



GLOBAL
CCS
INSTITUTE



Global Status of CCS, BECCS and CCS in the Americas

Jessica Morton – Capacity Development Adviser

Bio-energy and CCS (BECCS): Options for Brazil

University of Sao Paulo, 13-14 June 2013



THE GLOBAL STATUS OF CCS: 2012

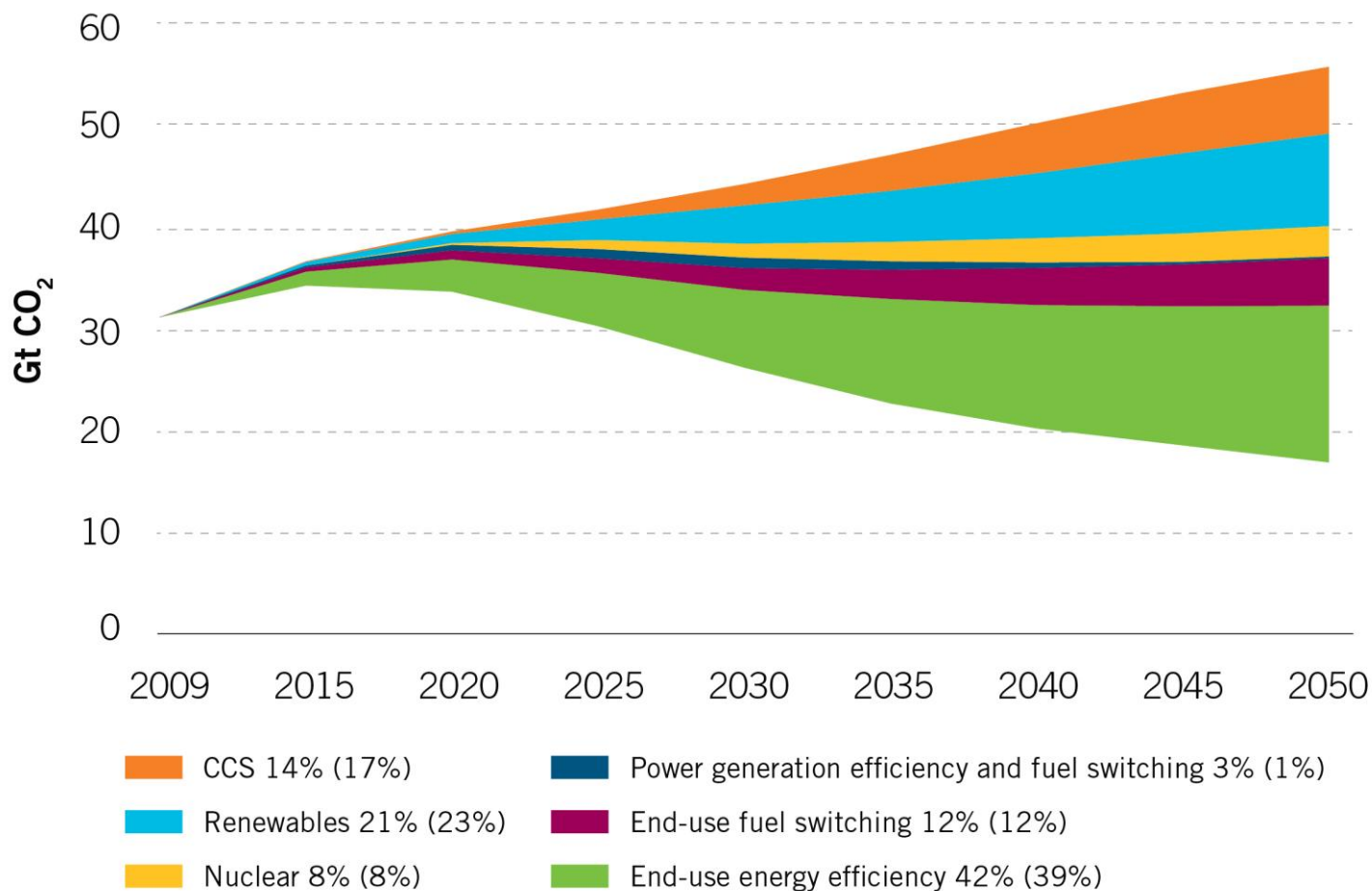


- Released October 2012.
- Update released January 2013.
- Comprehensive coverage on the state of CCS projects and technologies.
- Challenges and recommendations for moving forward.



ACTION IS NEEDED NOW TO ENSURE CCS CAN PLAY A VITAL ROLE IN TACKLING CLIMATE CHANGE

Energy-related CO₂ emission reductions by technology



SOURCE: IEA

NOTE: Percentages represent share of cumulative emissions reductions to 2050. Percentages in brackets represent share of emissions reductions in the year 2050.



CCS IS ALREADY CONTRIBUTING, BUT PROGRESS MUST BE ACCELERATED

9 operating projects:

- 6 natural gas processing plants
- 1 fertiliser plant
- 1 synthetic natural gas plant
- 1 hydrogen plant

8 projects under construction (Execute):

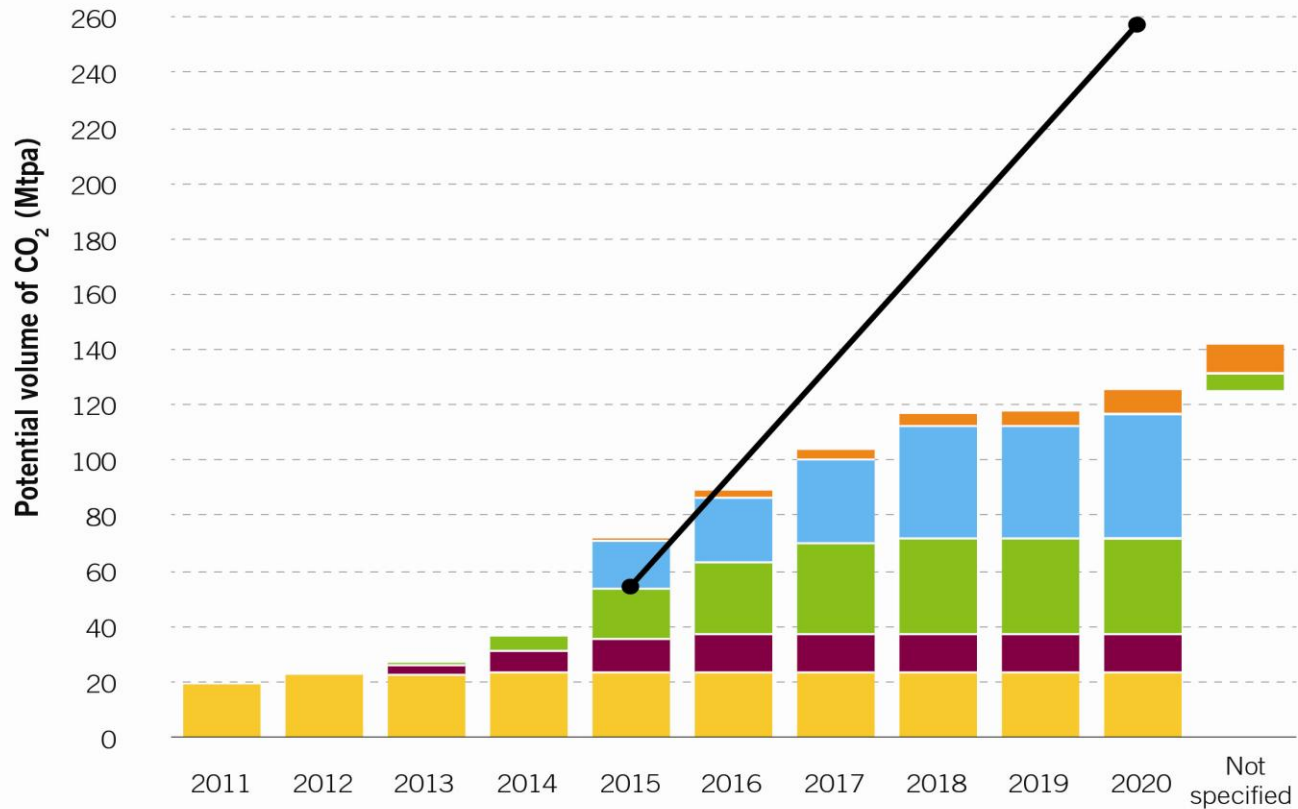
- 2 electricity generation plants
- 2 natural gas processing plants
- 1 hydrogen plants
- 1 fertiliser plant
- 1 ethanol plant*
- 1 oil refining

**Demonstration project in operation – scaling up to commercial scale*



CCS IS ALREADY CONTRIBUTING, BUT PROGRESS MUST BE ACCELERATED

Volume of CO₂ potentially stored by large-scale integrated projects



January 2013 Update

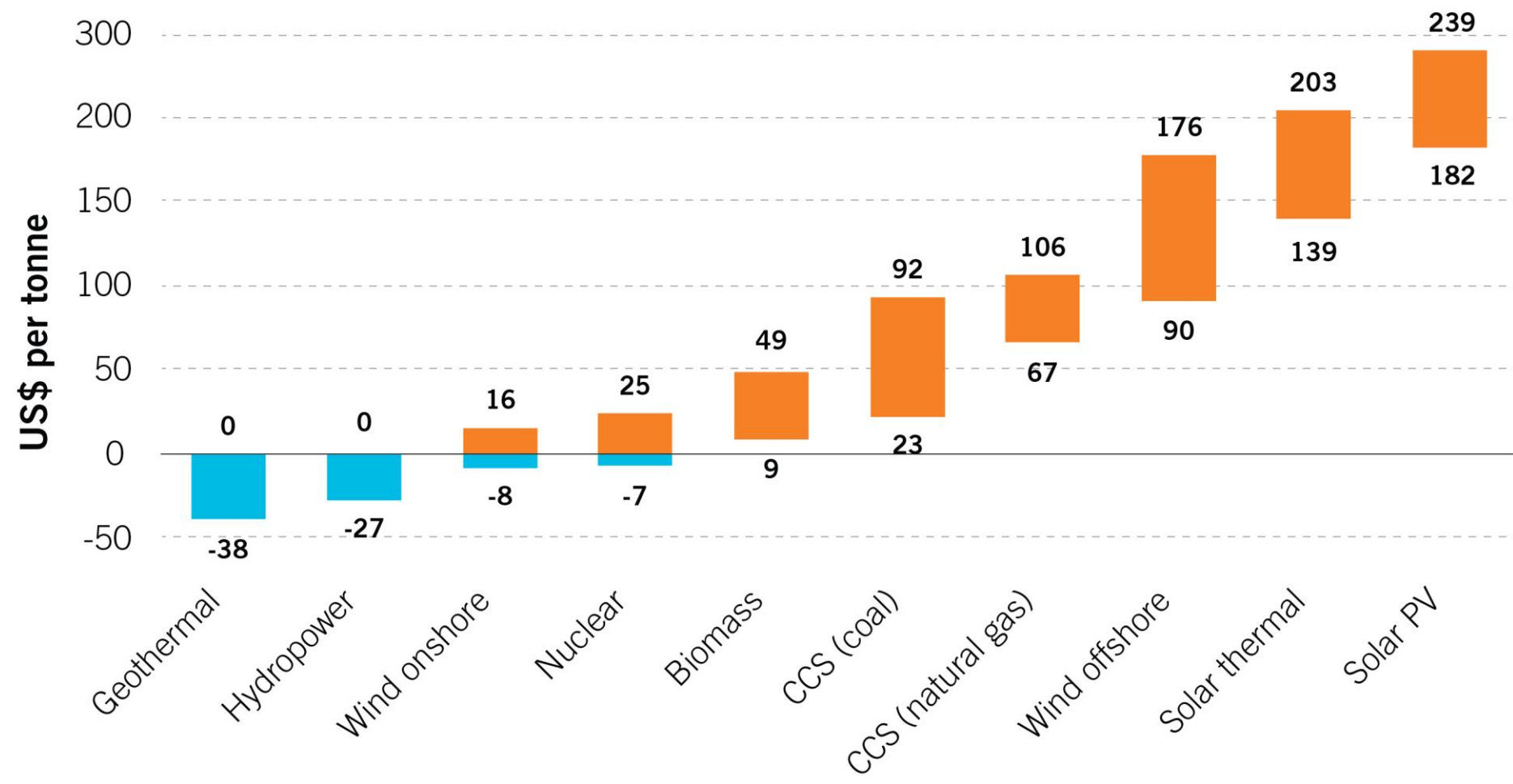
Identify Evaluate Define Execute Operate

● IEA target for CCS



BARRIERS MUST BE OVERCOME TO REALISE THE BENEFITS OF CCS

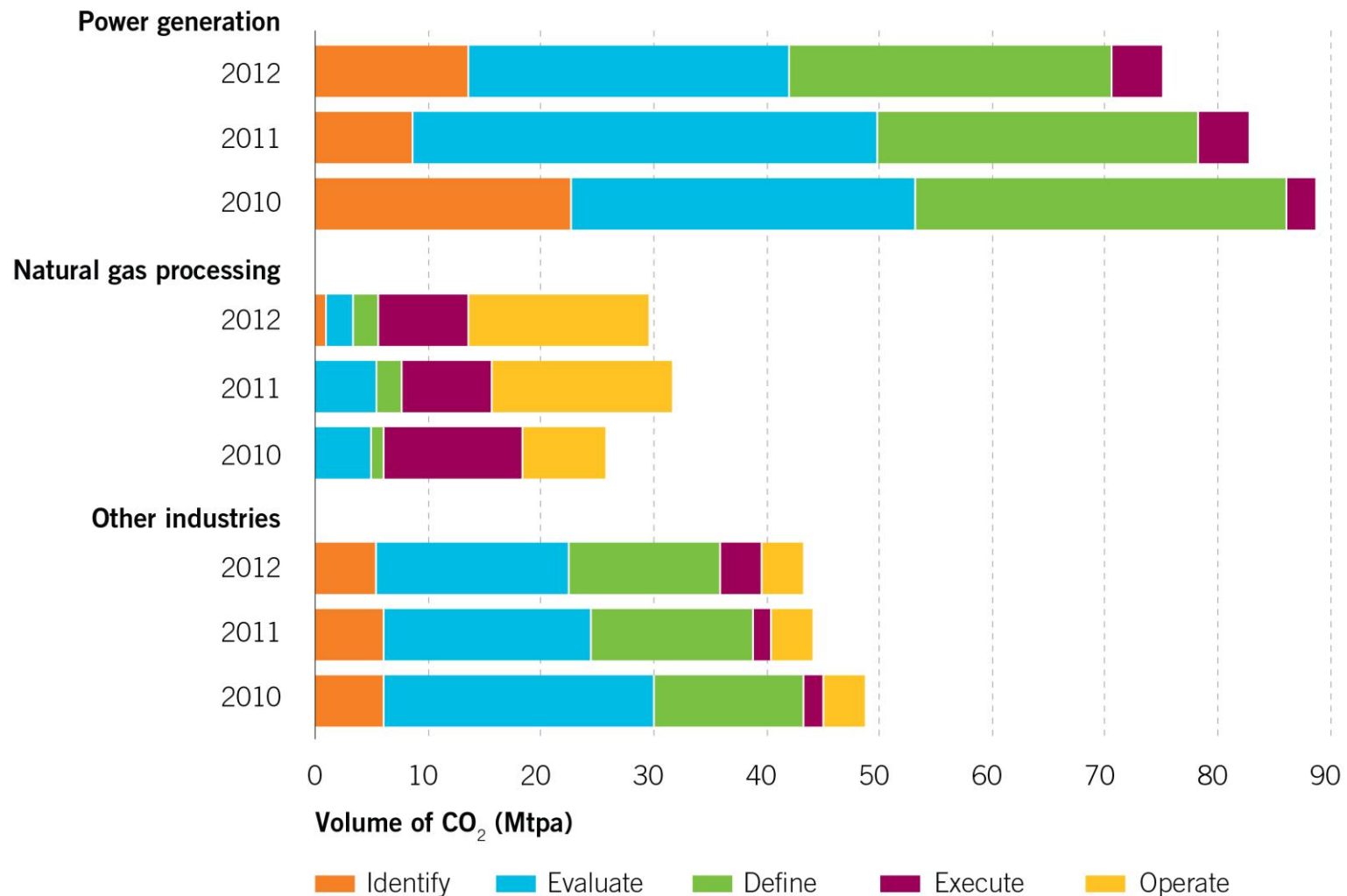
Costs of CO₂ avoided





REDUCING THE COST OF TECHNOLOGY THROUGH DEMONSTRATION PROJECTS IS VITAL

Volume of CO₂ potentially captured by industry sector and year





CCS SCOPE - INDUSTRIAL CO₂ SOURCES

THE ONLY REAL MITIGATION OPTION FOR SOME INDUSTRIES



Gas Processing to Remove Reservoir CO₂

- Relatively low additional cost for capture



Gasification for Chemicals or Liquids

- Low additional cost for capture – likely higher cost than gas



Coal and Gas Power Projects

- High capture cost and capital cost



Steel and Cement Plants

- High capture cost and capital cost



Bio-fuels plus CCS (potential for negative emissions)

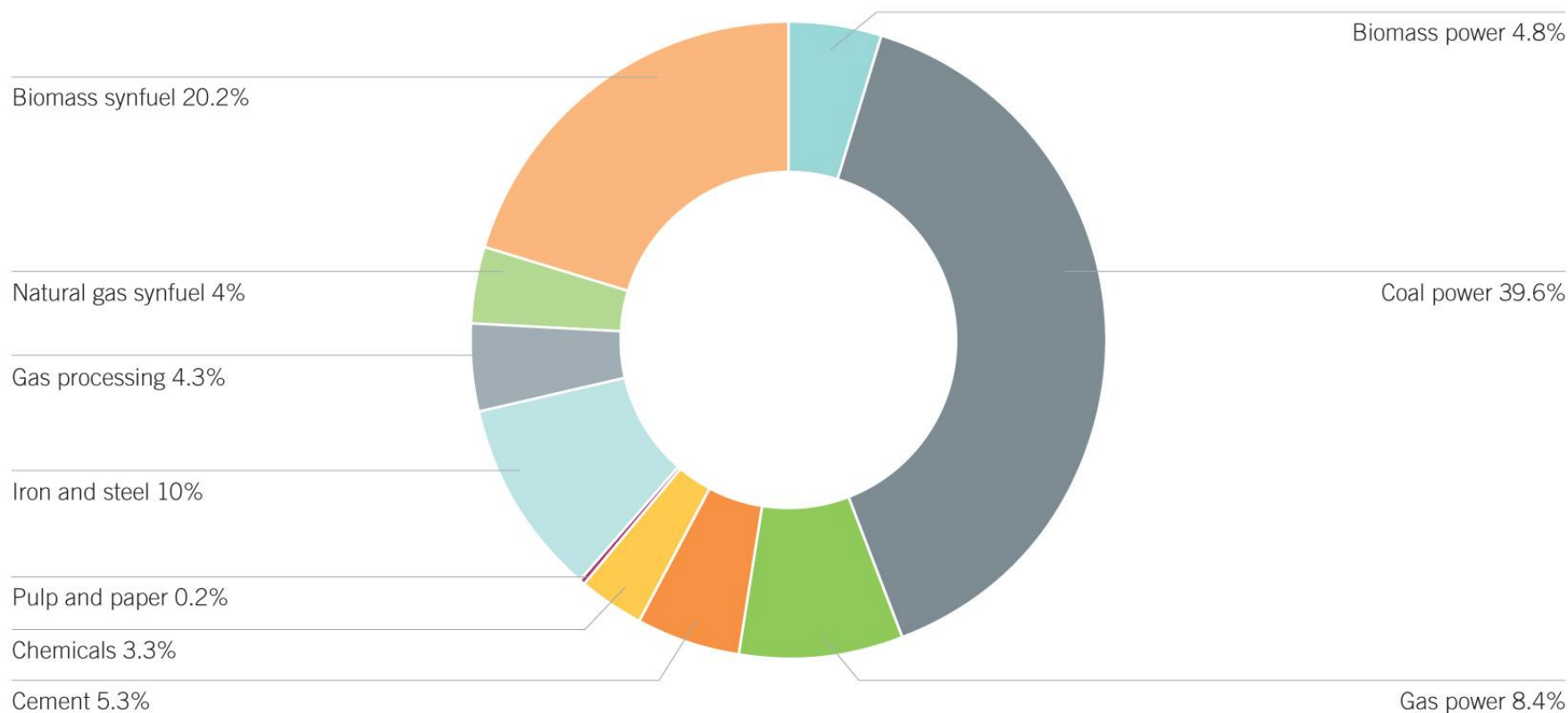
- Range of capture costs – current scale limitations



PROJECTED SECTOR CCS CONTRIBUTION IN 2050

~50% of CCS potential relates to industrial sources

~25% of CCS potential relates to BECCS

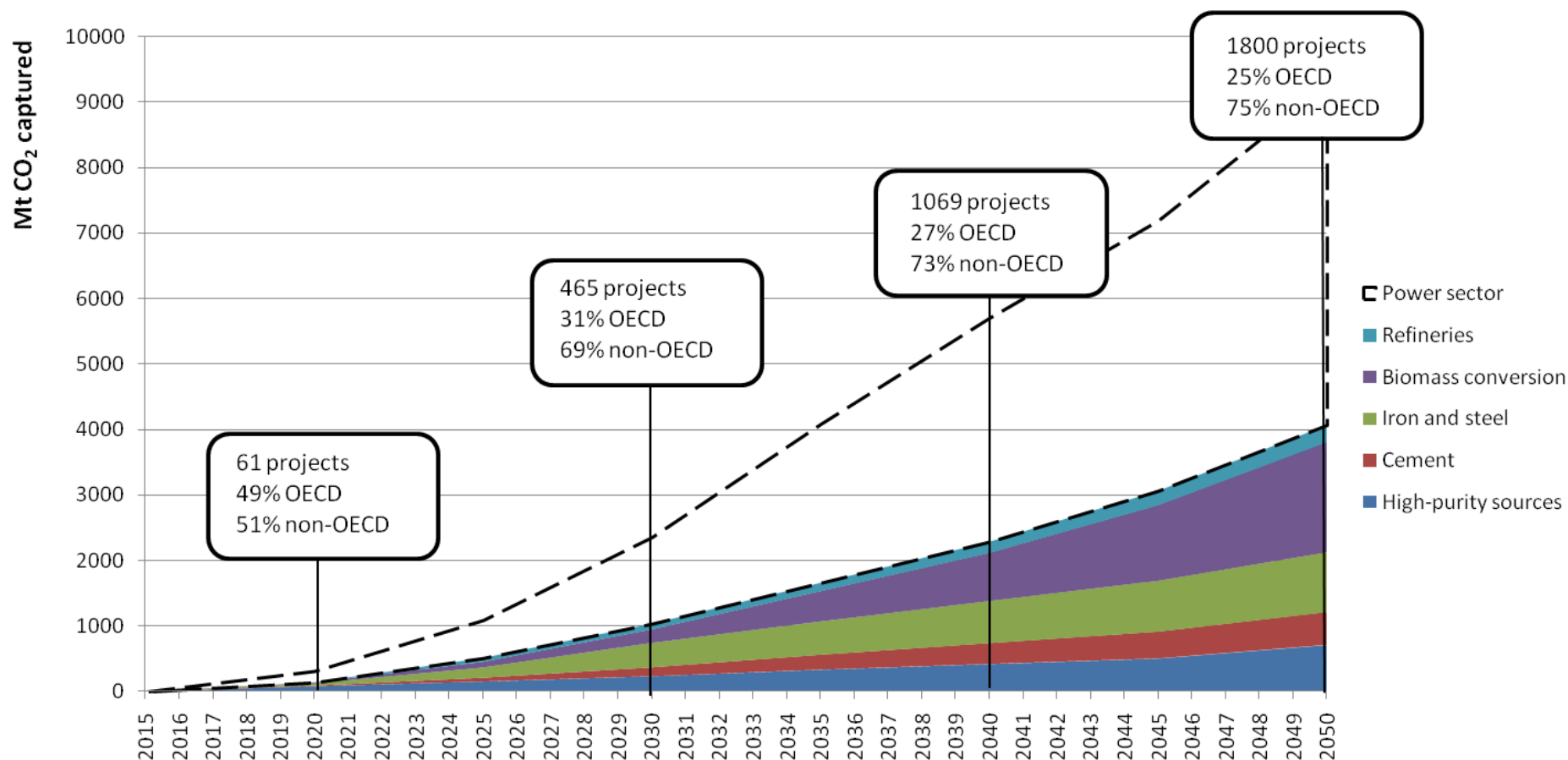


Source: IEA Roadmap on CCS



CCS IN INDUSTRY COULD DELIVER CO₂ EMISSIONS REDUCTION OF UP TO 4.0 GT ANNUALLY BY 2050

ACCOUNTING FOR 10% OF THE REDUCTIONS NEEDED TO HALVE CO₂ EMISSIONS IN 2050





BECCS PROJECTS: REPORT 2010

Russel, Kansas, United States	Värö, Sweden
North Dakota, United States	Artenay, France
Domsjö, Sweden	Norrköping, Sweden
Skåne, Sweden	Greenville, Ohio, United States
Wallula, Washington, United States	Rufiji cluster, Tanzania
Sao Paulo state, Brazil	Ketzin, Germany

Liberal, Kansas to Booker area, Texas, United States

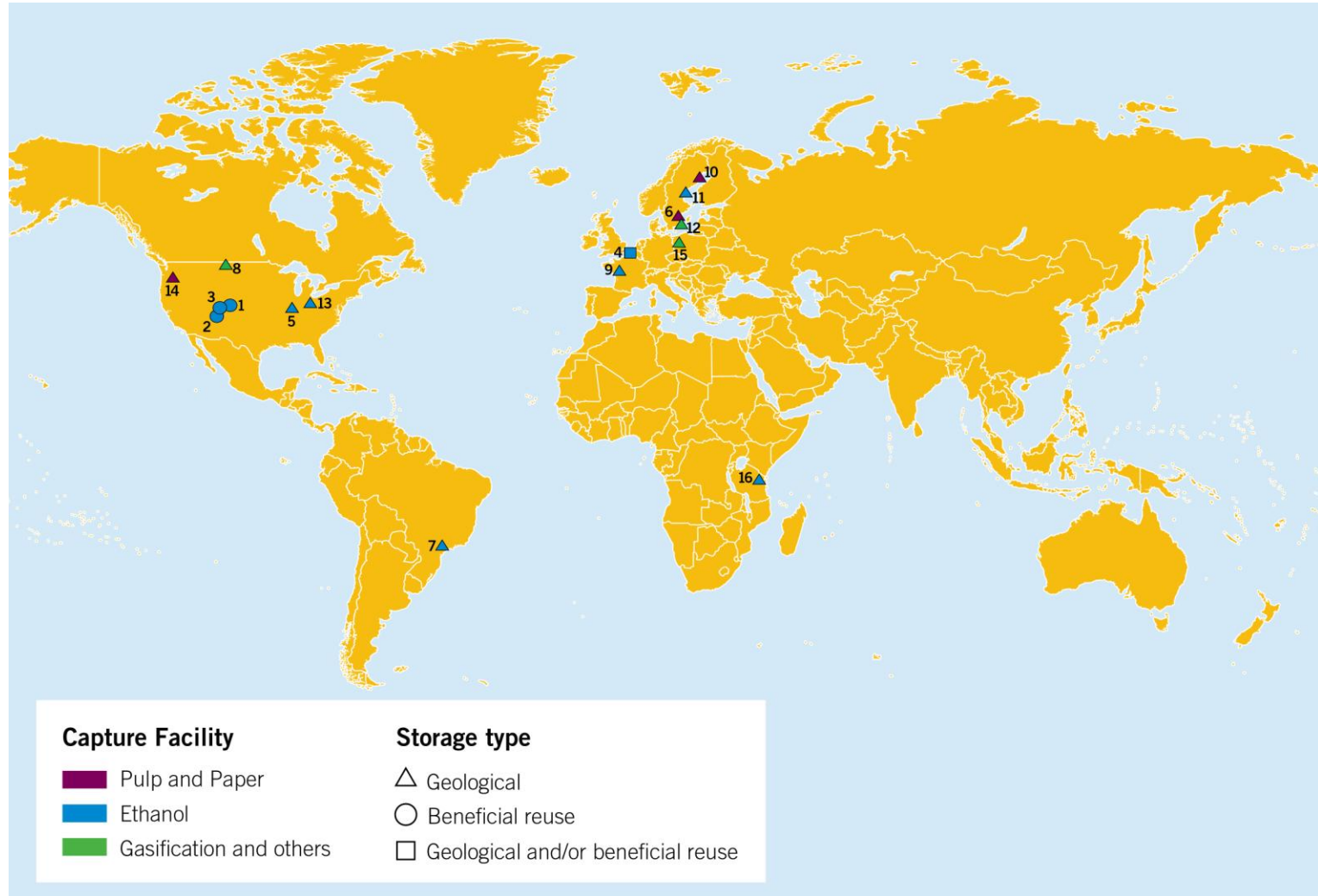
Garden City to Stuart Field, Kansas, United States

Rotterdam, The Netherlands

Decatur, Illinois, United States



BECCS PROJECTS: REPORT 2010





Importance of Central and South America

- Emissions from various fossil fuel-driven industries and energy consumption are high.
- Countries with a particular interest – and participating in capacity development activities – include:

Mexico

- Investigating CCS as part of its energy and climate change strategies

Trinidad and Tobago

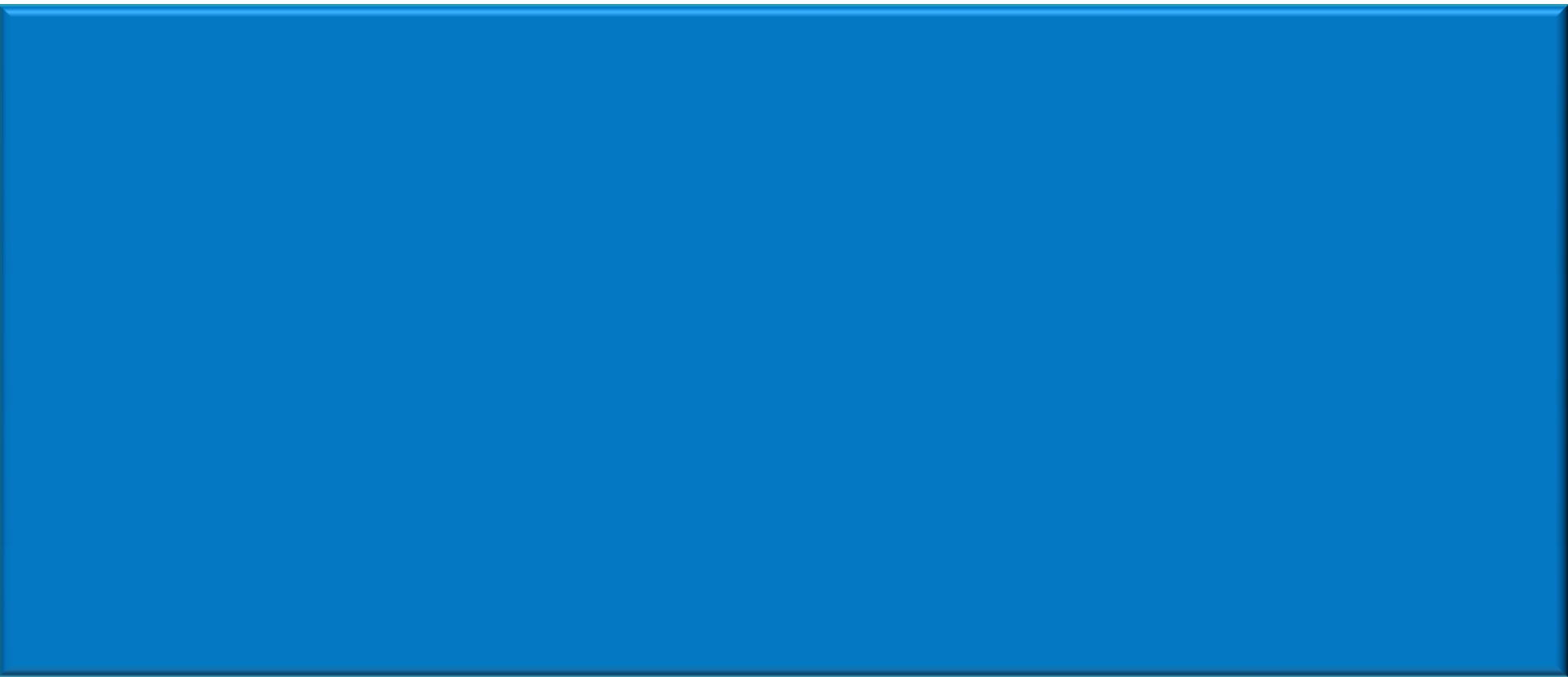
- Looking at CCS legal and regulatory issues

Brazil

- Publishing CO₂ geological storage atlas
- Pilot and large CCS projects



APPENDIX SLIDES





BRAZIL

August 2012	Institute sponsorship for a CEPAC staff member to attend the 34 th International Geological Congress and the Carbon Sequestration Workshop
September 2012	Stakeholder meetings to begin to establish relationships with Brazilian Coal Association, CEPAC, Ministry of Foreign Affairs, Ministry of Environment, United Nations Development Program and the Australian Embassy in Brazil.
February – August 2013	Funding provided to publish storage atlas
June 2013	Presenting at IEA Bio-energy and CCS Workshop
September 2013	Steering Committee CCS Workshop with Portuguese Speaking Countries
Support through other capacity development programs	
2012	<p>Co-funded through the Carbon Sequestration Leadership Forum (CSLF) three training courses on:</p> <ul style="list-style-type: none">▪ CCS and geological storage in an offshore environment;▪ monitoring and environmental impacts assessment on CCS projects in developing countries; and▪ CCS applied to mineral coal combustion and gasification process.



MEXICO

September 2011	Undertook a CCS Capacity Development Assessment in partnership with Secretariat of Energy and the CCS Working Group.
October 2011	Development of a CCS Capacity Development Work Program.
January-March 2012	Advice on the development of a National CCS Strategy Terms of Reference.
March 2012	Presented at the International Energy Agency (IEA) and Secretariat of Energy CCS workshop.
August 2012	Institute sponsorships for three Mexican stakeholders to attend the 34 th International Geological Congress and the Carbon Sequestration Workshop.
June 2012	Provide advice on development of basin level storage study.
June 2012	Presented at Asia Pacific Economic Cooperation (APEC) workshop on storage.
September 2012	University capacity development program agreed with 'Academic Council of the Earth Sciences Schools for the Implementation of Topics of Geological CO ₂ Storage'.
February 2013	Week long 'train-the-trainer' course for University Professors and CFE professionals on storage, capture, economics, legal and regulatory and public engagement aspects of CCS
Supported through other capacity development programs	
March 2012	Co-funded through the CSLF, technical training workshops on geological storage, EOR and CO ₂ capture.
2012 (in progress)	Co-funded through the World Bank a techno-economic assessment of a pilot and demonstration project at a gas-firing power generation plant, including analysis of costs, technologies and transport options.



TRINIDAD & TOBAGO

June- July 2012	Provided advice to Trinidad and Tobago Government on Terms of Reference and potential consultants for CCS scoping study.
July & September 2012	Chaired two stakeholder workshops and stakeholder meetings to seek input and feedback on draft CCS Legal and Regulatory Framework Review and Permitting Matrix.
30 September 2012	CCS Legal and Regulatory Framework Review and Permitting Matrix provided to Ministry of Environment and Water Resources.



GLOBALCCSINSTITUTE.COM