

Course Title: Development and Evaluation of Energy Projects (**Elective Course**)

Course Code: ESE-838

Course Objectives: The course covers the complex nature of energy project management. The cyclic nature of these projects, combined with their significant impacts, demands a robust understanding of various phases. The shift towards deregulation and privatization of the energy sector has amplified the need for skilled management, especially considering the global emphasis on sustainable development. The course aims at equipping the students with the key aspects such as project identification, preparation, evaluation, and financing. These elements are crucial for working on energy projects towards success while considering their socioeconomic and environmental effects. The methodologies and concepts involve analyses and strategic planning to ensure the viability and sustainability of energy projects. These concepts will empower students to navigate through the details of energy project management effectively.

Learning Outcomes: The objective of the course is to provide a comprehensive understanding of energy projects by exploring various factors, encompassing technical, economic, environmental, and financial considerations. The logical sequence in project design and development is crucial, especially in energy sector projects, where a multi-dimensional approach is necessary to ensure success. The incorporation of life cycle analysis is indeed a key in assessing renewable energy projects. This analysis helps in understanding the environmental impact of these projects across their entire life span, from raw material extraction to disposal or recycling. By evaluating the environmental footprint, stakeholders can make informed decisions to promote sustainable practices within the energy sector.

Detailed Contents:

Introduction to energy projects Features of energy projects; Project cycle; Context of energy projects.

Project preparation and Development; Project Identification; Project proposal preparation; Pre-feasibility and Feasibility studies; Budgeting; Project approval and implementation

Cost concepts and financial calculations; Cost concepts; Time value of money; Interest formulas and equivalence; Inflation; Depreciation

Economic evaluation of energy projects; Alternative methods of project evaluation; Economic vs. financial evaluation; Valuation of costs and benefits; Sensitivity analysis and break-even analysis

Financial evaluation of projects; Elements of financial costs; Financial structure and project feasibility

Revenue streams: Effects of assumptions and pricing; Sensitivity analysis

Environmental Issues in energy projects; Evaluation of Environmental Impacts; Methods of Economic Evaluation of Environmental Impacts; Effects of Environmental Regulations in Project Evaluation

Financing of energy projects; Sources of funds and the cost of capital; Project financing

Raising funds in the international market.

Risk analysis in project development; Origins of project risk; Methods of describing project risk; Measurement of investment worth under risk.

Life cycle analysis (LCA) of energy projects; Life cycle cost analysis; Other aspects of life cycle analysis

LCA applications in energy projects.

Development of projects under Clean Development Mechanism; Prerequisites of a CDM project; CDM project cycle; Estimation of baseline GHG emissions and certified emission reductions; Financial Valuation of a CDM project; Carbon market and financing issues in CDM projects

Text/Ref Books:

- Contemporary Engineering Economics; by Chan Park (Author); Pearson; 7th edition (20, 2023)
- Fundamentals of Engineering Economics by Chan Park, 4th edition Published by Pearson (July 14, 2021)

The Clean Development Mechanism; by Dave V Wright (Author), VDM Verlag