



2023 SPRING TECHNICAL WORKSHOP

March 27-30, 2023

Loews Ventana Canyon Resort – Tucson, AZ

PROGRAM AGENDA

Monday, March 27, 2023

8:00 – 9:00 a.m.

Registration & Breakfast

Location: Foyer JKL

9:00 a.m. – 12:00 p.m.

Tutorial: Integrating Planning Tools and Processes for Effective Planning of Future Power Systems

Location: Ballroom BC

Organizers: **Aidan Tuohy**, Senior Program Manager, EPRI; **Bethany Frew**, Group Manager, Capacity Expansion & Electricity Markets Group, NREL; **Julia Matevosyan**, Chief Engineer, ESIG; **Jason MacDowell**, Chief Systems Integration Officer, ESIG

As the power system continues to decarbonize and add more renewables, energy storage and demand side resources, planning methods have to evolve to ensure continued reliability and economic effectiveness. At the same time, they must meet new requirements for decarbonization, resilience and customer preferences. This will require revisiting how we currently plan the power system, as different modeling tools and processes have evolved over the years to study different aspects of system planning. This includes capacity expansion, production cost and resource adequacy, power flow and dynamics, distribution planning and other study areas. While there has always been some linkages between these areas, industry now needs to revisit and strengthen these linkages to better reflect issues that cut across multiple areas.

For example, using production cost modeling data to inform transmission planning cases requires more detailed consideration, now that simply studying peak and off-peak cases may no longer shed light on the highest risk periods, and results from the power flow and dynamic studies may have greater impact on how the system should be dispatched. Similarly, new technologies such as energy storage and various demand side resources can provide a greater range of services across generation, transmission and distribution and therefore need greater tool and model integration. This session will describe the need for more integrated planning, discuss the latest developments in the area and identify gaps.

First, researchers and power system study experts will provide an overview of the main challenges and current leading-edge practices with a set of detailed presentations. Then a panel of utility and ISO experts will provide their view on specific areas of the integrated planning discussion. Questions to be answered include the following:

- What does an analytical framework for integrated planning look like, and how does it change depending on the regulatory structure of the region studied?

- What tools can be used to integrate planning processes?
- How is data shared between tools and information transferred from one tool to another, particularly in a two-way fashion?
- What changes are being made in companies to better structure their organizations to respond to integrated planning needs?
- What tool capabilities are going to be more useful and necessary as the system evolves?

Introduction to Session

Aidan Tuohy, Senior Program Manager, EPRI (5 mins)

Integrated Strategic System Planning – What Are the Needs, What Does a Framework Look Like?

Anish Gaikwad, Senior Program Manager, EPRI (30 mins)

Linking Modeling Tools for Analyzing High Renewable Systems

Elaine Hale, Senior Research Engineer, NREL

10:15 – 10:35 a.m.

Break

Location: Foyer

Advanced Linkages Between Power Flow and Production Cost

Andrew Bachert, Principal, GE Energy Consulting (30 mins)

Panel (7-10 mins per panelist)

Starting Up Integrated Planning Processes

Angie Bond-Simpson, Director, Integrated System Planning & Support, Salt River Project

Data Management and Linking Tools

Armando Figueroa Acevedo, Engineer – Strategic Assessments, MISO

Tool Integration to Study Future Energy Systems

Carlo Brancucci, Co-founder/CEO, encoord

Linking Planning Processes

John Goldis, Chief Technology Officer, Newton Energy Group

Panel discussion (15-25 mins)

9:00 a.m. – 12:00 p.m.

Special Event: An Introduction to G-PST

Location: Salon JK

Session Purpose: The Global Power System Transformation Consortium (G-PST) is an international collaboration whose mission is to catalyze a rapid clean energy transition at unprecedented scale and speed. G-PST provides a coordinated and holistic approach to the necessary knowledge, education and support to power system operators across its 5 Action Pillars or workstreams. G-PST has a strong education and collaboration component to it; one goal of this peer learning is to share the learnings of those farther along with those just coming up the learning curve in order to circumvent the need for everyone to learn the same lessons over again. To that end, today's event will describe GPST's approach and activities, and take a deep dive into two topics of interest. The first is an initiative to accelerate the commercial deployment of grid forming (GFM) equipment through the development of GFM performance requirements and standards, and using those standards in the commercial procurement, application and testing of GFM equipment. This is being done through the GPST GFM Technology Council. The second topic explores the real-world power system transformation experience of G-PST members around the globe, and features system operators from

Ukraine, Vietnam and Colombia, discussing the challenges they are facing, the advances they have made, and the challenges which remain before them. The panel session seeks to engage system operators with a range of experience in decarbonization in the conversation, to better understand the path ahead and stimulate ideas for better sharing of experience and lessons learned to help accelerate the energy transition.

Who should attend: Anyone who would like to know more about the Global Power System Transformation (G-PST) consortium; utilities and system operators who are on the early part of their journey to transformation of their own system and would like to share experiences with other like-minded system operators; those who are further along the journey and would like to offer guidance and assistance; anyone curious about the challenges and opportunities facing these system operators and interested in contributing to the discussion.

Chair: **Karin Wadsack**, Program Manager, Innovation and Entrepreneurship Center, NREL

GPST Overview (including short descriptions of G-PST five action pillars)
Karin Wadsack, Program Manager, NREL

GPST Grid Forming Technology Council (accelerating the application of GFM equipment)
Jason MacDowell, Chief Systems Integration Officer, ESIG

Introduction to International Activities through Pillar 2, Country Partnerships
Amy Rose, Energy Analyst, NREL

“Ukrenergo Synchronization with ENTSO-E: Recent Experiences and Power System Repair/Restoration Activities.” Presenters from Ukrenergo will review challenges of power system operation during the war, and discuss the role of last year’s synchronization with ENTSO-E in maintaining power supply during critical stress periods.

Kateryna Deikun-Stepanchuk, Senior Engineer, Ukrenergo (Ukraine)
Liubov Lapko, Head of Group of Operation Calculation of Regimes, Optimization and Loss Forecasting, Ukrenergo (Ukraine)

“Variable Renewable Energy Challenges and Considerations on the Colombia Power System.” XM will present on the Colombia system to provide the context for challenges including a) the need for real-time inertia calculation considering anticipated decrease, b) flexibility adequacy for a changing set of power generation assets, and c) current calculation of reserve requirements and approach to new methodology including dynamic information processing for, specifically, secondary frequency reserves with uncertainty of solar and wind contribution.

Julian Castano Marin, Postoperative Analyst, XM (Colombia)
Jorge Andrés Mola, Planning Analyst, XM (Colombia)

10:15 - 10:35 a.m.

Break

Location: Foyer JKL

“Vietnam, a system in rapid transition.” Vietnam has experienced massive growth in rooftop and utility-scale solar over the last 4 years. NLDC, the power system operator, will share challenges, lessons learned, and the solutions they are implementing for planning, operation, and the deployment of new tools on their system.

Quynh Pham, Deputy Manager of Power System Analysis and Planning Engineer, NLDC, Vietnam
Bui Duy Linh, Renewable Operator, NLDC, Vietnam

Facilitated Panel Discussion and Q&A with audience

- How have the training and capacity building needs of your SO staff changed with the energy transition? What are you doing to address these emerging needs?
- How has peer exchange with other SOs helped overcome challenges and accelerate the deployment of solutions? What specific technical challenges or solutions lend themselves to peer exchange with other SOs?
- What additional types of technical assistance from those further along in the energy transition would have the most benefit?
- What opportunities exist for regional cooperation to help accelerate the energy transition in your region?
- What would be helpful for you in preparing for the application of GFM equipment?

12:00 – 2:00 p.m.

Lunch

Location: Bill's Grill

2:00 – 5:00 p.m.

Introduction & Keynote Comments

Location: Ballroom BC

2:00 - 3:15 p.m.

Welcome

Mark Ahlstrom, President, ESIG Board of Directors & NextEra Energy Resources

Keynote Comments: Planning for the Energy Transition

Alice Jackson, SVP, System Strategy & Chief Planning Officer, Xcel Energy

Meeting Overview

Charlie Smith, Executive Director, ESIG

3:15 – 3:45 p.m.

Break

Location: Foyer-Grand Ballroom

3:45 – 5:00 p.m.

Opening Plenary: A Panel Discussion: High VRE Future – A Way Forward

Chair: **Danielle Merfeld**, SVP & CTO, Hanwha Qcells

- **Alice Jackson**, SVP, System Strategy & Chief Planning Officer, Xcel Energy
- **Jaquelin Cochran**, Director, Grid Planning and Analysis Center, NREL
- **Debbie Lew**, Associate Director, ESIG

6:00 – 8:30 p.m.

Board Meeting & Dinner

Location: Executive Boardroom

Tuesday, March 28, 2023

7:00 – 8:00 a.m.

Registration & Breakfast

Location: Foyer-Grand Ballroom

8:00 – 9:45 a.m.

Session 1: Interregional Transmission

Location: Ballroom BC

Chair: **Debbie Lew**, Associate Director, ESIG

Interregional Transmission – A Landscape Analysis

Dev Millstein, Research Scientist, LBNL

National Transmission Needs Study

Adria Brooks, Transmission Engineer, US Department of Energy

National Transmission Planning Study Update

David Palchak, Transmission Group Manager, NREL

European Transmission Planning with Offshore Networks

Antje Orths, Chief Engineer, Energinet (Denmark)

9:45 – 10:15 a.m.

Break

Location: Foyer-Grand Ballroom

10:15 a.m. – 12:00 p.m.

Session 2: Scaling EVs - Grid Considerations

Location: Ballroom BC

Chair: **Obadiah Bartholomy**, Manager, Distributed Energy Strategy, SMUD

Utility EV Forecasting Grid Expansion

Andy Eiden, Principal Planning & Strategy Analyst, Distributed Resources,
Portland General Electric

Value of EV Managed Charging to Bulk Power Systems

Elaine Hale, Senior Research Engineer, NREL

Luke Lavin, Researcher, Grid Planning and Analysis Center, NREL

Evolution of Distribution Planning for Utilities

Sergio Islas, Sr. Advisor – Distribution System Operator, Southern Cal Edison

Reliability Considerations with Large-scale EV Charging

Joe Eto, Senior Advisor: Electricity Markets & Policy Department, LBNL

12:00 – 12:30 p.m.

Annual Meeting

Location: Ballroom BC

12:30 – 1:30 p.m.

Lunch

Location: Bill's Grill

1:30 – 3:30 p.m.

Session 3: GFM Requirements and Specifications

Location: Ballroom BC

Chair: **Ben Kroposki**, Director - Power Systems Engineering Center, NREL

GFM Batteries: A Unique Window of Opportunity

Julia Matevosyan, Chief Engineer, ESIG

ENTSO-E Requirements for Generators 2.0 Including GFM Specifications
Mario Ndreko, Electrical System Design, TenneT TSO GmbH (Germany)

Performance Based GFM Specification and Testing
Lukas Unruh, Power System Studies Engineer, Electranix

UNIFI GFM Performance Requirements
Deepak Ramasubramanian, Technical Leader, EPRI

NG ESO GFM Specification Best Practice Application Guide
Nick Harvey, Head of Network Operability, National Grid ESO (United Kingdom)

AEMO Draft Grid Forming Specifications
Nilesh Modi, Specialist, AEMO (Australia)

3:30 – 4:00 p.m.

Break

Location: Foyer-Grand Ballroom

4:00 – 5:30 p.m.

Session 4: Power Systems Operation

Location: Ballroom BC

Chair: **Josh Novacheck**, Transmission Planning Engineer, NextEra Energy Resources

Optimal Real-time Operations of Storage and Hybrids
Andy Kruse, Sr. Manager, Business Development, Ascend Analytics

Lessons Learned from 20 Years of International Renewables Integration Consulting
Thomas Ackermann, CEO/Founding Partner, Energynautics (Germany)

New Valuation and Opportunities for Pumped Storage Hydro
Nick Miller, Principal, HickoryLedge LLC

An Update from Kaua'i
Cameron Kruse, Engineering & Technology Manager, Kauai Island Utility Cooperative

6:30 – 8:00 p.m.

Awards/Networking Reception

Location: Bill's Grill

Wednesday, March 29, 2023

7:00 – 8:00 a.m.

Breakfast

Location: Foyer-Grand Ballroom

8:00 – 9:45 a.m.

Session 5: IBR Studies and Tools

Location: Ballroom BC

Chair: **Jason MacDowell**, Chief Systems Integration Officer, ESIG

Dynamic Stability Screening Approaches for High IBR Systems
Matt Richwine, Founding Partner, Telos Energy

Analysis of 19.5 Hz Oscillation on Kaua'i Island System
Jin Tan, Principal Engineer, NREL

Dynamic Performance Optimization for 100% Inverter-based Power Systems: Experiences from Hawai'i Island.

Ulrich Münz, Principal Key Expert, Siemens

New System Strength Metrics

Yue Zhu, Research Associate, Imperial College London (UK)

NERC EMT Modeling Guide

Alex Shattuck, Senior Engineer - Engineering and Security Integration, NERC

9:45 – 10:15 a.m.

Break

Location: Foyer-Grand Ballroom

10:15 a.m. – 12:00 p.m.

Session 6: Different Aspects of Resource Adequacy

Location: Ballroom BC

Chair: **Tom Acker**, Sr. Principal Engineer, Salt River Project

Climate and Weather Impacts on Resource Adequacy

Justin Sharp, Principal/Owner, Sharply Focused LLC

Probabilistic Operational Reserves Strategy with Increasing Solar and Storage

Sean Morash, Principal, Telos Energy

Improving RA Representations in Capacity Expansion Planning

Gord Stephen, Grid Systems Research Engineer, University of Washington

Modeling Transmission and Demand Side Resources in RA Studies

Irene Danti Lopez, EPRI

RA Reform: Uncertain Heterogenous Markets

Leah Kaffine, Director of Energy Market Fundamentals, Pattern Energy

12:00 – 1:30 p.m.

Lunch

Location: Bill's Grill

1:30 – 3:00 p.m.

Session 7: Planning Implications with Storage and IBRs

Location: Ballroom BC

Chair: **Aidan Tuohy**, Senior Program Manager, EPRI

Energy Storage Developments and Application in the Northeast China Grid

Sun Yu, Northeast China Branch of SGCC (China)

Long Duration Energy Storage

Babu Chalamala, Manager of Energy Storage Technology and Systems Department, Sandia National Laboratory

Application of GFM Batteries in Australia

Nilesh Modi, Specialist, AEMO (Australia)

Renewables and Pumped Hydro for the Alaskan Railbelt

Jonghwan Kwon, Energy Systems Engineer, ANL

3:00 – 3:30 p.m.

Break

Location: Foyer-Grand Ballroom

3:30 – 5:20 p.m.

Session 8: Closing Plenary Session - Flexibility in Sector Coupling

Location: Catalina Ballroom

Chair: **Anders Bavnhoj Hansen**, Chief Engineer, Energinet (Denmark)

ENTSO-E/G Long-term Scenarios for a Sector Coupled System

Antje Orths, Chief Engineer, Energinet (Denmark)

Sector Coupling System Design Towards Carbon Neutrality and Market Challenges – a German Perspective

Ralph Pfeiffer, Head of National and European Grid Planning Processes, Amprion GmbH (Germany)

Power Market Solutions for a Highly Sector Coupled System - a US LMP Perspective

Alex Rudkevich, President, Newton Energy Group

Integrated Energy Sector Planning

Carlo Brancucci, Co-founder/CEO, encoord

System Development Towards a Highly Sector Coupled Energy System – Strategy and R&D Roadmap for Denmark

Anders Bavnhoj Hansen, Chief Engineer, Energinet (Denmark)

5:20 – 5:30 p.m.

Closing Comments

Charlie Smith, Executive Director, ESIG

Thursday, March 30, 2023

7:00 – 8:00 a.m.

Breakfast

Location: Foyer-JKL

9:00 a.m. – 12:00 p.m.

Reliability Working Group

Location: Salon J

Chair: **Jason MacDowell**, Chief Systems Integration Officer, ESIG

Stability Task Force – Oscillations Guide (45-60 min)

Nick Miller, Principal, HickoryLedge LLC

Services Task Force (30-45 min)

Deepak Ramasubramanian, Technical Leader, EPRI

GFM Landscape Paper (10-15 min)

Julia Matevosyan, Chief Engineer, ESIG

GFM capabilities/performance with different GFM controls (20-30 min)

Shahil Shah, Senior Research Engineer, NREL

GPST GFM Technical Council update

Jason MacDowell, Chief Systems Integration Officer, ESIG

I2X project update (10 min)

Julia Matevosyan, ESIG and **Jason MacDowell**, ESIG

Group Discussion (10-15 min)

9:00 – 11:00 a.m.

System Planning Working Group

Location: Salon K

Chair: **Josh Novacheck**, Transmission Planning Engineer, NextEra Energy Resources

Transmission Resilience Task Force

Warren Lasher, President, Lasher Energy Consulting

DERs and Transmission

Keegan Moyer, Principal, Energy Strategies

Integrated Planning

Carlos Brancucci, Co-founder/CEO, encoord

Planning for 100% Clean

Nischal Rajbhandari, Sr. Planning Engineer, NYISO

Group Discussion

10:00 – 10:30 a.m.

Break

Location: Foyer-Grand Ballroom

11:00 a.m. – 12:00 p.m.

New Resource Adequacy Task Force

Location: Salon K

DOE Resource Adequacy – Tools and Data

Bethany Frew, Group Manager, Capacity Expansion & Electricity Markets Group, NREL,

Debbie Lew, Associate Director, ESIG, and **Aidan Tuohy**, Sr. Program Manager, EPRI

Overview of project (10 min)

Past work and how this new task force fits in (30 min)

Interactive topics and polling (10 min)

Task Force expectations and vision (10 min)

12:00 – 1:00 p.m.

Lunch

Location: Bill's Grill

1:00 – 4:00 p.m.

System Operations and Market Design Working Group

Location: Salon J

Chair: **Aidan Tuohy**, Senior Program Manager, EPRI and **Erik Ela**, Principal, EPRI

DOE Resource Adequacy – Tools and Data

(continued discussion)

ESIG Resource Adequacy Efforts

Derek Stenclik, Founding Partner, Telos Energy

Markets for 100% Clean Energy Task Force
Erik Ela, EPRI and **Debbie Lew**, ESIG

Flexibility/Hydrogen Task Force
Aidan Tuohy, EPRI

Extreme Weather Task Force
Justin Sharp, Sharply Focused

Group Discussion

1:00 – 3:00 p.m.

DER Working Group

Location: Salon K

Chair: **Obadiah Bartholomy**, Manager, Distributed Energy Strategy, SMUD

Grid Planning for Transportation Electrification Task Force (30 min)
Sean Morash, Principal, Telos Energy

Transmission-Distribution-Customer Coordination Initiative (30 min)
Brian Levite, Senior Manager, ICF and **Paul DeMartini**, Consultant

Group Discussion

Buildings Task Force (30 min)
Obadiah Bartholomy, Manager, Distributed Energy Strategy, SMUD

Group Discussion

2:30 – 3:00 p.m.

Break

Location: Foyer-Grand Ballroom