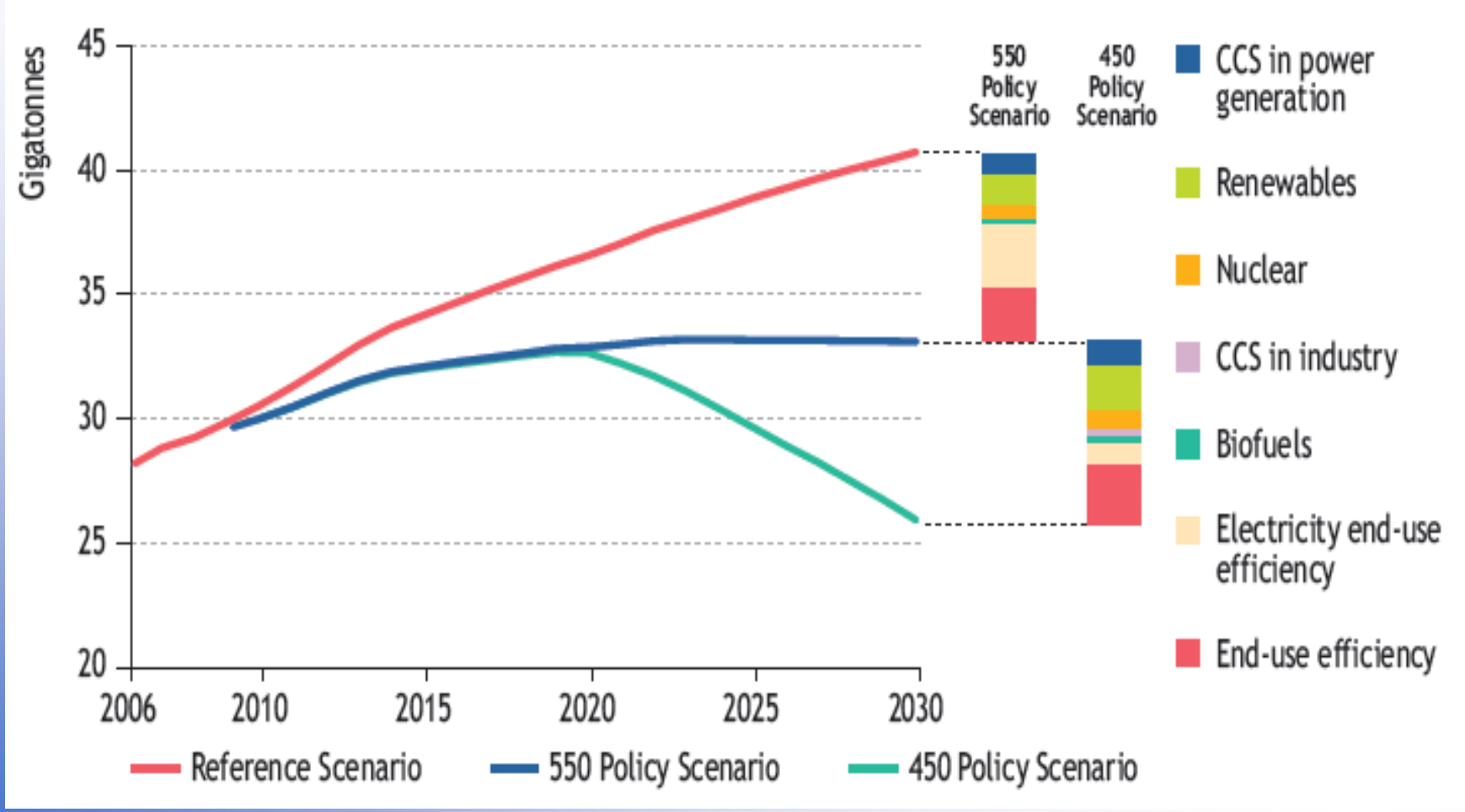
- Build from existing efforts -
  9 Countries + EU & CSLF have CCS Roadmaps
- Facilitate greater international collaboration/coordination on CCS where feasible
- Accelerate the RD&D process
- Track progress toward 20 projects
- Help to make modeling and actions consistent

IEA Roadmapping Process

- Roadmapping workshop 6 – 7 November 2008, Paris (see IEA's CCS website)
- +2 weeks: IEA sends synthesis document to meeting attendees for review & comment, later to larger CCS expert network
- 2nd meeting during 1st week of February 2009
- Final draft document for review in April 2009
- Publication in June 2009

Broad Coverage of CCS in WEO 2008

Launch 12 November 2008



High-level CCS Summit in 2009

- **Goal: to create a platform/venue for making major new commitments to CCS and inform the public**
  - **Focus is on funding near-term demonstrations**
  - **Governments, industry will be engaged to make announcements**
- **Work with IEA WPFF, CSLF, IEA GHG, others**

The IEA will be guided by the following (1)

- The IEA together with the CSLF should assess the implementation of the action described above and the more detailed recommendations from IEA/CSLF workshops on an ongoing basis. This assessment will include further actions that could be taken by the G8 to further accelerate the exploitation of near-term CCS opportunities.
- The IEA should organise a workshop to discuss an internationally shared concept on CO2 capture readiness. A report, including policy recommendations on possible policy action and incentives should be prepared.
- The IEA should prepare a more regionally-detailed assessment of CO2 storage potentials and look into possible matching with major stationary CO2 sources.

The IEA will be guided by the following (2)

- The IEA should include in its next scenarios on CCS more regional details, which are appropriate to analyse opportunities and barriers.
- The IEA should work with the CSLF towards the development of internationally reviewed technical and legal principles for storing CO2 for the implementation in national legal and regulatory frameworks.
- IEA should continue to contribute to key international and national events by sharing and disseminating its findings, including events to communicate CCS opportunities and challenges to the public.
- The IEA should facilitate the exchange of information among demonstration projects and long-term R&D in collaboration with international partnerships such as the CSLF and IEA Implementing Agreements.

Thank you!