

FY05-LII(52)-134

“North Dakota Partnership in the Canadian Clean Power Coalition”

Contractor: Basin Electric Power Cooperative; Duration: 14 months
Principal Investigator: Dave Schmitz

PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
Basin Electric Power Cooperative	\$ 9,375
Great River Energy	\$ 9,375
Ottertail Power Cooperative	\$ 9,375
Montana Dakota Utilities	\$ 9,375
Great Northern Power Development	\$ 9,375
Westmoreland Coal Co.	\$ 9,375
Dakota Gasification Co.	\$ 9,375
Minnesota Power Co.	\$ 9,375
NDIC	<u>\$ 75,000</u>
Total Cost	\$150,000

Project Schedule - 14 Months

Contract Date – 2/11/05
Start Date – 2/11/05
Completion Date – ~~12/31/05~~
Contract extended – 6/30/06

Project Deliverables

Contract Signed: √
Quarterly Reports:
4/1/05(√); 7/1/05(√); 10/1/05(√)
Final Report ~~12/31/05()~~;
6/30/06 (√)

OBJECTIVE / STATEMENT OF WORK:

Participate in studies of advanced technologies for future lignite power generation, including IGCC and advanced steam cycles such as ultra super-critical steam cycles in conventional and fluid bed combustion power plants that would also be amendable to CO2 capture.

STATUS

Status Report 4/1/05

Discussions are on-going with Shell, ConocoPhillips, Future Energy (gasification technology) and with GE (gas turbines). The vendors are studying the use of lignite and subbituminous coals for use in their gasification systems. Heat and material balance information will be provided to the CCPC Program Manager.

Status Report 7/1/05

Eight gasification technologies were reviewed, with three selected for detailed examination. The technologies are offered by ConocoPhillips, Shell Global Solutions and Future Energy (lignite application). Three performance cases will be developed for subbituminous and lignite for the following approach to CO2 capture: No capture; capture ready and full capture. Additional studies for use on Rankine cycle plants will provide information on amine scrubbing and for conventional and oxycombustion power plants.

Due to delays in receiving vendor detailed IGCC information, the contract will need a time extension for the October quarterly report and the Final report to complete gasifier studies.

Status Report 10/1/05

Mitsui Babcock Energy Limited is leading a consortium investigating amine scrubbing and oxyfuel combustion technologies for use on a supercritical steam cycle. Other members of the consortium are Air Products, Alstom, Imperial College, and Mitsubishi Heavy Industries. The ground rules for lignite, subbituminous and bituminous have been established. A draft report on plant design considerations and integration issues has been completed. The project is scheduled for completion by June 30, 2006

Final Report

Work accomplished under this project included commissioning of two major engineering/feasibility studies to examine performance and economic aspects of Saskatchewan lignite (which is very similar to ND lignite), Alberta sub-bituminous, and bituminous coals under different greenfield and limited retrofit plant designs and carbon capture configurations.

Findings:

- Study results indicate substantial negative impacts to plant output, plant performance, and to power production costs with any of the means of removing CO₂ that were studied. Such impacts were generally more pronounced for lignite compared to other coals
- IGCC performance is very adversely impacted by the moisture in low rank coals. In addition, the type of coal feed system use by the gasification technology provider is very critical in overall performance of an IGCC plant. A thorough comparison of technologies was conducted prior to selecting the Future Energy gasifier technology for the lignite study.
- The “footprint” of amine scrubbing and CO₂ compression facilities is very large, nearly equaling the footprint of the total powerplant it would be serving.
- There is no “winner” for a carbon capture technology with low rank coals. This is consistent with other recent publicly reported information.
- Participation in the CCPC Phase II program has provided good value for the ND lignite industry. The ND lignite industry cost was \$150,000 for a program that totaled over \$2.3 million. In addition to obtaining comprehensive technical and economic information, participants have also gained valuable insights into the readiness and interest of technology providers and the process required by technology providers to get full coverage (“wrap”) guaranteed technical and commercial terms for advanced technology projects.