Technology Transfer for Clean Coal Technology

Presentation to
Beijing High-Level Conference on Climate Change:
Technology Development and Technology Transfer

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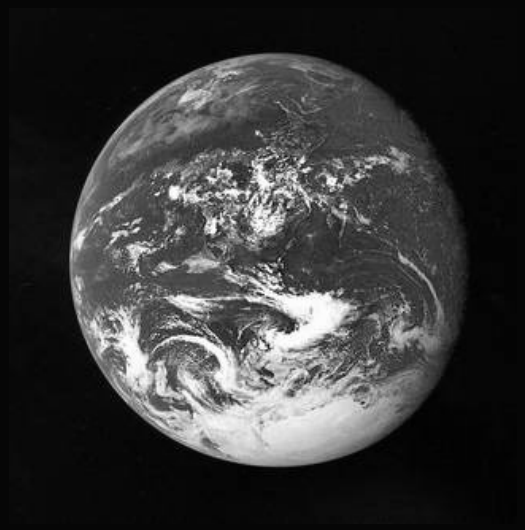
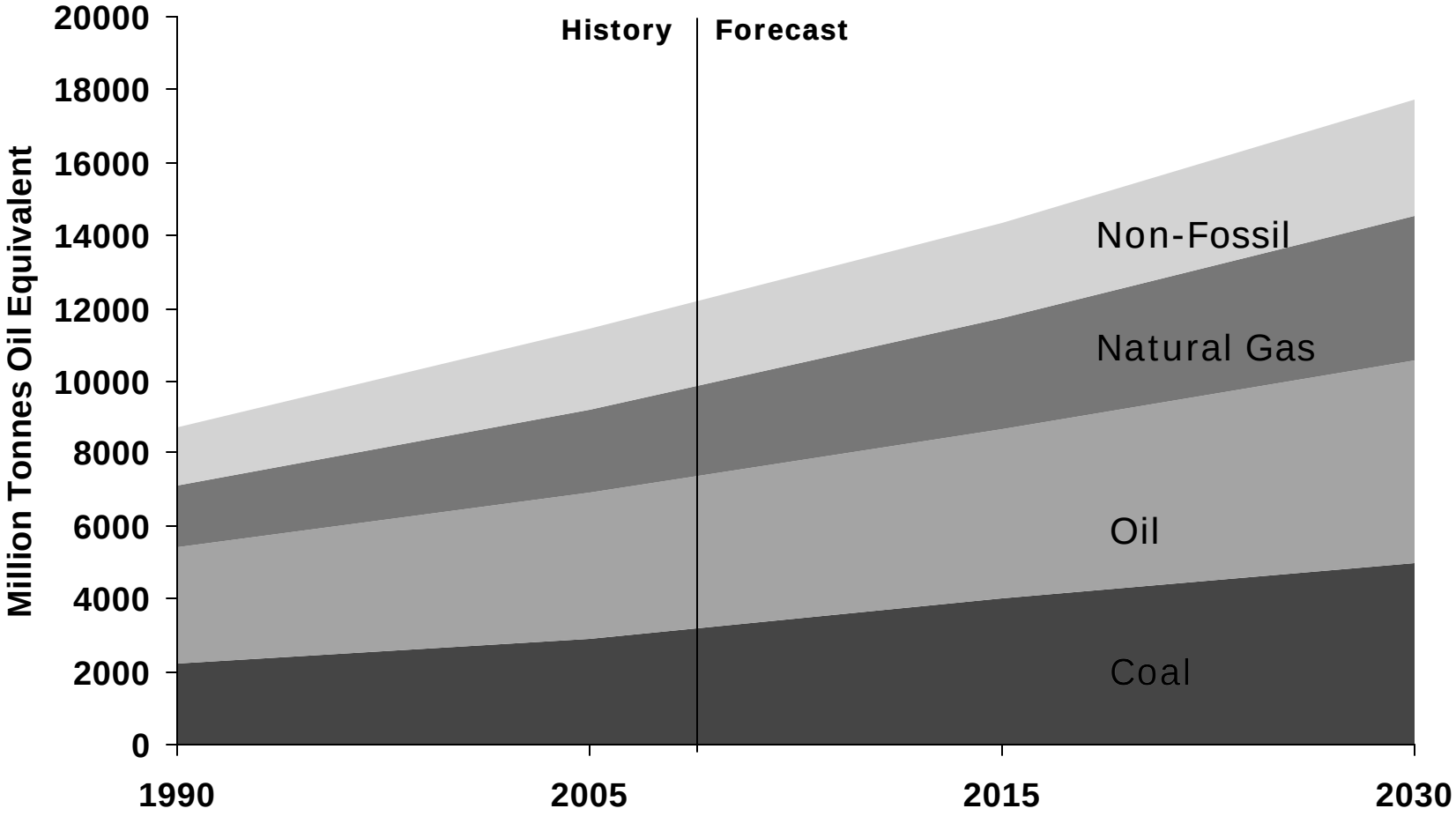


Sustainability and its Challenges

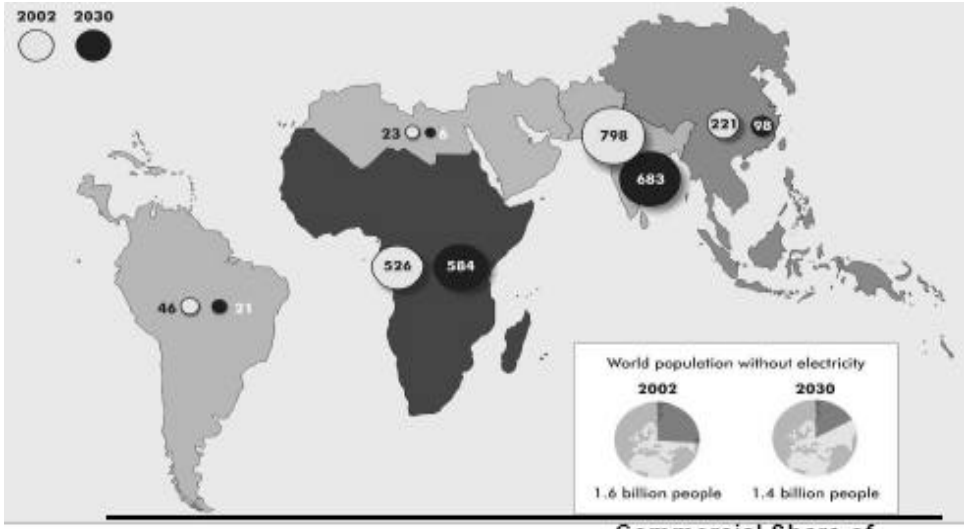
Global Growth in Energy Use



Source: International Energy Agency, *World Energy Outlook*, 2007

Sustainability and its Challenges

Energy Poverty: Who will be left behind?



Indicator of Human Welfare	Commercial Share of Total Energy		
	0-20 %	21-40 %	41-100 %
Life Expectancy (Years)	59.8	69.0	69.5
Probability of not surviving to 40	21.7	9.4	9.1
School Enrollment (%)	52.4	65.4	76.9
Children Underweight (%)	40.9	15.1	11.9
No Access to Clean Water (%)	20.9	22.8	12.8

Source: IEA World Energy Outlook

Source: 2006 UN HDI Report

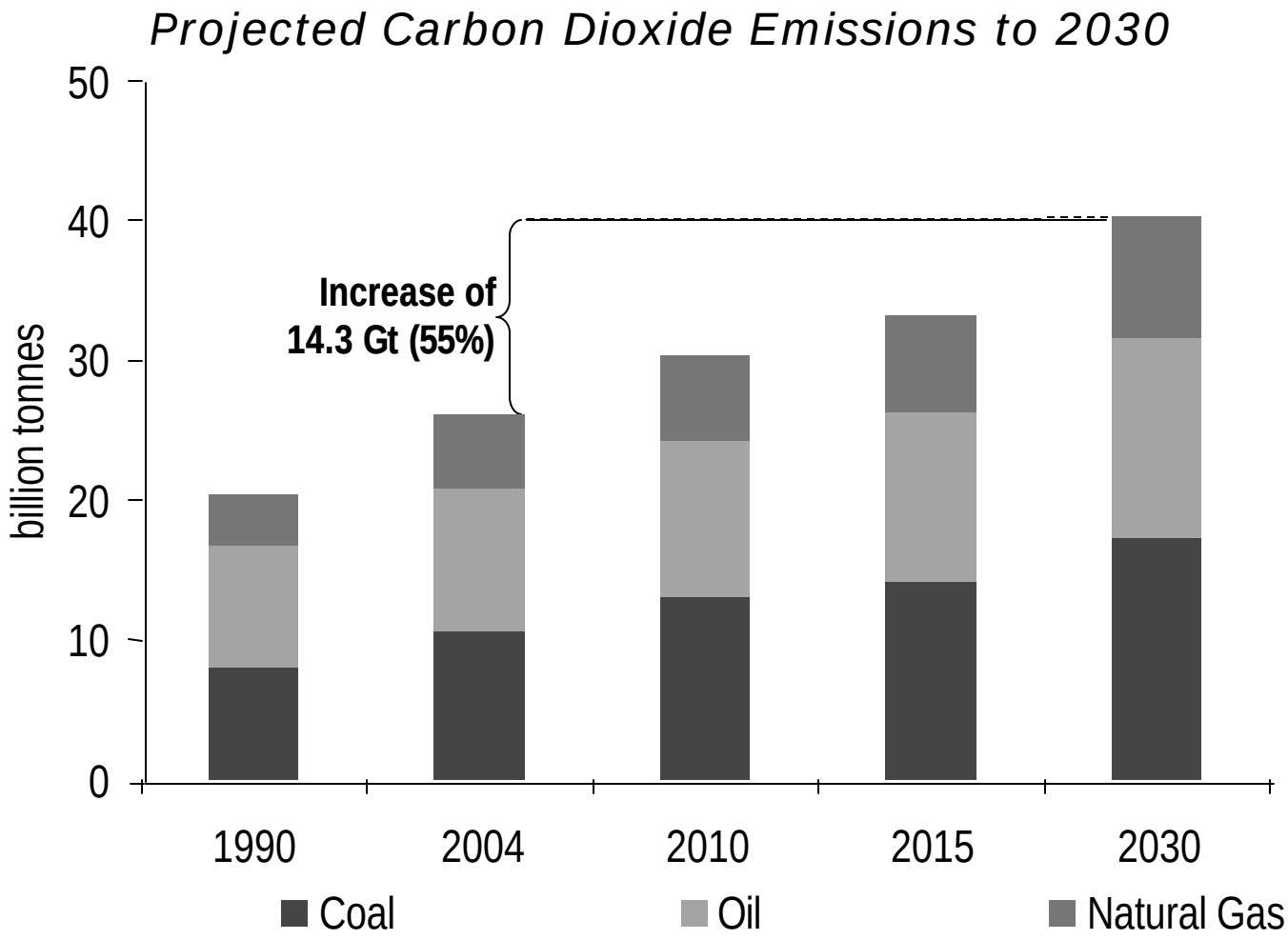
Sustainability and its Challenges

Impact of climate change on the poor…

Source: 2006 UN HDI Report

…disproportionate.

Sustainability and its Challenges



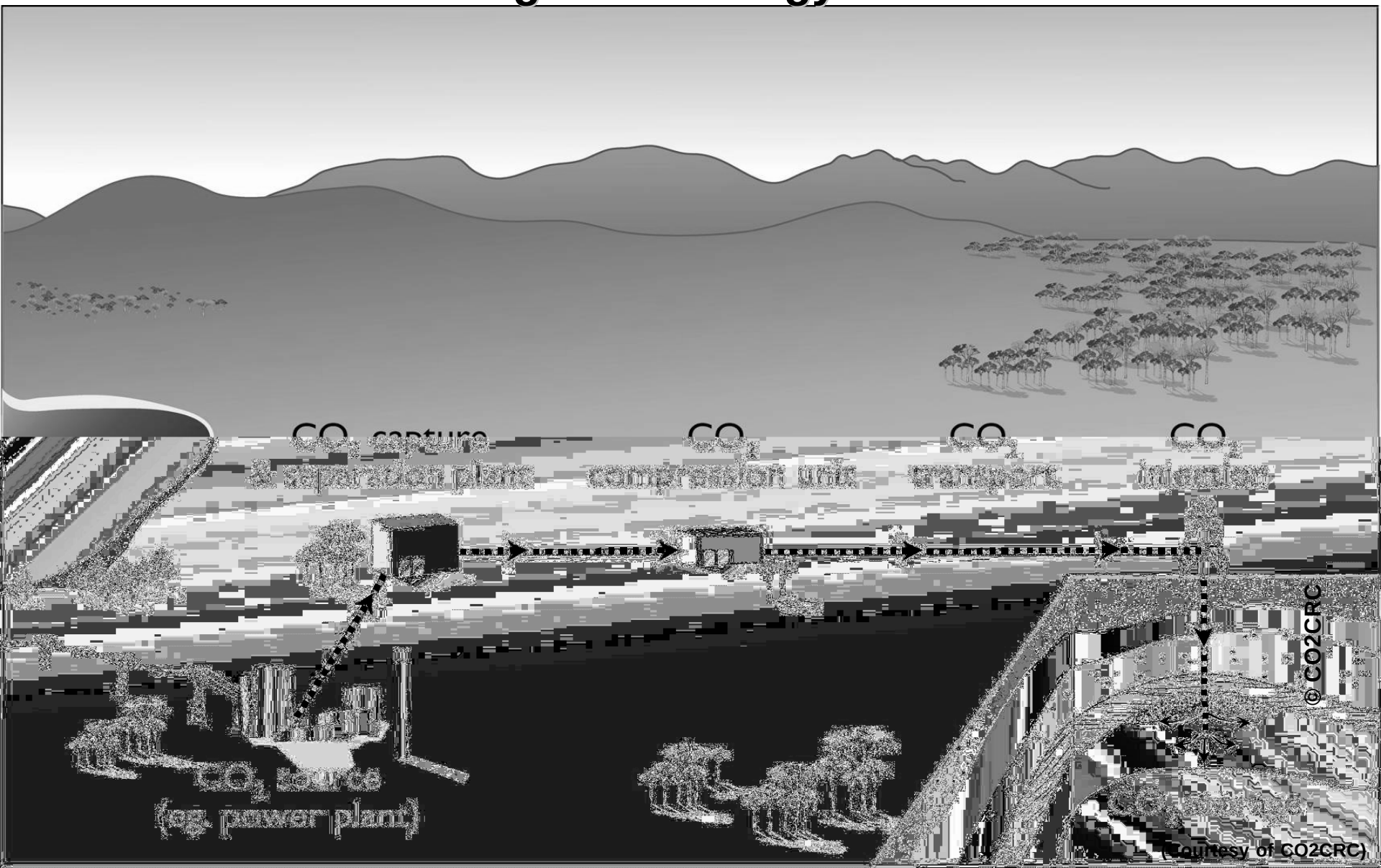
Source: International Energy Agency, *World Energy Outlook*, 2006

Global Energy Transformation
20th to 21th Centuries

New technologies are also transforming coal.

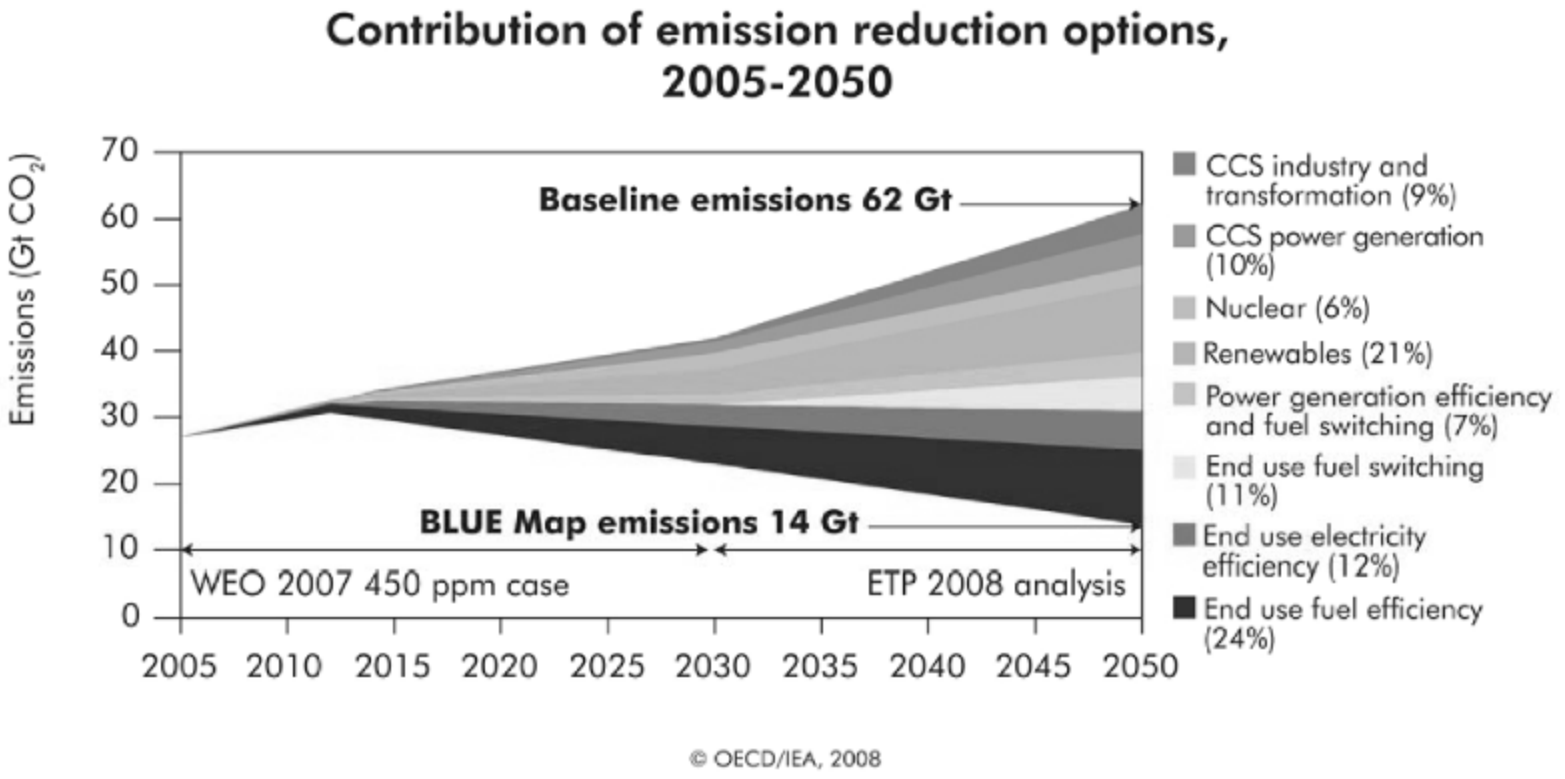
- Enhanced Coal Bed Methane
- Coal to Liquids (CTL)
- Polygeneration
- Coal to Synthetic Natural Gas (SNG)
- Ultrasupercritical plants with CCS
- Integrated Gasification Combined Cycle (IGCC)
- Advanced gas turbines and fuel cells
- Combined Heat and Power (CHP)
- Advanced emissions controls

Carbon Capture and Storage (CCS): Transforming fossil energy use.



(Courtesy of CO2CRC)

Contribution of emission reduction options, 2005-2050



ENERGY TECHNOLOGY PERSPECTIVES 2008

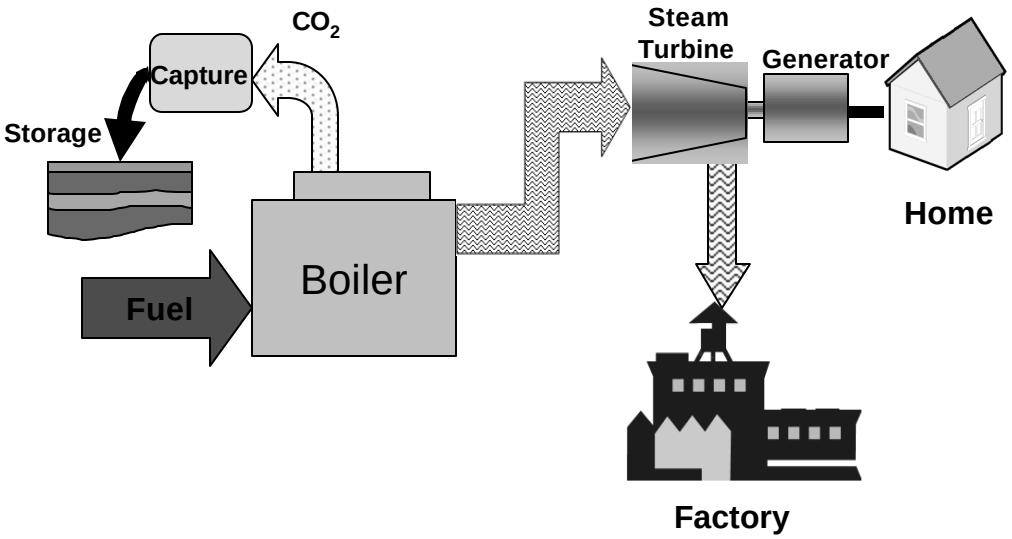
Scenarios & Strategies to 2050

INTERNATIONAL ENERGY AGENCY

In support of the G8 Plan of Action

Efficiency and Near-Zero Emissions with CCS

Jamestown, New York Public Utility
Cogeneration Project with CCS



The United States has a very strong commitment to climate change mitigation (including CCS technology).

- DOE budgets include: funding for research, development, and demonstration of advanced technologies;
- EPAct authorized $1.65 billion in tax credits for clean coal projects with priority given to greenhouse gas capture capability.
- Over the past 5 years DOE-FE funded research on CCS and Clean Coal was approximately $11 billion.
- DOE FY-08 the appropriations include $8 billion for loan guarantees, $6 billion of which require carbon capture or beneficial reuse of CO_2.
- Significant increases in private sector investments have been realized.
- Even with all that we have done, there are still hurdles to overcome in advancing Clean Coal technology:
  - Public perceptions to new coal plants can produce local resistance (NIMBY)
  - Escalations in labor and material costs
  - Technical, regulatory and financial challenges remain in getting technology deployed
- Our Near Zero Emission Coal program (including Restructured FutureGen) is aimed at providing affordable CCS technologies for broad, effective, global deployment.

US Clean Coal Technology Transfer: Partnerships

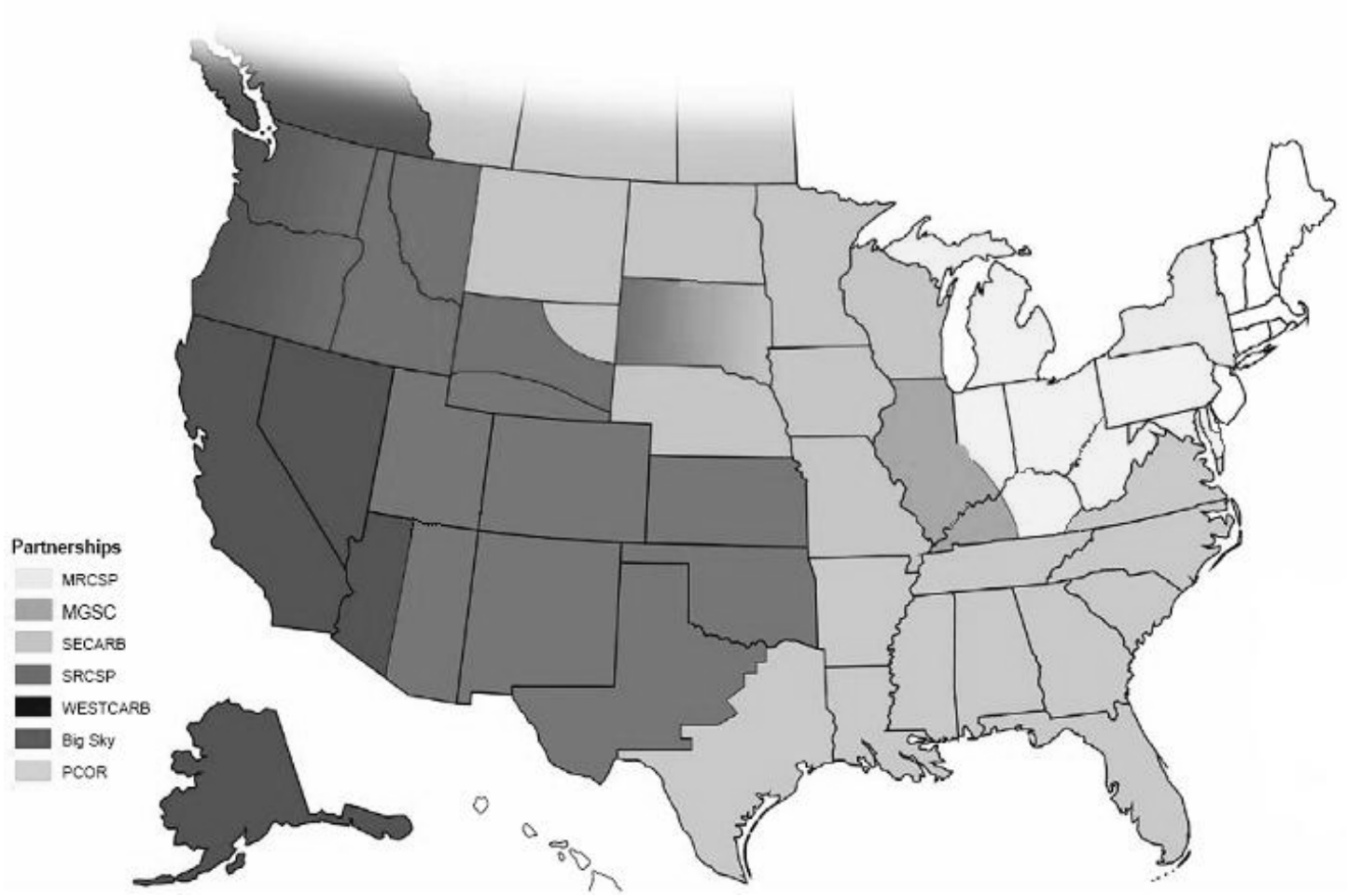
Domestic Partnerships

- Clean Coal Technology Program
- Regional Carbon Sequestration Partnerships
- FutureGen
- Clean Coal Power Initiative

International Partnerships

- Bilateral Agreements
- APEC Expert Group on Fossil Fuels
- Asia-Pacific Partnership
- Carbon Sequestration Leadership Forum
- International Energy Agency
- United Nations
- World Energy Council

Regional Carbon Sequestration Partnerships



China-US Bilateral Partnerships

- US/China Energy and Environmental Technology Center
  - Tsinghua University, Beijing
  - Tulane University, New Orleans

- Fossil Energy Protocol
  - Advanced Power Generation
  - Clean Fuels
  - Oil and Gas
  - Energy and Environmental Control Technologies
  - Climate Science

carbon
sequestration leadership forum

Top-Level Recommendations to the G8

- Demonstrating CO_2 capture and storage
- Taking concerted international action
- Creating value for CO_2
- Addressing the financial gap for early projects
- Establishing legal and regulatory frameworks
- Raising public education and awareness
- Defining capture- and storage-ready concepts
- Planning for infrastructure
- Monitoring and assessment

Public-private partnerships: the critical connection.

Some examples for CCS:

- DOE Regional Sequestration Partnerships (US, Canada)
- GreenGen (China)
- Zero Emissions Power Plant Technology Platform (EC)
- CCS Demonstration Competition (UK)
- CO2CRC, Coal21 and ZeroGen (Australia)
- Clean Power Coalition (Canada)
- Carbon Capture Project (Global)
- IEA Greenhouse Gas R&D Programme (Global)