

INTRODUCTION TO WHOLESALE ELECTRICITY MARKETS: RTOs AND ISOs

March 13-14, 2017
W Chicago City Center
Chicago, IL

POST-COURSE WORKSHOP

Wholesale Electricity Markets 201

TUESDAY, MARCH 14, 2017



EUCI is authorized by IACET to offer 1.0 CEUs for the course and 0.4 CEUs for the workshop



EUCI is authorized by CPE to offer 12 CEUs for the course and 5 CEUs for the workshop

OVERVIEW

This course is designed to provide a basic understanding of the operation of electricity systems in the North America, focusing on the role of electricity markets, including the how and why markets have evolved over the past two decades. Considerable time will be spent in the beginning to understand the role of generation, transmission, and load for reliable system operation, which is a must to facilitate competitive regional wholesale markets. Participants will gain a high-level understanding of current issues affecting electricity markets and will receive detailed explanation at a basic level of how the electricity markets operate. Upon completion of the course, participants will return to their organizations with the ability to discuss the functions and day-to-day operations of power systems in the interconnected environment and electricity markets, as well as actively contribute to their organization's analysis and discussions on electricity markets. Topics addressed in the course include:

- Electricity basics
- Generation basics
- Transmission, distribution, and load basics
- Functioning of generators, transmission, and loads in integrated manner
- Transmission contingencies and congestion
- RTOs/ISOs' roles and functions
- Locational Marginal Pricing (LMP) and its components
- Ancillary services requirements and responsibilities
- Demand response participation in capacity and real time energy markets
- Capacity and ancillary services markets
- State and federal regulation
- Bidding strategies
- Energy price forecasting
- FTRs and transmission congestion
- Risk management
- Credit issues



“Very clear and easy to follow. This is my second course with Raj, really enjoy his lectures.”

Business development
Manager, XIGNUX

LEARNING OUTCOMES

- Describe the role of generators, transmission, and load
- List the major components of transmission and generation plants
- Describe the uniqueness of the AC power system, reactive power and power factor
- Define and provide examples of ancillary services
- State the role of FERC and state regulatory agencies
- Describe the ISO/RTO functions
- Describe role of transmission in the regional wholesale electricity markets
- Review Bilateral and real-time energy markets
- Explain locational marginal pricing –energy, congestion, and loss components
- Discuss financial transmission rights for hedging transmission congestion
- Describe how risk can be managed involving electricity markets
- Discuss energy price forecasting and credit issues

WHO SHOULD ATTEND

- Employees new to the industry or with limited industry experience
- Attorneys and regulatory personnel new to the industry
- Accounting, IT personnel, and support personnel that need a better understanding electricity markets
- Marketing and customer service representatives
- Employees of independent system operators
- Energy market participants
- Power generator owners/developers
- Electricity marketers and brokers
- Energy service companies
- Energy purchasing agents
- Power generator owners/developers

AGENDA

MONDAY, MARCH 13, 2017

- 7:30 – 8:00 am** **Registration and Continental Breakfast**
- 8:00 – 10:15 am** **Basics of Electric Power Systems**
- Fundamentals of electricity, definitions and units
 - Generation, transmission, distribution, and loads
 - Types of generation resources, including intermittent resources, costs, and capabilities
 - Load duration curves, system load factors, load growth and customer classes
 - Power system losses
- 10:15 – 10:45 am** **Networking Break**
- 10:45 am – 12:00 pm** **Power System Relationships to Electricity Market Basics**
- Power system integration and operations
 - Transmission congestion and loop flows
 - Power system reliability and NERC compliance
 - Ancillary services
 - Regulatory oversight – Role of FERC and State regulatory agencies
 - Power flow simulation
- 12:00 – 1:00 pm** **Group Luncheon**
- 1:00 – 3:00 pm** **Regional Transmission Originations (RTOs) and Independent System Operators (ISOs)**
- RTOs/ISOs in U.S. and Canada
 - Regulatory structure of RTOs/ISOs
 - Characteristics and functions of RTOs
 - Advantages and disadvantages of RTO participation
 - RTO case study
 - Role of FERC and state regulatory agencies
- 3:00 – 3:30 pm** **Networking Break**
- 3:30 – 5:00 pm** **Regional Wholesale Electricity Markets Fundamentals – Part 1**
- Types of participants in RTOs/ISOs
 - Review of supply and demand relationship, spot versus bilateral markets
 - Economic merit order and unit commitment
 - Security constrained economic dispatch
 - Cost of transmission congestion and losses
 - Locational marginal pricing (LMP)
 - Financial transmission rights (FTRs) for hedging
 - Demand response
 - Capacity markets: functions, design, and operation
 - Ancillary services markets
 - Comparison of markets offered by RTOs/ISOs in the U.S.
 - Two settlement system: Day ahead and real-time settlement



“Very good high level view of wholesale markets”

Public Utility Specialist, Southwestern Power

AGENDA

TUESDAY, MARCH 14, 2017

| | |
|----------------------------|--|
| 8:00 – 8:30 am | Continental Breakfast |
| 8:30 – 9:00 am | Review of Previous Day; Opportunities for Questions and Discussion on Previous Day's Material |
| 9:00 – 10:00 am | Regional Wholesale Electricity Market Fundamentals - Part 2 <ul style="list-style-type: none">• Bidding strategies• Energy price forecasting - technical and fundamental• Regulatory oversight: FERC and state regulatory agencies, market monitor• Energy and ancillary service markets |
| 10:00 – 10:30 am | Networking Break |
| 10:30 – 11:15 am | Risk Management <ul style="list-style-type: none">• Credit requirements |
| 11:15 am – 12:00 pm | Issues and Challenges |
| 12:00 pm | Wrap-Up, Final Questions, and Completing Course Evaluation and Assessment Form |



“Raj is very thorough in explaining topics and patient when responding to questions. More importantly, Raj is very knowledgeable in the subject matter.”

Senior Project Manager, Southern California Edison

INSTRUCTOR

Raj Rana, PE, MBA, CEM, PMP
President, Rana Energy Consulting

While serving as the director of RTO Policy and NERC Compliance at American Electrical Power, Raj was responsible for coordination of energy, transmission, market structure, finance, and governance related RTO policy issues among the AEP business units, development of corporate positions/policies, and advocacy of such positions at regulatory agencies, at stakeholder forums in PJM, SPP, and ERCOT RTOs. He was also responsible for the development and coordination of strategic direction of AEP's power system reliability compliance program among all business units as well as coordination and facilitation of compliance plans, policies and procedures within the company to ensure timely and successful compliance of NERC and regional reliability standards.

Previously, Mr. Rana worked in AEP's System Planning department in various positions. His experience at AEP includes planning and operation of the bulk transmission network, generation interconnections, tariff and regulatory/legislative issues, system integration, asset management, mergers and acquisitions, as well as planning and engineering studies for international transmission and generation projects.

Mr. Rana holds a BSEE degree from M. S. University (India), an MSEE degree from West Virginia University, and an MBA degree from University of Dayton. Mr. Rana also completed the AEP Management Development Program at the Fisher Business College of the Ohio State University. He is a life-senior member of IEEE, and holds the Ohio State PE license. Mr. Rana is also a certified energy manager and project management professional.

POST-COURSE WORKSHOP

Wholesale Electricity Markets 201

TUESDAY, MARCH 14, 2017

EUCI's post-course workshop builds upon the basic concepts covered in the Introduction to Wholesale Electricity Markets: RTOs and ISOs course, and deep dives to increase the understanding of attendees from basics to an intermediate level. This half-day session will include simulation of LMP and FTRs for a three-bus system, mechanics and options of participating in the RTO markets, understanding of generation dispatch instructions and obligations, as well as examples of managing risk by hedging using futures, options, and spreads. This session will also further explore issues raised during the Introduction to Wholesale Electricity Markets: RTOs and ISOs course.

LEARNING OUTCOMES

- Discuss energy market participation options
- Explain bilateral contract components
- Discover LMP and FTR simulations
- Identify examples of managing risk
- Examine generation dispatch instructions and obligations

AGENDA

12:30 - 1:00 pm

Registration

1:00 - 5:00 pm

Workshop Timing

- Demonstration of LMP and FTRs
- FTR auctions and ARR eligibility
- Bilateral contract components
- Wholesale energy market participation options
- Scheduling generation and loads
- Generation operation and participation – three-part offer
- Dispatch instructions
- Risk management strategy
- Examples of hedging using futures and options



"If you are looking to a comprehensive course that covers the basics of RTO's and ISO's, this is the course for you!"

Settlements Analyst, City of Utilities Springfield, MO



"The information provided an excellent overview of the electricity markets"

Director, IPA

REQUIREMENTS FOR SUCCESSFUL COMPLETION OF PROGRAM

Participants must sign in/out each day and be in attendance for the entirety of the course to be eligible for continuing education credit.

INSTRUCTIONAL METHODS

This program will use PowerPoint Presentations, group discussions, as well as active participation.

PROCEEDINGS

The proceedings of the course will be published, and one copy will be distributed to each registrant at the course.

EVENT LOCATION

A room block has been reserved at the W Chicago City Center, 172 W Adams St, Chicago, IL 60603 for the nights of March 12-13, 2017. Room rates are \$129, plus applicable tax. Call **312-332-1200** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is February 19, 2017 but as there are a limited number of rooms available at this rate, the room block may close sooner. **Please make your reservations early.**

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 AN-SI/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 AN-SI/IACET Standard.

EUCI is authorized by IACET to offer 1.0 CEUs for the course and 0.4 CEUs for the workshop.

CPE CREDITS



EUCI is registered with the National Association of State Boards of Accountancy (NASBA) as a sponsor of continuing professional education on the National Registry of CPE Sponsors. State boards of accountancy have final authority on the acceptance of individual courses for CPE credit. Complaints regarding registered sponsors may be submitted to the National Registry of CPE Sponsors through its website: www.learningmarket.org.

Upon successful completion of this event, program participants interested in receiving CPE credits will receive a certificate of completion. **EUCI is authorized by CPE to offer 12 credits for this course and 5 CEUs for the workshop.**

There is no prerequisite for this course.

Program Level 1: Intermediate, **Delivery Method:** Group-Live, **Advanced Preparation:** None

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.



Please make checks payable to: "PMA"

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PLEASE REGISTER

- INTRODUCTION TO WHOLESALE ELECTRICITY MARKETS: RTOs AND ISOs COURSE AND WHOLESALE ELECTRICITY MARKETS 201 POST-COURSE WORKSHOP**, March 13-14, 2017: US \$1795, Early bird on or before February 24, 2017: US \$1595
- INTRODUCTION TO WHOLESALE ELECTRICITY MARKETS: RTOs AND ISOs COURSE ONLY**, March 13-14, 2017: US \$1395 Early bird on or before February 24, 2017: US \$1195
- WHOLESALE ELECTRICITY MARKETS 201 POST-COURSE WORKSHOP ONLY**, March 14, 2017: US \$595, Early bird on or before January 20, 2017: US \$495

How did you hear about this event? (direct e-mail, colleague, speaker(s), etc.)

Print Name Job Title

Company

What name do you prefer on your name badge?

Address

City State/Province Zip/Postal Code Country

Phone Email

List any dietary or accessibility needs here

CREDIT CARD INFORMATION

Name on Card Account Number

Billing Address Billing City Billing State

Billing Zip Code/Postal Code Exp. Date Security Code (last 3 digits on the back of Visa and MC or 4 digits on front of AmEx)

OR Enclosed is a check for \$ _____ to cover _____ registrations.

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 February 10, 2017 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 at (201) 871-0474.