

# **PLAINS CO<sub>2</sub> REDUCTION (PCOR) PARTNERSHIP (PHASE II) – TASK 9 – EVALUATION OF SINK OPTIONS IN THE VICINITY OF EXCELSIOR ENERGY'S PROPOSED IGCC PLANT**

## **2007 Quarter 3 Milestone**

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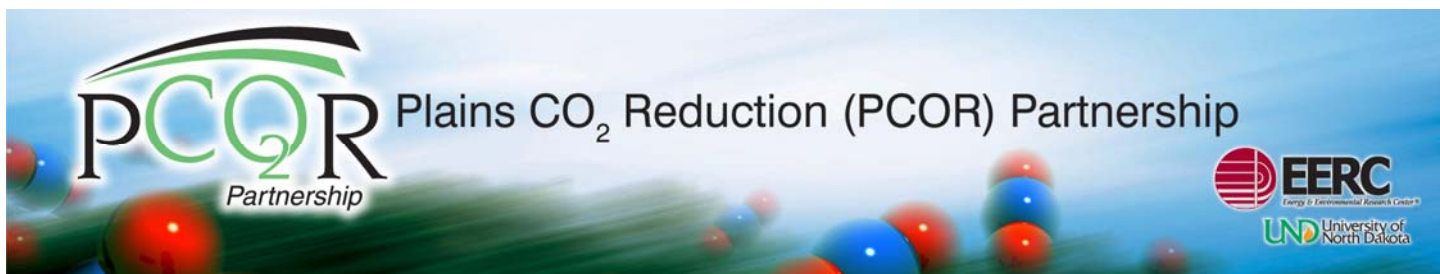
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The geological sinks that are the most likely to be considered for sequestration of CO<sub>2</sub> from Excelsior Energy's Mesaba integrated gasification combined-cycle plant are ones for which the CO<sub>2</sub> could be sold to defray at least some of the cost of capture, dehydration, compression, and transportation, i.e., oil fields in which CO<sub>2</sub> would be used for enhanced oil recovery (EOR). The most viable EOR opportunities are in the Williston Basin, approximately 300 miles west of the proposed plant location. The cost of capture, dehydration, and compression will remain the same irrespective of which sink location is chosen. To differentiate between regional EOR opportunities, the pipeline infrastructure needed to reach each sink was estimated using a pipeline route and cost model. This information was combined with sink capacity, and the various sink options were ranked.

Pipeline infrastructure needs were estimated using a geographic information system-based model for CO<sub>2</sub> pipeline transport and source–sink matching optimization that was developed at the Massachusetts Institute of Technology (MIT) (Herzog, 2006). The MIT model calculates pipeline diameter, identifies the least cost path connecting a CO<sub>2</sub> source to a given sink, and calculates the total and annualized CO<sub>2</sub> pipeline transportation costs. The model implements 1×1-km obstacle grid layers in which local terrain, crossings, protected areas, and populated places are assigned relative cost factors to determine the least cost route between a single CO<sub>2</sub> source and a geologic sink. For the given route, the length, diameter, pipeline construction cost, annual operations and maintenance cost, and total cost per ton of CO<sub>2</sub> are calculated.

The specific results of the source–geological sink matching are confidential to Excelsior Energy. Six EOR options were examined (three sinks for each of the two potential Mesaba power station locations). Estimated pipeline construction costs ranged from \$177 million to \$237 million. On a per-ton-CO<sub>2</sub> basis, total pipeline infrastructure cost was estimated to range from about \$18/ton to about \$24/ton. Based on cost and sink capacity, the most appropriate source–sink matches seem to be those in which about 50 years' worth of CO<sub>2</sub> from the Mesaba plant could be sequestered at a cost of about \$21/ton to \$24/ton of CO<sub>2</sub>.

**Reference**

Herzog, H., 2006, A GIS-based model for CO<sub>2</sub> pipeline transport and source–sink matching optimization: Presented at the WESTCARB Annual Business Meeting, Phoenix, Arizona, November 2006. Available online at [www.westcarb.org/Phoenix\\_pdfs/finalpdfs-11-08-06/17-Herzog\\_GIS.pdf](http://www.westcarb.org/Phoenix_pdfs/finalpdfs-11-08-06/17-Herzog_GIS.pdf).