

# 2019 SPRING TECHNICAL WORKSHOP ALBUQUERQUE, NM

March 19 - 21, 2019

19 Tuesday

7:00 – 8:00 a.m.

8:00 a.m. – 12:00 p.m.

Our 2019 Spring Technical Workshop will take place at the Hyatt Regency Tamaya Resort & Spa, just outside of Albuquerque, New Mexico.

This three-day event will include a half-day tutorial, ESIG Working Group Meetings, and our technical workshop.



**Registration & Breakfast**

**Location:** Rio Grande Bar

**Tutorial: Impact of DER on Bulk System**

**Location:** Tamaya FGH

Co-chairs: **Aidan Tuohy**, EPRI / **Debbie Lew**, GE

As the penetration of distributed energy resources (DER) increases and distribution systems become increasingly “active”, the role of the distribution system operator (DSO) and their interaction with the transmission system operator (TSO) becomes increasingly complex. This tutorial will provide attendees the opportunity to hear about real world experiences and participate in a discussion on the future challenges and opportunities in the area of transmission and distribution coordination. With the findings of a DOE-funded project and two recent expert workshops on transmission and distribution (T&D) coordination providing a platform for the tutorial, the panelists assembled will provide overview and insights into their experiences navigating the interface between T and D. It is important for both sides of the interface to understand the others concerns and requirements. Challenges and solutions will be discussed from the perspective of transmission operations, distribution operations, transmission planning and distribution planning. Issues will be addressed from the perspective of regions already experiencing significant T&D interaction, and those yet to see significant change but who are planning towards it. After each panelist presents their viewpoint, a facilitated discussion with strong audience participation will ensure that the key points are distilled and analyzed, so attendees can take away a greater understanding of this complex and important topic. (*continued on page 2*)

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### Tutorial Speakers:

Overview of T&D Interactions in Operations and Planning  
**Aidan Tuohy**, EPRI

IEEE 1547 and Bulk Power System Considerations  
**Charlie Vartanian**, PNNL

Transmission/Distribution Co-simulation Approaches  
**Bryan Palmintier**, NREL

T&D Co-simulation Considerations  
**Ning Kang**, ANL

Protection Implications of DER  
**Ratan Das**, GE

Load forecasting for planning  
**Paritosh Das**, NREL

10:00 – 10:30 a.m.

**Break**

**Location:** Bear Prefunction

12:00 – 1:00 p.m.

**Lunch**

**Location:** Rio Grande Bar

1:00 – 3:00 p.m.

**Research and Education Working Group**

Chair: **Mark O'Malley**, NREL

**Location:** Bear

The Research and Education Working Group will continue discussion and preparation of the ESI research road map. The work will continue the next week at a special session of ESIG's Second International Conference on Energy System Integration, which will be hosted at Imperial College in London.

1:00 – 3:00 p.m.

**Reliability Working Group**

Co-chairs: **Sebastian Achilles / Jason MacDowell**, GE **Location:** Eagle

The Reliability Working Group will hold the first meeting of the High-Share of Inverter-Based Generation Task Force. This includes discussion and presentations around challenges and technology capability (such as grid forming inverters) to address system reliability needs with high penetration of inverter-based resources. The modeling task force will also cover modeling needs and updates for inverter-based resources.

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1:00 – 3:00 p.m.

## System Operations and Market Design Working Group

Chair: **Aidan Tuohy**, EPRI

**Location:** Tamaya FGH

The System Operations and Market Design Working Group will continue sharing recent experience and identifying challenges and solutions related to energy systems integration. At this meeting, we will focus on how several specific issues are currently modeled and could be modeled in the future using advanced production cost modeling tools. These tools are intended to simulate operations and can be used to examine impacts of the changing resource mix, support investment decisions and understand how changes to operating strategy impact outcomes. Topics covered include gas/electric interactions as the resource mix changes, the use of probabilistic information to support system operations, and a study of how different levels of detail in models can impact on the results observed. A panel discussion will be held at the end to identify ways the working group can support efforts in the area. WG members are encouraged to send any material in advance, relevant to this or other related activities, to share with the group during the discussion (atuohy@epri.com).

3:00 – 3:15 p.m.

**Break**

**Location:** Bear Prefunction

3:15 – 5:15 p.m.

## Distributed Energy Resources (DER) Working Group

Chair: **Debbie Lew**, GE

**Location:** Eagle

The DERWG will focus on DER behavior during disturbances and resulting operational issues; how protection practices change from the transmission to distribution system and resulting requirements from inverter-based resources; grid-forming converters applications in microgrids; and non-wires alternatives.

3:15 – 5:15 p.m.

## System Planning Working Group Meeting

Chair: **Aaron Bloom**, NextEra Analytics

**Location:** Tamaya FGH

The System Planning WG will explore three topics in a talk show format. There will be no power points. Panelists will be asked to discuss how their organization is planning for: new import and export patterns; extreme weather and climate; and neighbors that are aiming for 100% Renewable Energy. The goal of the session is to create new knowledge about these topic areas through an active discussion with the audience. At the completion of the session, an outline will be generated for an ESIG blog post.

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6:00 – 8:30 p.m.

**20** Wednesday

7:00 – 8:00 a.m.

8:00 – 9:00 a.m.

9:00 – 11:45 a.m.

## ESIG Board of Directors Meeting/Dinner

**Location:** Badger

## Registration & Breakfast

**Location:** Rio Grande Bar

## Welcome and Overview Session

Introduction

**Mark Ahlstrom**, NextEra Energy Resources

**Location:** Tamaya FGH

Local Welcome

**Bob Cummings**, NERC

Keynote Remarks – Local Perspective

**Todd Fridley**, VP, New Mexico Operations, PNM

Keynote Remarks - North American Perspective

**Jim Robb**, CEO, NERC

Meeting Overview

**Charlie Smith**, ESIG

## Opening Plenary: Managing a High Penetration Power System

Chair: **Nick Miller**, Hickory Ledge Consulting

**Location:** Tamaya FGH

MISO Renewable Energy Impact Assessment

**Jordan Bakke**, MISO

Grid Forming Inverters, What's the Buzz

**Dennis Woodford**, Electranix

A European View on Grid Forming Inverters and Network Codes

**Ralph Pfeiffer**, Amprion / ENTSO-E, Germany

Grid Forming Inverters: Requirements and Practical Applications

**Abraham Ellis**, Sandia National Laboratory

Grid Forming Converter System Control Strategies

**Deepak Ramasubramanian**, EPRI

Could Grid Forming be a Silver Bullet for High Inverter-Based Penetration?

**Julia Matevosyan**, ERCOT

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10:00 – 10:15 a.m.

**Break**

**Location:** Tamaya Prefunction North

11:45 a.m. – 12:15 p.m.

**ESIG Annual Membership Meeting**

**Location:** Tamaya FGH

12:15 – 1:15 p.m.

**Lunch**

**Location:** Rio Grande Bar

1:15 – 3:00 p.m.

### **Session 1 – Improving Flexibility and Frequency Response**

Chair: **Bethany Frew**, NREL

**Location:** Tamaya FGH

Flexibility from Thermal/Electric Energy Systems Integration,  
**Danny Pudjianto**, Imperial College London, UK

CHP as a source of flexibility in Northeast Branch of SGCC  
**Yu Jun**, Northeast Branch, SGCC, China

Frequency Response Assessment of Three NA Interconnections with  
High PV Penetration  
**Yilu Liu**, ORNL

El Frequency Response Assessment with Inverter Based Resources  
**Olushola J. Lutalo**, NERC

1:15 – 3:00 p.m.

### **Session 2 – Distribution System Developments**

Chair: **Debbie Lew**, GE

**Location:** Bear

Planning the Integration of DER in the Colombian Power Grid  
**Lina Ramirez**, XM Grid Operator, Colombia

Case Study on an Alternative Approach to Distributed Energy Demand  
**Chase Lansdale**, Electric Power Engineers

Forecasting Adoption of DERs  
**Ben Sigrin**, NREL

Market Integration of DERs and Storage  
**Dave Edelson**, NYISO

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3:00 – 3:15 p.m.

**Break**

**Location:** Tamaya Prefunction North

3:15 – 5:00 p.m.

### Session 3 - Electric Transportation and Energy System Integration

Chair: **Obadiah Bartholomy**, SMUD

**Location:** Tamaya FGH

Energy Supply and Consumption with High EV Penetration  
**Todd Davidson**, U of Texas, Austin

Integration of Electric Transportation  
**Bernie Ernst**, Fraunhofer IEE, Germany

When the Rubber Hits the Grid: Planning for 100% Transit Electrification in Renewable Power Systems  
**Liz Waldren**, Black & Veatch

Turning EVs into Grid Assets  
**Pamela MacDougall**, NRDC

3:15 – 5:00 p.m.

### Session 4 - Preparing for Future Energy Systems

Chair: **Charlton Clark**, DOE

**Location:** Bear

Transmission Topology Optimization for Congestion Management  
**Pablo Ruiz**, Brattle & **Jay Caspary**, SPP

Linking Grid Services to Storage and Hydropower Plant Capabilities  
**Rebecca O'Neil**, PNNL

Energy System Integration Modeling and Planning: Practice in China  
**Jingwei Yang**, Tsinghua University, China

Future System Impact of DOE Solar Integration Activities  
**Guohui Yuan**, DOE

Impact of VG on Average ISO Wholesale Prices  
**Andrew Mills**, LBNL

6:30 – 8:00 p.m.

### Annual Awards Reception & Student Poster Session

**Location:** Tamaya Veranda

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# 21 Thursday

7:00 – 8:00 a.m.

7:00 – 8:00 a.m.

8:00 – 9:45 a.m.

8:00 – 9:45 a.m.

**Breakfast**

**Location:** Rio Grande Bar

**Early Career Networking Breakfast**

**Location:** Puma

**Session 5 - High Penetration and Weak Grid Issues**

Chair: **Jason MacDowell**, GE

**Location:** Tamaya FGH

Blackstart of Wind and Solar Plant with Battery Grid Forming Inverter  
**Vahan Gevorgian**, NREL

A First Methodology to Assess the Economic Cost Related to the Inertia Issue  
**Grégoire Prime**, EDF, France

System Dynamic Interactions with Wind Plants  
**Shahil Shah**, NREL

Qinghai High Penetration Case Study  
**Caixia Wang**, SGERI, China

Weak Grid Case Study  
**Yongning Chi**, CEPRI, China

**Session 6 - Energy Storage Developments**

Chair: **Russ Philbrick**, Polaris Optimization

**Location:** Bear

Filings in Response to FERC Order 841  
**Jason Burwen**, Energy Storage Association

Demonstration of Advanced Frequency Response Battery Energy Storage for Low-inertia WECC Scenarios  
**Yingchen Zhang / Vahan Gevorgian**, NREL

Energy Storage Optimization for Solar Power Plant Applications  
**Mak Nagle**, sPower

Long Duration Energy Storage Batteries  
**Lynn Trahey**, ANL

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9:45 – 10:15 a.m.

**Break**

**Location:** Tamaya Prefunction North

10:15 a.m. – 12:30 p.m.

**Closing Plenary – Long-term Planning Considerations**

Chair: **Mark O'Malley**, NREL

**Location:** Tamaya FGH

CIGRE Global Electricity Network Feasibility Study  
**David Radu**, University of Liège, Belgium

Incorporating the Social Cost of Carbon into Market Prices  
**Dave Edelson**, NYISO

Integrated Gas and Electricity Planning  
**Antje Orths**, Energinet, Denmark

Role of Renewable Energy in Electrification and Decarbonization  
**Chris Clack**, Vibrant Clean Energy

Consumer Behavior and Technology Adoption  
**Geertje Schuitema**, University College Dublin, Ireland

Working Group Meeting Summaries  
**Josh Novacheck**, NREL

12:30 – 12:40 p.m.

**Closing Remarks**

**Charlie Smith**, ESIG

**Location:** Tamaya FGH

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