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Press Release

OIL REFINERY CO₂ CAPTURE DEMONSTRATION UNDERWAY IN BRAZIL

Oxy-combustion demo on a Fluid Catalytic Cracking unit - a high-CO₂ emitter in the refinery

The CO₂ Capture Project (CCP) has started an oxy-combustion capture trial on a pilot-scale Fluid Catalytic Cracking (FCC) unit – one of the highest CO₂ emitting units in a refinery. The test is expected to bring closer a more cost-effective technology capable of capturing up to 95% of FCC CO₂ emissions, potentially equating to some 20-30% of emissions from a typical refinery.

The demonstration is taking place at a full burn FCC unit at a Petrobras research complex in Parana state, Brazil, with testing scheduled for completion at the end of May 2011. It is expected to confirm the technical and economic viability of retrofitting an FCC unit to enable CO₂ capture through oxy-combustion. The project will test start-up and shut-down procedures and different operational conditions and process configurations – allowing the CCP partners to gain reliable data for scale-up.

The refinery is a challenging environment for capturing CO₂, with many different operations producing emissions. In a refinery, the FCC unit converts heavy, lower-value hydrocarbon feedstock into lighter, more valuable products. This unit is often the largest single source of CO₂ emissions in a refinery. Traditionally, air is used to regenerate the catalyst, by burning the coke deposited on the surface. In the oxy-combustion mode, air is replaced by pure oxygen, which is diluted with recycled CO₂ to maintain thermal balance and catalyst fluidization.

Established in 2000, the CCP aims to advance the technologies that will underpin the deployment of industrial-scale CO₂ capture and storage (CCS) in the oil and gas industry. The CCP identified oxy-combustion as one of the most promising capture technologies to take forward for demonstration, from over 200 options evaluated. It initially conducted an economic assessment of oxyfiring and post-combustion amine absorption for CO₂ capture from the FCC regenerator. Both processes were able to achieve the required specifications and recovery level. Although the post-combustion option had a lower capital cost, the lower operational costs for oxyfiring delivered a lower overall capture cost.

Gardiner Hill, CCP Chairman said: "Refineries are significant emitters of CO₂ and face unique challenges in managing their emissions. This demonstration brings us a step closer in identifying cost-effective,



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industrial-scale technology to help manage the carbon footprint of our operations."

Raul Rawet, manager of FCC R&D group, of Petrobras, commented: "A number of issues will be addressed by the demonstration such as start-up and shut-down operations using oxygen, thermal balance and catalyst entrainment. This is an important demonstration; we anticipate that the learnings gained will have long-term value, helping our industry manage its CO₂ emissions. As a long standing member of CCP, Petrobras is delighted to be hosting this demonstration."

For further information on the CCP, and to download a factsheet on the FCC oxy-combustion demonstration please visit www.co2captureproject.com

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Notes to Editors

FCC Overview:

The FCC is often the largest single source of CO₂ emissions from a refinery. The pilot FCC unit has the capacity to process up to 33 bbl/d of hydrocarbon feed (emitting 1 ton/day of CO₂). It consists of an adiabatic riser, stripper and regenerator, which allows simulation of a commercial FCC unit, including the energy balance.

The CO₂ Capture Project:

The CO₂ Capture Project (CCP) is an award-winning partnership of several major energy companies, working to advance the technologies that will underpin the deployment of industrial-scale CO₂ capture and storage.

Since its formation in 2000, the CCP has undertaken more than 150 projects to increase understanding of the science, economics and engineering applications of CCS. The group has been working closely with government organizations — including the US Department of Energy, the European Commission and more than 60 academic bodies and global research institutes. CCP received the Carbon Sequestration Leadership Forum (CSLF) Recognition Award in 2009 for its contribution to the advancement of CCS.

Phase Three (CCP3) members are: BP, Chevron, Eni, Petrobras, Shell, Suncor, ConocoPhillips and EPRI is an associate member. For further information on the work of the CO₂ Capture Project please visit www.co2captureproject.com

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