Graduate Certificate in Upstream Oil and Gas Operations Financing

Financial Analysis and Valuation in the Oil and Gas Industry

Financial Analysis and Valuation in the Oil and Gas Industry are critical concepts that require a deep understanding of key terms and vocabulary. Here are some of the most important terms and concepts, explained in detail:

1. Reserves: Reserves are the estimated quantities of oil and gas that can be recovered from known reservoirs under existing economic and operating conditions. They are classified into three categories: proven (1P), probable (2P), and possible (3P) reserves, based on the level of certainty associated with the estimate.
2. Production Sharing Contract (PSC): A Production Sharing Contract (PSC) is a type of contractual arrangement between a government and a petroleum exploration and production company. Under a PSC, the government grants the right to explore for and produce oil and gas in a specific area, in exchange for a share of the production.
3. Lifting Costs: Lifting costs are the costs associated with extracting and delivering oil and gas to the surface. They include expenses such as drilling, maintenance, and transportation costs. Lifting costs are typically expressed in dollars per barrel of oil equivalent (BOE).
4. Findings and Development Costs (F&D Costs): Findings and Development Costs (F&D Costs) are the costs associated with discovering and developing new oil and gas reserves. F&D costs include expenses such as seismic data acquisition, drilling, and facility construction costs.
5. Discounted Cash Flow (DCF): Discounted Cash Flow (DCF) is a valuation method used to estimate the value of an oil and gas asset based on its expected future cash flows. DCF analysis involves discounting future cash flows to their present value using a discount rate that reflects the risk associated with the asset.
6. Net Present Value (NPV): Net Present Value (NPV) is a measure of the present value of an investment's future cash inflows and outflows. NPV is calculated by subtracting the present value of cash outflows from the present value of cash inflows. A positive NPV indicates that an investment is expected to generate a return greater than the cost of capital.
7. Internal Rate of Return (IRR): Internal Rate of Return (IRR) is a financial metric used to evaluate the profitability of an investment. IRR is the discount rate that makes the NPV of an investment equal to zero. IRR is expressed as a percentage and is used to compare the profitability of different investments.
8. Price/Earnings (P/E) Ratio: Price/Earnings (P/E) Ratio is a valuation metric used to evaluate the relative price of a company's stock. The P/E ratio is calculated by dividing the market value per share by the earnings per share (EPS). A high P/E ratio indicates that a company's stock is considered to be overvalued, while a low P/E ratio indicates that it is undervalued.
9. Enterprise Value (EV): Enterprise Value (EV) is a valuation metric used to evaluate the total value of a company. EV is calculated by adding a company's market capitalization, debt, and preferred shares, and subtracting its cash and cash equivalents. EV is used to compare the value of companies with different

capital structures.
10. Reserve Replacement Ratio (RRR): Reserve Replacement Ratio (RRR) is a measure of a company's ability to replace the oil and gas reserves it produces. RRR is calculated by dividing the total reserves added in a given year by the total production in that year. A RRR of greater than 100% indicates that a company is replacing more reserves than it is producing, while a RRR of less than 100% indicates that it is producing more reserves than it is replacing.
11. Price Deck: A price deck is a set of assumptions about future oil and gas prices used in financial analysis. Price decks are used to estimate future cash flows, discount rates, and other financial metrics. Price decks are typically based on historical price data, industry forecasts, and macroeconomic trends.
12. Hedging: Hedging is a financial strategy used to manage risk associated with fluctuations in oil and gas prices. Hedging involves entering into financial contracts that lock in future prices for a portion of a company's production. Hedging can help reduce volatility in revenue and cash flow.
13. Risk-adjusted Discount Rate: A risk-adjusted discount rate is a discount rate that reflects the risk associated with an oil and gas investment. A higher discount rate is used for riskier investments, while a lower discount rate is used for less risky investments.
14. Decline Curve Analysis (DCA): Decline Curve Analysis (DCA) is a method used to estimate the production decline rate of an oil or gas well. DCA involves analyzing historical production data and fitting a mathematical model to the data to estimate future production declines.
15. Profit to Investment Ratio (PIR): Profit to Investment Ratio (PIR) is a financial metric used to evaluate the profitability of an oil and gas investment. PIR is calculated by dividing the net present value of future cash flows by the initial investment.

Now that we have defined some of the key terms and vocabulary used in financial analysis and valuation in the oil and gas industry, let's look at some examples and practical applications.

Example 1: Discounted Cash Flow Analysis

Suppose an oil and gas company is considering investing in a new oil field. The company estimates that the oil field will produce 10 million barrels of oil over a 10-year period, with an average lifting cost of $20 per barrel. The company also estimates that the oil field will require an initial investment of $100 million.

To determine whether the investment is profitable, the company can use a discounted cash flow (DCF) analysis. The DCF analysis involves estimating the future cash flows from the oil field, discounting them to their present value, and comparing the present value to the initial investment.

The estimated cash flows from the oil field can be calculated as follows:

Revenue = 10 million barrels x $60 per barrel = $600 million
Less: Lifting costs = 10 million barrels x $20 per barrel = $200 million
= Net cash flow = $400 million

To determine the present value of the net cash flow, the company must use a discount rate that reflects the risk associated with the investment. Suppose the company uses a discount rate of 10%. The present value of the net cash flow can be calculated as follows:

Present value = $400 million / (1 + 0.10)^10 = $214 million

Since the present value of the net cash flow is less than the initial investment of $100 million, the investment is not profitable.

Example 2: Reserve Replacement Ratio

Suppose an oil and gas company produced 10 million barrels of oil in a given year and added 12 million barrels of oil to its reserves in the same year. The company's reserve replacement ratio (RRR) can be calculated as follows:

RRR = 12 million barrels / 10 million barrels = 1.2

Since the company's RRR is greater than 1, it is replacing more reserves than it is producing. This is a positive sign for the company's long-term sustainability.

Example 3: Hedging

Suppose an oil and gas company has agreed to sell 1 million barrels of oil at a price of $60 per barrel, but is concerned about a potential decline in oil prices. The company can use hedging to manage its risk.

One way the company can hedge its risk is by entering into a futures contract. A futures contract is a legal agreement to buy or sell a commodity at a specified price on a specified date in the future. The company can enter into a futures contract to sell its oil at a price of $60 per barrel, even if the market price declines.

Example 4: Risk-adjusted Discount Rate

Suppose an oil and gas company is considering investing in a new oil field with a high level of geological risk. To reflect the additional risk, the company uses a higher discount rate in its DCF analysis.

If the company uses a discount rate of 15%, the present value of the net cash flow can be calculated as follows:

Present value = $400 million / (1 + 0.15)^10 = $163 million

Since the present value of the net cash flow is significantly lower than the initial