

Powder River Basin (PRB) Coalbed Methane (CBM)

Preliminary Financial Analysis Model

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PRB CBM Financial Model

- Objectives
- Methodology
- Assumptions
- Results
- Preliminary Conclusions

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PRB CBM Financial Model:

Objectives

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PRB CBM Financial Model

- Objectives:
 - Construct representative financial model(s) of coalbed methane production projects
 - Ultimately, include wells that represent CBM production in all parts of the PRB
 - Extend financial model to cover different scales of operation

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PRB CBM Financial Model

- Objectives
 - Examine the financial and economic impacts of different water disposal options

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PRB CBM Financial Model

- Objectives
 - Serve as a comparison to check results and impressions obtained from other sources
 - E.g., Other possible sources include EPA, industry groups, conservation groups, other stakeholders

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PRB CBM Financial Model:

Methodology

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PRB CBM Financial Model

- Methodology
 - Currently at very preliminary stage of evaluation
 - Discounted cashflow analysis (DCF)
 - Standard industry project evaluation practice
 - Same tools used by PRB CBM firms for different projects' evaluation

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PRB CBM Financial Model

- Methodology: Primary Data Sources
 - Morgan Stanley Dean Witter Research on Coal Bed Methane (4/10/00)
 - EPA website
 - *Feasibility Study: Water Placement Related to Coalbed Methane Gas Production, Hanging Woman Basin Project*", Caribou Land & Livestock Montana, LLC (12/17/01)
 - *Coal Bed Methane Operators Information Survey Results*, Standard industry evaluation practice

PRB CBM Financial Model

- Methodology
 - Model project costs and revenues over life of project
 - 9 years
 - 15 years
 - Annualize cost and revenue components to directly compare impacts with different patterns

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PRB CBM Financial Model

- Methodology
 - Revenue items
 - Henry Hub spot gas price
 - BTU Adjustment
 - Gas Transportation in Pipeline
 - Shrinkage, Compression, Field Use Adjustments
 - Henry Hub (LA) Spot gas price + Adjustments = Wellhead Gas Price (Netback)

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PRB CBM Financial Model

- Methodology
 - Cost items
 - Initial capital costs: drilling, completion, pro-rata pod construction (inc. surface water disposal)
 - Additional water disposal capital costs
 - Operating costs (except addl. water disposal)
 - Additional water disposal operating costs

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PRB CBM Financial Model

- Methodology
 - Cost items
 - Lease, rental, royalty costs
 - Severance tax
 - Federal, state income taxes
 - Include various depletion, depreciation, intangible drilling cost (IDC) scenarios
 - Excess of Revenues over costs = Above-normal profits

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PRB CBM Financial Model

- Methodology
 - Use discounting (discount rate concept) to value current costs and revenues more than future ones
 - Express costs and revenues as life-of-project values

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PRB CBM Financial Model:

Assumptions

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PRB CBM Financial Model

- Assumptions
 - Revenues: Current Price
 - Natural Gas Price: Current NYMEX Henry Hub Spot Price of \$3.69 per MCF (4/3/02)
 - Other revenue assumptions from Morgan Stanley Dean Witter analysis

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PRB CBM Financial Model

- Assumptions: Base Case
 - Modeled Field Characteristics (source: EPA from WOGCC, COGCC, and Montana DNR Data)
 - Based on actual 12-well project: High Production, Medium Efficiency
 - Use characteristics of one of the older PRB CBM fields – East, Fairway N field
 - Average 1000 foot depth

PRB CBM Financial Model

- Assumptions
 - Field Characteristics
 - Max. water/max. gas ratio = 1.37
 - Max water output = 96,000 Bbl/year
 - Max gas output = 70,000 Mcf/year
 - Gas decline = 13 percent/year
 - Water decline = 30 percent/year

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PRB CBM Financial Model

- Assumptions
 - Water discharge
 - Model includes minimal water surface discharge costs in generalized capital and operating costs
 - Alternative water discharge scenarios describe water treatment and handling facilities over and above minimal surface discharge

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PRB CBM Financial Model:

Results

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PRB CBM Financial Model

- Results
 - Base Case, Current Price Scenario
 - Wellhead (Netback) = \$2.62/Mcf
 - Costs
 - Base case: NPDES-permitted surface water disposal

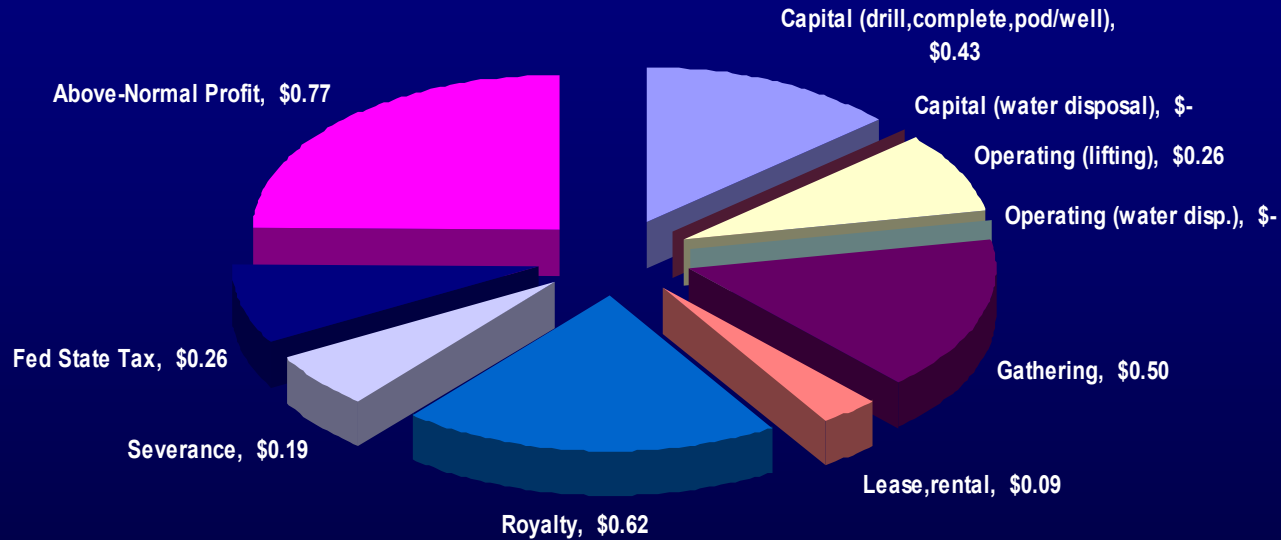
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Base Case, Current Price Scenario

Cost Items (\$2.62/Mcf Wellhead, 41% ROI)

Surface Water Disposal



Primary sources: General costs: EPA, website, Caribou Land and Livestock, Coalbed Methane Operators Survey Results, Morgan Stanley Dean Witter research

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PRB CBM Financial Model

- Results

- Base Case, Current Price Scenario (\$3.69/Mcf)
- Surface water disposal scenario
 - Total capital cost (w/o addl. water disposal) = \$0.43/Mcf
 - Total operating cost (w/o addl. water disp.) = \$0.76/Mcf
 - Lease, rental, royalty costs = \$0.71/Mcf
 - Severance, income taxes = \$0.45/Mcf
 - Above-normal profit = \$0.77/Mcf
- Total Return on Investment (ROI) = 41 Percent

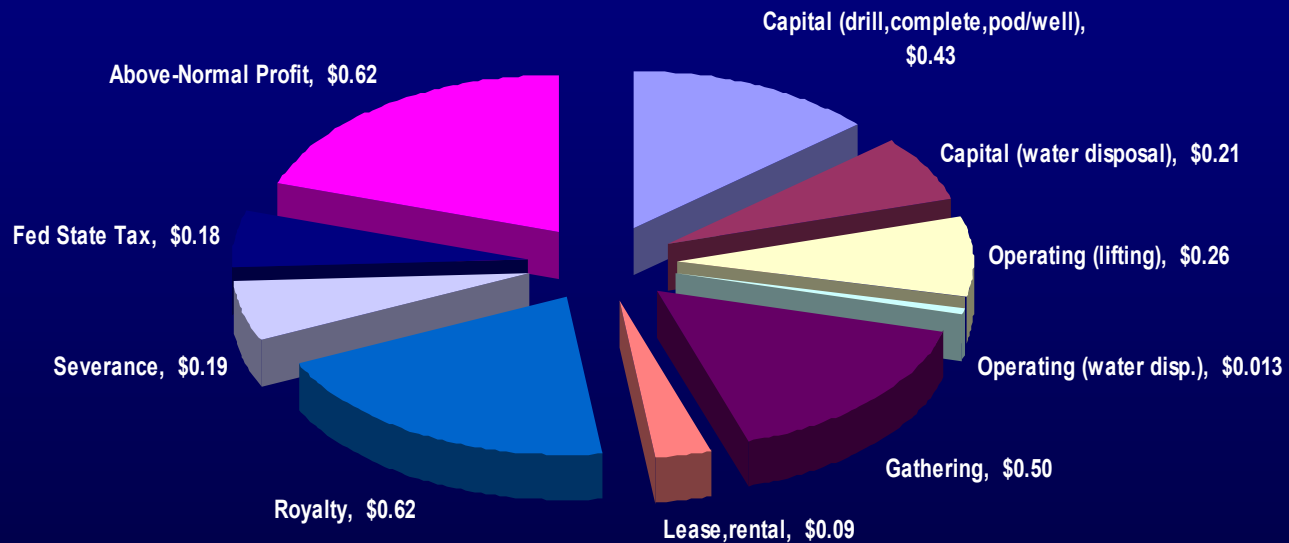
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Base Case, Current Price Scenario

Cost Items (\$2.62/Mcf Wellhead, 28% ROI)

Deep Well Injection/Wastewater Treatment Water Disposal



Primary sources: water disposal costs: Hodgson, 2001, (Marathon Oil), general costs: EPA, website, Caribou Land and Livestock, Coalbed Methane Operators Survey Results, Morgan Stanley Dean Witter research

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PRB CBM Financial Model

- Results

- Base Case, Current Price Scenario (\$3.12/Mcf)
- Deep well injection/wastewater treatment water disposal scenario,
 - 2640 feet of piping to link production well w/ disposal well

Differences from Base Case Surface water disposal

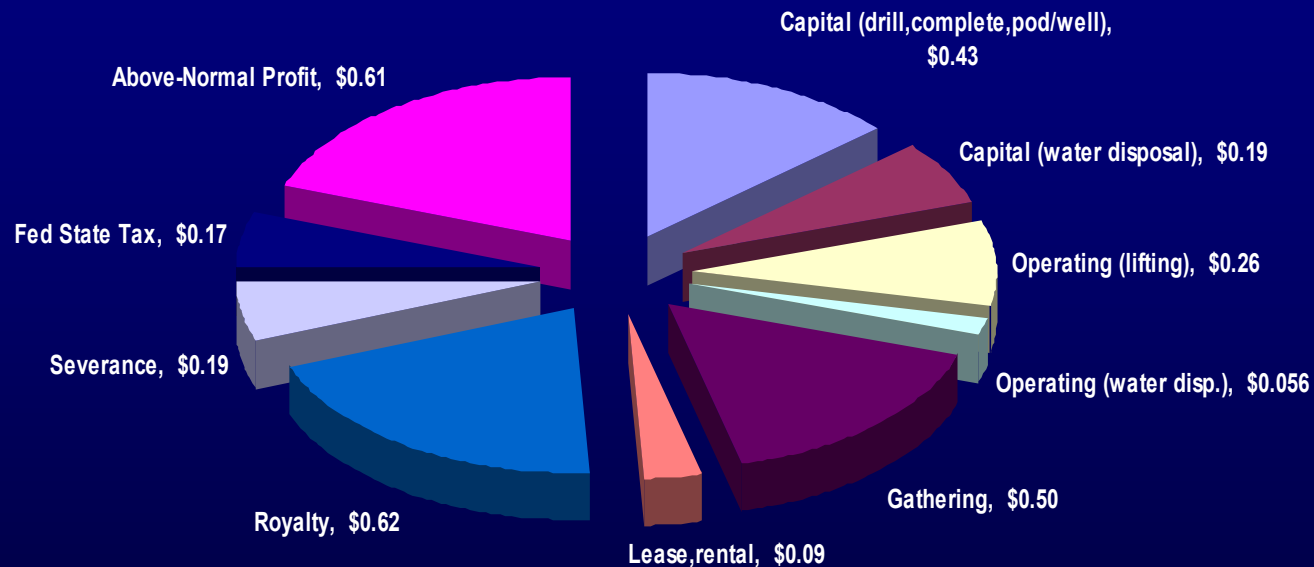
- Total additional water disposal capital cost = +\$0.21/Mcf
- Total water disposal operating cost = +\$0.013/Mcf
- Severance, income taxes = -\$0.08/Mcf
- Above-normal profit = -\$0.15/Mcf

- Total Return on Investment (ROI) = 28 Percent (-13%)

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Base Case, Current Price Scenario Cost Items (\$2.62/Mcf Wellhead, 28% ROI) Rapid Spray Evaporation Water Disposal



Primary sources: water disposal costs: Hodgson, 2001, (Marathon Oil), general costs: EPA, website, Caribou Land and Livestock, Coalbed Methane Operators Survey Results, Morgan Stanley Dean Witter research

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PRB CBM Financial Model

- Results

- Base Case, Current Price Scenario (\$2.71/Mcf)
- Rapid spray evaporation water disposal scenario

Differences from Artificial wetland water disposal

- Total water disposal capital cost = +\$0.19/Mcf
- Total water disposal operating cost = +\$0.056/Mcf
- Severance, income taxes = -\$0.09/Mcf
- Above-normal profit = -\$0.16/Mcf

- Total Return on Investment (ROI) = 28 Percent (-13%)

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PRB CBM Financial Model

- Results
 - Base Case, Breakeven Scenarios
 - NPDES-permitted surface discharge
 - Deep well injection/wastewater treatment
 - Rapid spray evaporation
 - Solve for gas price needed to achieve minimum ROI (7% - EPA assumption)

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PRB CBM Financial Model

- Results
 - Base Case, Breakeven Scenarios, 10% ROI
 - Surface discharge = \$2.23/Mcf, 7% ROI
 - Deep well injection/wastewater treatment = \$2.50/Mcf (+\$0.23/Mcf), 7% ROI
 - Rapid spray evaporation = \$2.54 (+\$0.31/Mcf), 7% ROI

PRB CBM Financial Model:

Preliminary Conclusions

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PRB CBM Financial Model

- Preliminary Conclusions
 - Current Price Case shows profitability in all water disposal cases
 - Most expensive water disposal options modeled reduce above-normal profit by about \$0.15-\$0.16/Mcf and reduce ROI about 13%

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PRB CBM Financial Model

- Preliminary Conclusions
 - Breakeven Scenarios required a gas price increase of \$0.23 to \$0.31 to pay for additional water disposal costs of Deep well injection/wastewater treatment or Rapid spray evaporation over Surface discharge

PRB CBM Financial Model

- Preliminary Conclusions
 - Future Needs
 - Model different basin areas, different scales, different water/gas ratios
 - Refine costs, especially alternative water disposal costs
 - Compare with other financial models, e.g., EPA, PRB CBM operators, stock analysts, others

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PRB CBM Financial Model:

Appendix:

Natural Gas Spot Prices

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CBM Financial Model: Assumptions

