

DISTRIBUTED RESOURCE (DER) SYSTEM PLANNING 101

*What Utilities and Other Power Organizations Need to Know
to Adjust Their System Planning*

February 16-17, 2017

**Hilton Garden Inn Austin Downtown
Austin, TX**



EUCI is authorized by IACET
to offer 1.2 CEUs for the
course

OVERVIEW

The growth of distributed generation (DG) and distributed energy resources (DERs) is challenging many of the assumptions upon which traditional utility system planning relies. In many regions already, DER penetration is reaching levels at which it has a measurable impact on system planning and operations. For example, DERs are creating two-way power flows on the distribution and transmission grids that legacy equipment was not designed for. DERs are also confounding conventional load forecast methodologies and complicating system modeling by introducing new kinds of generation sources or modifying load profiles.

DER adoption is driven by three major developments:

1. Advances in technologies that accommodate multi-directional, rather than uni-directional, power flows
2. Fundamental shifts in generation, distribution and transmission grid profiles
3. Changing, “more democratic” concepts about the relationship between utility service models and customer pricing

DERs, though, are not just one thing; rather, they are many things. Therefore, a treatment of the system impacts of DER must address several elements that comprise DERs, and how they produce different impacts.

This program is a primer. It is intended to collect — in one forum — the content necessary for utilities, load-serving entities (LSEs), grid operators, project developers and others to develop their own internal system for evaluating the impact of DG and DER development on their system(s). It is not intended to be an advocacy forum for or against the adoption of these technologies, nor for their implementation. Nor is it intended to offer detailed instruction in the analytical instruments referenced during the program. It will, however, provide a useful cross-disciplinary blueprint for reference, adaptation and refinement.

LEARNING OUTCOMES

Through presentations and panel discussions, attendees will have the opportunity at this symposium to consider the following elements as to how distributed energy resources (DER) are changing utility and power industry norms:

- Evaluate the different types and classes of DERs and their special requirements
- Identify the operational differences between renewable and conventional energy DERs
- Review regulatory matters that determine how DERs are governed on a jurisdictional basis
- Examine long-term planning assessment and analysis that properly incorporates DERs
- Discuss challenges that DERs present to existing utility compacts/business models and what options are available to address these issues
- Assess system data access and transparency requirements to facilitate DERs
- Evaluate operational tools required for real-time DER modeling and forecasting
- Discuss DER interconnection issues at the distribution, sub-transmission and transmission levels

AGENDA

THURSDAY, FEBRUARY 16, 2017

7:30 – 8:00 am

Registration and Continental Breakfast

8:00 – 8:15 am

Welcome and Overview

8:15 – 9:00 am

Types and Characteristics of DERs

- Types
 - o PV
 - o Energy storage
 - o Electric vehicles
 - o Combined heat & power (CHP)
 - o Turbines, generators and reciprocating engines
 - o Microgrids
 - o Virtual power plants (VPPs)
 - o Demand side management
- Size
- Location
 - o Regional power system considerations
 - o Proximity/relationship to distribution utility
- Primary generation (of offset) time of day

9:00 – 10:30 am

DER Development and Control

- Applicable technologies and resources
 - o Renewables
 - o Non-renewables
 - o Both of the above with and without storage
 - o Storage (standalone)
 - o DSM
- Classes
 - o Customer-developed
 - o Utility-developed
 - o Continuum of self-supply to grid-supply
 - o Behind-the-meter
 - o Utility side-of-the-meter
- Interconnection aspects
 - o Distribution level
 - o Sub-transmission level
 - o Transmission level

10:30 – 10:45 am

Morning Break



“High quality speakers with excellent expertise in DER planning, operations, economic analysis, regulatory and business models, and methodology/tools; jam-packed with great content.”

Manager, Black & Veatch

AGENDA

- 10:45 – 11:30 am** **Jurisdictional and Market Design Matters**
- DERs operating in wholesale markets
 - DERs operating in traditional vertically-integrated (non-markets) utilities' service territories
 - o Enabling legislation and state utility oversight governance
 - o FERC
 - o NERC
 - o ISO/RTO
 - DERs in public owned utilities' service territories
 - Transactive energy concepts
- 11:30 am – 12:00 pm** **Development Scenarios**
- Utility
 - Third-party (collaboration)
 - Third-party (market-imposed)
- 12:00 – 1:00 pm** **Group Luncheon**
- 1:00 – 2:30 pm** **Challenges to Existing Utility Compact/Business Model**
- Reduced system operational transparency
 - System stability and protection
 - Load (and corresponding revenue) reduction
 - Cost / value methodology selection and analysis
 - Cost / value application and imposition process
 - Cost allocation provisions and measures
 - Tariffs and market designs
 - Utility rate structures
 - Risk evaluation and planning w/respect to reliability
- 2:30 – 5:30 pm** **Strategic Planning: Long-term Assessment and Analysis**
- Determining impact studies required
 - System power flow modeling
 - Hosting capacity requirements and availability
 - Distribution and bulk power systems' impacts
 - Mitigation measures identification for protection/safety limit violations
 - Valuing locational costs and benefits
 - Monitoring and control options and requirements
 - Infrastructure deployment and system awareness
 - Utility-driven vs third-party-driven installations
 - Revenue (reduction) modeling
- 5:30 pm** **First Day Adjournment**



“The DER Planning 101 course exceeded my expectations and was certainly a great learning experience.”

DER Manager, APS

AGENDA

FRIDAY, FEBRUARY 17, 2017

7:30 – 8:00 am

Continental Breakfast

8:00 – 9:00 am

System Data Access, Transparency and Utilization

- Systems integration and engineering analysis
- Grid impact and optimization
- Customer information and program optimization
- Market strategies development
- Locational value of DERs

9:00 – 10:00 am

Reliability Considerations

10:00 – 10:15 am

Morning Break

10:15 am – 12:15 pm

Operational Tools Required

- Real-time modeling, forecasting and scenario balancing
 - System impacts
 - Load shape
 - Utility rate structures
 - Customer adoption rate
 - Relationship of incentives to load shapes
 - Mitigation considerations
 - ADMS systems
 - Solar impact studies

12:15 pm

Program Adjourns



“This course provided a good overview of the definitions and issues associated with increased DER systems. It also provided a great opportunity to network with experts in the industry.”

Postdoc, NREL



“Experts talking to – and with – professionals in a cordial, focused setting.”

Power Resources Manager, Burbank Water & Power

INSTRUCTORS

Mike Coddington

Principal Engineer, National Renewable Energy Laboratory (NREL)

Michael Coddington is a Principal Engineer with the National Renewable Energy Laboratory (NREL) - a Department of Energy owned laboratory in Colorado. Before coming to NREL over seven years ago, he worked as a Distribution Planning and network Engineer, System Planning Engineer, Key Account Executive, and numerous other roles at two electric utility companies. His work at NREL focuses on the integration of photovoltaic systems (and other distributed generation systems) to the electric distribution system, with a focus on high penetration PV concerns and solutions. Mr. Coddington has authored and collaborated on dozens of technical reports and papers focusing on integrating distributed generation systems onto the grid in a safe, reliable and cost-effective manner. He is active in standards and codes development, is a Senior Member of the IEEE, was Secretary of IEEE 1547.6, and is a voting member of the UL1741 Standards Technical Panel (STP). He received his electrical engineering degree from Colorado State University, is a licensed Master Electrician and licensed Electrical Contractor in the State of Colorado, and is a licensed commercial electrical inspector.

Brian Fitzsimons

CEO, Qado Energy

Brian Fitzsimons is CEO and founder of Qado Energy. He started the software firm in 2009 to help make global electricity systems more sustainable and renewable. Qado Energy provides electric distribution system analytics Software as a Service (SaaS) to utilities, renewable developers, and other commercial clients. The service enables clients to use a singular platform to analyze and manage the processes of interconnection applications, distributed generation impact analysis, as well as DER planning and optimization to cut the time required for complex analytic efforts. He is a pioneer in the use of XML for automated data integration, transformation, collaboration and management. He has actively contributed to global data standards development in several industries and is currently an active analyst of the IEC Smart Grid Data Standards. Prior to Qado Energy, Mr. Fitzsimons founded and successfully grew innovative software companies in the media, publishing, and financial sServices industries. He holds three patents in the areas of data transformation and automation.

Dr. Jeremy Hargreaves

Senior Consultant, E-Three

Dr. Jeremy Hargreaves is a senior consultant at Energy and Environmental Economics, Inc (E3). He possesses extensive knowledge and experience in distributed resource planning and evaluation, system flexibility planning under high renewable penetrations, retail rate design, dispatch and storage modeling, and resource planning and procurement. Most recently Dr. Hargreaves was technical lead on evaluating the costs and benefits of distributed energy resources (DER), informing resource planning and strategy for Tata in Delhi, India. He was also primary author of a white paper on how to capture local value from deferring distribution system upgrades through DER for Pacific Gas and Electric. Prior to that, he managed the design and development of the Integrated Demand Side Management (IDSMS) model for Consolidated Edison in New York - winner of a 2014 Utility Analytics Institute Innovation Award. Dr. Hargreaves' has done distributed generation cost and potential studies for the three IOUs in California, and for policy planning at the California Public Utilities Commission. He is a principal architect of the E3 REFLEX model for long term system capacity and flexibility planning. Dr. Hargreaves joined E3 after completing his PhD in Geography and Environmental Engineering at the Johns Hopkins University. His research involved using optimization modeling techniques for stochastic unit commitment and dispatch of high renewable energy penetration electricity systems, and economic decision support in land and energy management. He also holds a MSE in Environmental Management and Economics from Johns Hopkins, and a MEng in Chemical Engineering from Imperial College, London.



"The information presented is very topical as it pertains to what utilities are looking at."

Manager of Engineering and Rates, United Power

INSTRUCTORS

Daniel Haughton

Manager – Distributed Energy Resources Integration & Analysis, Arizona Public Service (APS)

Daniel Haughton is a lead / supervising transmission operations engineer and Manager – Distributed Energy Resources Integration & Analysis at Arizona Public Service (APS). His duties include:

- Supervision of a high-performance team of 8 transmission operations engineers and consulting engineers in utility operations
- Coordination of technical power flow, transient stability, and voltage margin studies for seasonal, next-day and/or current day system analysis
- Representing the interests of the transmission operations engineering group to APS management
- Representing APS interests at technical committee meetings, sub-regional study groups, the reliability coordinator (RC) and other external entities
- Serving as subject matter expert (SME) for specific NERC Standards related to transmission operations
- Interfacing with the Energy Control Center (ECC) leaders and operators and IT to ensure real-time tools performance meets expectations and produces accurate results as judged by both engineers and operators
- Provides training, development and growth opportunities for the engineering team

Mr. Haughton has worked at APS for four years. Prior to that, he was in various roles at Tampa Electric, CAISO, Intel Corp and Arizona State University.

Dr. Abhishek Somani

Senior Research Economist – Electricity Infrastructure Integration Division, Pacific Northwest National Laboratory (PNNL) Invited

Abhishek Somani is a Senior Research Economist in the Electricity Infrastructure Integration division of Pacific Northwest National Laboratory (PNNL). He has used concepts from game theory, optimization theory and agent-based modeling to study the issues of efficiency and market power. Dr. Somani's research interests include retail markets design and their integration with wholesale markets to accommodate new smart grid technologies. He received his Ph.D. in Economics from Iowa State University.

Dan Wilson

Manager – Renewable Energy, Black & Veatch Consulting

Dan Wilson is Manager of Renewable Energy in Black & Veatch Consulting's power business, focusing on the intersection of the electric utility sector with renewable and distributed energy resources. Over the past five years, he has led numerous studies for utilities and other clients related to grid integration of renewable and distributed resources, quantifying the value of solar, integrated resource plans (IRPs), distributed solar PV potential across large geographic areas, solar policy design, customer-facing solar program management, implementation of new software to streamline solar incentives and interconnection, solar PV and battery storage feasibility analysis, and distributed energy planning for smart cities.



“High level presentations and discussions that address practical issues/challenges in adopting and integrating in the grid a wide range of DERs.”

Business Representative, IBEW Local Union 1245

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.

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 1.2 CEUs for the course

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 \$195, plus applicable tax. **Call 512-480-8181** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is January 15, 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.**

REGISTER 3, SEND THE 4TH FREE

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



"A must for utilities entering into the game-changing world DERs present."

Manager, Distribution Planning, ATCO Electric

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PLEASE SELECT

DISTRIBUTED RESOURCE (DER) SYSTEM PLANNING 101 COURSE: February 16-17, 2017 : US \$1495
Early bird on or before January 27, 2017: US \$1295

Please make checks payable to: "PMA"



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

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CREDIT CARD INFORMATION

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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.