

ANCILLARY SERVICES FUNDAMENTALS AND MARKET DYNAMICS

February, 16-17, 2017
Austin - Hilton Garden Inn
Austin, TX



EUCI is authorized by
CPE to offer 13 credits
for the course



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

OVERVIEW

The emergence of renewable and variable energy resources has drawn attention to the supplemental services — beyond the basics of energy, generating capacity, and power delivery — that bulk-power systems and balancing areas require to ensure grid stability. Some of these ancillary services (such as regulation and reactive power) are required during normal operations to maintain the necessary balance between generation and load in real-time and maintain voltages within the required ranges. Other ancillary services (such as contingency reserves) provide insurance to prevent minor problems from becoming full-scale catastrophes or to restore the bulk-power system to normal operations after a major outage occurs.

To deal more effectively with the growing importance of deploying these ancillary services (AS), independent system operators (ISOs) and other bulk power systems are refining their approach to recognize and compensate market participants for offering these AS into the system. Therefore, it's imperative that utilities, load serving entities (LSE's) and market participants have a clear understanding of what and how they need to interact with these AS and reserve market mechanisms.

This course will explain the functions performed by each ancillary service with a focus on the real-power services. It will also provide an in-depth treatment of four features of ancillary service and reserve market design:

1. Co-optimization in the scheduling and dispatch of energy and ancillary services
2. The theory and practice of reserve and regulation shortage pricing
3. The pricing and scheduling of storage and demand side ancillary services
4. Market design approaches to scheduling and pricing ramp capability to meet transforming grid needs

Finally, it will provide a comparison of ancillary services products across the various North American independent system operators (ISOs) markets and other bulk power systems. Attendees will leave this program with a clear understanding of what functions these services provide, why they are important, their cost components and available market participant bidding opportunities.

LEARNING OUTCOMES

- Identify what ancillary services are and why the power system needs them
- Discuss what is required to provide ancillary services
- Examine what the cost drivers are for ancillary services
- Interpret FERC Orders and other actions that affect A/S markets
- Address participation challenges in the regulation and reserve markets
- Evaluate A/S cost, value and bidding approaches across the North American markets and bulk power systems
- Assess the reasons co-optimization of energy and ancillary services is becoming a standard feature of wholesale power markets and how they function
- Examine the relationship between ramp constraints, regulation shortage prices, price variability, and the returns to being on dispatch
- Examine the need for inertia, virtual trading and other new A/S products, services and pricing models
- Analyze and understand how the development of demand ancillary services is related to the level of price caps and the introduction of meaningful shortage pricing
- Identify the options of faster ramp and more accurate provision of regulation

WHO SHOULD ATTEND

Power industry personnel who need to have a better understanding of what ancillary services are, how they are competitively procured, how they are scheduled, and how and when they are called upon:

- Portfolio managers and traders responsible for formulating bidding strategies for ancillary services
- Power-plant and systems operations engineers who would like to understand the impact of ancillary services on their plant profitability
- Genco and DR executives who need a good understanding of the potential impacts and opportunities of ancillary services and reserve markets on their operations
- Personnel of Independent System Operators (ISOs), attorneys, and regulators who need to understand the function of ancillary services, co-optimization measures, and reliability implications in various markets
- Power marketing professionals responsible for optimizing their fleet utilization and profitability
- Demand side, demand response and aggregation services that must capitalize on access opportunities across multiple AS markets

AGENDA

THURSDAY, FEBRUARY 16, 2017

8:00 – 8:30 a.m. Registration and Continental Breakfast

8:30 a.m. – 4:45 p.m. Course Timing

12:00 – 1:00 p.m. Group Luncheon

Ancillary Services Fundamentals

- Background / Who is in control
- What are Ancillary Services (AS)?
- Reliability Performance Requirements
- Comparison of AS across all ISOs
- Normal Conditions
 - o Frequency Regulation
 - o Load Following
 - o Energy Imbalance
- Contingency Conditions
 - o Frequency Response
 - o Supplemental Reserves
- Other Ancillary Services
 - o Voltage Control and Reactive Supply
 - o Black Start
 - o Scheduling, System Control and Dispatch
- Sources of Ancillary Services
 - o Generation
 - o Energy Storage
 - o Demand Response
- Trends in Ancillary Services
 - o Impact of FERC orders
 - o Impact of State Initiatives (New York, California)
 - o Texas and ERCOT-Specific AS Conditions, Initiative and Outcome
 - o Impact of Variable Energy Resources (wind and solar)
 - o Aggregated Supply from Distributed Energy Resources
 - o Shifts in Resource Ownership and Offerings
- Multiple Services Possibilities and Practicalities

AGENDA

FRIDAY, FEBRUARY 17, 2017

7:30 – 8:00 a.m. Continental Breakfast

8:00 a.m. – 12:30 p.m. Program Timing

Critical Elements of Ancillary Services Market Design and Costing

- Overview of Ancillary Services Pricing
- Co-Optimization of Energy and Ancillary Services
 - o Why is Co-Optimization Needed for Economic Efficiency?
 - o How Does Co-Optimization Work?
- Reserve and Regulation Shortage Pricing
 - o Overview of Alternative Scarcity Pricing Mechanisms
 - o The Advantages of Reserve Shortage Pricing
 - o How Does Reserve Shortage Pricing Work?
 - Determining Energy Prices in Markets with Reserves Shortage Pricing and Co-Optimized Energy and Ancillary Service Markets
 - o ERCOT's Operating Reserve Demand Curve
 - o Ramp Constraints, Price Spikes and Regulation Shortage Values
 - o The Role of Scarcity Pricing in Markets with Capacity Requirements
- Ramping Products
 - o Evolving Need for Ramping Products
 - o CAISO Flexible Ramping Product
 - o MISO Ramp Capability Model
- Storage and Demand Side Ancillary Services
 - o Overview of Current Storage and Demand Side Ancillary Service ISO Products
 - o Economics of Storage and Demand Side Ancillary Services for Provision of ISO Products
 - o Expected Evolution of Energy Storage Products and Likelihood of Broader Valuation of Multiple Uses
- Comparison of AS Pricing Across All ISOs



“A thorough survey of practices and issues across the organized markets.”

Director, Regulatory Affairs, NRG Energy

INSTRUCTORS



Bill Capp

President and Founder, Grid Storage Consulting

Bill Capp is the Founder of Grid Storage Consulting, an advisory firm providing expertise to various stakeholders interested in improving the operation of electrical systems with advanced energy storage. Clients include utilities interesting in learning about how to integrate storage, firms developing an energy storage strategy and financial entities evaluating potential energy storage investments. Before founding GSC, Mr. Capp served Beacon Power as President and CEO for 10 years. He led Beacon's technology development and commercial deployment efforts to align the company's patented flywheel technology with grid-scale energy storage opportunities. Beacon is frequently credited for leading the creation of markets for energy storage resources to provide frequency regulation services and subsequently for leading the effort to achieve "pay for performance" (FERC order 755). The Beacon 20 MW regulation facility in the New York ISO was completed on time and budget in July 2011 and has been operating at over 95% availability ever since. Prior to Beacon Power, Mr. Capp had a variety of general management, product development and manufacturing technology roles in Ford Motor Company, Ingersoll-Rand and York International. He holds seven patents in diverse fields relating to sensors, micro-grids, photovoltaic systems, and grid services. He holds a bachelor's degree in aeronautical engineering from Purdue University and a Masters in Mechanical Engineering from the University of Michigan, where he also earned his MBA degree.



Joseph Cavicchi

Executive Vice President, Compass Lexecon

Joseph Cavicchi is Executive Vice President with Compass Lexecon (Boston), an FTI Company. He provides wholesale and retail electricity market regulatory economic analyses in connection with the restructuring of the US electricity industry. In particular, he advises clients in a variety of Federal Energy Regulatory Commission (FERC) and state regulatory proceedings, and files testimony and affidavits supported by economic analyses. His work focuses extensively on analyzing the competitiveness of the U.S. wholesale electricity markets and developing an in-depth understanding of the operations of the wholesale markets. Mr. Cavicchi's work also involves conducting wholesale market power screens, analyzing the competitive impact of mergers and acquisitions, and overseeing the development of complex analytical modeling to assess electricity system operations.

REGISTRATION
to register *CLICK HERE* or

Call: 201 871 0474
fax: 253 663 7224
email: register@pmaconference.com
web: <http://pmaconference.com/>
Mail: POB 2303 Falls Church Va 22042

INSTRUCTIONAL METHODS

Case studies and PowerPoint presentations will be used in this program.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

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

EVENT LOCATION

A room block has been reserved at the Hilton Garden Inn Austin Downtown / Convention Center, 500 N Interstate 35, Austin, TX 78701, for the nights of February 15-16, 2017. Room rates are US \$195 plus applicable tax. Call **512-480-8181** for reservations and mention the EUCL event to get the group rate. The cutoff date to receive the group rate is January 15, 2016 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 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.

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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 13 credits for the course.**

There is no prerequisite for this course.

Program Level: Beginner

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 SELECT

- ANCILLARY SERVICES FUNDAMENTALS AND MARKET DYNAMICS COURSE:** FEBRUARY 16-17, 2017: US \$1495, EARLY BIRD on or before JANUARY 27, 2017: US \$1295

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

Print Name

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What name do you prefer on your name badge?

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CREDIT CARD INFORMATION

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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 January 13, 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.