

OPTIMIZING THE INTERCONNECTION PROCESS FOR RENEWABLES & STORAGE

A National Forum for Addressing Process and Technical Issues

July 24-25, 2019
Baltimore Gas & Electric Smart Energy Hall
Baltimore, MD

POST-CONFERENCE WORKSHOP

**How Smart Inverters Can Limit
the Complicating Effects of DERs
on the Distribution System**

THURSDAY, JULY 25, 2019

“

“I was very impressed with the efficiency at which this conference flowed. The schedule and amenities were great. I also think the speakers were professional and content was exactly what I signed up for.”

Specialist Engineer, TVA



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OVERVIEW

The process for interconnecting new energy generation to the electric grid — both large scale (LGIP) and small scale (SGIP) — has become increasingly complex. Challenges remain to federal and state regulations and requirements; technical and regulatory issues facing owners of generation and transmission assets continue to evolve; and different motivations influencing the actors in the interconnection process often result in miscommunications and delays around prospective projects.

Even greater complexity is added to the interconnection process when considering renewable energy and battery storage resources. Wind, solar PV, and storage technologies are increasingly moving into mainstream use, with projects of all shapes and sizes proposed and in development requesting to be interconnected to the transmission and distribution grid. Due to the recent emergence of these types of resources in many parts of the country, the power industry is still very much in a ramp-up phase to understand their impacts on the electric grid. Thus, special consideration is required for renewable and battery projects during the interconnection process to ensure these resources are connected to the grid in an optimal way that maintains system stability and reliability. States with aggressive renewable and climate change goals are especially challenged, as they will be required to interconnect these types of projects and manage the operational aspects of a grid with increasingly high renewable penetrations.

The intent of this conference is to serve as a forum for the multiple entities involved in the interconnection process. Sessions will feature the perspectives of project developers, vertically-integrated utilities, transmission and distribution utilities, balancing authorities and system operators to share their expertise and discuss best practices for optimizing the interconnection process. The content will address both large and small generation projects, with the bulk of discussions and focus centered on distribution-level interconnections for small renewable generator and distributed energy resource (DER) projects. Sessions will compare the interconnection processes and experiences of different entities across the country, identify the technical requirements of the interconnection process from start to finish, and evaluate the potential regulatory and policy directions related to the recent FERC Notice of Proposed Rulemakings (NOPRs) on interconnection.

LEARNING OUTCOMES

- Identify the latest interconnection regulatory changes and rulemakings in process on the state and FERC level
- Evaluate how new technologies and a changing grid create new technical and operational challenges for interconnection
- Examine interconnection processes of utilities in different regions of the country and how they are managing increasing volumes of interconnection applications
- Evaluate interconnection case studies across regional jurisdictions and project requirements for generator interconnection for specific RTOs, ISOs, and PMAs
- Assess specific challenges for interconnecting grid-scale wind, solar and battery projects
- Assess specific challenges for interconnecting distributed energy resources (DERs)
 - Distributed solar photovoltaic (PV) systems
 - Battery storage technologies
 - Microgrids
 - Electric vehicles (EVs)
- Review the interconnection process from the perspective and experiences of:
 - Investor-owned utilities in regulated and retail markets
 - Renewable and storage project developers
 - Independent System Operators (ISOs), Regional Transmission Organizations (RTOs), and Power Marketing Administrations (PMAs)
- Identify advanced modeling tools and techniques utilized by utilities and transmission owners leading the way in distributed energy resource (DER) and storage interconnection
- Review key issues that cause delays in utility interconnection timelines, and solutions for expediting scheduling without sacrificing safety and reliability
- Review a value proposition analysis for projects from an interconnection standpoint

To Register, Call 201 871 0474 or [Click Here](#)

AGENDA

WEDNESDAY, JULY 24, 2019

8:00 – 8:30 am

Registration & Continental Breakfast

8:30 – 9:15 am

Keynote Speech: Baltimore Gas & Electric – Making Connections in a Time of Change
Representative, Baltimore Gas & Electric (BG&E)

9:15 – 10:00 am

Interconnection to the Electric Grid: A Brief History on Policy/Regulation and FERC Update

- Transmission-level vs. Distribution-level interconnections
- How did we get where we are today with the interconnection process and rules?
- Overview of the standard interconnection process and current related rulemakings
- Generator interconnection – what is the core guidance for interconnection, and why do we have that guidance?
- Commission-issued core guidance for interconnection:
 - o Standard large generator interconnection procedures (LGIP) and agreements (LGIA)
 - o Standard small generator interconnection procedures (SGIP) and agreements (SGIA)
- Background/history of FERC standard interconnection agreements and procedures for generators
- Regional variations from the commission-issued interconnection procedures and agreements & RTO/ISO reforms
- Some current interconnection challenges and concerns
- Some recent interconnection-related developments
- December 2016 Interconnection NOPR RM17-8-000
 - o Improving certainty for interconnection customers
 - o Promoting more informed interconnection
- Recent FERC action on electric storage resources
 - o November 2016 NOPR — participation model for electric storage resources
 - o FERC energy storage order of Feb. 2018 — requirements for new grid operator rules on energy storage
 - o Implications for storage interconnection
 - o Implications for bulk/system support

Tony Dobbins, Energy Industry Analyst - Commission's Office of Energy Policy and Innovation, Federal Energy Regulatory Commission (FERC)

Myra Sinnott, Energy Industry Analyst – Commission's Office of Energy Policy and Innovation, Federal Energy Regulatory Commission (FERC)

10:00 – 10:15 am

Morning Break

“

“High quality of attendees and topics!”

Manager,
Transmission &
Interconnection,
8minutenergy

“

“Understanding both utility and developer perspectives helps tremendously with understanding the gravity and responsibility of my role as an interconnection engineer”

Senior Engineer, Salt River Project

“

“Conference was very informative. It is encouraging to hear from others in the industry and their views for addressing DER challenges and solutions.”

Senior Product Manager, Alliant Energy

To Register, Call 201 871 0474 or [Click Here](#)

AGENDA

WEDNESDAY, JULY 24, 2019 (CONTINUED)

I. Bulk Power System

10:15 – 11:00 am

Transmission-Level Interconnection for Renewable Energy Projects

- Project development process brief overview
- North America electric grid overview
- Market characteristics impacting developers' generator interconnection process
 - o Organized nodal markets
 - o Bilateral markets
- Generator interconnection process
 - o Interconnection study process timeline
 - o Data and model requirements
 - o Interconnection study methodology and modeling assumptions
 - o New technology
- Developer perspective for utility-scale projects
 - o PV solar
 - o Hybrid (PV solar + storage)
 - o Stand-alone storage
- Summary of major risks

Enrique Silva, Principal – Transmission & Interconnection, Plus Power

11:00 – 11:30 am

MISO: Interconnection Process to Transmission-Grid for Renewable Energy Projects

This session will discuss MISO's interconnection process and will provide insights and updates regarding multiple initiatives and developments:

- Queue policies, procedures, deadlines and requirements
 - o Making requests and applying for interconnection
 - o Required and optional studies and analyses
 - o Interconnection agreements for a generator
- Percentages of specific technologies currently in MISO's queues (T&D)
- How is storage currently studied in the MISO queue?
- Update on MISO coordination with SPP, PJM & non-RTO jurisdictional systems
- MISO's 2017 Queue Reform — results and successes so far
- Operational considerations for an increasingly renewable grid:
 - o Complementary/peaking scenarios with natural gas and wind
 - o Developments and opportunities for "hybrid interconnection"
- Efforts to relieve overfilled generation queue
 - o Impact of FERC rejection on MISO 2018 interconnection reform proposal
 - o Site control and payment requirements
- Projection of future footprint of MISO's interconnection queue
- Energy storage as a transmission reliability asset

Noel Augustine, Senior Engineer – Resource Interconnection Planning, Midcontinent ISO (MISO)



"Enjoyable conference with relevant and timely information and great networking opportunities."

Principal Engineer,
Salt River Project



"A great overview of some utilities interconnection process and impact of integrating renewable to it."

Solar Development Manager, EON Climate & Renewables

AGENDA

WEDNESDAY, JULY 24, 2019 (CONTINUED)

11:30 am – 12:00 pm

Tennessee Valley Authority (TVA): Managing Interconnections at T&D Levels

Tennessee Valley Authority (TVA) is a federally-owned corporation that manages 16,200 miles of transmission lines and a variety of generating assets — fossil fuels, nuclear, hydro, natural gas and renewable energy — in Tennessee, Alabama, Mississippi, Kentucky, and small slices of Georgia, North Carolina, and Virginia. This session will focus on the technical analysis and studies TVA conducts when interconnecting renewable generation to the grid, addressing:

- Technical and operational requirements for generation interconnection
- Applicable codes, standards, criteria and regulations
- Solar and storage projects in TVA's queue
- How TVA is managing solar and storage interconnections of varying sizes
 - o 20-60 MWs
 - o 1-20 MWs

Joshua Lewey, Specialist Engineer – Transmission Interconnection Planning, Tennessee Valley Authority (TVA)

12:00 – 1:00 pm

Group Luncheon

II. Distribution Level System

1:00 – 2:45 pm

Distribution-Level Grid Interconnections: Optimizing the Process & Operations of Solar PV, Storage & DERs

- Overview of how distributed energy resource (DER) interconnections differ from centralized generation interconnection
 - o Technical analyses
 - o Application of technology type
- DER interconnection analysis components
 - o Voltage fluctuation, reverse power flow, device operations, and time-series analysis
 - o Moving from rule-based to power flow-based automated technical analysis
- Managing interconnection of various DER resources to the existing utility grid
 - o Collaborating with community stakeholders, state agents and project developers
 - o Tips for streamlining DER interconnection practices
 - o Coordinating utility side-engineering work for various DER interconnections
- DER criteria and operations — considerations for utilities that are reaching higher DER penetration levels
 - o Harnessing smart inverters
 - o Hosting, heat and restriction maps
- Grid connected storage
 - o Benefits and challenges
 - o Improving the processes and standards for energy storage interconnection
 - o Optimizing grid-connected battery storage to enhance renewable energy performance

Aram Shumavon, Co-founder & CEO, Kevala Analytics

Howard Smith, Manager – Distributed Energy Resources Policy, Southern Company

Brian Barr, Manager – Distributed Energy Group, PECO Energy

2:45 – 3:00 pm

Afternoon Break



“All very good presentations with lots of updated info to optimize and understand challenges and opportunities.”

Contract Manager – Interconnection, HECO

AGENDA

WEDNESDAY, JULY 24, 2019 (CONTINUED)

3:00 – 5:00 pm

Optimizing Interconnection Practices for Maryland’s Renewable Future

- Renewable development and interconnection landscape in Maryland
 - o Maryland state renewable goals and programs for renewable procurement and development
 - o Providing power to low/moderate income housing communities through collaborative programs
 - o Breaking cycles of unemployment, under employment and incarceration in urban communities through the advancement of sustainable energy
 - o Project development case studies
 - Rooftop PV solar
 - Community solar
 - Landfill solar
- Utility considerations for managing increasing volumes of interconnection applications
 - o Customer education
 - o Organizational development
 - o Forecasting
- Building effective utility-developer relationships: collaborating for best practices to streamline interconnection process

James Mirabile, Principal Engineer – Green Power Connection (GPC) Team, Baltimore Gas & Electric (BG&E)

Robert Wallace, Co-Founder & Principal, Power 52Energy Inc.

Richard Gilker, Partner – Engineering, SGC Power

5:15 – 6:15 pm

Networking Reception: Offsite (location TBA)

THURSDAY, JULY 25, 2019

8:00 – 8:30 am

Continental Breakfast

8:30 – 9:00 am

Forecasting Utility Interconnection Volumes

This session will evaluate methodology for utilities to forecast generation volumes in their interconnection queues, evaluating:

- Overview — what is necessary for a good utility forecast?
- Modeling the impact and adoption rate of DERs and renewable resources given:
 - o Local and state economics
 - o Environmental policy scenarios
 - o Current energy mix and specific technology drivers
- Developing analyses, models and projects from hypothesis to delivery that reflect deep knowledge of landscape and align with project and business objectives
- Organizing and presenting analysis and recommendation reports for both internal and external use

Joshua Farnsworth, Director – Strategic Modeling & Analysis for Utility of the Future, Exelon (invited)



“Really well-run conference with great variety of experts who are engaging and well versed on topic. Great way to meet professionals in your field.”

Engineer,
Lincoln Clean Energy, LLC



“A great balance of speakers with diverse backgrounds focus on interconnection. Many key interconnection people attending.”

Director, Transmission of Interconnection,
8minutenergy Renewables, LLC

AGENDA

THURSDAY, JULY 25, 2019 (CONTINUED)

9:00 – 9:30 am

Streamlining the Interconnection Process for Small Developers: Department of Energy & National Lab Research Projects Update

Center for Sustainable Energy (CSE) is a mission driven non-profit that administers multiple market development programs, funded by research agencies and the Department of Energy (DOE). This session will discuss the collaborative work CSE is currently undergoing to research and streamline renewable interconnection processes, discussing:

- Summary of CSE national study done in partnership with Department of Energy and Lawrence Berkeley National Lab
 - o Overview of interconnection study and research scope
 - o Discrete choice experiment to determine interconnection process preferences from three stakeholder groups:
 - Authorities having jurisdiction
 - Solar installers
 - Utility interconnection staff
 - o Using conclusions to develop standardized interconnection systems and processes
 - o Inform those present at conference on how they can participate in the research study
- Summary of findings of yet to be published study – “SunShot II Report” – analyzing California interconnection applications
 - o Analyzing interconnection processes of 3-5 major California utilities to identify commonalities and shared challenges
 - o Determining how a developer can create a streamlined interconnection application based on conclusions

Marcus Gilmore, Senior Regional Manager, Center for Sustainable Energy (CSE)

9:30 – 10:15 am

Analyzing the Value Proposition for Projects Based on Interconnection

- Overview of value analysis model – how it relates to interconnection process from start to finish
- Financial metrics utilized
- Impact analysis and assessing project value proposition and projected timeline
 - o Pilot site analysis
 - o Local impact analysis
 - o Regional directives

David South, Senior Principal – Energy & Utilities, West Monroe Partners

10:15 – 10:30 am

Morning Break

10:30 – 11:45 am

Closing Panel: Optimizing the Interconnection Process

- Addressing problems and inefficiencies in the interconnection process
- Removing barriers to renewable energy, storage and DER integration
- Grid design and operational improvements for more efficient penetration of renewable energy
- Smarter ways to provide grid connections for renewable and storage project developers
- Regulatory and policy updates that would better enable clean energy integration
 - o FERC 845 — implications and moving forward for compliance
- Changes and updates to current practices that would enable:
 - o schedule certainty
 - o cost certainty
 - o considerations for overall system reliability planning
- Hybrid generation opportunities

Moderator: David South, Senior Principal – Energy & Utilities, West Monroe Partners

Panelists:

James Mirabile, Principal Engineer – Green Power Connection (GPC) Team, Baltimore Gas & Electric (BG&E)

Rebecca Sappenfield Baptiste, Associate Manager – DER Programs, Center for Sustainable Energy

Howard Smith, Manager – Distributed Energy Resources Policy, Southern Company

POST-CONFERENCE WORKSHOP

How Smart Inverters Can Limit the Complicating Effects of DERs on the Distribution System

THURSDAY, JULY 25, 2019

12:30 – 1:00 pm **Registration**

1:00 – 4:45 pm **Workshop Timing**

OVERVIEW

As more utilities grapple with higher penetrations of PV solar and other distributed energy resources (DERs) on the distribution grid, proactive planning becomes essential for two reasons:

1. To streamline the grid-connection process
2. To optimize the operational function, in ways that enhance grid resiliency and maintain stable energy flows

This workshop will focus on the role of smart (advanced) inverters as a solution to managing the impacts of new technologies on the distribution grid, evaluating their critical role in supporting the successful accommodation of PV solar and other distributed energy resources (DERs).

LEARNING OUTCOMES

- Evaluate the role of smart inverters in evolving distribution grid management practices
- Identify how smart inverters can limit distribution grid complications caused by PV solar and other distributed energy resources (DERs)
- Discuss utility case studies and scenarios for effective smart inverter implementation and operation
- Participate in live demonstration of Pepco Holdings “Smart Micro-Inverter” modeling

WORKSHOP INSTRUCTOR



Steve Steffel

Manager, Regional Capacity Planning for Distributed Energy Resources, Pepco Holdings Company

Steve Steffel has been working with Pepco Holdings Company (PHI) since 1984 in various positions in Engineering Standards, System Operations, Substation Switchman Training, Transmission and Distribution Planning, and Distributed Energy Resources Planning and Analytics (DERP&A). The focus in DERP&A has been to analyze and plan for the interconnection of various types of distributed generation on the distribution grid, develop and maintain criteria, deploy new electric system modeling tools, prepare and present papers and presentations on the impact of PV on the grid and work with Public Service Commission personnel, the Regional Transmission Operator, and public officials and industry professionals. In addition, efforts have also focused on collaboration with industry partners and the Department of Energy (DOE) in finding new solutions for hosting renewables.

To Register, Call 201 871 0474 or [Click Here](#)

WORKSHOP AGENDA

THURSDAY, JULY 25, 2019

- I. Distributed Energy Resource (DER) Impacts on the Grid
 - Proactive vs. reactive planning for DERs on the grid
 - How smart inverters are evolving distribution system planning practices (short and long-term)
- II. Smart Inverters– Overview and Define
 - Technology overview, current uses and applications
 - What are the functions smart inverters can perform for the distribution grid?
 - Future landscape — how will they be deployed?
 - Related IEEE codes and standards — impacts to the interconnection process
- III. Smart Inverter Functions on the Distribution Grid
 - Enhancing PV solar and DER operations
 - Fixing absorbing power flows
 - o Lessons learned after years of successful integration
 - o Case study — correctly adjusting a 1.9 MW system that started as a unity
 - Using smart inverters in the secondary network
 - Smart inverters as a tool to mitigate secondary upgrades
- IV. Considerations for Effective Smart Inverter Deployment
 - Considerations for low voltage ride-through
 - o PJM case study and other settings
 - Communication and control
 - Achieving low cost security communications
 - o Settings for self-join and self-identity
 - o Providing telemetry and change as needed with coordinated control
- V. Pepco Holding Case Studies and Scenarios Working with Smart Inverters
 - Chesapeake College project — an integrated smart grid/smart inverter test site
 - Department of Energy (DOE) project on cyber security, autonomous vs coordinated control, competing control
- VI. Demonstration of Pepco Holdings “Smart Micro-Inverter” Modeling Tool



“Very informative conference!”

Transmission Account Executive, Bonneville Power



“Enjoyable conference with relevant and timely information and great networking opportunities”

Principal Engineer, Salt River Project

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INSTRUCTIONAL METHODS

Case Studies, PowerPoint presentations and panel discussions will be used in program.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

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

REGISTER 3, SEND THE 4TH FREE

Any organization wishing to send multiple attendees to this conference 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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EVENT LOCATION



An Exelon Company

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See nearby hotels on page 10

BUNDLE PRICE: OPTIMIZING THE INTERCONNECTION PROCESS FOR RENEWABLES & STORAGE CONFERENCE AND POST-CONFERENCE

WORKSHOP: JULY 24-25, 2019: US \$1795
Early bird on or before July 5, 2019: US \$1595

OPTIMIZING THE INTERCONNECTION PROCESS FOR RENEWABLES & STORAGE CONFERENCE ONLY

JULY 24-25, 2019: US \$1395
Early bird on or before July 5, 2019: US \$1195

POST-CONFERENCE WORKSHOP ONLY: HOW SMART INVERTERS CAN LIMIT THE COMPLICATING EFFECTS OF DERS ON THE DISTRIBUTION SYSTEM

JULY 25, 2019: US \$595
Early bird on or before July 5, 2019: US \$495

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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 June 21, 2019 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.