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EUCI COURSE

ENERGY TRANSACTION & TRADING FUNDAMENTALS

For Bi-Lateral, OTC, Exchange and Wholesale Electricity Market Transactions

May 4 – 5, 2020
Renaissance Orlando Hotel-Airport
Orlando, FL

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OVERVIEW

The landscape of power generation and delivery is tremendously vaster and more complex than it was a generation ago. Long gone, for the most part, are islanded utilities that command the full-scale infrastructure to generate, transmit and distribute electricity without linkage and access to the larger power universe. Now, most utilities and power providers must engage in sophisticated energy contracting and trading transactions to serve their load efficiently, profitably and in a balanced fashion on a moment-to-moment basis. Whether through 1) bi-lateral contracts, 2) over-the-counter (OTC) trading, 3) exchange trading or 4) wholesale electricity market transactions, utilities and power organizations must:

- Be familiar with the array of options available to them
- Understand how to properly deploy these different instruments
- Manage the financial and operational processes with these transactions, and
- Optimize the risk profile of their organizations to avoid catastrophic outcomes

This course will provide the fundamental knowledge necessary to understand these energy transaction and trading principles, how they relate to each other and what is necessary to optimize their functions. It will start with an overview of power system structures, price drivers and regulatory oversight. The program will then look at the types of instruments that can be used in bilateral, over-the-counter, exchange-based and wholesale electricity market transactions. A review of hedging, with the goal of minimizing risk, will explore the strategy and tactics of these programs. Finally, it will devote attention to risk monitoring, reporting and management oversight with an eye toward anticipating program exposures and limiting breakdowns.

LEARNING OUTCOMES

- Review power system elements in a transactional context
- Identify the regulatory and oversight bodies and their roles relating to transactions and trading
- Assess multiple energy markets and transaction platforms
- Evaluate the price drivers associated with power transactions
- Discuss energy transacting, trading and hedging elements
- Examine risk oversight, measurement and monitoring concepts
- Review case studies of trading and transacting approaches that failed
- Assess trading and transacting best practices
- Build a simple, coherent risk management model

AGENDA

MONDAY, MAY 4, 2020

7:45 – 8:15 am **Registration and Continental Breakfast**

8:15 – 8:30 am **Overview and Introductions**

8:30 – 9:45 am **Survey of Power System Elements in a Transactional Context**

- Laying the groundwork of electricity, terms/definitions, and units
- Power system components
  - Generation
  - Transmission
  - Distribution
  - Loads
- Electricity tranches in energy markets
  - Capacity
  - Energy (+ fuel)
  - Supplemental system needs
    - Ancillary and reserves services
    - Congestion
  - Temporal dynamics
    - Monthly, day ahead and daily
    - Intra-day
  - Impact of variable and demand side resources on dispatch of the electric commodity
    - Renewable
    - Fuels
    - Emissions
    - Demand response, energy efficiency and load management products

9:45 –10:40 am **Industry Structure and Regulatory Oversight**

- Types of utilities
  - Vertically integrated
    - IOUs
    - Munis
    - CoOps
  - Local distribution utilities
  - Independent power producers (IPPs)
  - Retail electricity providers (REPs)
  - Regional transmission (RTOs) and independent system operators (ISOs)
- Oversight bodies and their roles, especially relating to transactions and trading
  - Federal Energy Regulatory Commission (FERC)
    - Anti-market manipulation authority
    - Reporting elements
      * EQR
      * Standards of Conduct
  - Commodity Futures Trading Commission
  - North American Electric Reliability Corporation (NERC)
  - Nuclear Regulatory Commission (NRC)
  - State Public Service Commissions

10:40 – 11:00 am **Morning Break**

AGENDA

11:00 am – 12:30 pm **Energy Markets and Transaction Platforms**

- Transaction premise — wholesale electricity price volatility
- Transaction platforms and characteristics
  - Bi-lateral contracts
  - Over-the-counter (OTC) trades
  - Exchange trades
  - ISOs/RTOs
- Types of energy markets
  - Physical vs. financial
  - Forward vs. real time
- Liquidity
- Products
  - On-peak
  - Off-peak
  - Wrap
- Firmness viewed across the span of the marketplace
  - Firm
  - System firm
  - Unit firm
  - LD
  - Non-firm
- Cost of transmission congestion

12:30 – 1:30 pm **Group Luncheon**

1:30 – 2:00 pm **Overview of Price Drivers**

- Heat rates and impact on dispatch stack and electricity prices
- Renewable offer pricing and impact on electricity prices
- Net Load impacts on dispatch clearing price
- Natural gas fuel price drivers
- Coal fuel price drivers

2:00 – 3:30 pm **Energy Transacting, Trading and Hedging Elements**

- Energy transacting lifecycle
- Correlating physical vs. financial markets and transactions
- Energy transaction parties and risk profiles
  - Price taker
  - Asset optimizer
  - Proprietary trader
- Hedging — trading vs speculating
- Examining specific transactional elements
  - Price volatility
  - Counterparties
  - Contracts
- Establishing the value portal
  - Real time vs. forward markets
  - Forward price curves
- Differentiating common financial hedging instruments
  - Futures contracts
  - Swaps contracts
  - Options (calls and puts)

AGENDA

3:30 – 3:45 pm **Afternoon Break**

3:45 – 5:15 pm **Risk Oversight, Measurement and Monitoring Concepts**

- Market risk exposures
  - Price
  - Volatility
  - Correlation
- Mark-to-market, P/L position management
  - The mark-to-market process
    - Step-by-step calculations for futures
    - Step-by-step calculations of gas and power swaps
  - Bid-ask spreads in gas and power transactions
  - Margin and collateral calculations
  - Value of transparency in public utility hedging programs
  - Credit risk exposures
    - Current exposure
    - Collateral and collateral-at-risk
    - Liquidity planning
    - Margin
      * Initial
      * Maintenance
      * Variation
    - Case study — potential future exposure
  - Limits
    - Position
    - Transaction
    - Risk
  - Measuring and reporting risk exposures
    - Different risk simulation techniques
      * Historical
      * Parametric
      * Monte Carlo
    - Advanced "at-risk" metrics
    - Pros and cons of different risk metrics
    - Case study — applying different risk quantification techniques
    - Identifying the most appropriate risk metric for an organization

5:15 pm **Day One Program Adjournment**

AGENDA

TUESDAY, MAY 5, 2020

7:45 – 8:15 am **Continental Breakfast**

8:15 – 8:30 am **Review of Previous Day Topics**

8:30 – 10:20 am **Hedge Strategy Design for Utilities and Others Transacting in Power**

- Hedging philosophy and policy
- Key dimensions in hedging
  - Market
  - Credit
  - Liquidity
  - Accounting
  - Regret
- How should the ratepayer's risk appetite influence the hedging decisions?
- Balancing 'potential' and 'regret' in hedge strategy design
- Common hedging mistakes
- Case study — alternative hedging programs
  - Pros and Cons

10:20 – 10:40 am **Morning Break**

10:40 – 11:45 am **Weaving Together a Coherent Risk Management Approach**

- Chart the organizational risk mission
- Obtain assurances of proper…
  - Risk functions
  - Alignment
  - Feedback loops
  - Compliance
  - Accountability
- Formation of front, middle and back offices
  - Assigning roles and delegating responsibilities
  - Assembling best practices
- Vet the processes and systems
- "Go live"
- Establish and follow performance criteria
- Maintain system integrity

11:45 am **Course Adjournment**

OVERVIEW

This course is geared toward those who want to build on a base-line knowledge of energy markets transacting, power trading and hedging. It will cover market dynamics and the difference between transacting in traditional bilateral markets, OTC and exchange energy markets as well as wholesale electricity (ISO) markets. The contents will examine the different market players and their motives, as well as the difference between hedging and speculation. The course will also address various instruments and the implications of credit and collateral on prudent decision-making.

The content explains the various tools used to control the associated risks. It also details how these contracts work, how and when they should be used, and how they are priced. Case examples and problem-solving illustrations optimized for power and natural gas trading are used throughout the course to enhance the understanding of the material. Finally, it will identify and illustrate best practices associated with the sound measurement of uncertainty and building solid risk metrics for portfolio management and risk management through optimal hedging and solid hedging program design.

LEARNING OUTCOMES

- Review portfolio management in traditional utility/balancing area, OTC, Exchange and ISO-based market transactions
- Assess market distinctions and price driver dynamics
- Discuss relationships between power market trading and hedging
- Examine market, credit and counterparty risk management best practices
- Evaluate energy trading compliance programs and their application in the current regulatory environment
- Demonstrate meaningful uncertainty framework for developing utility and power portfolio hedging programs
- Describe and illustrate simulation analysis and risk metrics for utilities and power trading organizations
- Build, design, develop and implement a hedge program

AGENDA

TUESDAY, MAY 5, 2020

12:30 – 1:00 pm **Registration**

1:00 – 1:15 pm **Overview and Introductions**

1:15 – 4:45 pm **Program**

Portfolio Management in Traditional Utility/BA, OTC, Exchange and ISO-based Market Transactions

- Market vs contracted cost
- Dispatch to load vs dispatch to price
- OTC vs Exchange transaction
- Purchases and sales positions vs distinct load and generation positions
- Integrated utility value vs portfolio component value

Markets and Price Driver Dynamics

- Spot and forward prices for gas and power
- Forward curves for gas and power markets
- Fundamental drivers – Weather and load as key drivers for gas and power price behavior
- Heat rates and impact on dispatch stack and electricity prices
- Renewable generation and the impact on electricity prices
- Key sources of volume risk in power markets
- Case study – weather, load, gas and power price relationships

4:45 pm **Program Adjournment for Day**

WEDNESDAY, MAY 6, 2020

7:45 – 8:15 am **Continental Breakfast**

8:15 – 11:45 am **Program**

Energy Markets Advanced Trading & Hedging

- Physical forward contracts
- Swaps and basis swaps
  - OTC markets
  - Collateral agreements
- Case study — hedging with futures vs swaps
- Congestion hedge instruments
- Comparative analysis of use of instruments in hedging strategies
- Recognizing market players and their objectives
  - Price taker
  - Asset optimizer
  - Proprietary trader
- Hedging vs speculation
- Forward price curves, volatility and correlation

AGENDA

WEDNESDAY, MAY 6, 2020 (CONTINUED)

Energy Markets Advanced Trading & Hedging (continued)

- Overview of standard instruments
  - o Futures contracts
  - o Swaps contracts
  - o Options
    - Calls, puts and collars
    - Options as insurance
    - Are options a cost or an investment?
    - Why most utilities should have options as part of their hedging program
  - o Case study — best instruments for different portfolios

Market and Counterparty Risk Management

- Market risk measurement and reporting
- Distinction and applications of
  - o Mark-to-Market (MtM)
  - o Value at Risk (VaR)
  - o Cost at Risk (CaR)
  - o Rates at Risk (RaR)
  - o Gross Margin at Risk (GMaR)
- Sensitivity analysis and stress tests
- Position management for portfolios with assets, physical contracts and financial instrume ts
- Counterparty risk management and internal rating systems
- Current and potential counterparty exposures

Energy Trading Compliance Programs

- Execution best practices for regulatory risk management and compliance in energy physical and financial t ading
- Identifying potential regulatory risk 'red flag '
- Components of a best practices compliance program
- Proactive compliance monitoring techniques
- Review of PwC energy trading compliance program assessment of TransAlta
- Review of FERC enforcement division's "Energy Trading Compliance and Market Manipulation Law" white paper
- A practical framework for analysis of market manipulation
- Case study — FERC enforcement case against BP for alleged market manipulation
- Effective exception reporting and intervention
- Energy trading compliance case studies
- Creating practical approaches to a better compliance program

11:45 am – 1:00 pm **Group Luncheon**

1:00 – 4:45 pm **Program**

Meaningful Uncertainty Framework to Develop Utility Hedging Programs

- How to produce realistic weather, load, gas and price scenarios
- Creating a portfolio view of physical and financial xposures
- Integrating price and volume risk modeling in a coherent framework
- Modeling expected costs and revenues
- How to assess and visualize market and weather risk factors on cash fl ws

AGENDA

WEDNESDAY, MAY 6, 2020 (CONTINUED)

Simulation Analysis and Risk Metrics for Utilities

- Risk metrics and simulation
- Introduction to distributions
- Best practices in management of weather, load and price risk for utilities
- Volumetric risk and hedging
  - Supply and demand risk
- The cost of ignoring volume uncertainty in hedge programs
  - Lessons learned from utility hedging debacles
- Designing optimal hedge programs for the entire energy portfolio
  - Retail load
  - Unit characteristics
  - Forced outages

In-Depth Hedge Program Design and Implementation

- Hedging tactics vs. hedging strategy
- A roadmap to implementing an effective hedging strategy
- Understanding and quantifying risk profile and appeti e
- Case Study — understanding the revenue-at-risk of different wind projects
- Defining hedge st ategy objectives, linkage to performance objectives
- Building hedge strategy alternatives — different types of hedge decisions
  - Programmatic (dollar cost averaging) hedges
  - Defensive (risk limits) hedges
  - Contingent hedges (managing foregone opportunities)
- Hedge strategy design and scenario analysis
- Case Study — an iterative approach to evaluating the effectiveness of a hedge strategy
- Implementing a hedge strategy
  - Tactical planning
  - Ongoing monitoring and reporting
  - Case study — the execution of a hedge strategy under different market conditions

4:45 pm **Program Adjournment**

INSTRUCTORS

Scott Wrigglesworth

Director of Analytics and Strategy, Ascend Analytics

Scott Wrigglesworth is Director of Analytics and Strategy with Ascend Analytics. Before joining the company, he spent 17 years with Dayton Power and Light and the AES Corporation. There he focused on practical solutions in energy analytics, actionable reporting, margin modeling and portfolio optimization. In that role, Mr. Wrigglesworth provided analytic expertise for portfolio optimization, planning, and risk management activities. These activities included merchant generation optimization, fuel procurement, wholesale hedging, retail energy, load auctions, rate case preparation, asset valuation, and commercial budget development. Mr. Wrigglesworth teaches a course in Energy Markets at the University of Dayton from where he also earned his MBA. He holds a BA in Global Economics and International Business from Cedarville University.

Michael Ballow

Director of Analytics and Strategy, Ascend Analytics

Michael Ballow is Director of Analytics and Strategy with Ascend Analytics. He has 37 years of diversified isk management experience in energy, financia , and commodity markets, and 22 years of direct portfolio risk management in electric and gas utilities, including wholesale electric and gas, and retail gas and electric marketing. Before he recently joined Ascend Analytics staff, Mr. Ballow worked in concert for 12 years as a user of its products and services while at Dayton Power and Light (DP&L), where he served as Director of Portfolio Analytics and Risk Analytics. Prior to joining DP&L, he was Vice President of Portfolio Management at Cinergy where he managed the utility's portfolio in Ohio, Kentucky, and Indiana. He previously was in senior risk management roles at the Tennessee Valley Authority and Public Service of New Mexico. Prior to his experience in the energy sector, Mr Ballow was in fi ed income brokerage, asset management, and interest rate hedging.

INSTRUCTIONAL METHODS

This program will use PowerPoint presentations, case studies and group discussions.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Participants must sign in/out each day and be in attendance for a minimum of four hours to be eligible for any continuing education credit.

IACET CREDITS

EUCI has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET). In obtaining this accreditation, EUCI has demonstrated that it complies with the ANSI/IACET Standard which is recognized internationally as a standard of good practice. As a result of their Authorized Provider status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.

EUCI is authorized by IACET to offer 1.1 CEUs for this course

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Upon successful completion of this event, program participants interested in receiving CPE credits will receive a certific te of completion. **EUCI is authorized by CPE to offer 12.0 credits.**

There is no prerequisite for this course. **Program Level 1:** Beginner and Intermediate, **Delivery Method:** Group-Live, **Advanced Preparation:** None

EVENT LOCATION

A room block has been reserved at the **Renaissance Orlando Hotel-Airport,** 5445 Forbes Pl, Orlando, FL 32812, for the nights of MAY 3-5, 2020. Room rates are $165 plus applicable tax. Call **1-407-240-1000** for reservations and mention the EUCI event to get the group rate. The cutoff d te to receive the group rate is March 10, 2020 but as there are a limited number of rooms available at this rate, the room block may close sooner. ***Please make your reservations early.***

REGISTER 3, SEND THE 4TH FREE

Any organization wishing to send multiple attendees to this course may send 1 FREE for every 3 delegates registered. Please note that all registrations must be made at the same time to qualify.

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Substitutions & Cancellations
Your registration may be transferred to a member of your organization up to 24 hours in advance of the event. Cancellations must be received on or before April 3, 2020 in order to be refunded and will be subject to a US $195.00 processing fee per registrant. No refunds will be made after this date. Cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCI event. This credit will be good for six months from the cancellation date. In the event of non-attendance, all registration fees will be forfeited. In case of course cancellation, EUCI's liability is limited to refund of the event registration fee only. For more information regarding administrative policies, such as complaints and refunds, please contact our offices
EUCI reserves the right to alter this program without prior notice.