INTERCONNECTION INNOVATION e-XCHANGE

U.S. DEPARTMENT OF ENERGY

an EERE collaboration between SETO & WETO

Launch Webinar

June 7th, 2022

Presenter

Ammar Qusaibaty

Technology Manager

Solar Energy Technologies Office

Meeting Recording Announcement

This Zoom call is being recorded and may be posted on DOE's website or used internally. If you do not wish to have your voice recorded, please do not speak during the call or disconnect now. If you do not wish to have your image recorded, please turn off your camera or participate only by phone. If you speak during the call or use a video connection, you are presumed to consent to recording and to the use of your voice or image.

Zoom Logistics

- Audience video, unmute, and chat functions are disabled
- Q&A function is enabled and can be used to propose questions to speakers and panelists
  - Q&A vote function is enabled allowing you to show increased interest in a particular question
- **Note:** We may not get to questions today, but they will be aggregated to inform future i2X engagement discussions
- **Reminder:** Webinar will be recorded and posted to the i2X website shortly following the event.

Jim Ahlgrimm

Acting Director

Wind Energy Technologies Office

A Special Thank You to our Inaugural Partners

Suncatch Energy LLC

NARUC
National Association of Regulatory
Utility Commissioners

Keynote Speaker:

Jennifer M. Granholm

U.S. Secretary of Energy

INTERCONNECTION INNOVATION e-XCHANGE
U.S. DEPARTMENT OF ENERGY

Opening Remarks:

Alejandro Moreno

Deputy Assistant Secretary

Office of Energy Efficiency and Renewable Energy

AGENDA

1. **Program Overview**
   (1:20 – 1:30 PM)
2. **Panel Discussions**
   (1:30 – 2:30 PM)
3. **Problem Prioritization**
   (2:30 – 2:40 PM)
4. **Event Closing**
   (2:40 – 3:00 PM)

Presenter

Dr. Cindy Bothwell

Grid Integration Engineer

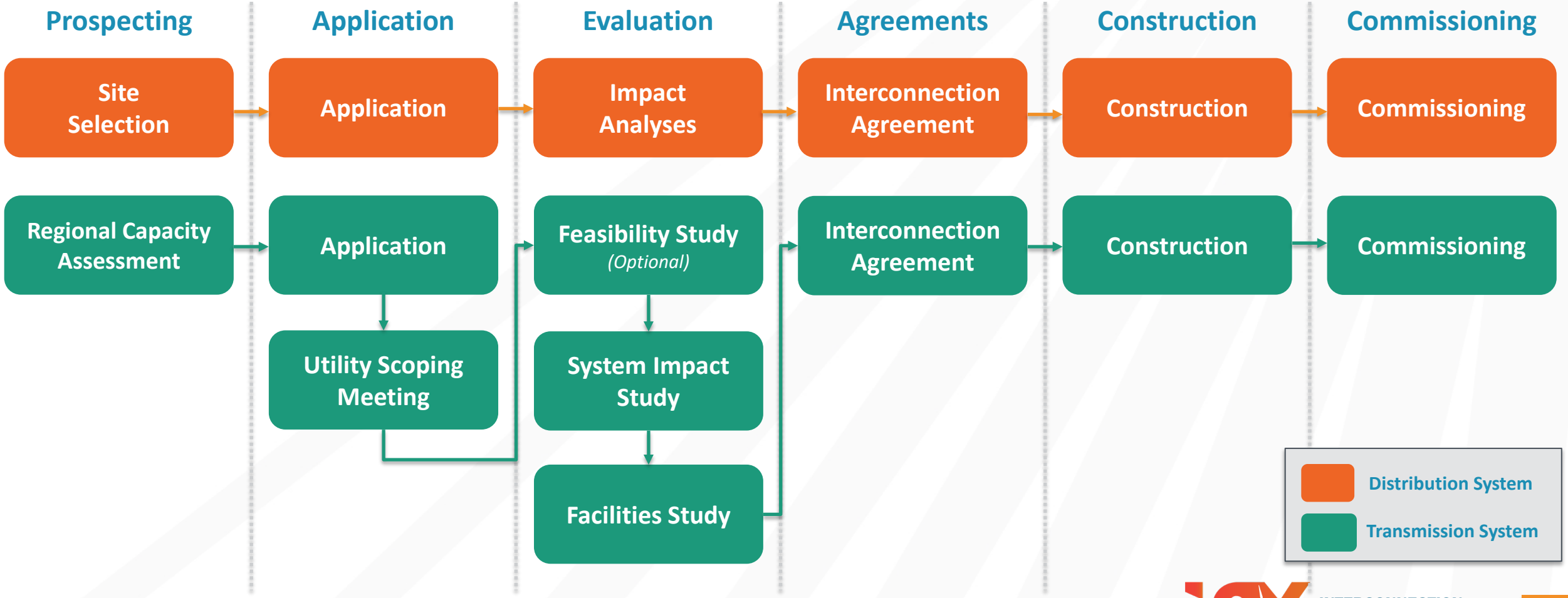
Wind Energy Technologies Office

Program Overview

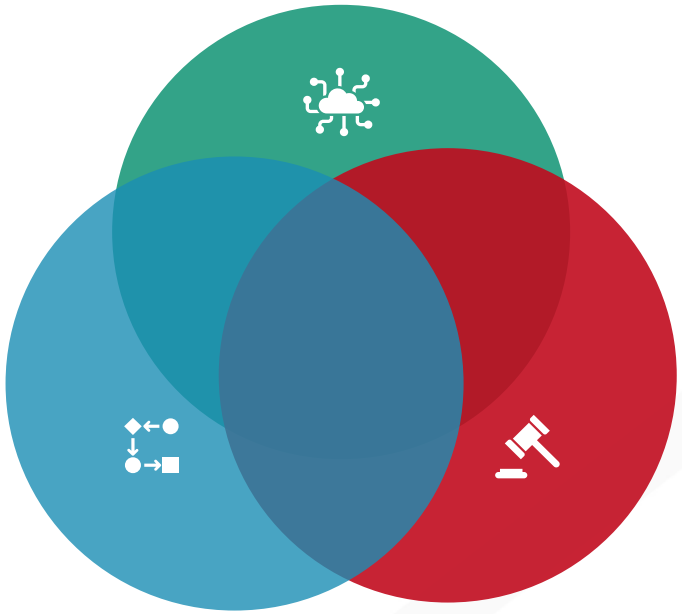
- Interconnection Background
- i2X Mission
- Program Pillars
- Team Introduction

INTERCONNECTION INNOVATION e-XCHANGE
U.S. DEPARTMENT OF ENERGY

A Framework for Examining Interconnection



Workshop Feedback on Interconnection Challenges



Technology & Engineering

- Complex grid reliability impact assessments of intermittent generation assets
- Outpaced Transmission planning and expansion by high incentives for renewables
- Fragmented Transmission & Distribution institutional coordination

Administrative Process

- Insufficient human resources and capabilities to manage long queues
- Unfair cost allocations triggered by unpredictable grid networks upgrades
- Opaque grid networks data and modeling informational asymmetries

Markets & Regulation

- Dizzying rules and regulators for interconnecting to distribution networks
- Misaligned utility models for private ownership of distributed generation
- Insufficient regulatory oversight of queue management and compliance

Prior Distribution Interconnection Work

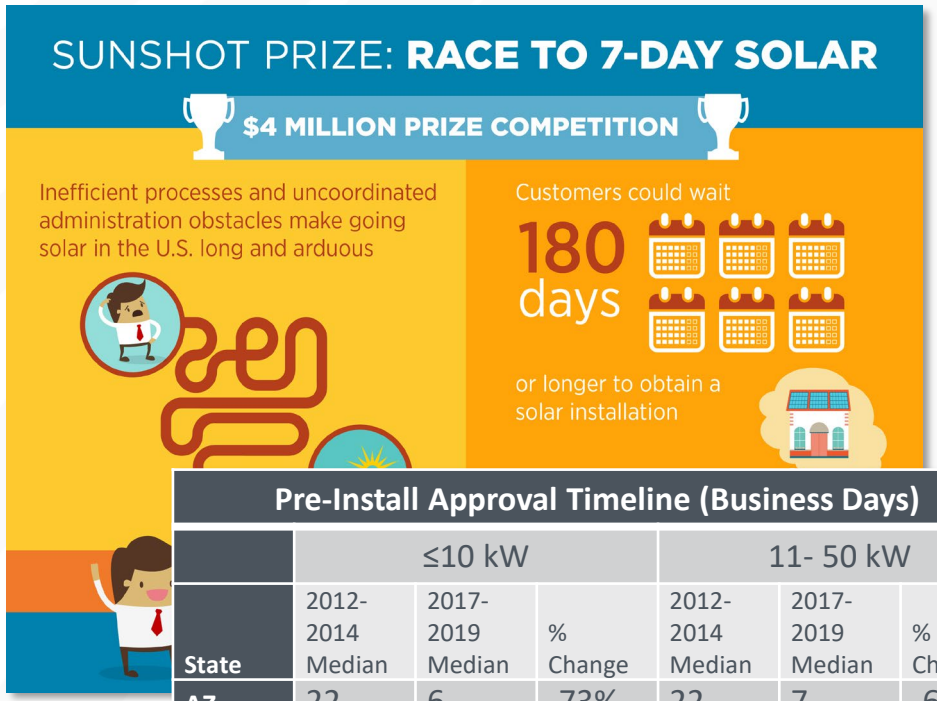
8% Of existing SETO portfolio dedicated to improving solar interconnection experience the last decade totaling between $125 and $150 Million

70+ Projects in SETO portfolio with cross-team collaboration in 25 programs and with 65+ Organizations

$40M Of current SETO funding allocated to addressing interconnection challenges primarily focused on distribution-connected renewables

71% Average median reduction in pre-install approval timeline for systems ≤10 kW between 2014 and 2019.

3 Workshopping events held by SETO and WETO to engage with diverse stakeholders on reimagining interconnection for distributed energy resources

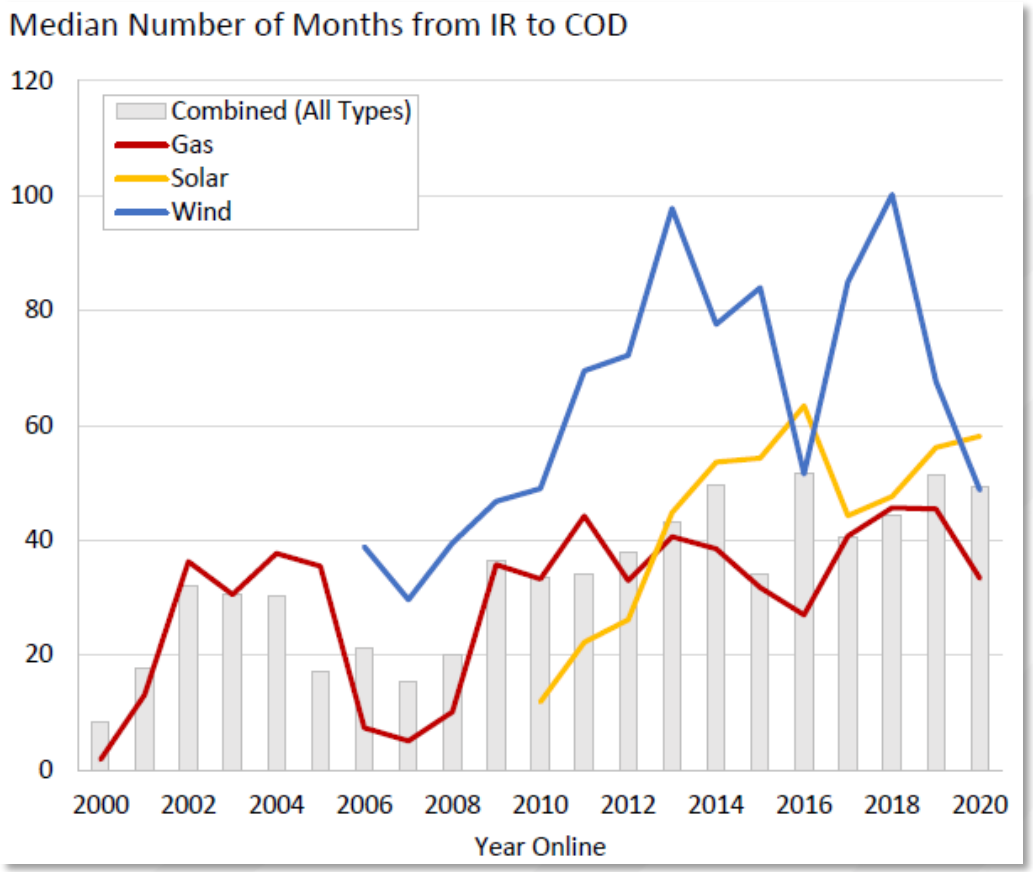


Pre-Install Approval Timeline (Business Days)

	≤10 kW			11- 50 kW		
State	2012-2014 Median	2017-2019 Median	% Change	2012-2014 Median	2017-2019 Median	% Change
AZ	22	6	-73%	22	7	-68%
CA	20	0	-100%	23	6	-74%
CO	32	12	-63%	25	14.5	-42%
NJ	14	6	-57%	15	8	-47%
NY	10	4	-60%	10	4	-60%

Source: NREL Lab Review of interconnection queues

Prior Bulk Power Interconnection Work



Source: "Queued Up v2: Extended Analysis on Power Plants Seeking Transmission Interconnection as of the End of 2020" by J. Rand, W. Gorman, D. Millstein, A. Mills, J. Seel, and R. Wider at Lawrence Berkely National Laboratory presented to DOE-SETO in January 2022

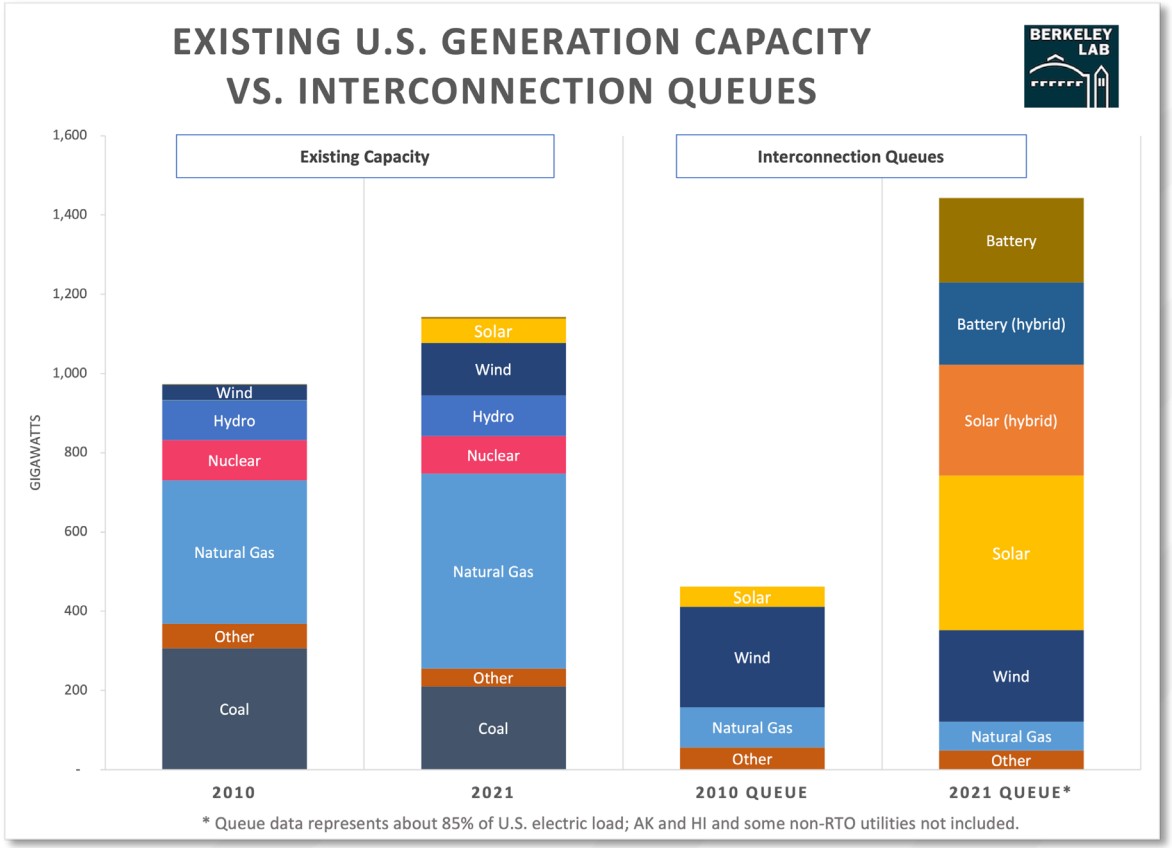
2 Investigatory projects through SETO and WETO set on evaluating the current interconnection landscape

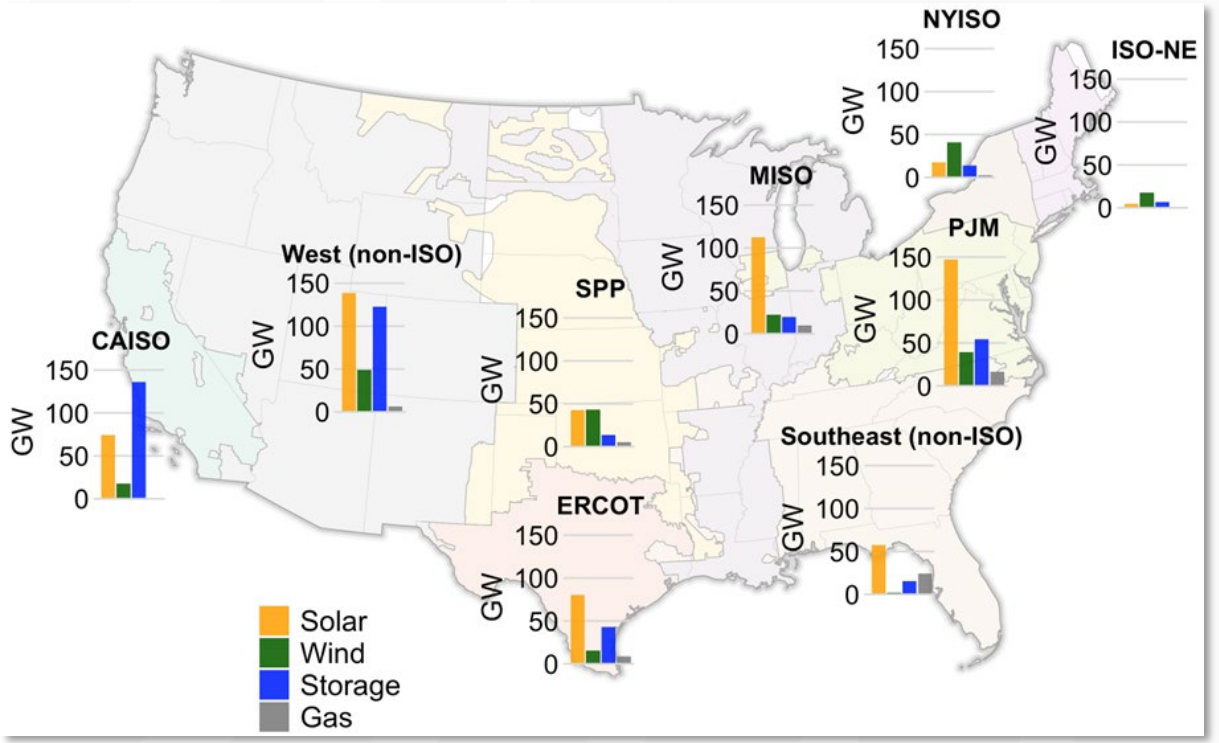
$10M Funding allocated by WETO to advancing transmission impact studies and capacity expansion

1 Workshops held by WETO focused on defining bulk power system interconnection and grid integration issues.

Prior efforts focused primarily on distribution with work on transmission interconnection to be heavily expanded in i2X.

Status of Interconnection Queue





The i2X Mission

To enable the **simpler**, **faster**, and **fairer** interconnection of solar and wind energy resources all while boosting **reliability**, **resiliency**, and **security** of our electric grid.

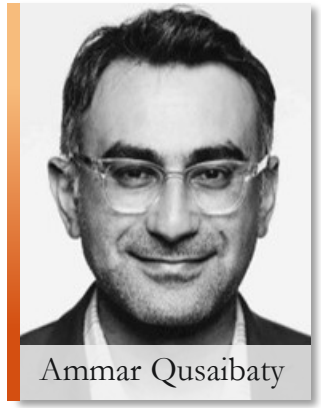
Stakeholder Engagement

Data Collection and Transparency

5-Year Strategic Roadmap

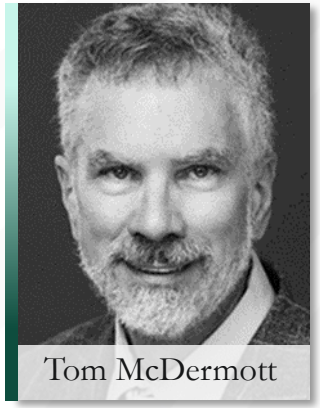
Technical Assistance

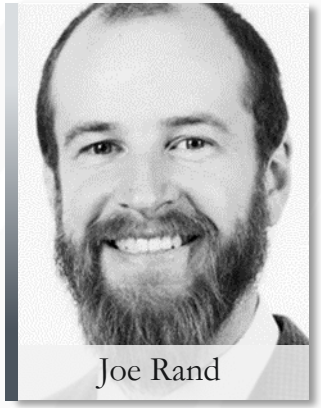
Leadership Team

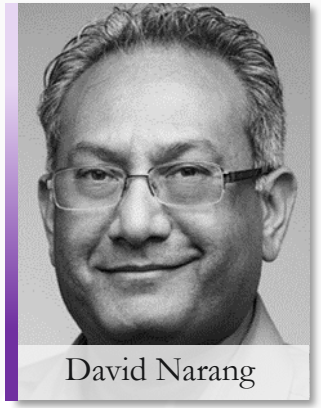

SETO
Ammar Qusaibaty

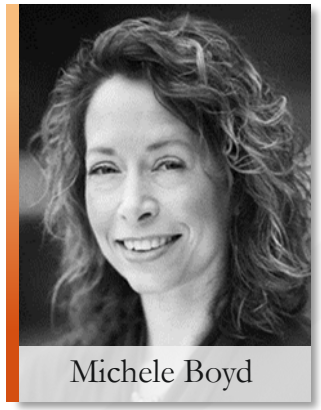

WETO
Cindy Bothwell


SETO
Shay Banton

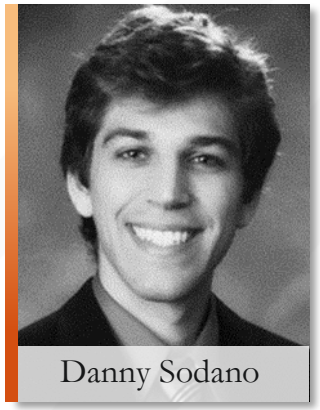

PNNL
Tom McDermott

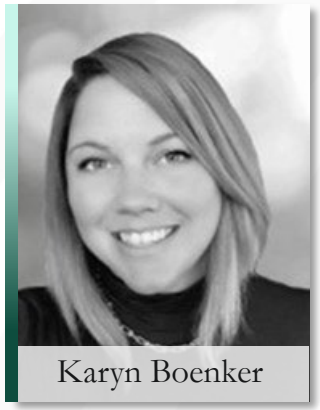

LBNL
Joe Rand

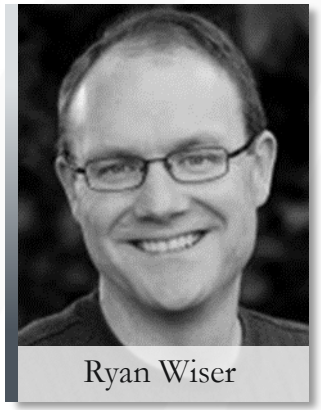

NREL
David Narang

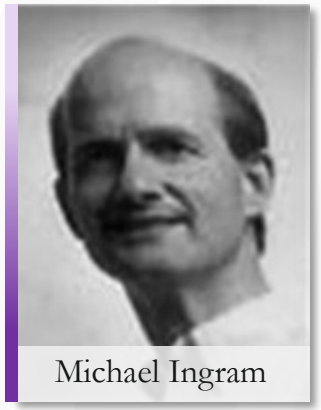

SETO
Michele Boyd


WETO
Jian Fu


SETO
Danny Sodano


PNNL
Karyn Boenker


LBNL
Ryan Wiser


NREL
Michael Ingram

Presenter

Shay Banton

Technology Manager

Solar Energy Technologies Office

Stakeholder Engagement & Technical Assistance Pillars

Stakeholder Diversity

Government
State / Local / Federal / Tribal / Regulators / Agencies

Utilities
Investor-Owned / Public Power / Munis / Cooperatives

Grid Operators
Independent Service Operators (e.g. PJM, MISO, CAISO)

Non-Profits
Trade Groups / Energy Justice / Environmental Conservation

For-Profits
Developers / Consultants / Off-Takers / Solutions Providers

Engagement Mechanisms

Working Groups

Regional
- Northeast
- Mid-Atlantic
- + more

Sector
- Utilities
- Developers
- + more

Topic
- Energy Justice
- Standards Adoption
- + more

Engagement Platform

Technical Assistance Opportunities

Goal: To provide access to various interconnection technical assistance opportunities to support our partners in their implementation of developed reforms

- **Implementing Queue Management Methods**
- **Accelerated Tool Development and Deployment**
- **Direct Access to Interconnection Experts**
- **Best Practices and Training**

Panel Discussion

Stakeholder Engagement & Technical Assistance Pillars

Naomi Davis

CEO & Founder

BIG blacksingreen

Kat Cox-Arslan

Director, Interconnection Policy

borrego

Danielle Sass Byrnett

Director, Center for Partnerships & Innovation

NARUC
National Association of Regulatory Utility Commissioners

Presenter

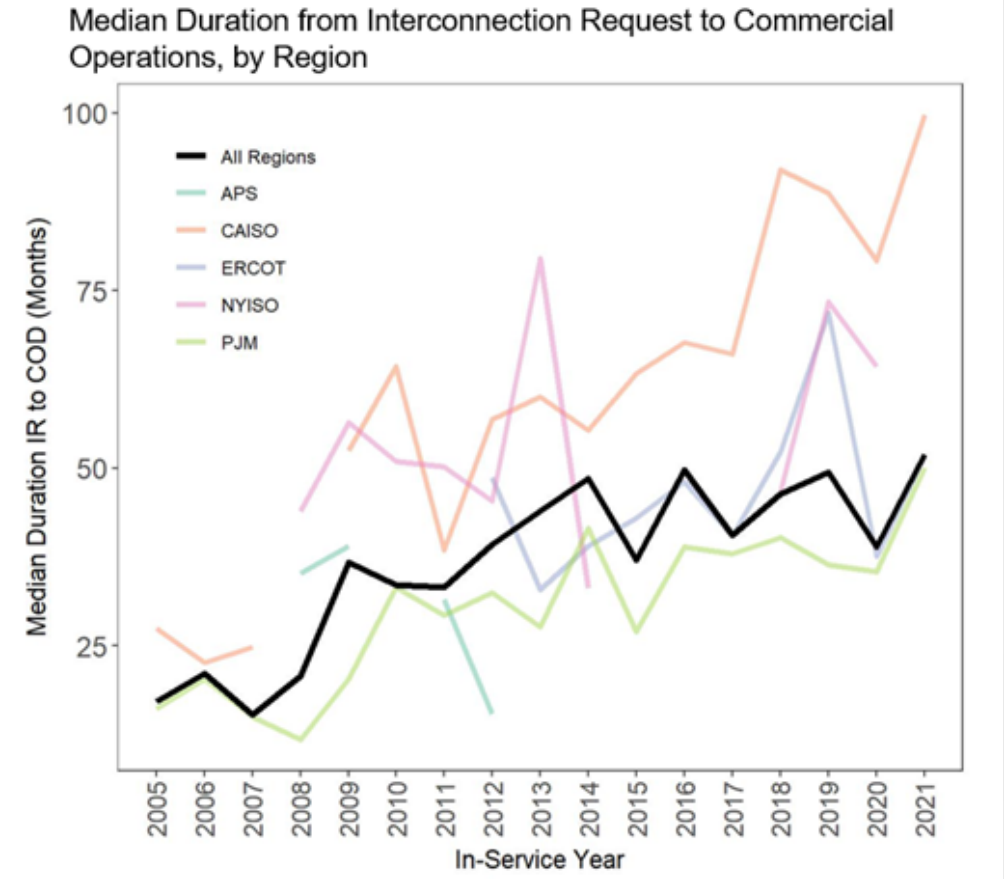
Tom McDermott

Chief Engineer & Solar Lead

Pacific Northwest National Lab

Data Collection and Transparency & 5-Year Strategic Roadmap Pillars

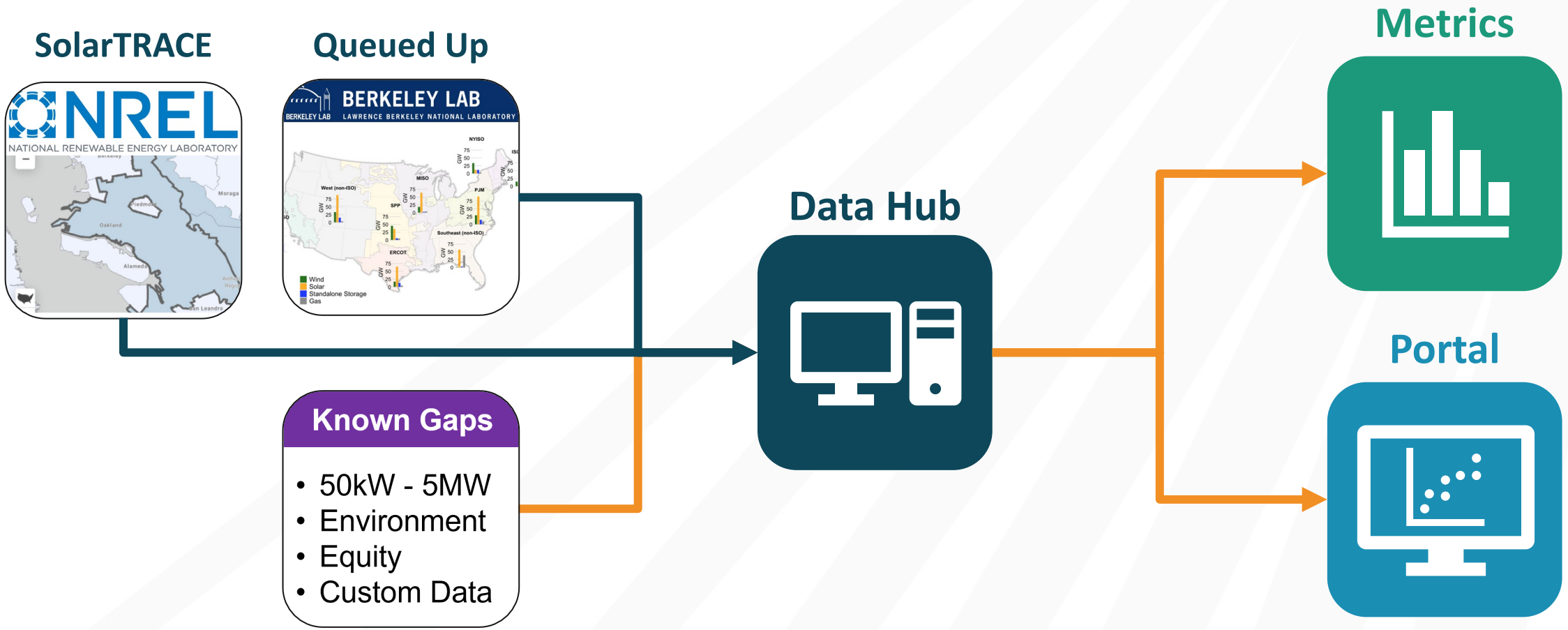
Data Collection & Transparency



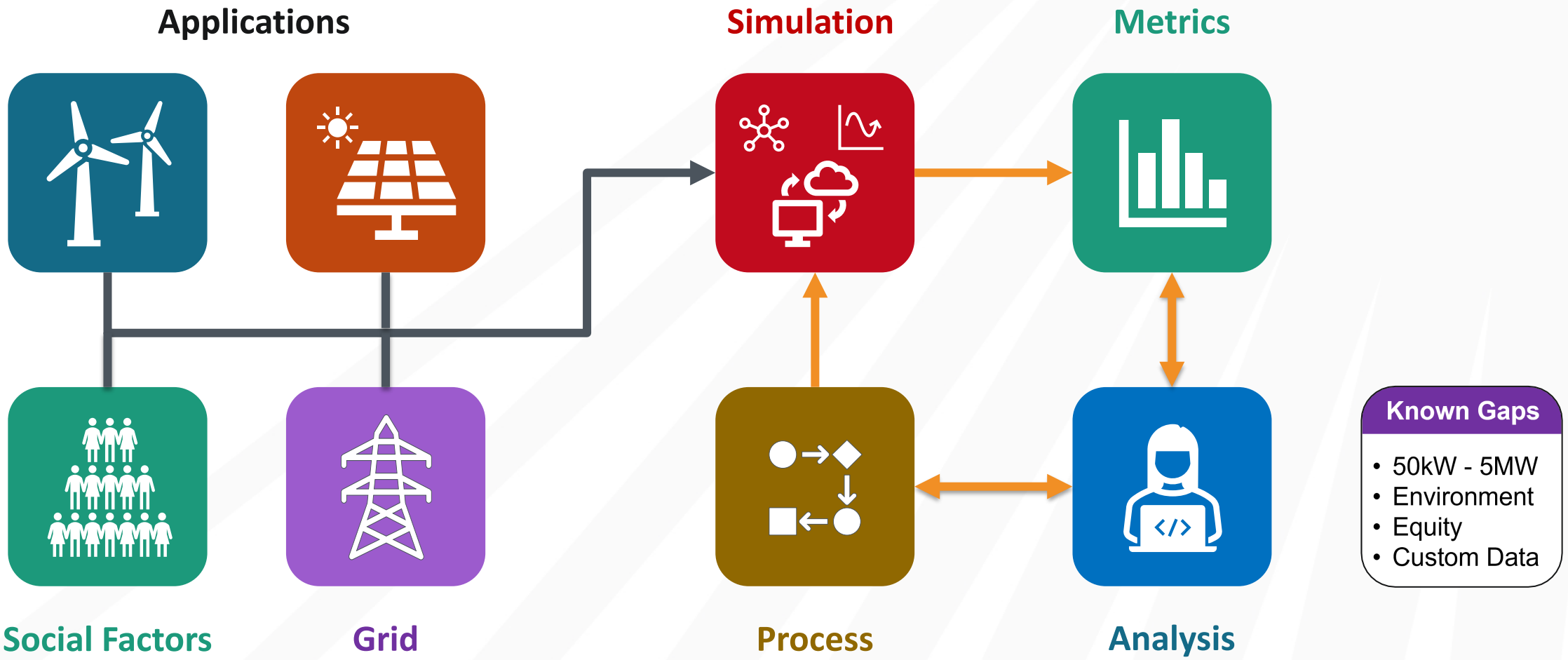
Source: LBNL Queued Up 2.0 briefings

- Distribution data for small building-scale is detailed **but** unavailable for the 50kW - 5MW PV scales (e.g., community solar projects)
- Transmission data is widely available **but** lacks necessary detail
- Data collection and transparency efforts limited by privacy and security concerns

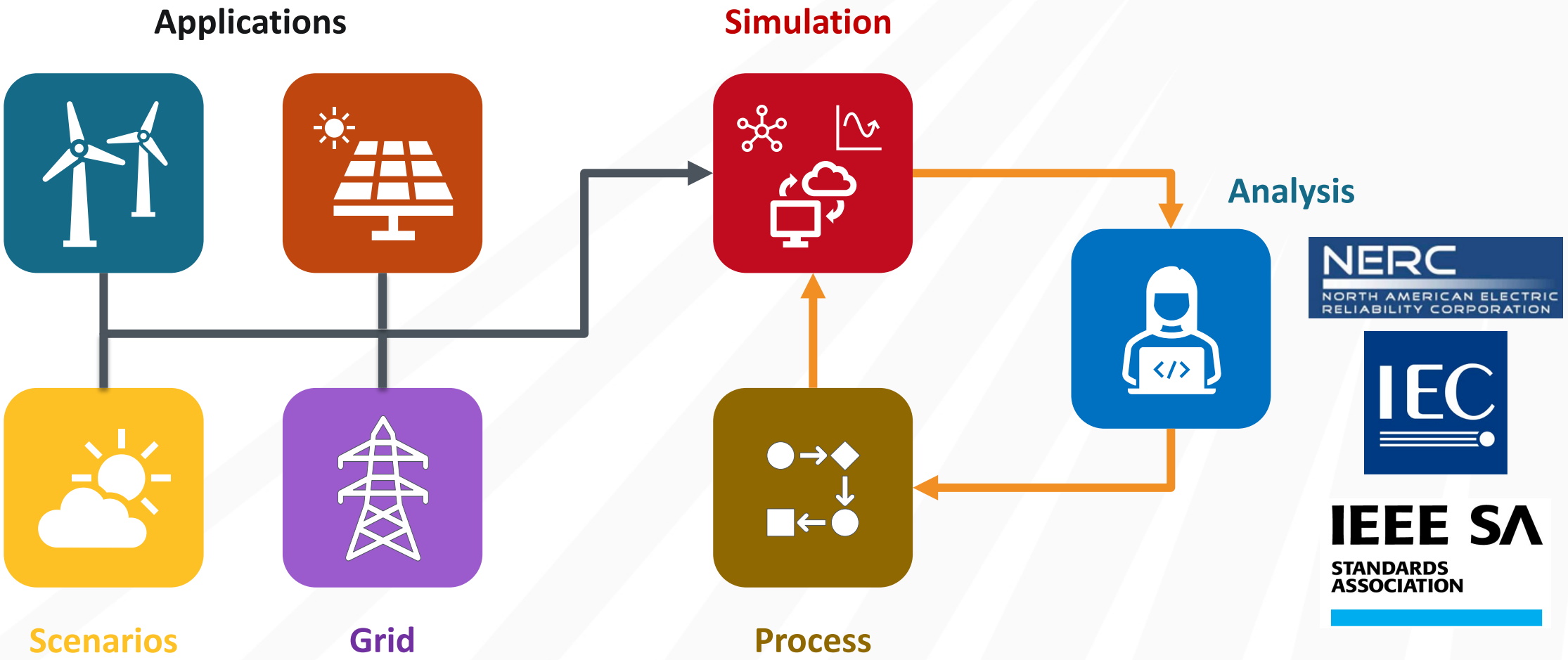
Filling Data Gaps to Support New Metrics



Sprint Studies with Public Data and Tools



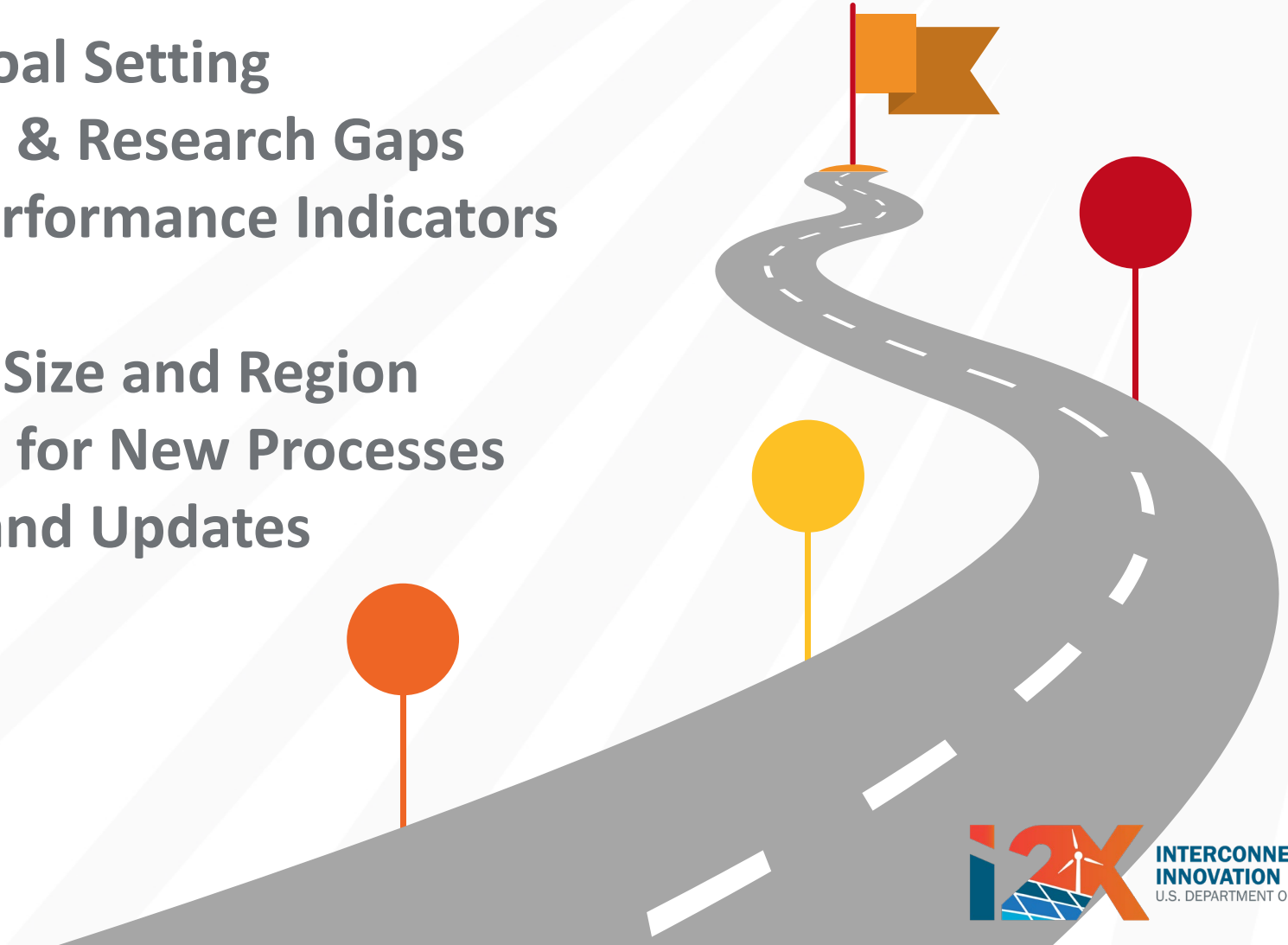
Technical Guide to Interconnection Studies



5-Year Strategic Interconnection Roadmap

- Expert-Informed Goal Setting
- Success Milestones & Research Gaps
- Transparent Key Performance Indicators

- Customizations for Size and Region
- Transition Planning for New Processes
- Buy-in, Adoption, and Updates



Panel Discussion

Data Collection and Transparency & 5-Year Strategic Roadmap Pillars

Brian Fitzsimons

Chief Executive Officer

GridUnity

Bailey McGalliard

Lead, Strategy & Analytics Consultant

DUKE ENERGY

Ryan Quint

Senior Manager, BPS Security and Grid Transformation

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Charlie Smith

Executive Director

ESIG

What's Next?

BOOKMARK THE WEBSITE

Be sure to visit the i2X website for any and all information regarding the program: energy.gov/i2x

What's Next?

JOIN THE PARTNERSHIP

Join the growing list of i2X partners to benefit from all that the i2X program has to offer

- Access to the Online Stakeholder Platform
- Participate in Working Groups
- Direct Access to Interconnection Experts
- Workshops and Informational Resources
- Feedback on Deliverables
- Technical Assistance Opportunities

What's Next?

PARTICIPATE IN UPCOMING EVENTS

Join any one of the amazing opportunities to connect with i2X leadership such as our **Interconnection Office Hours**

- **Join our Interconnection Office Hours**
  - Starting Mid-June
  - Direct Access to i2X Leadership
- **Look Out for Preliminary i2X Working Groups**
  - Energy Justice Working Group
  - IEEE 1547-2018 Adoption Support Working Group
  - Experienced Peer Learning Webinar Series

What's Next?

BOOKMARK THE WEBSITE

Be sure to visit the i2X website for any and all information regarding the program: energy.gov/eere/i2x

JOIN THE PARTNERSHIP

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PARTICIPATE IN UPCOMING EVENTS

Join any one of the amazing opportunities to connect with i2X leadership such as our **Interconnection Office Hours**

Join Our Growing List of i2X Partners!

- 8minute Solar Energy
- AC Power LLC
- Advanced Battery Concepts
- Alegna Technologies, Inc.
- Altitude Grid, LLC
- Amazon Web Services
- American Council on Renewable Energy
- American Microgrid Solutions
- American Renewable Energy Standards and Certification Association (ARESCA)
- AnnDyl Policy Group
- Appalachian Voices
- Audubon
- Black & Veatch
- Bob Wolfson Consulting
- BrightNight Energy
- Capstone Green Energy
- Center for Renewables Integration, Inc.
- ChargeNet Stations
- City of Los Angeles - Mayor's Office
- City of Santa Barbara
- Clean Catch Energy
- CleanTech Energy Solutions, Inc.
- Coalition for Community Solar Access (CCSA)
- Cold Volt
- Colorado Clean Transportation Coalition
- Community Renewable Energy
- Compass Energy Consulting
- Cornell University
- Cox Enterprises
- Czero, Inc.
- DAE Technologies, Inc.
- Daheco Engines & Energy
- Dividend Finance, Inc.
- DRG Technical Solutions
- Eastman Kodak Co
- Ecogy Energy
- EDP Renewables
- Electric Power Engineers, LLC
- Electric Power Research Institute (EPRI)
- Elia Grid International
- Elysian Carbon Management
- Energy Innovation
- Energy Partners
- Enovation Analytics
- Environmental Defense Fund
- Environmental Protection Network
- EPC LLC
- Exeter Associates, Inc.
- Fluor Corporation
- Flux XII LLC
- Fusion Power Energy Systems
- GE Research
- GismoPower LLC
- Green Energy Enterprise Ltd. (GEEL Power)
- Green Lantern Development, LLC
- Grid Strategies LLC
- GridBright
- GridUnity
- Grow Greater Englewood
- GRUPO ROCHA
- GTI Energy
- IAEM
- ICE Thermal Harvesting
- Idaho National Laboratory
- InnoGrid
- Intengy Co, Inc.
- Iowa State University
- IPLC/Vantera www.pf-one.com
- Jacobs Engineering
- K&A Engineering Consulting
- K. R. Saline & Associates, PLC
- LADWP
- Lehigh University
- LineVision
- Longroad Energy
- Marathon Digital Holdings
- Marquette University
- Mercury Solars LLC
- Michigan Energy Innovation Business Council
- Midwest Agrivoltaic Systems LLC
- Midwest Climate Collaborative
- Mid-West Electric Consumers Association
- Modern Grid Solutions
- National Grid
- National Grid Partners
- Navia Energy Inc
- NERC
- NextEra Energy Resources, LLC
- Oak Ridge National Laboratory
- OATI
- Ostendo Technoogies
- Override Industries
- Pearl Street Technologies
- PENNSYLVANIA SOLAR CENTER
- Pepper Energy
- Petrolern
- Pine Gate Renewables
- Pixida USA Inc.
- Polaris Systems Optimization
- power2Peer
- PowerGrid Strategies, LLC
- Prologis
- PSC North America
- PSC Power Systems Consultants
- Queen City Solar
- Reactivate
- Reinhauen
- Renewable Energy Industries Association of New Mexico (REIA)
- Royal Cypress
- School Star Energy Inc.
- Self
- Services for the Power Industry
- Sheehan Phinney Bass & Green
- SISCO
- SolarKal
- SolarSCADA
- Southern Renewable Energy Association
- Southernstar
- Stanford University
- STATE GRID co China US office
- Stem
- Stevens Institute of Technology
- Storke Renewables
- Sun Tribe Development
- Sundial Energy
- Sustainable Bitcoin Standard
- Sylvamo
- SynerGen Solar, LLC
- Synergics
- Texas A&M University
- Tom's Service
- TotalEnergies Renewables USA
- U.S. DOE
- Univeristy of New Mexico
- University of Alaska Fairbanks
- UT Austin
- Utah Office of Energy Development
- Utilidata. Inc.
- Virginia State Corporation Commission
- W International SC, LLC
- Wallaby Capital
- Wilson Sonsini Goodrich & Rosati, P.C.
- Xcel Energy Inc.

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U.S. DEPARTMENT OF ENERGY

Thank You!

Website: energy.gov/i2X