Using the Proxy NPV Model for Value-Based Strategic Decisions

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The Importance of Value-Based Development Decisions

The "Influence Curve" has long been the foundation of best practice thinking for project development and the source of the industry's adherence to the concept of Front-End Loading (FEL). The best example of how operators make effective use of the early stages is the definition of alternative development schemes during FEL 2 (often called the "select stage"), and the selection of the optimum scheme for definition during FEL 3 and eventual sanction.

Although everyone knows the importance of defining and selecting the optimum development alternative, few operators do this well. Some spend too much time ("analysis paralysis"), some too little ("just pick a scheme and run with it".) Both are likely to end up with a less valuable asset (i.e., lower NPV) than might have been the case if the optimum development alternative had been selected.

As projects have become larger and more complex, so too has the difficulty of the selection process. Maximizing value is clearly the goal, yet the way the variables that drive value interact under different development scenarios is not always intuitive or self-evident. Making the selection process more difficult still is the fact that different alternatives carry different levels of risk and uncertainty.

A value-based approach is the only way to integrate all the project variables and provide a quantitative basis for decision-making. Using Net Present Value (NPV) as the metric for asset value, a value-based analysis can be applied to the evaluation of development alternatives so that the optimal development scheme can be selected.

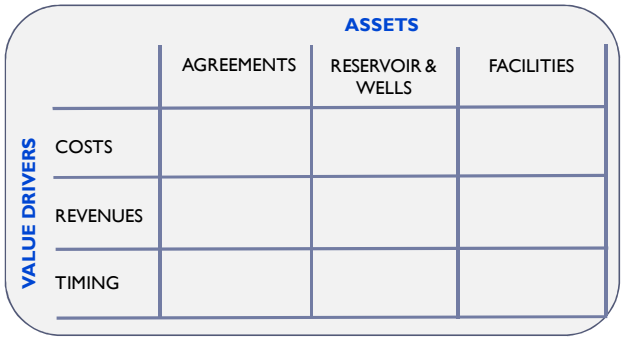
A Value-Based Approach to Decision-Making

Mapping Value Assets and Drivers

An upstream development typically has assets in the form of:

- Commercial and Financial Agreements
- Reservoir and Wells
- Production Facilities

The value (NPV) of these assets is determined by the value drivers: costs, revenues, and timing. This is illustrated by the Value Matrix below.



Each development alternative will have a unique Value Matrix. The project's NPV for each alternative is determined by how each of these assets impacts each of the value drivers.

For example,

- Certain agreements might specify how costs and revenues are shared, as well as the required timing for first oil, or the expiration of a lease.
- The size, composition, and potential flow rates of the reservoir, as well as the number of wells, impact both development costs and revenues.
- The size of the facilities, and the timing of their engineering and installation, impact both cost and revenues.

One can add value by improving the terms of agreements, increasing the definition or performance of the reservoir, or optimizing the facility design.

Assessing Risks to Value Assets and Impacts on Value Drivers

Development alternatives differ in another significant way: the sources and extent of the risks they present. These risks act upon the various assets and impact the value drivers of costs, revenues and timing. While there are many ways to categorize risks, Westney Risk Resolution® uses the taxonomy shown below.

These risk categories are described as follows:

1. Location Risks
    a) Geo-Political Risks – these can be local or regional
    b) Regulatory Risks
    c) Local Conditions – this addresses location related risks such as logistics, weather, labor supply etc.

2. Economic & Market Risks
    a) Project Cost Risks - this addresses how market conditions impact the capital cost of the facilities and drilling.
    b) Product Price – this addresses how variations in the price of product impact project economics

3. Technical Risks
    a) Technology – risks associated with new or significantly improved technology, or an existing technology being used under new conditions
    b) Completeness – risks associated with how well the project scope and design has considered everything that could potentially be required

c) Definition – risks associated with how well the expected facilities have been defined.

4. Organizational Risks: Governance & Competencies
   a) Owner's organization – risks associated with the owner organization's ability to execute all aspects of the project. In JVs, this includes partner organizations as well.
   b) Owner team – risks associated with the specific project team's (operator and partner) ability to execute all aspects of the project.
   c) Contractor – risks associated with ability of the various contractors, selected or potentially selected, to execute the engineering, procurement, installation, and commissioning.

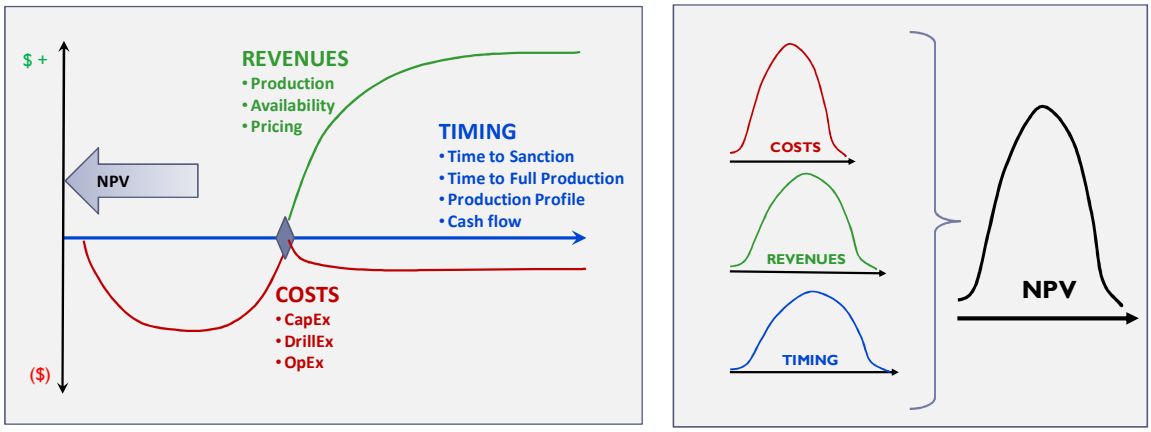
Assessing Value Using the Proxy NPV Model

How do risks interact with assets to determine value/NPV and enable development alternatives to be accurately compared? The answer is with the Proxy NPV Model.

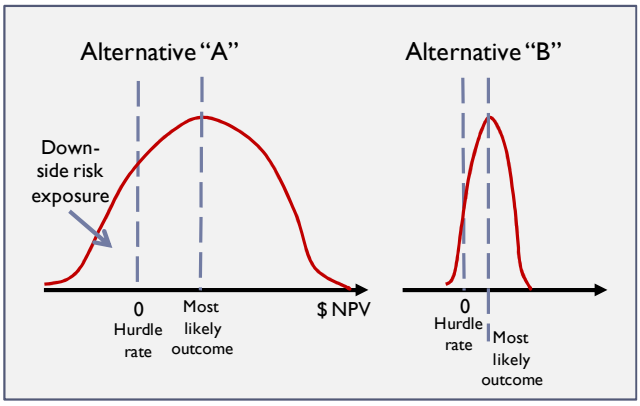
The Proxy NPV Model, as the name indicates, is a project economic model built for use in making project decisions in which alternatives are compared based on their relative, risk-informed, NPV. It is a "proxy" model in that:

- It DOES NOT replace, duplicate or in any way substitute for the more complex and formal models the company's planning and economics function uses to determine the true value of the investment to the company.
- It DOES provide project organizations with:
  - A valid way to measure the relative value/NPV of various development alternatives
  - A modeling capability so that all manner of planning and development decisions can be made based on their potential impact on value and risk
  - A planning capability to develop an accelerated path to sanction by knowing the most important areas to work on in order to maximize value and reduce risk.

The Proxy NPV Model works on the principles illustrated below.



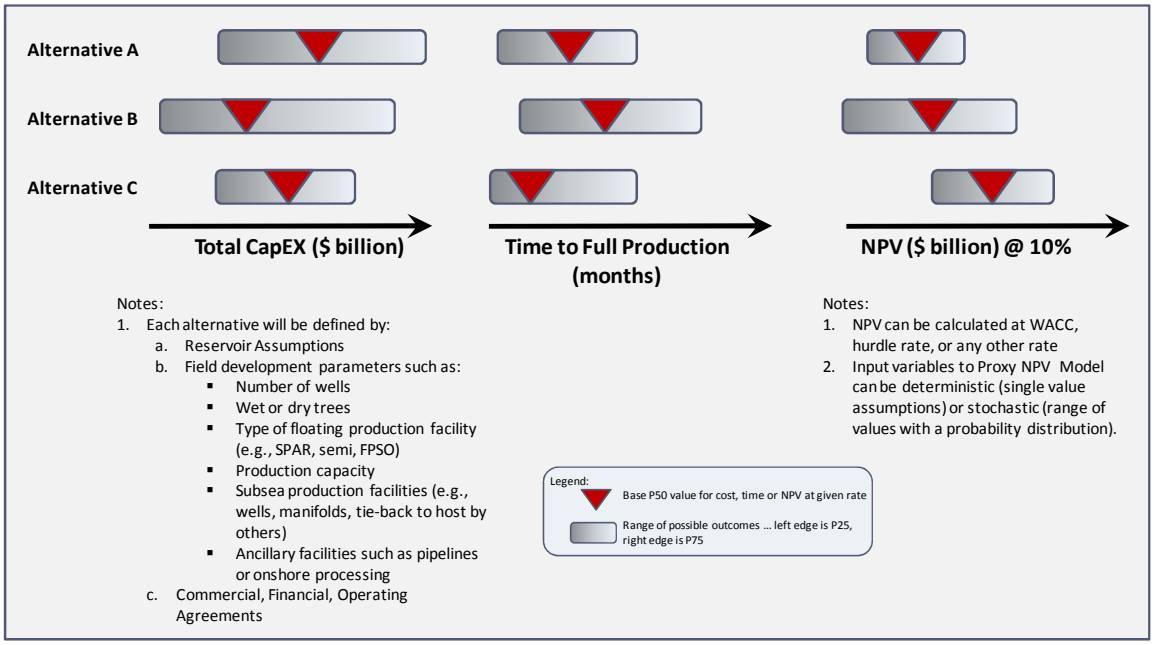
On the left, we see a classic NPV curve showing the Value Drivers of Costs, Revenues, and Timing. These are inputs to the model, for each alternative. The chart on the right illustrates the fact that each of these Value Drivers has a risk profile which varies with each alternative. The combined effect of these risk profiles is a probabilistic view of NPV for each alternative. This probabilistic view is very important when decisions are being made as is illustrated by the chart below.



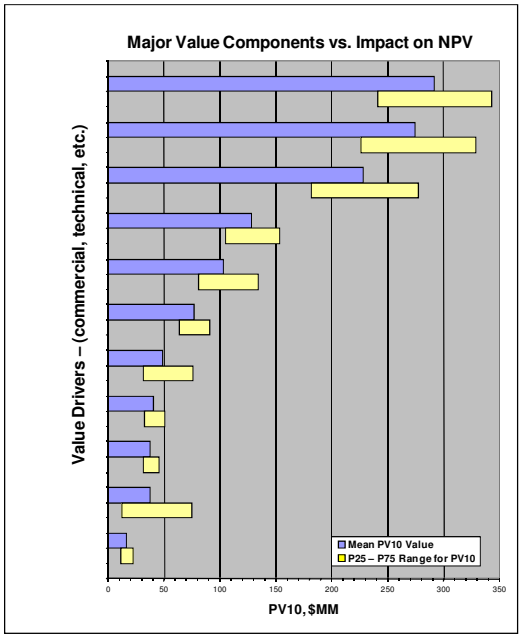
In the absence of a probabilistic view, Alternative A would appear to be preferred as it clearly has the higher most likely NPV. However, the probabilistic view shows that, Alternative A also has considerable downside risk, whereas Alternative B is almost certain to at least meet the hurdle rate.

Which of these alternatives is the best choice? While there is no "right" answer, one might use the results of the analysis to develop ways to improve Alternative A so that its downside risk is reduced.

The primary purpose of the model is a comparative analysis of alternatives. The illustration below shows how modeling results will be used to indicate how each alternative creates value and how the value created compares. Note how the band around each base value indicates the level of uncertainty; the wider the band, the greater the uncertainty. Note that the analysis is not intended to determine the correct choice; it is intended to provide value- and risk-informed information for executive decision-making.



The second type of output from the model is an indication, for each alternative, of the relative contribution of each of the input variables to value and risk. The purpose is to indicate what areas need to be focused on in order to increase the value and reduce the risk of that alternative. This is illustrated by sample output shown here.



This NPV "tornado chart" is very valuable in re-focusing the team; our experience indicates that the information is often not what the team had expected, and useful re-direction of effort occurs. It provides the basis for Westney's Front-End LEAN™ process, developing a plan for the balance of FEL 2 (Pre-FEED) and FEED that focuses on the main drivers of value and predictability.

Summary

Strategic decisions are seldom self-evident or intuitively obvious for large, complex projects. The Proxy NPV Model provides a means to decide between alternatives by comparing a fully risked assessment of the economic value each one is likely to create.

About Westney Consulting Group, Inc.

Founded in 1978, Westney Consulting Group is internationally recognized for thought leadership in the risk management, strategic planning, and organizational effectiveness of large, complex engineering and construction projects. Based in Houston, Texas, the company advises owner/operator, developer, and financial executives in the energy, chemicals, mining & minerals industries.

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