Section 2: Case Study – A Chip Off The Old Block

Relates to Questions 6-19

Time Allocated: 36 minutess

INTRODUCTION

All the inputs mentioned below are provided in the workbook for this case study.

You are working for a company that is planning to bid for a 20% stake in the cashflows of a biomass plant which burns wood chip to produce electricity. You have been asked to predict the cashflows of the project from 1 January 2017 until 31 December 2026, using a quarterly model, and to use your model to recommend to your CEO the purchase price she should offer for the 20% stake.

You should assume that all invoices are settled in the same quarter they are issued, there are no inventory requirements and no taxes are applicable.

Where amounts are to be inflated they are given in 2017 prices and inflation should be applied on 1 January of each subsequent year. Do NOT round inflated prices to whole cents in interim calculations.

ELECTRICITY GENERATION

The plant is a 9MW plant; i.e. if it is running at full capacity it will produce 9MWh of electricity per hour.

Your company's engineers think it is reasonable to assume that the plant will usually run at 95% of its capacity, 24 hours a day.

There are several planned shutdown periods when no electricity will be produced at all from the start of the first day (at midnight) until the end of the final day (at midnight).

First day of shutdown	Final day of shutdown
1 June 2017	15 June 2017
15 December 2019	3 January 2020
5 April 2021	25 April 2021
25 October 2023	10 November 2023
6 May 2025	26 May 2025
26 June 2026	5 July 2026

SALE OF ELECTRICITY

Electricity is sold as follows:

- At the market price if this is between the cap price and the floor price.
  The predictions for the market price have been provided in the workbook accompanying this question on an April -March annual timeline, and should not be inflated.
- At the cap price if the market price is higher than the cap price.
  The cap price is $70 per MWh, inflated at 2% per annum.
- At the floor price if the market price is lower than the floor price.
  The floor price is $45 per MWh, inflated at 1% per annum.

Your CEO is concerned that the market price predictions for the sale of electricity may be overly optimistic. She has therefore asked you to run some of the analysis (**see Questions 5, 11 and 13**) as though electricity were always sold at the floor price. It will be beneficial if you develop your model in a way that makes it easy to switch between modelling the electricity price as described above and modelling only the floor price.

PURCHASE OF WOOD CHIP

In each quarter, the project purchases exactly enough wood chip to produce the MWh output of the plant in that quarter.

The plant has two possible wood chip suppliers. The project first buys the wood chip from the supplier that gives them the lowest cost per MWh in that quarter, and, if necessary, tops this up with wood chip from the other supplier.

The first supplier sells wood chip on the following terms:

- Wood chip costs $100 per tonne, inflated at 2% per annum
- 1 tonne of wood chip will produce 3.5 MWh of electricity
- Up to 4,500 tonnes may be purchased per quarter

The second supplier sells wood chip on the following terms:

- Wood chip costs $130 per tonne. This is a fixed price that should not be inflated
- 1 tonne of wood chip will produce 4 MWh of electricity
- An unlimited amount of wood chip may be purchased per quarter

FIXED COSTS

The project incurs $75,000 of fixed costs per month. This amount is indexed at 1.5%.

VALUATION

The company's required rate of return for this project is 10%, and you should assume that there is no terminal value or disposal costs for the 20% stake at the end of the ten years.
To determine the purchase price your company should offer:
i)   Discount using an Excel function (or functions) that discounts on an *actual/365* basis;
ii)   Assume an acquisition date of 31 December 2016; and
iii)   Assume that all cashflows occur at the end of the quarter in which they occur.

GENERAL COMMENTS

When used in the question wording, "Q1" refers to the period January to March, "Q2" to the period April to June, "Q3" to the period July to September and "Q4" to the period October to December.

For Questions 6 to 17, perform your analysis assuming a 10% required rate of return.
For Question 18, perform your analysis assuming a 4% required rate of return.

For Questions 6 to 16, select your answer from a multiple choice list.
For Questions 17 to 18, you are required to type in your answer.

Prepare your model and then use it to answer the given questions.
When finished, please upload your workbook (Question 19).

QUESTIONS

Question 6
How many days is the plant operational in Q4 2023?

A. 72

B. 73

C. 74

D. 75

E. 76

F. 77

G. 78

H. 79

I. 80

Question 7
How many MWh of electricity are produced in total over the ten years?

A. 728,047

B. 728,048

C. 728,049

D. 728,050

E. 728,051

F. 728,052

G. 728,053

H. 728,054

I. 728,055

Question 8
What is the cap price in April 2025?

A. $81.94

B. $81.95

C. $81.96

D. $81.97

E. $81.98

F. $81.99

G. $82.00

H. $82.01

I. $82.02

Question 9
What is the total revenue earned through the sale of electricity over the ten years based on the market price inputs subject to the floor and cap?

A. $45,176,687

B. $45,176,688

C. $45,176,689

D. $45,176,690

E. $45,176,691

F. $45,176,692

G. $45,176,693

H. $45,176,694

I. $45,176,695

Question 10
What is the total revenue earned through the sale of electricity over the ten years based on the floor price only?

A. $34,274,773

B. $34,274,774

C. $34,274,775

D. $34,274,776

E. $34,274,777

F. $34,274,778

G. $34,274,779

H. $34,274,780

I. $34,274,781

Question 11
On which quarter start date does the wood chip from supplier 2 first become cheaper per MWh produced than the wood chip from supplier 1?

A. 1 Jul 2023

B. 1 Oct 2023

C. 1 Jan 2024

D. 1 Apr 2024

E. 1 Jul 2024

F. 1 Oct 2024

G. 1 Jan 2025

H. 1 Apr 2025

I. 1 Jul 2025

Question 12
What is the total cost of wood chip purchased in Q1 2018?

A. $547,331

B. $547,332

C. $547,333

D. $547,334

E. $547,335

F. $547,336

G. $547,337

H. $547,338

I. $547,339

Question 13
What is the total cost of wood chip purchased in Q3 2023?

A. $608,439

B. $608,440

C. $608,441

D. $608,442

E. $608,443

F. $608,444

G. $608,445

H. $608,446

I. $608,447

Question 14
How many tonnes of wood chip are purchased from supplier 2 over the ten years?

A. 72,325

B. 72,326

C. 72,327

D. 72,328

E. 72,329

F. 72,330

G. 72,331

H. 72,332

I. 72,333

Question 15
What are the total revenues less total costs of the project over the ten years based on the revenues calculated using the market price subject to a floor and a cap? Round your answer to the nearest whole dollar.

A. $12,829,511

B. $12,829,512

C. $12,829,513

D. $12,829,514

E. $12,829,515

F. $12,829,516

G. $12,829,517

H. $12,829,518

I. $12,829,519

Question 16
What are the total revenues less total costs of the project over the ten years based on the revenues calculated using the floor price only? Round your answer to the nearest whole dollar.

A. $1,927,596

B. $1,927,597

C. $1,927,598

D. $1,927,599

E. $1,927,600

F. $1,927,601

G. $1,927,602

H. $1,927,603

I. $1,927,604

Question 17
What price should your company offer for a 20% stake in the plant in order to earn the 10% required rate of return based on the revenues calculated using the market price subject to a floor and a cap? Round your answer to the nearest whole dollar.

Type in your answer, without any dollar signs or thousands separator. E.g. $1,000,000 should be typed as 1000000.

Question 18
What price should your company offer for a 20% stake in the plant in order to earn the 4% required rate of return based on the revenues calculated using the floor price only? Round your answer to the nearest whole dollar.

Type in your answer, without any dollar signs or thousands separator. E.g. $1,000,000 should be typed as 1000000.

Question 19
Please upload your workbook from this section. [0 marks]

Answers

6	D
7	D
8	I
9	A
10	H
11	C
12	E
13	H
14	D
15	A
16	I
17	1661626
18	323272
19	n/a