TETRA TECH RPS ENERGY | TRAINING

EC019: Resource, Risk and Economics Assessment

Format and Duration
Self-Paced - 11 Hours

Summary

This comprehensive course provides a deep dive into resource risk and economic assessment within oil and gas projects. It begins with foundational concepts of risk, uncertainty, and their management throughout the project lifecycle, including key tools like risk registers, matrices, and frameworks such as the Boston Square. You will explore the importance of value and cash flow and consider decision-making aids such as influence diagrams, decision trees, and scenario trees, alongside factors influencing diverse decisions in uncertain environments. The course also covers statistical distributions, combining uncertainties using parametric and Monte Carlo methods, and the critical role of correlation in uncertainty assessments. Importantly, it addresses human cognitive biases and heuristics that affect estimation accuracy and emphasises strategies for effective de-biasing. By mastering these topics, learners will be equipped to gauge uncertainty levels accurately, integrate multiple uncertainties, and apply robust methodologies to enhance project evaluation and decision-making in complex, risk-laden environments.

Learning Outcomes

Participants will learn to:

1. Understand the Exploration Evaluation Process and Project Value Model in resource risk and economic assessment.
2. Define risk and uncertainty, recognise common types, and apply risk management principles in energy projects.
3. Understand why value measurement matters and be able to apply value metrics, discounted cash flow, net present value, and project-ranking techniques using practical examples.
4. Differentiate between influence diagrams, decision trees, and scenario trees and manage choice interdependencies.
5. Identify factors influencing decision-making and apply tools to improve decisions under uncertainty.
6. Apply the Risk Management Process Cycle, use risk registers, risk matrices, and the Boston Square framework.

Training Method

This is a self-paced e-learning course, consisting of 11 modules. Within each module the learning materials are structured into short sections, each including interactive text and image content, animations, video, and audio. Each module has a scored quiz at the end to provide the learner with their learning progress. This course has a learning time of approximately 11 to 15 hours.

Who Should Attend

This course is aimed at professionals involved in energy project evaluation and decision-making, including project managers, geoscientists, reservoir and production engineers, risk analysts, commercial analysts, and technical leads who want to develop skills in resource risk and economic assessment.

Course Content

Introduction to Resource Risk and Economic Assessment

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This module serves as an introduction to the topic of resource risk and economic assessment in the context of an oil and gas project. The topics consider the Exploration Evaluation Process and the Project Value Model. The module finishes with an overview of what to expect as you work your way through the course.

Risk and Uncertainty

Understanding risk and uncertainty is important at all stages of the project lifecycle. This module starts by defining what risk and uncertainty are and looking at some of the terminology used when we talk about risk and uncertainty. Some risk and uncertainty types common to energy operations are considered as well as ways to graphically display these. Risk management is discussed before the module concludes by looking at sources of risk and uncertainty in the subsurface.

Value

Understanding value is essential for making informed investment decisions. This module covers why measuring value matters, the key metrics used to quantify value, and the fundamentals of discounted cash flow (DCF) analysis. It explains net present value (NPV) as a core tool for assessing project profitability and demonstrates how to rank competing projects using consistent financial criteria. Practical examples illustrate these concepts and show how to apply them in real-world decision-making.

Influence Diagrams and Decision Trees

In this module, we explore the distinctions between influence diagrams, decision trees, and scenario trees, highlighting their unique roles in decision-making processes and how to build and use them. We also discuss the advantages and disadvantages of decision trees, such as their clarity and ease of interpretation versus potential complexity with numerous branches. Lastly, we address how to manage choice interdependencies within projects to ensure coherent decision-making across interconnected variables.

Making Decisions

In this module, we will explore the complexities of decision-making, highlighting why individuals often arrive at different conclusions despite having access to the same information. We will examine various tools that can enhance decision-making processes, particularly in the context of uncertainties prevalent in the Oil and Gas industry. Additionally, we will discuss other influential factors that can impact decision-making, and provide strategies for making sound decisions. By understanding these elements, learners will be better equipped to navigate the intricacies of decision-making in their professional environments.

Risk Matrices Management

In this module, we will explore essential components of the risk management process, beginning with the Risk Management Process Cycle, which outlines the systematic approach to identifying, assessing, and mitigating risks. We will delve into the creation and use of a risk register, a vital tool for documenting

identified risks and tracking their status throughout the project lifecycle. Additionally, we will examine the risk matrix, a practical application for visualising risks based on their likelihood and impact, enabling effective prioritisation and decision-making. Finally, we will discuss the Boston Square, a framework that aids in defining key risks by categorising them into quadrants based on their severity, ensuring that organisations can focus their resources on the most critical threats.

Statistical Distributions

This module on statistical distributions will begin by defining what a statistical distribution is and discussing its fundamental characteristics. You will learn about the key parameters that define a distribution and how to derive these parameters from your dataset. Additionally, we will cover the coefficient of variability as a measure of normalised uncertainty, which aids in comparing the degree of variability relative to the mean. Finally, we will guide you through the process of selecting the most appropriate distribution for your dataset, ensuring that you can effectively analyse and interpret your data.

Statistically Combining Distributions

In this module we will learn why it is important to combine distributions and the approaches we can use to do this. We will explore the parametric method, understanding why it provides exact solutions for the mean and variance, and how it can serve as a valuable quality control tool for validating other approaches. Additionally, we will introduce the Monte Carlo method, discussing how it works and ways to optimise performance. Finally, we will compare the strengths and limitations of both the parametric and Monte Carlo methods to help you select the most appropriate technique.

Heuristics and Biases

In this module, you will learn how common human characteristics and heuristics can lead us to make inaccurate estimates of ranges and probabilities. By recognizing these cognitive biases, we can consciously work to avoid their pitfalls and better understand how group dynamics influence decision-making. The key to effective de-biasing lies in actively considering alternative perspectives and applying different methodologies to improve the accuracy of our estimates.

Volume Estimation and Benchmarking

This module will guide you on how to accurately gauge the appropriate level of uncertainty when estimating hydrocarbon volumes in-place. You will learn how to combine different sources of uncertainty effectively and apply both parametric and Monte Carlo methods to improve the reliability and robustness of your volume estimates.

Correlation and Dependant Variables

In this module, you will learn what correlation is and understand the difference between positive and negative correlations. You will explore how correlations impact uncertainty assessments and how to incorporate them into your calculations using both parametric methods and Monte Carlo simulations.

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