BLACK SEA REGIONAL TRANSMISSION PLANNING PROJECT

SOUTHEAST EUROPE COORDINATION INITIATIVE TRANSMISSION PLANNING PROJECT

ENGINEERING ECONOMIC ANALYSIS WORKSHOP

July 7-8, 2009
Kyiv, Ukraine

The United States Energy Association, in cooperation with USAID, has administered the Black Sea Regional Transmission Planning Project since 2004 and the Southeast Europe Coordination Initiative Transmission Planning Projects since 2002. Through these projects, USAID and USEA have assisted transmission system engineers develop a regional planning capacity by creating the first integrated planning models of the Black Sea and Balkans regional electrical networks. The model is used to identify transmission investments necessary to increase the trade and exchange of electricity while improving the security and reliability of the regional networks.

To further build the capacity of the Working Group members, USEA is organizing a training workshop on financial tools and methodologies used to evaluate projects, including the calculation of internal rate of return and cost-benefit analysis. The training will be conducted from July 7-8, in coordination with working group meetings for the projects in Kyiv on July 6 (BSTP) and July 9 (SECI).

The first day of the two day workshop will focus on specific evaluation methods and techniques in the field of engineering economics used to evaluate infrastructure projects. The second day of the workshop will provide working group members with insight into international financial institutions' project cycles. An examination of the techniques used by international financial institutions to appraise electric power transmission projects will familiarize working group members with what constitutes a "bankable" project.

At the end of the workshop, each participant will:

- Understand the time value of money and be able to apply the concept to problem solutions

- Be able to construct a cash-flow diagram and apply it to engineering economic situations
- Be able to determine the equivalence of various financial transactions
- Understand the concepts of cost – benefit analysis for engineering design projects
- Be able to calculate Present Values (PV), Future Values (FV) and Amortization (A) using formulas, Compound Interest Tables, Microsoft Excel
- Be able to perform discounted cash flow analysis using Net Present Value (NPV) and Internal Rate of Return (IRR) techniques.
- Begin to understand the challenges of gathering reliable financial data for these learned techniques.
- Gain an understanding of the financial and economic analyses used by international financial institutions to appraise potential transmission projects.

Day One – Morning

INTRODUCTIONS AND WORKSHOP STRUCTURE

William L. Polen, United States Energy Association
Patrick Miller, Workshop Training Instructor

CASH FLOW DIAGRAMS

- Drawing Cash Flow Diagrams
- Cash Flow Diagrams and Spreadsheets
- Cash Flow Diagram Problems
- Computing Cash Flows

TIME VALUE OF MONEY

- Simple Interest
- Compound Interest
- Repaying a Debt

EQUIVALENCE

- Difference in Repayment Plans
- Equivalence is dependent on the Interest Rate
- Application of Equivalence Calculations

COMPOUND INTEREST FORMULAS

- Single Payment Compound Interest
- Uniform Series Compound Interest
- Arithmetic Gradient Compound Interest

Day One – Afternoon

PRESENT VALUE ANALYSIS

- Applying Present Value Techniques
- Solving Problems using Compound Interest Tables
- Solving Problems using Microsoft Excel
- Net Present Value (NPV) Analysis

RATE OF RETURN ANALYSIS

- Internal Rate of Return (IRR)
- Solving Problems using Microsoft Excel

DISCOUNTED CASH FLOW ANALYSIS

- Using NPV and IRR to analyze various cash flows
- Selection of a Minimum Attractive Rate of Return (MARR)

Day Two – Morning

Patrick Miller, Workshop Training Instructor
Davor Bajs, Energy Institute of Croatia
Goran Majstrovic, Energy Institute of Croatia

- Using NPV and IRR to analyze actual Electric Transmission Projects
- Group discussion of data needs for further analysis
- Next steps in data gathering

Day Two -- Afternoon

International Financial Institution Financial and Economic Appraisal of Electric Power Transmission Projects

1:30 pm **Financial and Economic Appraisal : The European Bank for Reconstruction and Development Approach**
Louis Borgo, Senior Banker, Power & Utilities Team, European Bank for Reconstruction and Development

2:30 pm **Afternoon Break**

3:00 pm **Financial and Economic Appraisal : The World Bank Approach**
Dmytro Glazkov, Energy & Infrastructure Operations Officer, The World Bank

These presentations will examine the Project Appraisal process in the context of the overall project cycle, with an emphasis on the economic and financial components of the appraisal. The presentations will illustrate how the financial and economic methods and techniques discussed during Day One of this workshop are used to appraise potential

transmission projects considered by the European Bank for Reconstruction and Development and the World Bank.

- Project Cycle
    - Country Strategy and Project Identification
    - Project Preparation
    - Project Appraisal
    - Project Approval
    - Project Implementation
    - Project Completion
    - Evaluation

- Case Study of a Transmission Project Appraisal
    - Cost Benefit Analysis “With” and “Without” the Project
        - Assumptions
        - O&M Costs
        - Losses
        - Unserved Load
        - Cost Overruns
        - Delays in Project Construction
    - Calculations
        - Net Present Value Calculations
        - Internal Rate of Return Sensitivity to Various Assumptions