POLICY facts

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OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Strategic Center for Natural Gas

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IMPACTS OF ALTERNATIVE WATER MANAGEMENT PRACTICES ON COALBED METHANE DEVELOPMENT IN THE POWDER RIVER BASIN

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Background

During the past few years, the most active natural gas play in the U.S. has been development of coalbed methane (CBM) in the Powder River Basin. More than 10,000 wells are producing 975 million cubic feet per day (MMcf/d) of methane in addition to 1.65 million barrels of water per day (bbls/d).* Over the next 10 years, natural gas development in the Powder River Basin is expected to increase dramatically. Continued development of CBM in the basin may require drilling of up to 39,000 new wells. Environmental Impact Statements (EIS's), which will establish the foundation for future development, are now being finalized by the Bureau of Land Management (BLM). In a related matter, the U.S. Environmental Protection Agency (EPA) [Region 8] is conducting a study of Best Professional Judgment (BPJ) general permit requirements for CBM produced water on Native American lands in the region. Powder River Basin operations are receiving considerable attention in this effort. The BLM's EIS's and the EPA BPJ study (and possible follow-on actions) will have a significant impact on the development of natural gas resources in the basin.

Description

In order to provide new data and analytical results to these and other agencies, the Strategic Center for Natural Gas (SCNG) at the U.S. Department of Energy's National Energy Technology Laboratory (NETL) sponsored a comprehensive analysis of CBM development in the Powder River Basin to determine the *energy impacts* of alternative water management practices. This analysis is contained in a report released by the SCNG in November 2002, titled ***Powder River Basin Coalbed Methane Development and Produced Water Management Study***. Infiltration/impoundment, shallow reinjection, and two cases of active water treatment were examined in this study, in addition to state-permitted surface discharge of produced water.

Coal stratigraphy was extensively reviewed and mapped on a township basis. Gas content data and fluid flow properties from highly drilled areas led to the construction of 142 type wells representing basin-wide distributions of these critical parameters. These type wells were then used to generate well production profiles from 12 distinct coals seams located throughout the basin. A contemporary cost model was developed and used with the production streams to evaluate the economic viability of CBM development as a function of water management.

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* Wyoming data, September 2002 (WOGCC)

RELEVANT INVOLVED PARTIES

- Federal Agencies
- State Governments
- Operators and Producers
- Service Industry
- Environmental Groups
- Ranchers and Ag Concerns
- Pipeline Companies
- Royalty Owners

RELATED LINKS

Bureau of Land Management and Forest Service
http://www.prb-eis.org/

Bureau of Land Management Buffalo Field Office
http://www.wy.blm.gov/bfo/

Bureau of Land Management Miles City Field Office
http://www.mt.blm.gov/mcfo/

U.S. EPA (Region 8)
http://www.epa.gov/region08/water/wastewater/npdeshome/cbm/cbm.html

U.S. Geological Survey
http://energy.cr.usgs.gov/oilgas/cbmethane/index.htm

Montana Board of Oil and Gas Conservation
http://bogc.dnrc.state.mt.us/coalbedmeth.htm

Montana Bureau of Mines and Geology
http://www.mbmg.mtech.edu/

Montana DEQ
http://www.deq.state.mt.us/coalbedmethane/index.asp

Wyoming DEQ
http://deq.state.wy.us

Wyoming Oil and Gas Conservation Commission
http://wogcc.state.wy.us

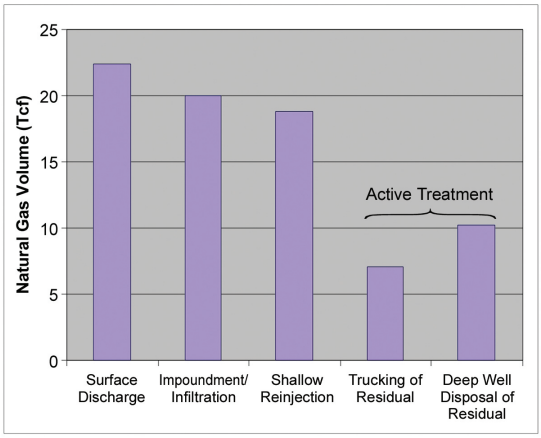
Wyoming State Geological Survey
http://www.wsgsweb.uwyo.edu/

Impacts of Alternative Water Management Practices on Coalbed Methane Development in the Powder River Basin

Results/Potential Impacts

The study concludes that Powder River Basin coals contain a considerably larger volume of in-place and technically recoverable gas than established by previous analyses. The analysis also forecasts that, with prudent development practices, several thousand fewer wells would be needed to produce the resource, compared to widely-accepted well count estimates. Nevertheless, the study concludes that development of the basin's CBM resources will be significantly impacted by the costs and feasibility of produced water management practices and requirements.

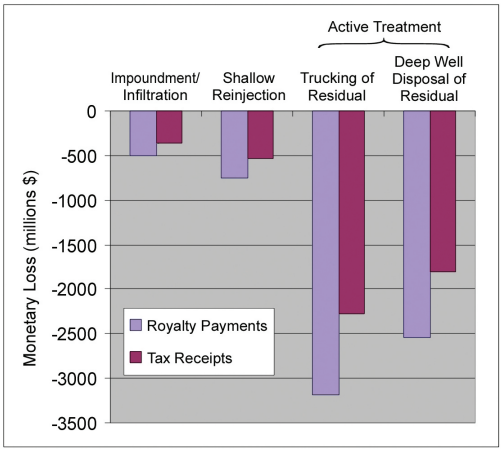
Estimates of economically recoverable CBM were developed as part of the analysis. A matrix of economically recoverable CBM volumes resulted based not only on the selected produced water management option, but also as a function of netback price at the wellhead. Results for one gas price/basis differential scenario (transitional case) are provided in the chart at right.



*Economically Recoverable CBM**

Overall, economically recoverable CBM could be reduced by 2.4 to 15.3 trillion cubic feet (Tcf)* if more restrictive produced water management practices are adopted. Commensurate with the reduction in CBM production are reductions in a variety of economic benefits, e.g., royalty payments and tax receipts. It is estimated that progressively more stringent water management would result in economic losses that range from over $850 million to nearly $5.5 billion.* The distribution of these royalty and tax reductions are shown in the chart at right.

In summary, the study juxtaposes the economic and regulatory considerations of CBM development in an effort to determine a viable solution that meets increasing energy, environmental, and human needs. The full report and further information on this issue can be obtained from the SCNG website at www.netl.doe.gov/scng.



*Summary of Economic Impacts**

* Basis differential narrows over 3 year period (reference case 2 of the study)