



## >> FOSSIL FORWARD

### Revitalizing CCS: Bringing Scale & Speed to CCS Deployment

#### Chapter B – Global Status of CCS/CCUS

##### **Global CCS Status: Large Scale Project Overview**

In order for CCS to become commercially available beyond enhanced oil recovery (EOR) and other niche markets, continued investments in second and third generation capture systems that reduce costs, maintain operational flexibility, and build confidence are critical. These investments need to be accompanied by sustained policy action that provides certainty and incentives, enabling CCS to be recognized within the low carbon technology portfolio.

As of November, 2014, there are 13 large scale CCS projects in operation around the world, with another 9 under construction. There are also 19 projects in the early planning stage and 14 in advanced planning. North America and the U.S. dominate in terms of project numbers and investment levels, followed by China.

By 2017, all of the projects currently under construction are expected to be in operation, bringing the total CO<sub>2</sub> capture and storage capacity of operational projects to around 40 million ton/year. As a point of comparison, coal fired power plants in the U.S. emit about 2.2 billion tons/year. While these projects represent a good start, many more projects will be needed.

##### **Power Sector CCS Project Successes**

While there is often a perception that CCS is a technology for coal power plants, a large natural gas combined cycle (NGCC) plant produces nearly two million ton/year of CO<sub>2</sub> and will also require CCS under international CO<sub>2</sub> reduction goals. NGCC CCS demonstration projects currently in the advanced planning stage (Sargas in Texas, U.S. and Peterhead in the U.K.) are critical to advancing CCS for NGCC applications.

##### **Key Electricity Generating Projects with CCS/CCUS**

Project	Location	Status	CO <sub>2</sub> Capture	Cost
Plant Barry	Alabama	Operation	150,000 ton/year	
Boundary Dam	Saskatchewan	Operation	900,000 ton/year	CAN \$1.35 billion
Kemper County Energy	Mississippi	Construction	3,000,000 ton/year	\$6.1 billion
Petra Nova – W.A. Parish	Texas	Construction	1,400,000 ton /year	\$417 million
Sargas Texas Point Comfort	Texas	Advanced Planning	800,000 ton/year	
FutureGen 2.0	Illinois	Construction	1,100,000 ton/year	\$1.8 billion
Peterhead	United Kingdom	Advanced Planning	1,000,000 ton/year	
White Rose	United Kingdom	Advanced Planning	(zero emission facility)	
GreenGen	China	Advanced Planning	(near zero emission facility)	

### Polygeneration Project Highlights

With regulatory challenges in the power sector, a number of project developers are looking to polygeneration configurations that have a lower emissions profile than conventional coal plants and, in addition to power, produce a range of products. Various feedstocks (e.g., coal, petcoke, biomass, etc.) can be gasified to produce syngas (a mix of carbon monoxide and hydrogen) that can in turn be used to produce fertilizer, methanol, various liquid fuels, specialty chemicals, etc.

**Polygeneration Projects in Advanced Planning**

Project	Status	CO2 Capture	Power Generation
Texas Clean Energy	Advanced Planning		195 MW net
Hydrogen Energy California	Advanced Planning	3,000,000 ton/year	280 MW net

### International Trends and Project Highlights

There is considerable CCS large scale project activity worldwide with the U.S. in the lead in terms of project numbers and public and private sector investments.

Of the 22 projects identified by the Global Carbon Capture and Storage Institute (GCCSI) that are either in operation or under construction, the U.S. is home to 10 with another 6 of 9 in the advanced planning stage. Canada has 5 projects in operation or construction, followed by two in operation in Europe. Brazil and Algeria each have one project in operation.

### Technology Focus: The CCS Test Centre Network

The CCS Test Centre Network was launched in late 2012 and currently has four members: CO2 Technology Centre Mongstad (Norway), National Carbon Capture Center (Alabama, US), SaskPower (Canada), and Statoil. The network's primary goals include:

- Provide enhanced technical learning and confidence that can be beneficial for projects in applying more efficient CCS solutions
- Increase insight and awareness of different technologies for relevant stakeholders that may reduce risks and increase investments in CCS technology
- Provide a broader base of factual evidence which can increase general transparency of CCS, and thereby enhance public awareness and acceptance of the technology
- Increase the value of public and private CCS research and technology investments through increased sharing of lessons learned and results from parallel activities networks

### Global Carbon Capture and Storage Institute Perceptions Survey

According to GCCSI's annual survey, the top three CCS/CCUS project enablers are access to direct subsidies, access to viable CO2 storage, and off take arrangements offering guaranteed prices. Lack of these enablers represents the major stumbling block to the successful deployment of large scale CCS projects.

### Key Findings

- Capital and operating costs for projects with CCS are more expensive than conventional technologies and carry greater technology and commercial risk.
- Funding remains a major challenge.
- The current, large scale CCS project activity is largely a function of policies and funding programs established toward the end of the last decade.
- Additional policy action is required now to improve the investment climate for CCS and ensure that current momentum is sustained.
- There is considerable CCS large scale project activity worldwide with the U.S. in the lead in terms of project numbers and public and private sector investments.

<http://www.nationalcoalcouncil.org/studies/2015/Fossil-Forward-Revitalizing-CCS-NCC-Approved-Study.pdf>