CBA Builder Advanced Worksheet 2: Oil Extraction

You are required to perform a project appraisal of a proposed new oil drilling and extraction platform in the North West of Scotland. The oil platform is estimated to generate substantial revenues, after initial construction and drillings costs have passed. There are, however, a number of key concerns and risks involved. As the oil platform will be extracting deep sea oil there is a risk of environmental damage if any damage occurs to the well which will be some 2000ft under sea level. There is also the risk of explosions on the oil platform, although both of these potential catastrophic situations are highly unlikely to occur. You have been recommended to use a social discount rate of 3%.

Initial Costs

The new oil platform will be partially constructed on land and then put together and positioned over the drilling site. The cost of this process is some £100m. Costs are unlikely to change at this stage as this is a well practiced process. The other short term initial cost is the drilling, using a drilling ship. This will take the most of the first year (year 0), at an estimated cost of around £5m (which includes drill ship rental and other costs).

Ongoing Costs

There is a significant maintenance cost associated with the oil platform given the poor weather conditions off the North West coast of Scotland. The annual cost of maintenance including cleaning, painting, and replacement of parts is estimated at £500,000. These costs will begin in year 1 following the completion of the oil platform. This will need to be accounted for by lagging the growth rate for this cost by one year. The growth rate for this cost is estimated at 2% per annum.

The other key ongoing cost is wages for oil workers which will need to be paid from year 1. These are summarised in the table below. The table also includes the additional risk associated with these occupations compared to the average occupation, and the additional salary compared with other similar on-land occupations. Growth rate of salaries is 1.5%. This will need to be accounted for by lagging the growth rate for this cost by one year.

Job Title	Annual Salary	No. of Workers	Added risk	Additional Salary
Platform Foreman	£90,000	2	1/10,000	£5,000
Rig Worker	£45,000	20	1/500	£6,000

Table 1

Benefits

Benefits will be significant in terms of revenues from the oil extracted. However, it is unlikely to be a prolific well as the source is small. The value of a barrel of crude oil is highly volatile over time. The benefit from each barrel of oil extracted could be as much as £60 or as low as £30. The average price during the last 12 months was £48. It has been recommended that this value is used in the CBA.

The number of barrels extracted from the well is estimated to be 1,000 per day. The returns from the well will diminish over time, by approximately 50 barrels per day each year until the well ceases to produce enough oil to continue extraction. The average growth in the value of oil is estimated at 2.5% per annum.

Questions

1. Using the data on costs and benefits provided what is the NPV and BCR associated with the project given a project lifetime of twenty years?

2. Calculate a long term horizon value for the project using the scrap value method, given an estimated scrap value of £3.2m. The project will end after twenty years. A final cost of £4.8m must also be added to shutdown and cap the well at this time. How does the horizon value affect the outcome of the CBA?

3. How would it impact the CBA if the number of barrels extracted per day declined faster than expected at a rate of 60 barrels per day each year?

4. The risk of potential lost lives has not yet been considered. The risk of an explosion is low. However, if it were to happen it is estimated that around half of the 'rig workers' would be killed. Use the labour market method, and the data contained in Table 1, to calculate the cost of lost life if an accident of this variety were to happen?

5. How would this type of accident affect the NPV, BCR, and discount rate sensitivity of the project? Should the project still go ahead?

6. Environmental damage has still not been considered. Although unlikely, if an explosion were to occur, it could have catastrophic impacts by rupturing the well, leaking oil into the sea. There are a number of additional preventative measures which could be costed into the project to ensure no chance of oil leak should the well become damaged. These are, however, expensive. Using the preventative expenditure method enter the list of preventative measures shown in Table 2 below. How does this affect the NPV and BCR of the CBA (with and without the explosion considered in question 4)?

Preventative Measure	**Cost (in year 0)**	**Life-Cycle**	**Replacement cost**
Under sea-bed well shutdown valve	£3.5	20 years	N/A
Insertion tube for pumping out oil should main pump fail	£4.01m	10 years	£4.01m with growth rate of 2% per annum.
'heavy mud' pumping mechanism to block well should leak occur	£3.89 m	10 years	£3.89m with growth rate of 2%.

Table 2

7. Given the results of the CBA with and without the horizon value, and with differing values for certain variables, do you think the project should go ahead? Explain your answer.