



THOUGHT PIECE

BUILDING BETTER RESOURCES COMPANIES THROUGH ENHANCING THE FINANCE FUNCTION!

Over the last 30 years, the natural resources industry, both energy and mining companies, have continually reinvented themselves through enhancing the operational side of their business. From 2-D to 4-D seismic, from simple vertical wells to highly complex horizontal wells, the geoscientists and engineers have added significant value. Yet, the finance function is still relying on simple, static financial models. How can the finance function further enhance its contribution to company success?

Relevant Natural Resources Industries – Oil & Gas, Mining & Metals

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4-D RESOURCES
ADVISORY LLC

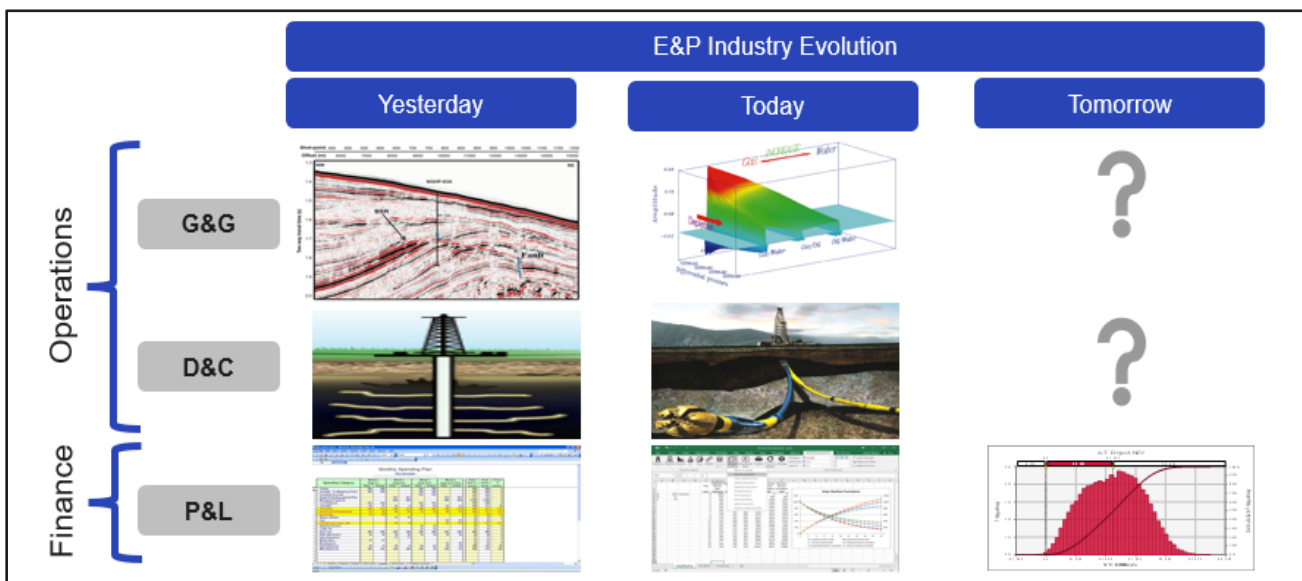
Value Accretive Insights for Resources Executives and Investors

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The natural resources industry, both oil/gas and mining companies, has fundamentally transformed itself operationally over the last 30 years – the duration of my university studies and career, hence this time stamp. With respect to the oil and gas industry, the process of constant and never-ending improvement has seen the G&G part of the value chain (geology and geophysics) evolve from using 2-D seismic to capture a single slice of a reservoir, through 3-D seismic which facilitates a volumetric understanding of the total reservoir, to 4-D seismic which shows how reservoir fluid volumes change over time. Likewise, the D&C (drilling and completion) part of the value chain has evolved from simple vertical wells with simple horizontal completions to complex horizontal wells, many miles long, with bespoke vertical completions to only target the productive part of the reservoir. Not to mention also applying these technologies in challenging offshore environments. The mining industry, likewise, has evolved from a G&G perspective and with significant automation across the mining, milling and processing stages.

Yet, the finance function has not evolved in nearly the same manner with many executives, investors and bankers still using the same deterministic, static spreadsheet approach to the budgeting, valuation, M&A, capital raising and liability management processes, and internal decision-making, per Figure 1 below.

Figure 1:



Additionally, while the operational groups use a probabilistic approach to their financial models and the related output, which fundamentally enhances the quality of their decision-making process, and which

facilitates the most important document for a resources company – the reserves report – the finance group primarily takes “slices” from the reserves report (for production, opex and capex) as the foundation for their financial models. Problematically, this transfer of data does not typically reflect the probability associated with the data slices taken, making the input to, and output from, their financial models random and potentially misleading with respect to the so-called insights generated.

But there is a better way to build financial models – one that includes the probability aspect of the data from the reserves report. And today, the software exists to include the probabilistic nature of input variables and correlations into the model, along with the analysis and graphing tools to optimize the output presentation. As the natural resources industry seeks further ways to transform its business, and to make it a more attractive investment opportunity versus other industries offering similar “blue-sky potential”, the finance function would seem to be the next part of the industry to work towards a paradigm shift with respect to how they model and analyze the business to further enhance the capital budgeting, investment and financing decisions using a probabilistic approach.

For a more detailed discussion of the benefits of a dynamic/probabilistic approach to financial modeling versus the more traditional static/deterministic approach, please read my Thought Piece, dated 5 October, 2021, entitled *Natural Resources Financial Modeling and How to Make It Better!* per 4-dresourcesadvisory.com/natural-resources-financial-modeling-and-how-to-make-it-better/.

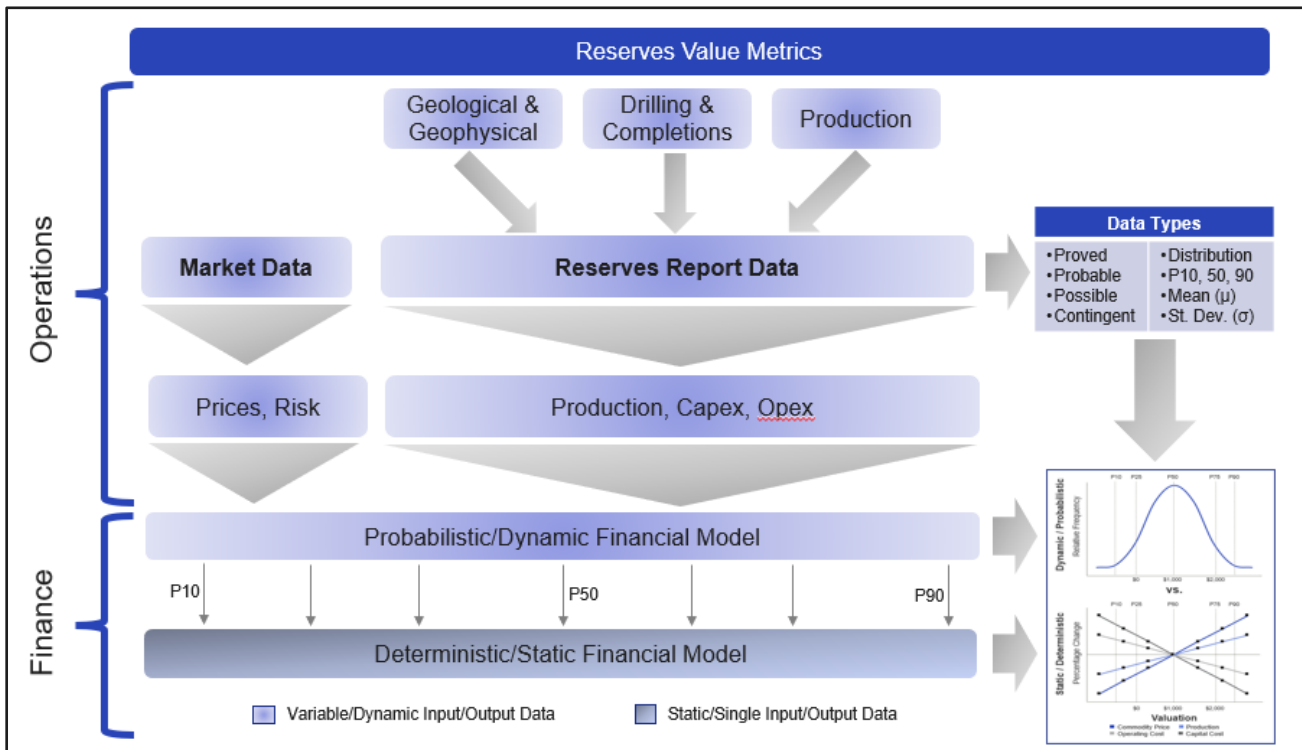
To understand how this dynamic approach can be applied to the natural resources industry, please read my Thought Piece dated January 17, 2022, entitled *Using Dynamic Financial Modeling to Enhance Insights From Financial Reports!* per 4-dresourcesadvisory.com/using-dynamic-financial-modeling-to-enhance-insights-from-financial-reports/ which applies this approach to valuing a gold project, and a Thought Piece dated April 4, 2022, entitled *Using Dynamic Financial Modeling in a Volatile Commodity Price Environment!* per 4-dresourcesadvisory.com/using-dynamic-financial-modeling-in-a-volatile-commodity-price-environment/ which applies this approach to valuing a publicly traded E&P company.

Accordingly, for the finance function in oil/gas and mining companies, the questions must be... “How can we as a function further synthesize and integrate more of the data from the reserves report into our financial models to help enhance their output relevance and integrity. How can we better use the

probabilistic software available, a simple Excel add-in, to build financial models to optimize the core parts of our business including budgeting, valuation, M&A, capital raising and liability management. And, how can we as financial executives, investors and bankers in the natural resources industry, through our financial models, ensure a more seamless integration of the information gathering and decision-making process across the organization than is currently possible today?”

To understand the best way to answer this question, it is important to first review the data used in most financial models in the resources industry – the reserves report. This report, created from a rigorous, risk-adjusted quantitative methodology, one that is enshrined in professional organization and financial market rules and regulations, is typically the best source of data we have for evaluating the financial aspects of producing a particular commodity. Yet, when that data is transferred to our financial models, most of its nuance and variability is excluded as the simple, static, deterministic financial models used cannot manage the real-world stochastic reality of the reserves report. Figure 2 below highlights the conundrum the finance function faces, but also how much additional value it can contribute by utilizing much more of the data, and critical insights, from the reserves report.

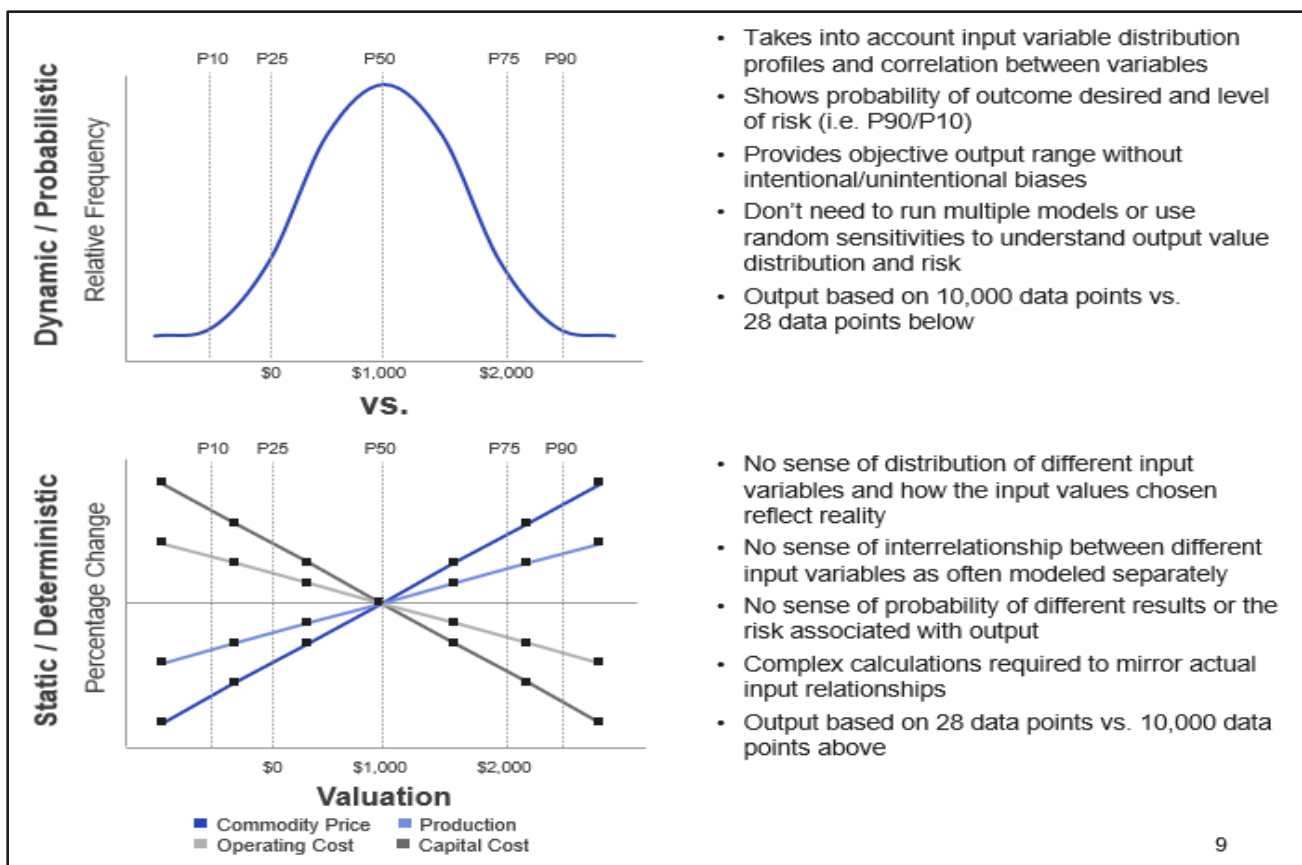
Figure 2:



By only taking “slices” from a reserves report, the finance function is attempting to capture the variability in the form of different scenarios or base, upside and downside cases. However, as highlighted in the bottom right graph in Figure 2 above, the data output can never give the same insight as a probabilistic output based on 10,000 iterations of the different scenarios. Which means the static model output will never even remotely reflect the potential range of outcomes likely to be experienced – hence any decisions based off this very limited data set cannot be seriously relied upon with any great certainty.

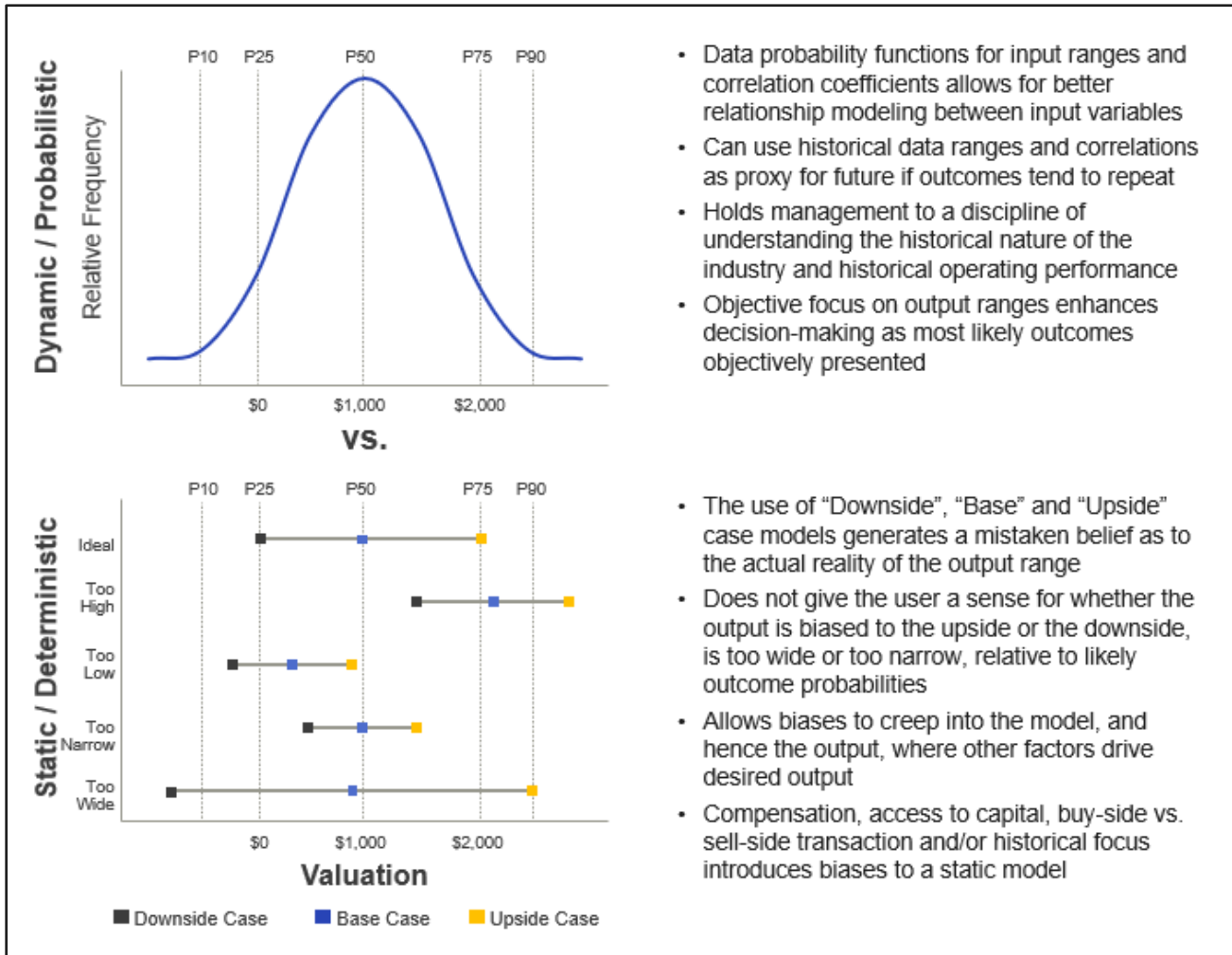
So, how do we fix this? By using a probabilistic software, an Excel add-in, such as Palisade Corporation’s @RISK, to allow the input variables to be included as a distribution, rather than a single data estimate, and to facilitate the correlation of those input variables so only one output value range is needed instead of the multitude of cases typically run in an attempt to develop a table of ranges. For a valuation, for example, a probabilistic approach will be far more insightful than the traditional scenario analysis used, as set out in Figure 3 below.

Figure 3:



A probabilistic approach further ensures a far greater range of input data, hence output data, along with the probability associated with each of these respective, possible outcomes per Figure 4 below.

Figure 4:



A probabilistic approach not only shows a more objective, realistic and commercial range for the output being calculated – it generates statistical information that can be used across the corporate finance function that a simple deterministic approach cannot. It generates the mean (μ) and standard deviation (σ) (or variability, risk) of the calculated variable and also the P10, P50 and P90 values on which a far better risk assessment can be completed rather than simply relying on CAPM or WACC. Given these intrinsic benefits, its application across all the corporate finance applications provides far greater insight versus using a static model for the same applications as set out in Figure 5 below.

Figure 5:

Application	Primary Probabilistic Modeling Insights/Benefits
Corporate Finance Models	<ul style="list-style-type: none"> Shows probability associated with specific values vs. Downside, Base and Upside cases typically used to show output variability Integrates input assumptions and correlations between variables requiring a single financial model to highlight different cases possible Significantly enhances understanding of primary variability drivers and represents unique tool to understand impact of different decisions
Valuation Analysis	<ul style="list-style-type: none"> Sigma (σ) highlights the risk applicable to the underlying valuation that a CAPM/WACC does not show Provides greater specific insight into relative valuation analyses that less specific company and transaction multiples cannot Less open to “strategic misrepresentation” as commercial input assumptions and correlations drive +50,000 model output iterations
Mergers & Acquisitions	<ul style="list-style-type: none"> Provides greater insight into risk/return of standalone asset value vs. pro forma combination and NAV accretion probability ranges Accretion/dilution analysis better reflects balance sheet impact across a range of leverage and liquidity scenarios
Equity Financing	<ul style="list-style-type: none"> Helps equity investors better understand the risk/return payoff, given value/probability relationship, vs. their risk spectrum position
Debt Financing	<ul style="list-style-type: none"> Calculates probability associated with default which is critical given related governance and auditing policies/controls
Liability Management	<ul style="list-style-type: none"> Better incorporates full, integrated variability of the asset portfolio to understand range of impacts on the capital structure and equity value

In short, a probabilistic approach to the finance function for both oil/gas and mining companies has the scope to significantly enhance the finance function’s role within the organization through better incorporating the insights and nuances from the reserves report into a form that quantitatively and qualitatively drives the decision-making process. Ultimately, and most importantly, better inputs will drive better outputs which will drive better decisions and a better company and industry performance over time.

CONCLUSION

Over the last 30 years, oil/gas and mining companies have fundamentally enhanced their operating capacity through the use of technology, especially using a probabilistic approach to understanding and managing their difficult environment. Yet, despite this constant and never-ending improvement to the

operational focus, the finance function has remained more static using the same deterministic financial models to analyze and project the financial performance of the company. In many ways, this approach represents an outdated way of using the data in the reserves report thereby limiting its contribution to company success. And, in many ways, impeding that success through sub-optimal decisions.

If the extractive industries are going to improve their performance, the finance function has to do a better job of providing data that more appropriately reflects the technical and commercial reality of the commodities business. Which means building and using financial models that better reflect the stochastic reality of their business. Which means using a probabilistic software to ensure the input to, and output from, their models highlight the variable nature of expected financial performance in a risk-adjusted manner – something a static financial model can never do.

The software to build these models, an Excel add-in, such as Palisade Corporation’s @RISK and Decision Tools Suite, and others, exist to facilitate this evolution in a timely, low cost, and low risk manner, either at a project level or at a more integrated company level. Which means the solution to poor financial decisions, and the significant economic, social and environmental cost of those poor decisions, is now far closer than it has ever been. The ball is now firmly in the court of the finance function to significantly improve their tools and processes using a probabilistic approach... but it will also likely require the rest of the organization supporting and encouraging this change for the next paradigm shift in the natural resources industry to occur.



Lachlan Hughson, the Founder of 4-D Resources Advisory LLC, has a 30+ year career in the oil/gas and mining/metals industries as an investment banker and a corporate executive. He has undertaken \$30+ billion of M&A and \$15+ billion of capital raising assignments during his career.

His commercial experience is further enhanced through a Master of Business degree from the University of Technology Sydney, Australia, a Master of Business Administration degree from the Kellogg School of Management, Northwestern University, U.S.A., and a Master of Science degree, with Distinction, from the Royal School of Mines at Imperial College London.

Lachlan founded 4-D Resources Advisory LLC to help executives and investors build better energy and mining companies using a probabilistic approach to the finance function. With management often making sub-optimal decisions based on limited output from static financial models, while the technical groups (geoscience, engineering) enhance their decisions through a probabilistic approach, the finance function can now provide improved insights to the decision-making process using the same approach.





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4-D Resources Advisory LLC is a boutique financial advisory firm that utilizes probabilistic-based financial models to enable executives and investors in the oil/gas and mining/metals industries to enhance their decision making process. Its genesis was the realization by its founder, Lachlan Hughson, that the natural resources industries are not well served by complex, static financial models but instead require a dynamic approach given the complexity and interrelationships of the primary variables driving the value creation process. If the geoscience and engineering departments rely on probabilistic software and models, and the enhanced insights gained from their output, shouldn't the finance function utilize the same approach to their work?

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