MERCURY

Energy Project Economics

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Introduction

Energy project economics is a foundational discipline that bridges technical energy systems with financial and economic decision-making. This course provides participants with a deep theoretical understanding of how to assess the viability, cost, and financial performance of energy projects across diverse sectors, including electricity generation, fossil fuels, and renewable energy systems. Learners explore how to evaluate energy investment analysis, perform lifecycle cost assessment, and apply economic principles to energy infrastructure planning. It emphasizes economic feasibility, regulatory impacts, and market dynamics in energy sectors. Through conceptual frameworks and theoretical models, participants will gain the analytical tools needed to interpret energy cost modeling and economic indicators. Learners will make informed decisions about energy projects that align with both economic and sustainability goals.

Targeted Groups

This Energy Project Economics training targets professionals seeking knowledge and skills:

- Energy economists and financial analysts.
- Project managers in power generation and transmission.
- Policy professionals in energy regulation and economic planning.
- Consultants advising on energy investments and feasibility.
- Engineers transitioning to economic and financial roles.
- Decision makers in the renewable and conventional energy sectors.

Course Objectives

Participants will achieve the following objectives by completing the Energy Project Economics course:

- Understand fundamental economic principles relevant to energy projects and markets.
- Analyze the cost behavior and financial performance of energy investments in diverse sectors.
- Evaluate energy investment analysis techniques, including discounted cash flows and net present value.
- Assess the economic feasibility of renewable energy and conventional power projects.
- Interpret energy market economics and pricing mechanisms affecting project outcomes.
- Apply lifecycle cost assessment methods to energy infrastructure planning.
- Compare economic and financial evaluation models used in energy project decision-making.
- Synthesize economic data to support strategic financial recommendations for energy portfolios.

Targeted Competencies

Participants will gain the following competencies during the Energy Project Economics program:

- Ability to articulate core concepts in energy economic feasibility and investment valuation.
- Proficiency in applying financial evaluation techniques to energy projects.
- Competence in constructing energy cost models and interpreting financial indicators.

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- Skills in using economic frameworks to compare renewable and non-renewable energy options.
- Capacity to integrate market economics into project planning and risk assessment.
- Competence in evaluating policy impacts on energy project economics.
- Skill in performing sensitivity and scenario analysis on project financial outcomes.
- Confidence in communicating economic insights to stakeholders and decision-makers.

Studying Scenarios

In this Energy Project Economics training, participants develop skills through the following scenarios:

- Perform economic feasibility analysis for a utility-scale solar power project.
- Compare lifecycle costs of gas turbine versus wind energy systems.
- Evaluate financial metrics for a proposed energy storage investment.
- Assess the impact of tariff changes on the returns of energy projects.
- Model cash flows for a grid expansion project under varying demand conditions.
- Analyze cost drivers in economic planning for energy infrastructure.
- Conduct a sensitivity analysis of fuel price assumptions for the economic evaluation.

Course Content

Unit 1: Fundamentals of Energy Economics

- Define energy project economics and its role in financial decision-making.
- Explain the principles of supply, demand, and price formation in energy markets.
- Describe economic costs versus accounting costs within energy projects.
- Illustrate opportunity cost concepts as applied to energy investment choices.
- Understand the elasticity of demand in energy sectors and price responsiveness.
- Examine economic indicators relevant to energy project assessments, such as inflation and interest rates.
- Discuss the role of public policy, subsidies, and taxation in shaping project economics.
- Interpret the relationship between macroeconomic conditions and energy sector performance.

Unit 2: Financial Evaluation Methods for Energy Projects

- Introduce time value of money concepts essential to energy investment evaluation.
- Calculate net present value NPV for energy cost modeling cases.
- Apply internal rate of return IRR analysis to project financial assessments.
- Understand the benefit-cost ratio and its relevance to energy economic feasibility.
- Engage in discounted cash flow DCF analysis for power project financial evaluation.
- Compare payback period criteria for energy project decision-making.
- Assess profitability index metrics in project ranking and selection.
- Practice scenario adjustments for risk-adjusted financial modeling in energy economics.

Unit 3: Cost Structures and Lifecycle Analysis in Energy Projects

- Define fixed costs, variable costs, and marginal costs in energy systems.
- Illustrate cost behavior patterns for renewable vs. conventional energy technologies.
- Explore economies of scale and scope in energy infrastructure planning.
- Conduct lifecycle cost assessment of energy projects incorporating decommissioning costs.
- Evaluate operations and maintenance cost components and escalation assumptions.

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- Integrate fuel price volatility into energy cost modeling frameworks.
- Consider environmental cost factors and externalities in economic evaluations.
- Perform comparative analyses of different cost structures affecting project feasibility.

Unit 4: Energy Market Economics and Regulatory Impact

- Describe various energy market structures: competitive, oligopolistic, and regulated.
- Explain how market pricing mechanisms influence project revenues and cost recovery.
- Assess regulatory frameworks governing tariffs, capacity markets, and power purchase agreements.
- Analyze the effects of renewable portfolio standards on economic planning.
- Evaluate energy subsidies, carbon pricing, and environmental regulation impacts.
- Interpret market signals and demand forecasts affecting investment decisions.
- Examine the integration of energy storage economics within modern energy markets.
- Apply economic reasoning to policy incentive design and market intervention outcomes.

Unit 5: Practical Economic Decision-Making for Energy Investments

- Guide participants through complete energy investment analysis case studies.
- Demonstrate financial modeling techniques for real-world energy projects.
- Conduct risk analysis using sensitivity and Monte Carlo methods for project economics.
- Explore valuation adjustments for uncertain market conditions.
- Apply multi-criteria decision analysis to select optimal energy portfolios.
- Evaluate renewable energy certificates and carbon credit valuation effects.
- Integrate stakeholder cost-benefit considerations within investment decisions.
- Summarize best practices in economic decision-making for large-scale energy infrastructure.

Final Insights & Key Takeaways

Participants will critically analyze and economically evaluate complex energy projects across sectors and markets. They will be able to apply theory-driven economic frameworks to inform strategic planning and investment decisions in energy economics.