

TECHNICAL CHALLENGES FACING THE INTEGRATION OF MICROGRIDS

August 21-22, 2017
Hyatt Regency Dallas
Dallas, TX

PRE-CONFERENCE WORKSHOP
Applications for Microgrids

AUGUST 21, 2017

POST-CONFERENCE WORKSHOP
Demystifying Inverters

AUGUST 23, 2017



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OVERVIEW

Microgrid applications are filled with complexities and challenges that are being overcome by the industry one hurdle at a time. Beyond the battles for microgrid ownership and their financial backing, the many technical complexities of maximizing microgrid applications have become pressing issues for utilities to embrace and understand.

This conference will bring together industry professionals to share their experiences and knowledge on the technical challenges facing the integration of microgrids. Some of the technical issues coming to the forefront discussed in this conference and its workshop will be: integrating microgrids into the distribution grid through sophisticated controls, islanding of the microgrid, system inverters, the creation of accurate microgrid studies, and critical performance evaluation among others.

LEARNING OUTCOMES

- Listen to Oncor's vision of the microgrid industry and their experiences
- Discuss the technical complexities in the overall strategy for integrating microgrids within Pepco Holdings larger grid
- Expand on the hierarchical control of microgrids and the major functions of the master controller
- Review Oncor's microgrid and its connections to achieve islanding, demand charge management and energy time shifting
- Participate in the on-site tour of Oncor's Microgrid
- Engage in a panel discussion on some of the technical challenges of microgrids
- List some of the technical issues related to integrating microgrids into a distribution system
- Discuss how the IEEE 1547 Standard on intentional islanding can affect microgrids interconnected to the area power system
- Review the key system performance details that must be accounted for when designing a microgrid
- List the various types of modeling tools and software used in microgrid studies

WHO SHOULD ATTEND

- Engineers, managers, and policy analysts from the utility industry
- Facility managers and electrical engineers for corporate, academic, or residential campuses
- State regulators and staff
- County and municipal officials
- Distributed generation industry
- Combined heat and power industry
- Renewable energy suppliers
- Researchers and academics
- Hardware suppliers, advanced metering vendors, software vendors, construction firms



"While everybody still has their cards on the table in this new industry, learn what's happening and what is making it happen."

CEO, American Microgrid Solutions

AGENDA

MONDAY, AUGUST 21, 2017

- 1:00 - 1:30 pm** **Registration**
- 1:30 - 1:40 pm** **Welcome Remarks**
- 1:40 - 2:10 pm** **Keynote Presentation**
Michael Quinn, Vice President, Strategy & Technology
Future Grid - Technologies, Architectures & Opportunities, Oncor
- 2:10 - 3:00 pm** **A Technical Look at a Utility's Strategy and Vision for Microgrids**
Developing and managing Pepco Holdings approach to evaluating and deploying advanced technologies and concepts for application on the electric system, such as microgrids, is a complex process. This presentation will discuss the technical complexities in the overall strategy for integrating microgrids and DER's as part of the vision for the future of the grid.
Robert S. Stewart, Manager-Smart Grid & Technology, Technical Services Group, Pepco Holdings
- 3:00 - 3:30 pm** **Networking Break**
- 3:30 - 4:15 pm** **Master Controller for Campus Microgrids**
The campus microgrid, powered by a master controller, offers the opportunity to eliminate costly outages and power disturbances, supply the hourly campus load profile, reduce daily peak loads, and mitigate greenhouse gas production. This presentation is focused on the hierarchical control of microgrids and the major functions of the master controller to achieve economically viable, environmentally friendly, fuel efficient, robust, and resilient energy supply solution for campuses.
Mohammad Khodayar Ph.D., Assistant Professor, Southern Methodist University
- 4:15 - 5:00 pm** **Oncor's Microgrid Development**
Oncor's Technology Demonstration & Education Center (TDEC) shows how distributed generation and storage can be maximized to improve reliability and flexibility of operations while enhancing the customer's experience. This presentation will review the microgrid and its components while discussing the connections to achieve islanding on loss of grid power, as well as demand charge management and energy time shifting when grid is connected and the lessons learned from it.
Bill Muston, Manager of Research & Development, Oncor
- 5:00 - 6:00 pm** **Networking Reception**



"The conference was very enlightening and educational. I enjoyed the wide range of topics covered under the conference's Microgrids subject. The onsite tour was definitely the highlight of the event."

Sr. Proposal Specialist, S&C Electric

AGENDA

TUESDAY, AUGUST 22, 2017

- 7:15 - 7:30 am** **Continental Breakfast and Board Bus for Oncor Microgrid Tour**
- 7:30 am** **Bus Leaves Hotel for Tour**
- 8:15 - 10:00 am** **Tour of Oncor's Microgrid**
The tour will be to an operating microgrid that serves an Oncor operational site. Oncor's Technology Demonstration & Education Center (TDEC) shows how distributed generation and storage can be maximized to improve reliability and flexibility of operations while enhancing the customer's experience.
- Visitors will learn about, and observe from the control room, the microgrid operations and operating modes. The Oncor microgrid integrates over 100 kW solar PV, a 65 kW propane microturbine, and 200 kW / 400 kWh of energy storage, with distribution automation, to achieve islanding on loss of grid power, as well as demand charge management and energy time shifting when grid connected.
- Normal street attire is appropriate. No protective equipment or clothing is needed.
- 10:00 - 10:30 am** **Bus Ride Back to Hotel**
- 10:30 - 10:45 am** **Return from Tour/Morning Networking Break**
- 10:45 am - 12:00 pm** **Microgrids Technical Panel Discussion**
This panel discussion will dive into some of the technical challenges facing microgrids. The interactive discussion will cover a wide range of topics from: microgrid modes of operation, controllers, connections to the grid, testing and more.
Doug Jones, PE, SCADA and Analytical Services Sr. Project Engineer II, POWER Engineers, Inc.
Michael Grabstein, Renewable Energy and Infrastructure Consultant, Advanced Microgrid Solutions
Eric Cotney, Vice President, Sales & Marketing, Axiom Solar
Jianhui Wang Ph.D., Section Manager - Advanced Power Grid Modeling, Argonne National Laboratory & Assistant Professor, Southern Methodist University
- 12:00 - 1:00 pm** **Group Luncheon**
- 1:00 - 1:45 pm** **Interconnection, Integration, and Interactive Impact Analysis of Microgrids and Distribution Systems**
This presentation deals with some of the technical issues related to integrating microgrids into a distribution system and its DMS. It first describes elements of the operation of microgrids within distribution systems, including possible modes of operation and interactions in normal and faulted operating conditions. It provides background information, in the form of use cases, on some of the internal modes of operation of microgrids that may impact the distribution system, including normal and faulted operation. It then addresses operating modes in which the microgrid interacts with the distribution system, including power exchanges under normal operation and fault conditions as well as protection coordination. Finally, it discusses power system analysis tools, such as power flow and fault analysis tools that can be used to analyze the impact of the integration of microgrids in distribution systems.
Jianhui Wang Ph.D., Section Manager - Advanced Power Grid Modeling, Argonne National Laboratory & Assistant Professor, Southern Methodist University

AGENDA

TUESDAY, AUGUST 22, 2017 (CONTINUED)

- 1:45 - 2:30 pm** **Protection Considerations at the Point of Interconnection for Grid Connected Microgrids**
Recent changes to IEEE 1547 Standard make certain allowances for intentional islanding and ride-through allowances for voltage and frequency. We will look at the proposed changes and how this will affect microgrids interconnected to the area power system.
Christopher Sticht, Senior Consultant, UC Synergetic
- 2:30 - 3:00 pm** **Networking Break**
- 3:00 - 3:45 pm** **Engineering Challenges for Microgrid Performance**
Key system performance details that must be accounted for when designing a Microgrid include voltage and frequency stability, protective relay performance, ground source arrangement, and island detection. The engineering studies and tools used to quantify and improve the answers to these critical performance questions will be discussed. Lessons learned and examples from several Microgrids will be included.
Dan Jones PE, SCADA and Analytical Services Project Engineer II, POWER Engineers, Inc.
- 3:45 - 4:30 pm** **Microgrid Studies**
Because many traditional simplifying assumptions used in power system analysis and planning break down in a microgrid environment, and because some of the complexities and issues associated with microgrids are relatively new, computer studies of microgrids are often critically important in de-risking, ensuring a successful deployment and diagnosing and correcting any problems that do arise. This presentation will discuss the various types of studies done, the modeling tools used including software and HIL, and what the studies can (and can't) tell you.
Michael Ropp, Northern Plains Power Technologies
- 4:30 pm** **Closing Remarks and Adjournment**



“Good opportunity for benchmarking, education and networking.”

Sr. Rate Administrator, ComEd



“It is a very good space for joining utilities, academia and industry to discuss the forthcoming trends of smart grids and its specific areas.”

PhD Student, Universidad de los Andes

PRE-CONFERENCE WORKSHOP

Applications for Microgrids

MONDAY AUGUST 21, 2017

8:00 - 8:30 am **Registration and Continental Breakfast**

8:30 am - 12:00 pm **Workshop Timing**

OVERVIEW

This workshop will expand on the details of microgrid applications. Microgrids can allow a community, critical facility or campus to tap into local energy resources to achieve many benefits, such as: better resilience, greater use of local renewable energy, reducing exposure to threats such as storms and terrorism, and helping to mitigate grid disturbances by maintaining energy supplies for critical facilities and services.

There are many configurations and complexities within microgrids and this workshop will discuss in detail many of those while providing the attendee a good overview of the applications for microgrids.

WORKSHOP AGENDA

1. Microgrid Applications
 - a. Military bases
 - b. Remote villages and communities
 - c. Operations requiring extremely high reliability/power quality
 - d. Data Centers
 - e. Municipal & Governmental applications
 - f. Office parks
 - g. High cost supply areas
2. Microgrid Generation Types
 - a. Renewables and Traditional Generation Sources
 - b. Pairing the dispatchable non-dispatchable forms of generation to fully support energy requirements
 - c. Determining the right mix of generation types
3. Island versus Grid-tied Microgrids
 - a. Interconnections to a "weak" electric power system
 - b. Extremely long distribution feeders not capable of supplying sufficient power quality or capacity to remote applications
 - c. Evaluating the system impacts
 - d. Net zero energy
 - e. Selling excess energy back to the grid - considerations
 - f. Stability of Stand Alone Microgrid Systems

WORKSHOP AGENDA

MONDAY AUGUST 21, 2017 (CONTINUED)

4. Microgrid Protection
 - a. Small generator protection
 - b. Extremely long feeder protection (or non-protection) - what is acceptable?
 - c. Coordinating protection with multiple generation sources
 - d. Coordinating protection with utility interconnection
 - e. Local protection - end user's contribution to protection and power quality
 - f. Advanced inverters
 - g. Volt/var support
5. Hybrid Solar Microgrid
 - a. Solar with battery backup for 24-hour service
 - b. DC Homes
 - c. Nano Grids
6. The Future of Microgrids

WORKSHOP INSTRUCTORS

Christopher Sticht

Senior Consultant, UC Synergetic

Kristen Rodriguez

Engineering Manager - Austin, UC Synergetic

Jerry Josken

Senior Consultant, UC Synergetic



"It was good to have regulators, vendors and utilities under one roof. This gave me a 360 degree view of the market around microgrids."

Global Solution Architect, OSIsoft

POST-CONFERENCE WORKSHOP

Demystifying Inverters

WEDNESDAY, AUGUST 23, 2017

8:00 - 8:30 am **Registration and Continental Breakfast**

8:30 am - 12:00 pm **Workshop Timing**

OVERVIEW

This workshop will give the audience a deep-dive into inverter technology. The goal is that participants will leave with a solid understanding of how inverters work, what inverters are good and not good at, how to evaluate inverters and compare them to rotating generation, and how they are changing—and potentially revolutionizing—the electric power industry. We will get technical, and please bring your questions!

WORKSHOP AGENDA

- I. Brief introduction to power electronics technology
 - a. Very brief history
 - b. Converter types
 - c. Semiconductor switch technology
 - d. Controls technology
- II. What an inverter is
 - a. “Guts” of inverter hardware
 - b. How an inverter works
 - c. Inverter types and topologies
 - d. Inverter controls—voltage, current, others, both on- and off-grid
 - e. What determines an inverter’s power rating
 - f. Typical inverter self-protection
 - g. Impact of different types, topologies and controls on behavior
- III. Important inverter behaviors—what inverters can and can’t do
 - a. How an inverter is like a synchronous machine
 - b. How an inverter is unlike a synchronous machine
 - c. Power factor
 - d. Speed of response
 - e. Inertia
 - f. Others
- IV. Brief overview of inverter applications
 - a. Distributed generation and energy storage
 - b. FACTS devices
 - c. Solid-state transformers (looking ahead a bit)
 - d. Transportation

WORKSHOP AGENDA

WEDNESDAY, AUGUST 23, 2017 (CONTINUED)

- V. Inverters in distributed energy resources (DERs) and microgrids
 - a. The role of the inverter in a DER plant
 - b. DER inverter types and resulting plant configurations
 - c. DER inverter codes and standards
 - d. DER inverters and transformers
 - e. Inverters and interconnection issues
 - i. Fault current contributions
 - ii. Ground fault overvoltage
 - iii. Load rejection overvoltage
 - iv. Ride-throughs and other abnormal system responses
 - v. Unintentional islanding detection

WORKSHOP INSTRUCTOR

Michael Ropp

Northern Plains Power Technologies



“Information you need to know in this industry.”

CEO, American Microgrid Solutions

INSTRUCTIONAL METHODS

This program will include PowerPoint presentations and panel 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 0.9 CEUs for this conference and 0.4 CEUs for each workshop

EVENT LOCATION

A room block has been reserved at the Hyatt Regency Dallas, 300 Reunion Blvd, Dallas, TX 75207, for the nights of August 20-22, 2017. Room rates are \$169 USD, plus applicable tax. Call **214-651-1234** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is July 20, 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 this event may send 1 FREE for every 3 delegates registered. Please note that all registrations must be made at the same time to qualify.

PLEASE SELECT

- TECHNICAL CHALLENGES FACING THE INTEGRATION OF MICROGRIDS CONFERENCE AND BOTH WORKSHOPS:** AUGUST 21-23, 2017 : US \$2195
EARLY BIRD ON OR BEFORE MAY 19, 2017: US \$1995
- TECHNICAL CHALLENGES FACING THE INTEGRATION OF MICROGRIDS CONFERENCE AND ONE WORKSHOP**
US \$1795, EARLY BIRD ON OR BEFORE AUGUST 4, 2017: US \$1595
(MAKE SELECTION BELOW)
 - PRE-CONFERENCE WORKSHOP: MON, AUGUST 21, 2017
 - POST-CONFERENCE WORKSHOP: WED, AUGUST 23, 2017
- TECHNICAL CHALLENGES FACING THE INTEGRATION OF MICROGRIDS CONFERENCE ONLY:** AUGUST 21-22, 2017: US \$1395,
EARLY BIRD ON OR BEFORE AUGUST 4, 2017: US \$1195
 - PRE-CONFERENCE WORKSHOP ONLY: MON, AUGUST 21, 2017: US \$595,
EARLY BIRD ON OR BEFORE AUGUST 4, 2017: US \$495
 - POST-CONFERENCE WORKSHOP ONLY: WED, AUGUST 23, 2017: US \$595,
EARLY BIRD ON OR BEFORE AUGUST 4, 2017: US \$495
 - YES, I PLAN TO ATTEND THE TOUR OF ONCOR'S MICROGRID: TUES, AUGUST 22, 2017 - AVAILABLE FOR CONFERENCE ATTENDEES ONLY**

REGISTRATION
to register [CLICK HERE](#) or

Call: 201 871 0474
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email: register@pmaconference.com/
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How did you hear about this event? (direct e-mail, colleague, speaker(s), etc.)

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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 July 21, 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.