Economics of Energy Exam, March 2023

Open the CCGT model

Insert the following assumptions:

Capacity – 900MW

Load Factor/Utilisation – 90%

Gas Cost - $5/mmbtu

Carbon Cost - $90/t

Corporate Tax Rate – 25%

Electricity Price - $85/MWh

Capacity Payment - zero

For the WACC calculation please assume (insert in box from Line 79 onwards):

Cost of Interest – 5%

Tax Rate – 25%

Cost of Equity – 10%

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.
    a. Is there a gas price at which both models can work? (2)
    b. Which investment do you prefer? Explain your thinking. (5)