

# Carbon capture and storage with natural gas delivers high electricity value

## Natural gas with CCS saves money, water and fuel compared to other fossil fuel applications.

Carbon capture and storage (CCS) holds considerable promise for producing clean electricity. The concept is simple: capture and safely store the carbon dioxide (CO<sub>2</sub>) emissions that are a byproduct of making electricity with fossil fuels, emissions that otherwise would be released into the air by a power plant. CCS could help facilitate our country's long term energy security and environmental objectives by allowing us to use abundant domestic resources, such as natural gas and coal, with near zero carbon emissions.

### CCS ALREADY PROVEN IN NATURAL GAS FIELD OPERATIONS

Natural gas companies already are leaders in the use of CCS, since they have been capturing and storing or reinjecting carbon dioxide at some natural gas production fields for decades. *In fact, four out of the five existing commercial-scale CCS projects in the world in 2009 separate and store CO<sub>2</sub> from natural gas.* (Sleipner West in the North Sea, In Salah in Algeria, Salt Creek in Wyoming and Snohvit in the Barent Sea.) At these sites, the CO<sub>2</sub> is separated from natural gas during the production process.

At the facilities cited above, the captured CO<sub>2</sub> is stored in deep saline formations or

recycled. For example, some CO<sub>2</sub> captured at production fields is reinjected as a gas to enhance oil production. Eventually, the CO<sub>2</sub> is stored. In its *2007 Carbon Sequestration Atlas*, the National Energy Technology Laboratory (NETL) reported that North America has enough storage capacity at its current rate of production for more than 900 years of CO<sub>2</sub>.

The natural gas industry is working hard to apply the CCS technology perfected at natural gas production sites to natural gas power generation. At Houston's sister city Abu Dhabi, for instance, BP and Masdar are well along in developing a 400 Megawatt power plant with full-scale carbon capture, while Statoil and the Norwegian government are also engaged in developing a full-scale carbon capture facility in Mongstad, Norway.

### NATURAL GAS CCS PRODUCES ELECTRICITY AT COMPETITIVE COST

Natural gas with CCS produces electricity at costs that are comparable to and in many cases less than other fuels with CCS, according to *America's Energy Future*, a 2009 study by the National Research Council, the most thorough study to date of CCS options and costs.

The NRC study examines different scenarios and concludes that CCS at natural gas power plants produces lower cost electricity than CCS alternatives at a \$6.33 per MMBtu price. To put this in context, government forecasters are projecting that the average spot price for natural gas in 2010 will be \$4.62. (U.S. Energy Information Administration Short-Term Energy Outlook, Dec. 2009)

As an environmental and savings bonus, natural gas with CCS also has the lowest "energy penalty," meaning that it uses less fuel in the CCS process than other fossil fuels with CCS. Natural gas CCS also uses less water than any fuel with CCS. (Cost and Performance Baseline for Fossil Energy Plants, NETL, August 2007)

### FUNDING NECESSARY FOR CCS

As policymakers move forward to address environmental goals, it's critical that they recognize and promote funding for natural gas CCS for power generation. Not only does natural gas CCS produce affordable electricity, it uses less fuel and less water than other fossil fuel CCS applications. The country needs funding for research and development of CCS technologies for all our fossil fuels.

## COSTS OF CCS WITH DIFFERENT TYPES OF POWER PLANTS (2007 US\$ PER MEGAWATT-HOUR)



Sources: *America's Energy Future: Technology and Transformation*, National Research Council, November 2009. Includes estimated costs of construction, fuel, operation & maintenance and costs of disposal. Based on natural gas at \$6.33/MMBtu and coal at \$1.80/MMBtu.