Case Study

AT A GLANCE INDUSTRY:
Greenfields Mine Study Financial Modelling

COMMODITY:
Iron Ore

CLIENT:
Iron Ore Mine

LOCATION:
Windhoek, Namibia

PROBLEM SUMMARY:
Model and Evaluate Financial Options in the Bankable Feasibility Study to Obtain Project Funding

SERVICE:
Financial Modelling

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Bankable Feasibility Study Financial Modelling

Modelling detail revenue, operational cost, capital expenditure, market indices, and regulatory factors for a Life-of-Mine to evaluate alternative options

Abstract:

The client needed to submit a comprehensive Bankable Feasibility Study (BFS) to financial institutions for funding of their Greenfields project. The BFS entailed a financial model that evaluated various options of operating philosophy, which influenced the cash flow and viability of the project.

Keywords:

Bankable Feasibility Study (BFS), Financial Modelling, Evaluate Options, Sensitivity Analysis, Monte Carlo Simulation, Contingency Estimate, Investment Funding, Revenue, OPEX, CAPEX, NPV, Cash Flow, Taxation

Problem Statement

The client required a detailed financial model that evaluated operating philosophy options for different operating philosophes to make informed decisions and demonstrate due diligence when requesting funding from financial institutions.

Options were evaluated for generator purchase vs rent, laboratory sampling insourcing vs outsourcing, water carting sources, and taxation costs for pelletisation in or outside Namibia.

Project Objectives

Bankable Feasibility Study Financial Model:

- Source detail quotations from at least three service providers for each cost item, according to the American Association for Cost Estimation International (AACEI) standard.
- Build options into financial model to evaluate different discounted cash flows and capital expenditure estimates.
- Baseline assumptions and constraints with the client, and declare sources and benchmarks used.
- Perform a sensitivity analysis with Monte Carlo simulation by assigning risk factors, distributions, and ranges to the financial model.
- Determine the required contingency for estimate, escalation, and schedule risk.
- Determine the investment requirement, and support the client in acquiring project funding by documenting the BFS financial model.

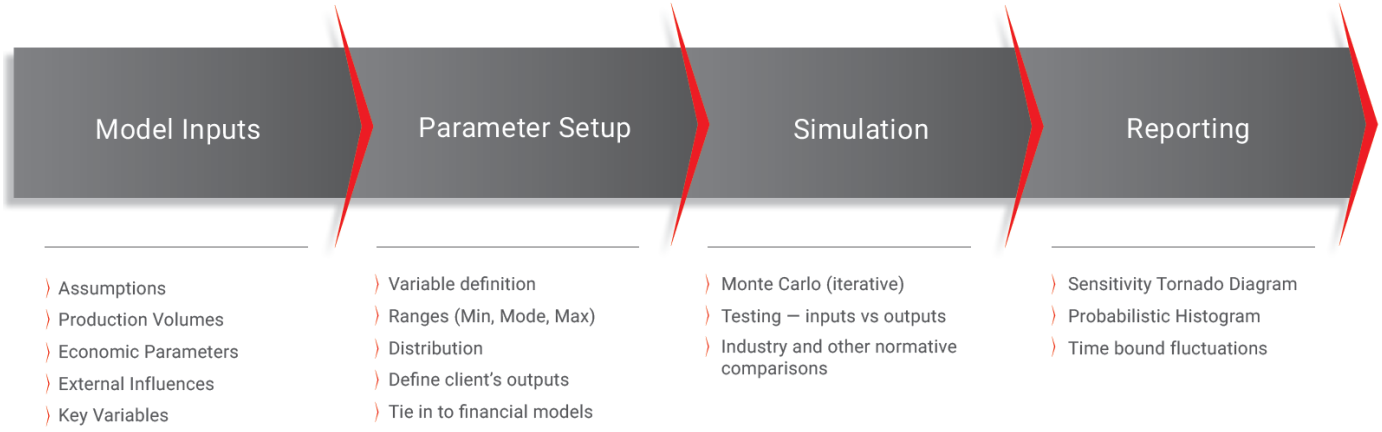
Method

VBKOM followed its standard process for financial modelling as depicted on the figure below.

The financial model was integrated with other disciplines in the BFS process, i.e. geology, geotechnical, mining, processing, logistics, infrastructure, marketing, HSEC, and legal. The BFS scope has also changed significantly from the Pre-Feasibility Study scope due to commodity price changes in the iron ore market.

The method to develop the financial model entailed:

- Liaising with all BFS stakeholders to incorporate the correct model inputs, such as assumptions, production volumes, etc.
- Developing the financial model with operating philosophy options and risk factor distributions. The model was validated by the client before continuing with option simulations.
- The financial model taxation calculations were validated by a recognised auditing firm.
- Once costs were sourced for all parameters and the model calculations were validated, the risk factors were simulated stochastically with the Monte Carlo method.
- Reports were generated to evaluate the cash flow effects between options.



Project Results

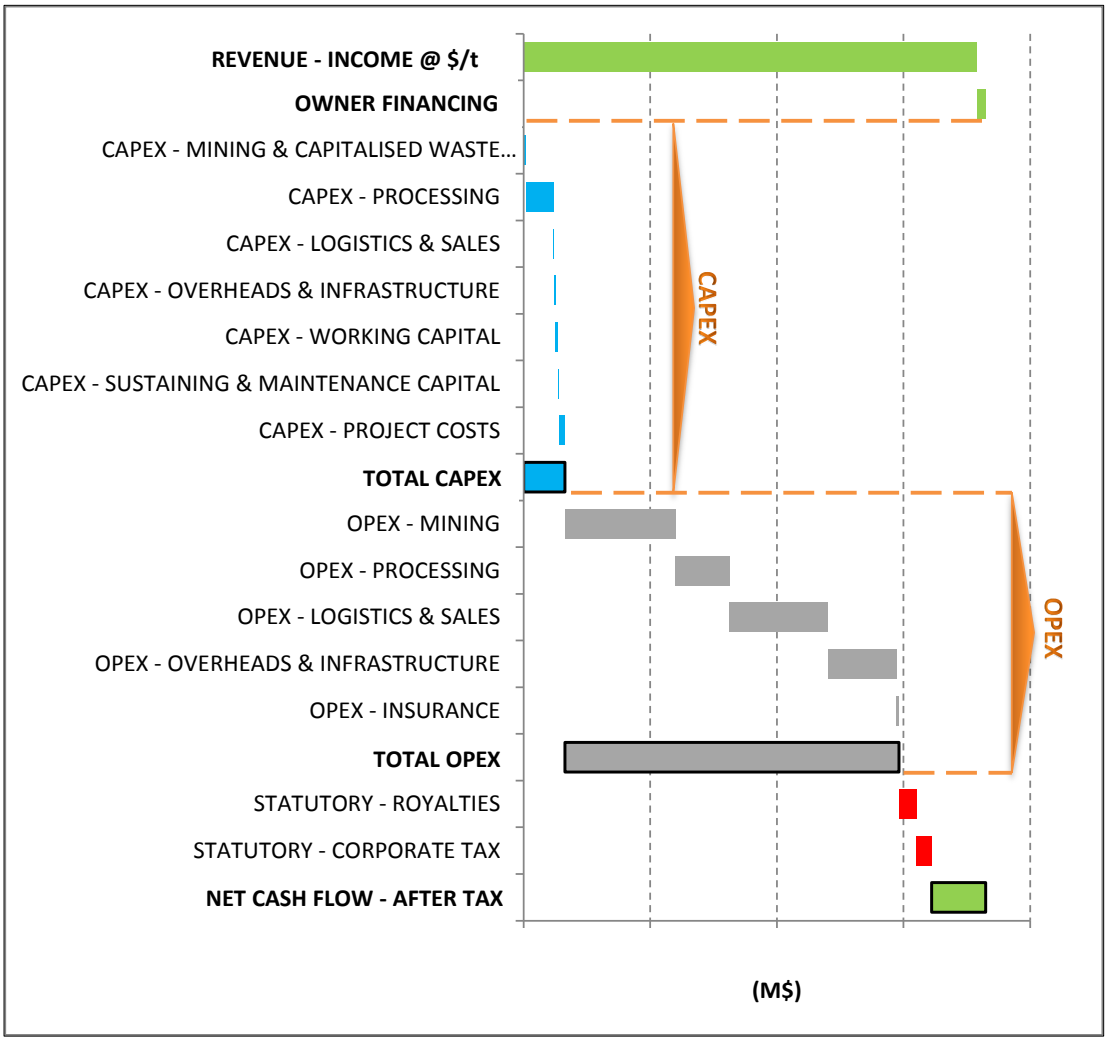
A detailed financial model, unique to the project, was developed and validated with 89% estimate accuracy, which is sufficient for the BFS stage. The 20-year Life-of-Mine (LOM) was modelled with certain base assumptions, such as product price, exchange rates (USD, AUD, EUR), real cash discount rate, inflation, royalties, loan financing, domestic and export taxation rates, fuel price, insurance, and sustaining capital.

Option Evaluation:

Options were evaluated for generator purchase vs rent, laboratory sampling insourcing vs outsourcing, water carting sources, and taxation costs for pelletisation in or outside Namibia. These options influenced the product price (revenue), operational expenditure (OPEX), and capital expenditure (CAPEX) in the financial model cash flow. The options were evaluated and presented to the client, at which stage a decision was made to pelletise ore domestically due to tax implications, purchase generators, outsource laboratory sampling, and source water from on-site boreholes and a nearby farm. These options were selected due to their beneficial impact on the project cash flow.

Cash Flow Breakdown:

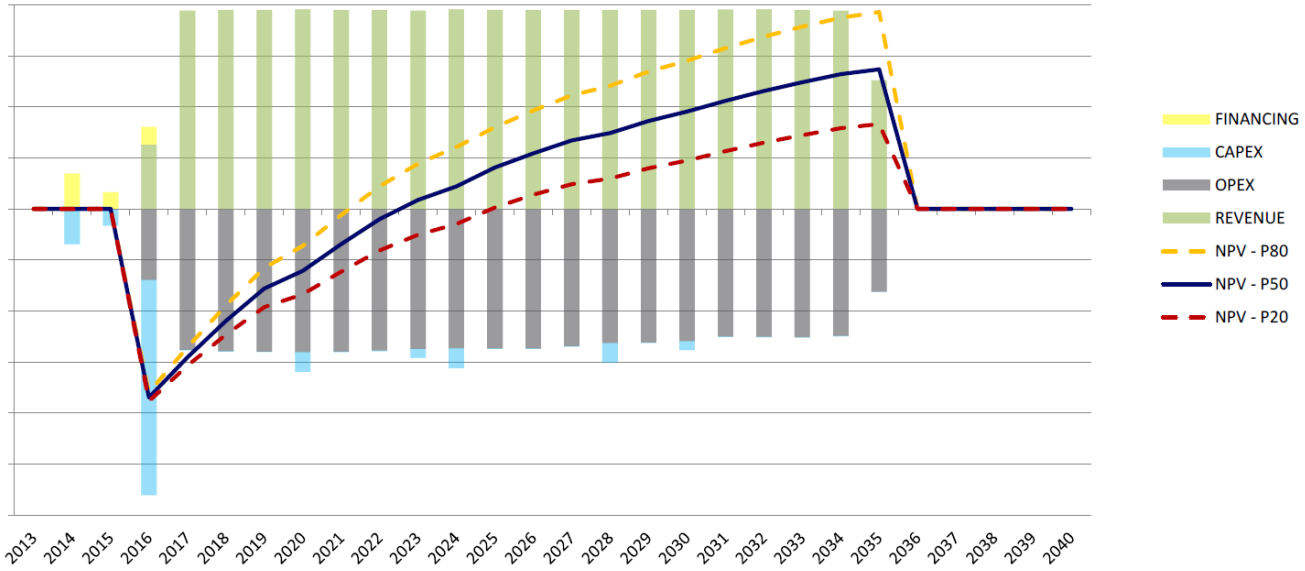
The next figure shows the breakdown of cash flow components in the financial model.



Loan Financing Cash Flow:

The inclusion or exclusion of loan financing was evaluated in the financial model cash flow to determine the viability of the project. A breakdown of revenue, OPEX, CAPEX, and financing is shown below for the project cash flow, including and excluding loan financing. The repayment of loan financing in 6 years has a significant impact on the cash flow and NPV. A 20th, 50th, and 80th percentile NPV was determined with a Monte Carlo simulation of 5,000 iterations.

Cash Flow Excluding Loan Financing:



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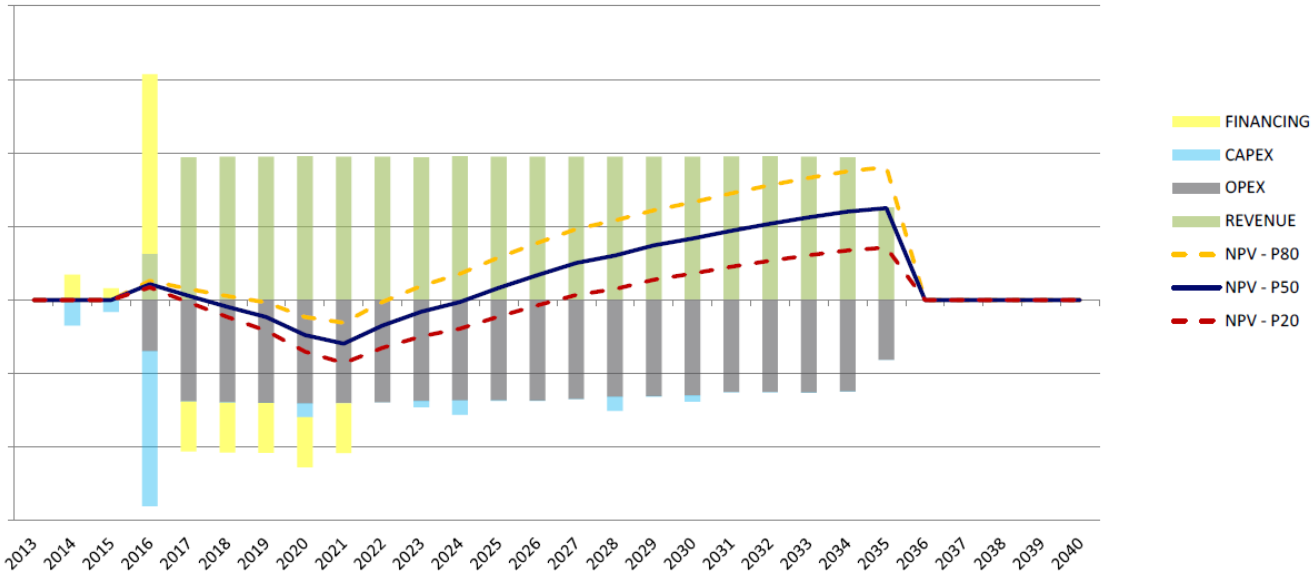
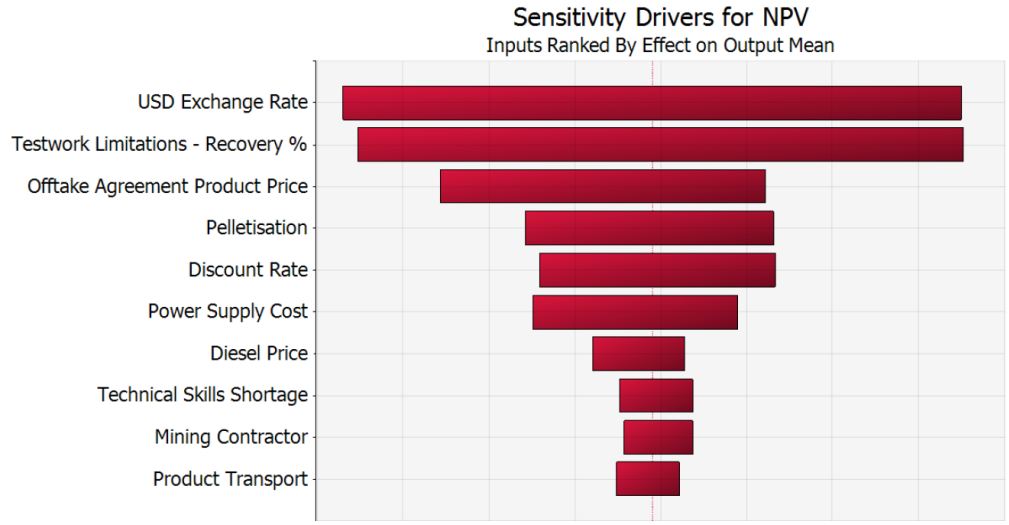
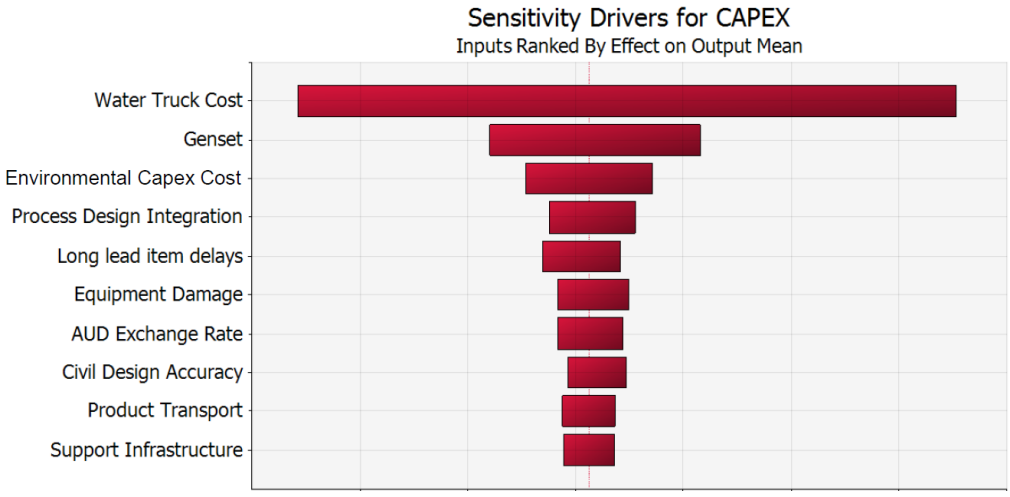
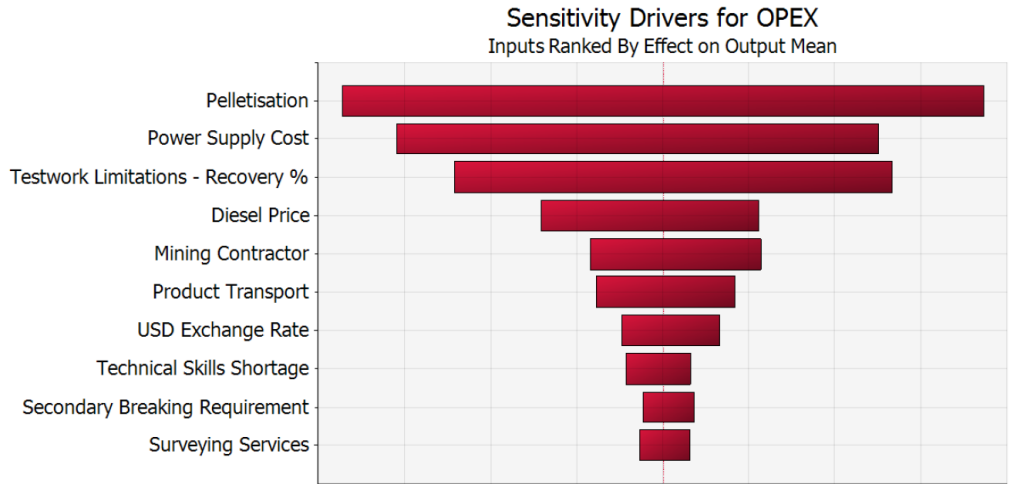


Sensitivity Analysis:

Probability (risk) distributions and ranges were assigned to certain key parameters in the financial model, to model uncertainty and risk. A Monte Carlo iterative simulation was applied to the financial model, and the top sensitivity drivers for Nett Present Value (NPV), CAPEX, and OPEX were identified, as shown below. These sensitivity drivers show which parameters have the greatest influence on the financial model, with their level of uncertainty.

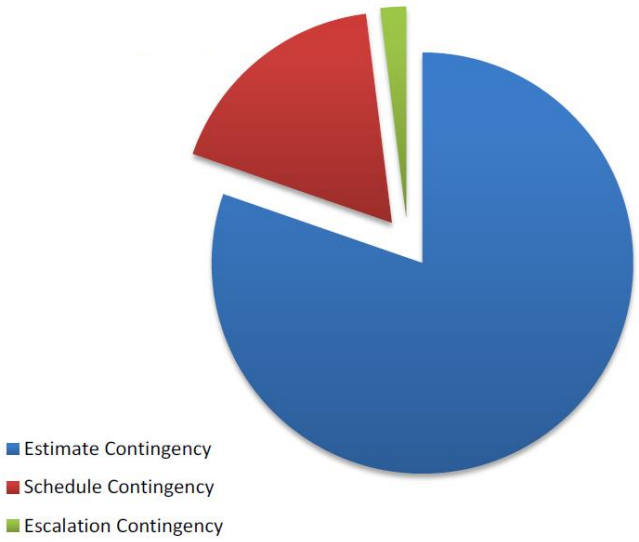






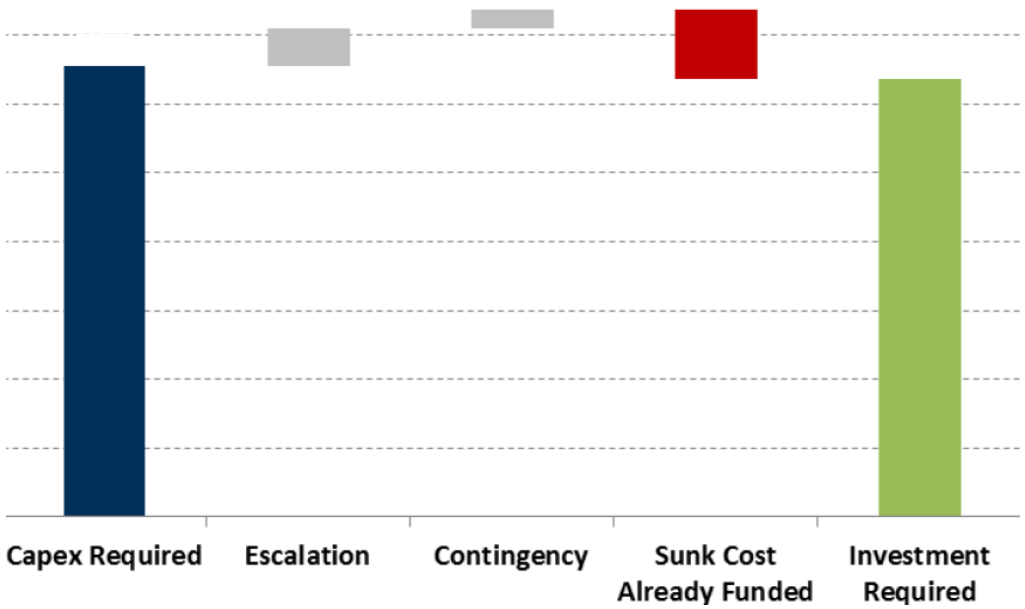
Contingency Estimate:

As part of the Monte Carlo risk and sensitivity analysis, the contingency estimate was determined to compensate for risk and uncertain parameters in the financial model. Three contingencies were determined, i.e. estimate, schedule, and escalation.



Investment Requirement:

The final investment requirement was determined by accounting for the CAPEX requirements, escalation over the LOM, total contingency estimate, and project sunken costs already funded by the client (excluded from BFS study), as shown below. Determining the investment requirement was critical for the client to source funding for the project's implementation.



Customer Value

VBKom's delivery of the BFS financial model enabled customer value:

- Quality Bankable Feasibility Study financial model and study report to progress into the project implementation stage.
- Client understands option effects on the project cash flow, and can make informed decisions.
- Financial model incorporates risk and investment requirement for client to request project funding according to financial institutions' requirements.