

Energy in a Globalising World: Economics, Politics and Policies

Economics of Energy Exam, November 2023

Open the CCGT model

Insert the following assumptions:

Capacity – 800MW

Load Factor/Utilisation – 90%

Gas Cost - \$5/mmbtu

Carbon Cost - \$85/t

Corporate Tax Rate – 25%

Electricity Price - \$80/MWh

Capacity Payment - zero

For the WACC calculation please assume (insert in WACC sheet):

Cost of Interest – 6%

Tax Rate – 25%

Equity Market Return – 10.5%

Risk Free Rate – 4.6%

Beta – 0.75

Balance of Debt to Equity – 60%/40%

Questions (Marks)

Part 1: Analysis of CCGT Model

1. What is the discount rate? (1)
2. What is the NPV? (1)
3. What is the IRR? (1)
4. What is the payback period? (1)
5. What is the breakeven electricity price? (2)
6. What is the breakeven gas price? (2)
7. What is the breakeven load factor? (2)
8. If the load factor falls to 10%, what is the breakeven electricity price? (2)
9. Return the load factor to 90%. If the gas price rises to \$7/mmbtu, what is the breakeven electricity price? (2)
10. If the load factor falls to 20% what capacity payment would you negotiate for and why? (2)
11. Using a spider graph, explain the sensitivities of the model to the gas, electricity and carbon prices and to the load factor. Which should management be most worried about. (6)

12. Write a 3 paragraph report on the economics of this project. Explain the key assumptions, the economics results and the main sensitivities. Would you recommend that the company proceeds with this project and why? (8)

Part 2: Comparison with Shale Gas Model

Now open the Shale Gas Model and look at the sheet entitled Model Output

- 13 Write a short review of the economic results of this model. What recommendation would you make to management and why? (5)
- 14 Look at the sheet called WACC. What does the calculation of the WACC tell us about this company? How might we think about lowering the discount rate? (3)
- 15 Compare the Shale Model with the CCGT model.
- Is there a gas price at which both models can work? (You can adjust the gas price in the shale model in cell i43, which is highlighted) (2)
 - Which investment do you prefer? Explain your thinking. (5)

Part 3: The Wind Farm model

16. Look at the results of the model. What are your thoughts about this investment and how does it compare to the outcomes for the CCGT plant? (5)
17. What are the major risks to the project economics in your opinion? If you were negotiating a minimum guaranteed price from the government what would it be? (5)
18. What would happen if a company with a higher Beta and interest rate was investing in the project? Give some thoughts on the impact of financing costs. (5)

Total Marks

Part 1 - 30

Part 2 – 15

Part 3 – 15

Total - 60