


APPENDIX B
WYODAK PRB COAL WITH DOE IGCC FINANCIAL MODEL

IGCC Project Analysis For

Wyodak H2 w/o CO2

Refresh



United States

Department of Energy

Science, Security and Energy: Powering the 21st Century

Project Description

MW integrated gasification combined cycle (IGCC) plant that has a total initial capital cost of \$425,879 (in thousand dollars). The Wyodak H2 w/o CO2 is located in the U.S. and, on an annual basis, will generate the following outputs (see shaded box to the right):

- > 313,232 MWh of Electricity
- > 30,951 MMcf of Hydrogen
- > 20,160 Tons of Elemental Sulfur

Project Timing

The scheduled start date for plant construction is January 1, 2002. The Wyodak H2 w/o CO2 has an estimated construction period of 36 months. Plant start-up will commence on January 1, 2005.

Project Financial Structure and Key Results

The capital structure for Wyodak H2 w/o CO2 is 80% debt and 20% equity. Key project financial results include:

- > 15% Internal Rate of Return
- > \$ 79,752 Net Present Value (in Thousand Dollars) at a 6% Discount Rate
- > 1.3 Benefit to Cost Ratio (BCR)
- > The Payback Year (on equity) is 2014

Additional Comments

Default Data

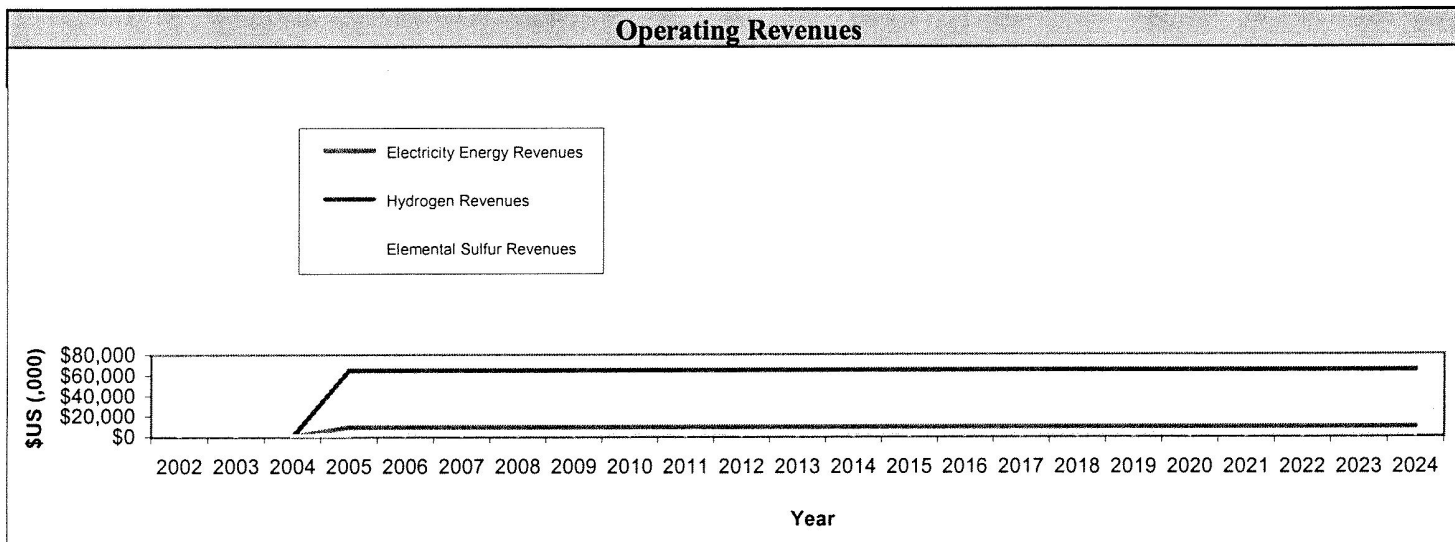
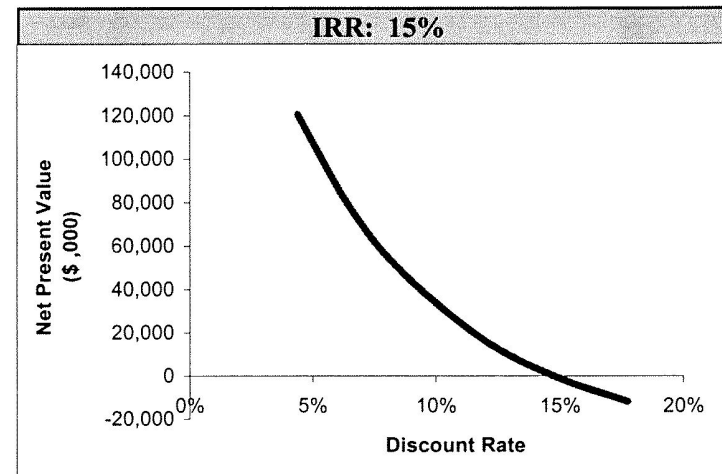
Gasification Financial Model:
Summary Financial Results

**Wyodak H2 w/o CO2
the U.S.**

Default Data

Key Financial Results	
Internal Rate of Return (IRR)	15%
Payback Year (on equity investment)	2014
Benefit to Cost Ratio	1.29

NPV (in Thousand Dollars)	
NPV at 4% discount rate	\$120,493
NPV at 6% discount rate	\$79,752
NPV at 8% discount rate	\$50,495



Gasification Financial Model:
Plant Performance Summary

Default Data

Plant Capacity	
Syngas Capacity (MMcf/Day)	0
Net Electric Power Capacity (MW)	40
Steam Capacity (Tons/Hr)	0
Hydrogen Capacity (MMcf/Day)	94
Carbon Monoxide Capacity (MMcf/Day)	0
Elemental Sulfur Capacity (Tons/Day)	61
Slag Ash Capacity (Tons/Day)	0
Fuel (Tons/Day)	0
Chemicals (Tons/Day)	0
Environmental Credit (Tons/Day)	0
Other (Tons/Day)	0

Annual Plant Output (adjusted for both planned and forced outages)	
Syngas (MMcf)	0
Power Generation (MWh)	313,232
Steam Generation (Tons)	0
Hydrogen Generation (MMcf)	30,951
Carbon Monoxide (MMcf)	0
Elemental Sulfur (Tons)	20,160
Slag Ash (Tons)	0
Fuel (Tons)	0
Chemicals (Tons)	0
Environmental Credit (Tons)	0
Other (Tons)	0

Gasification Financial Model:
Plant Performance Summary

Plant Performance Results	
Primary Project Output/Application	Multiple Outputs
First Year of Operation (plant start-up date)	2005
Primary Fuel Heat Rate (Btu/kWh) based on HHV	58,733
Secondary Fuel Heat Rate (Btu/kWh) based on HHV	0
Plant Operating Efficiency	Not Applicable
Primary Fuel Heat Input (MMBtu)	19,365,334
Secondary Fuel Heat Input (MMBtu)	0
Primary Fuel Type	Coal
Secondary Fuel Type	None
Annual Primary Fuel Consumption (Thousand tons)	1,122
Not Applicable	0
Operating Hours (8760 hours - Planned Maintenance)	8,322
Guaranteed Availability (adjusts for forced outages)	95%
Overall Plant Availability (adjusts for planned and forced outages)	90%

**Gasification Financial Model:
Cost Summary**

**Wyodak H2 w/o CO2
the U.S.**

Default Data

Construction/Project Cost (in Thousand Dollars)

<u>Capital Costs</u>	<u>Category</u>	<u>Percentage</u>
EPC Costs	\$337,513	79%
Initial Working Capital	\$5,313	1%
Owner's Contingency (% of EPC Costs)	\$33,142	8%
Development Fee (% of EPC Costs)	\$0	0%
Start-up (% of EPC Costs)	\$9,096	2%
Initial Debt Reserve Fund	\$0	0%
Owner's Cost (in thousand dollars)	\$0	0%
Additional Capital Cost	\$0	0%
Total Capital Costs	\$385,064	90%

Financing Costs

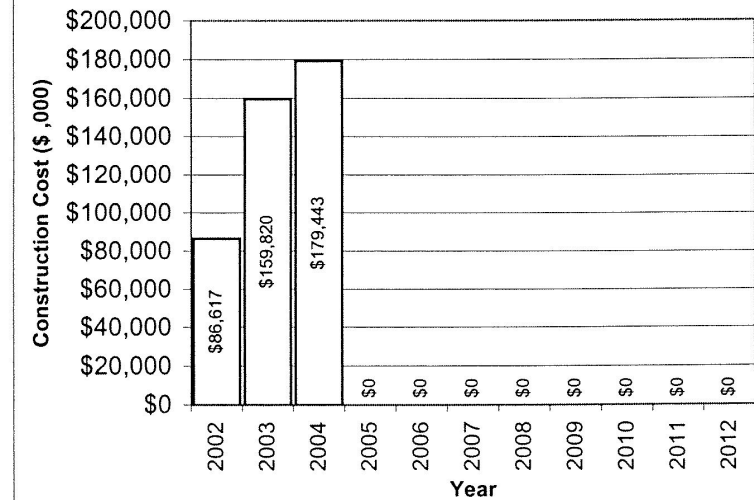
Interest During Construction	\$30,833	7%
Financing Fee	\$9,982	2%
Additional Financing Cost #1	\$0	0%
Additional Financing Cost #2	\$0	0%
Total Financing Costs	\$40,815	10%

Total Project Cost/Uses of Funds \$425,879 100%

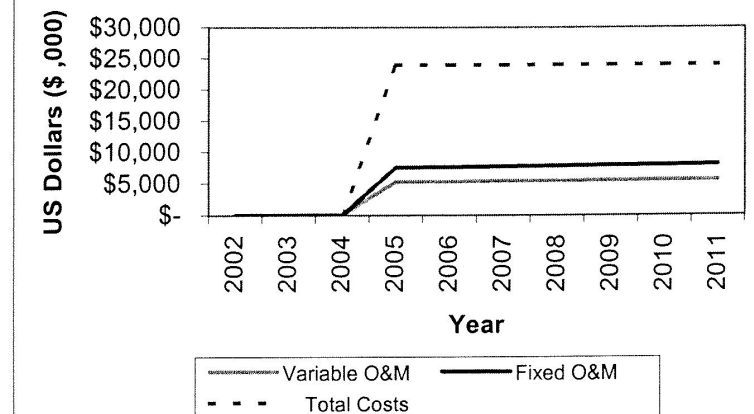
Sources of Funds

Equity	\$85,176	20%
Debt	\$340,703	80%
Total Sources of Funds	\$425,879	100%

Construction Costs by Year



Operating Expenses for First Ten Years



**Gasification Financial Model:
Plant Input Sheet**

Project Inputs	Case A	Case B	Case C	Case D
Project Summary Data				
Project Name	Wyodak H2 w/o CO2			
Project Location	the U.S.			
Project Type/Structure	BO			
Primary Output/Plant Application (Options: Power, Multiple Outputs)	Multiple Outputs			
Primary Fuel Type (Options: Gas, Coal, Petroleum Coke, Other/Waste)	Coal			
Secondary Fuel Type (Options: None, Gas, Coal, Petroleum Coke, Other/Waste)	None			
Plant Output and Operating Data : Note - All ton units are US Short Tons (2000 lbs)				
Syngas Capacity (MMcf/Day)	0			
Gross Electric Power Capacity (MW)	81			
Net Electric Power Capacity (MW)	40			
Steam Capacity (Tons/Hr)	0			
Hydrogen Capacity (MMcf/Day)	94			
Carbon Monoxide Capacity (MMcf/Day)	0			
Elemental Sulfur Capacity (Tons/Day)	61			
Slag Ash Capacity (Tons/Day)	0			
Fuel (Tons/Day)	0			
Chemicals (Tons/Day)	0			
Environmental Credit (Tons/Day)	0			
Other (Tons/Day)	0			
Operating Hours per Year	8,322			
Guaranteed Availability (percentage)	95%			
Enter One of the Following Items(For Each Primary/Secondary Fuel) Depending on Project Type:				
Primary Fuel Heat Rate (Btu/kWh) based on HHV FOR POWER PROJECTS				
Secondary Fuel Heat Rate (Btu/kWh) based on HHV FOR POWER PROJECTS				
Primary Fuel Annual Fuel Consumption (in MMcf OR Thousand Tons) FOR NON POWER PROJECTS	1,122			
Secondary Fuel Annual Fuel Consumption (in MMcf OR Thousand Tons) FOR NON POWER PROJECTS				
Initial Capital and Financing Costs (enter 'Additional Costs' in thousand dollars)				
EPC (in thousand dollars)	337,513			
Owner's Contingency (% of EPC Costs)	10%			
Development Fee (% of EPC Costs)	0%			
Start-up (% of EPC Costs)	3%			
Owner's Cost (in thousand dollars)	1%			
Additional Capital Cost	0			
Additional Financing Cost #1	0			
Additional Financing Cost #2	0			
Operating Costs and Expenses				
Variable O&M (% of EPC Cost)	1.7%			
Fixed O&M Cost (% of EPC Cost)	2.2%			
Additional Comments	Default Data			

Gasification Financial Model:
Scenario Inputs

Default Data

FINANCIAL ASSUMPTIONS

Capital Structure	
Percentage Debt	80%
Percentage Equity	20%
Total Debt Amount	\$340,703

Project Debt Terms	
Loan 1: Senior Debt	
% of Total Project Debt (total for Loans 1,2, and 3 must = 100%)	70%
Loan Amount (Thousand \$)	\$238,492
Interest Rate	6%
Financing Fee	3%
Repayment Term (in Years)	12
Grace Period on Principal Repayment	1
First Year of Principal Repayment	2006
Loan 2: Subordinated Debt	
% of Total Project Debt	30%
Loan Amount (Thousand \$)	\$102,211
Interest Rate	6%
Financing Fee	3%
Repayment Term (in Years)	15
Grace Period on Principal Repayment	1
First Year of Principal Repayment	2006
Loan 3: Subordinated Debt	
% of Total Project Debt	
Loan Amount (Thousand \$)	\$0
Interest Rate	
Financing Fee	
Repayment Term (in Years)	
Grace Period on Principal Repayment	
First Year of Principal Repayment	2005

Loan Covenant Assumptions	
Interest Rate for Debt Reserve Fund (DRF)	5%
Debt Reserve Fund Used on Senior Debt (Options: Yes or No)	No
Percentage of Total Debt Service used as DRF	50%

Depreciation : "SL" for Straight-Line OR "DB" for 150% Declining Balance	Method
Construction (Years) : Note - DB Method Must be 15 or 20 years	15 SL

Gasification Financial Model:

Scenario Inputs

Subsidized Tax Rate (used as investment incentive)	0%
Length of Subsidized Tax Period (in Years)	0

FUEL/FEEDSTOCK ASSUMPTIONS

Fuel Prices : For the Base Year, then escalated by fuel factors in B71-B74 above	
Gas (\$/Mcf)	4.00
Coal (\$/US Short Ton)	10.36
Petroleum Coke (\$/US Short Ton)	19.30
Other/Waste (\$/US Short Ton)	0.00
Alternatively, use Forecasted Prices (From Fuel Forecasts Sheet)? (Yes/No)	No
Heating Value Assumptions	
HHV of Natural Gas (Btu/cf)	1,022
HHV of Coal (Btu/lb)	8,630
HHV of Petroleum Coke (Btu/lb)	14,819
HHV of Other/Waste (Btu/lb)	10,714

TARIFF ASSUMPTIONS

INITIAL TARIFF LEVEL (In Dollars in the first year of construction)	
Syngas (\$/Mcf)	\$0
Capacity Payment (Thousand \$/MW/Year)	\$0
Electricity Payment (\$/MWh)	\$30
Steam (\$/US Short Ton)	\$5.00
Hydrogen (\$/Mcf)	\$2.10
Carbon Monoxide (\$/Mcf)	\$0
Elemental Sulfur (\$/US Short Ton)	\$75
Slag Ash (\$/US Short Ton)	\$0
Fuel (\$/US Short Ton)	\$0
Chemicals (\$/US Short Ton)	\$0
Environmental Credit (\$/US Short Ton)	\$0
Other (\$/US Short Ton)	\$0

CONSTRUCTION ASSUMPTIONS

Base Year :	2002						
Construction Schedule	A	B	C	D	E	F	G
Construction Start Date	1/1/02	1/1/02	1/1/03	1/1/02	1/1/02	1/1/02	1/1/02
Construction Period (in months)	36	48	36	36	36	36	36
Plant Start-up Date (must start on January 1)	1/1/05	1/1/06	1/1/06	1/1/05	1/1/05	1/1/05	1/1/05
EPC Cost Escalation in Effect? (Yes/No)	Yes						

Percentage of Cost for Construction Periods	Five Year Construction Period					Four Year Construction Period				Three Year Period		
Enter for Five, Four or Three Year Periods (To the Right ---->)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3
EPC Costs : Unescalated Allocations	15.0%	25.0%	25.0%	10.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	42.5%	32.5%
EPC Costs: Escalated Allocations (Use EPC Escalation Sheet to Calculate)	14.2%	24.5%	25.0%	10.2%	26.0%	23.9%	24.9%	25.4%	25.9%	24.5%	42.6%	32.9%
Initial Working Capital	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%