

Analysis of Contracts and Merchant Electricity for Independent Power

Course Overview

Financial Analysis of Contracts for Renewable Energy Projects is a digital course that addresses the analysis of alternative contracts for renewable energy projects. The course is structured into five separate three-hour sessions. These modules will address the mechanics and strategic implications of alternative contract structures and techniques to assess the risk assessment and allocation of the contracts. Analysis of different renewable energy contracts involves a variety of economic, financial, policy and legal subjects ranging from assessing the price and provisions of power purchase agreements to evaluating merchant power prices to understanding how power contract provisions affect debt structuring. The five different modules include: (1) PPA contracts with utility companies and feed-in tariffs; (2) Merchant renewable energy plants as contrast to fixed price contracts and background for Corporate PPA's; (3) Corporate PPA contracts for renewable energy with partial merchant risk; (4) Liquidated damages, power curve penalties, performance incentives, transmission and other non-price provisions of contracts; and, (5) off-taker issues in renewable energy.

Case studies from around the world will be used in the different modules derived from PPA agreements and other associated contracts. From different areas of the world will be used to illustrate financial, regulatory policy issues, economic analysis of different technology options, risk premiums associated with power contracts, appropriate hurdle rates and cost of capital and debt capacity. The course is delivered using a mixture of actual contracts, case studies, merchant price databases and hands-on analytical exercises. In addition to development of skills in the course, a resource library containing a range of relevant contracts, business cases, resource studies and financial models and documents for future reference.

Course Outline

Session 1: Introduction, History and PPA Contracts with Utility Companies and Feed-In Tariffs

- Background on PPA contracts in for power facilities with risk allocation and a brief history of rational for risk allocation through contracts
- Policy Arguments for and Against IPP's
- State owned systems and power outages, inefficient plants, high losses
- Vertically owned systems, regulatory costs, nuclear power in the U.S.
- Merchant power systems, California crisis, merchant meltdown and price increases
- Introduction to PPA database and comparison between renewable utility PPA's and PPA's for dispatchable plants
- Reasons that output allocation to investors is pervasive in renewable energy PPA's
- Work through case study of solar PPA contracts for Dubai and Nigeria
 - 1. Single Price Payment
 - 2. Transmission Risk
 - 3. Inflation Provisions
 - 4. Currency risk
 - 5. Exchange rate risk
- Feed-in tariffs compared to PPA contracts
- Work through case study of wind feed-in tariff for on-shore and off-shore projects in the Netherlands
- Connection between EPC, O&M, LSTA and other agreements with the PPA agreement
- Review of Wind Supply Agreement from Vestas and Power Curve Guarantee
- Case Study of Solar and Wind Resource Studies to Evaluate Output Risk

Session 2: Merchant Renewable Projects

- History and theory of merchant prices instead of fixed price PPA contracts
- Merchant price risks in renewable contracts
 - 1. Merchant tail
 - 2. Settlements
 - 3. Merchant Floor Prices for Feed-in Tariffs
 - 4. Mitigation of Off-taker Risk
- Review of merchant prices for different areas in the world
 - 1. Merchant prices in UK since 1989
 - 2. Merchant prices in Australia and spikes
 - 3. Merchant prices in Philippines and Turkey and Long-term Trends
 - 4. Merchant prices in Europe and effects of renewable energy
 - 5. Merchant prices and natural gas prices
 - 6. Evaluation of merchant prices with market heat rates
- Capacity pricing, day ahead pricing and ancillary service pricing
 - 1. Exposure to real time pricing for differences in generation
 - 2. Ancillary service prices and renewable energy with storage
 - 3. Capacity pricing for renewable projects
 - 4. Duck curve and operating reserves
- Theory of marginal cost and forward pricing
 - 1. Alternative supply curves
 - 2. Supply curves with surplus capacity
 - 3. Demand profiles and changes in demand
 - 4. Changes in fuel prices
 - 5. Changes in renewable resources

- Forward price shapes and renewable energy
 1. Case study of Australia and negative prices with sunny periods
 2. Case study of Denmark and prices during windy and non-windy periods

Session 3: Corporate PPA's

- Rationale for corporate PPA's with large firms like data centres
- Contracts of differences in corporate PPA's
 1. Review of contract language in CfD
 2. Review of websites with forward prices
 3. Language in forward contracts
 4. Review of websites with forward prices
- Case study of Corporate PPA language
 1. Corporate PPA Tenure
 2. Settlement accounts for difference between output and prices
- Merchant risks in Corporate PPA
 1. Basis risk and hub price
 2. Settlement risk and differences in quantity
 3. Shape risk and changes in merchant prices
- Case study of using financial model of corporate PPA
 1. Evaluation of hourly prices at the hub
 2. Evaluation of basis risk from wind farm to hub
 3. Settlement analysis
 4. Settlement risk and differences in quantity
 5. Shape risk and changes in merchant prices
 6. Alternative merchant price scenarios

- 7. Financial results with alternative price scenarios

Session 4: Liquidated Damages, Power Curve Penalties, Performance Incentives, Transmission and Other Non-Price Provisions of Contracts Corporate PPA's

- Theory of penalties and incentive clauses in power contracts
 1. Notion that penalties should equal off-taker costs
 2. Inefficiencies when the penalty is too high
 3. Inefficiencies when the penalty or incentive is too low
 4. Measuring off-taker marginal costs
 5. Measuring project marginal costs
 6. Off-shore wind case study
- Liquidated Damages
 1. Damages for delay
 2. Damages for performance ratio
 3. Damage for power curve
 4. Damage for deficit production
- Transmission Risk
 1. Allocation of transmission risk
 2. Case studies of transmission problems
 3. Payment of Up-front transmission costs
 4. Transmission and battery back-up
- Other Provisions
 1. Default by Off-taker
 2. Default by Investor
 3. Billing and Payment
 4. Testing and Dates

Session 5: Off-Taker Issues in Renewable Energy

- Case Studies of Off-taker Default
- 1. Spanish FIT Default
- 2. Tanzania Rate Change
- 3. U.S. Net Metering Change
- 4. Nigeria Distribution and Testing and Dates

- Political Risk Mitigation
- 1. Political Risk Insurance, cost and meaning
- 2. PPA Contract Guarantee, cost and meaning
- 3. Equity and Debt Insurance
- 4. Risk Mitigation from low PPA Rates

- Evaluation of Political Risk
- 1. Credit Risk of Off-taker
- 2. Cost of Renewable Contract to Government
- 3. Benchmarking Costs

- Volatility of exchange rates
- Problems with indexing capacity charges from off-taker perspective
- Alternatives for allocating exchange rate risk

- Architecture of Project Finance Models with Comprehensive Debt Structure
- Review of Actual Project Finance Models in Different Regions of the World
- Programming Sources and uses of funds statement during the construction period
- Programming Debt Structuring with Sculpting in Project Finance Model
- Computation of Cash Flow, Waterfall, Tax Payments and Financial Statements
- Equity IRR with Different Debt Structure in PPA Case – Level versus Annuity versus Debt Sculpting
- Computation of Debt Capacity and IRR with Alternative Repayment Structures – Direct and Indirect Effect

Session 6: Financing, Currency and Modelling

- Overview of Selected Project Finance Terminology
- Importance of Phases in Risk Analysis, Accounting and Modelling Project Finance
- Role of Contracts and Integration of Contracts in Project Finance
- Risk Analysis in Project Finance
- Use of Debt Capacity to Measure Risk
- Target DSCR, Debt Tenor and Required IRR in Different Markets
- Use of Export Credit in Power Finance

- Currency Risk and Interest Rate Risk in IPP's
- Theory of purchasing power parity and indexing capacity payments