Electricity Committee

NARUC Summer Policy Summit

Making DERs Cybersecure: Vulnerabilities, Standards and Requirements of Interconnecting DERs to the Grid

NARUC Summer Policy Summit

Moderators:

Hon. Judith Williams Jagdmann, Va.
Hon. Gladys Brown Dutrieuille, Pa.

Tobias Whitney, EPRI

Jake Gentle and Colleen Glenn, Idaho National Lab

Danish Saleem, NREL

NARUC Summer Policy Summit

Wind Energy Technologies Cybersecurity R&D Roadmap

Jake P. Gentle
Power Systems Engineer
Idaho National Laboratory

www.inl.gov

Wind Cybersecurity Roadmap

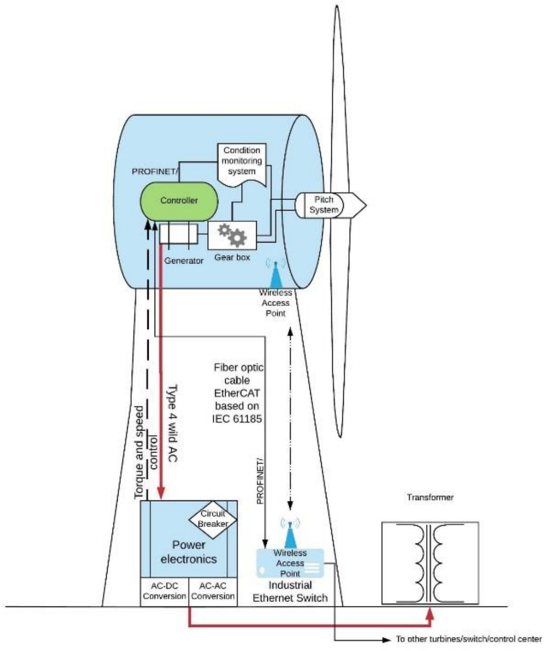
Establishing a cybersecurity roadmap for cyber-physical wind power systems

Project Description

Collaboratively establishing a cybersecurity roadmap for wind energy technologies. Roadmap prioritizes R&D efforts to elevate awareness of and preparedness for cybersecurity threats to wind power.

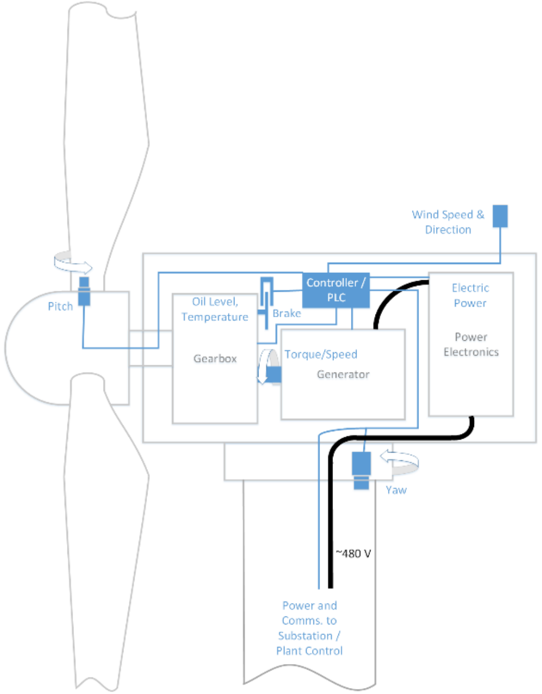
Team Partners

- ✓ Department of Energy Wind Energy Technologies Office (WETO)
- ✓ Idaho National Laboratory (INL)
  - ✓ NREL, SNL



Value Proposition

- ✓ Growth and development of U.S. wind-powered generation provides opportunities to strengthen cyber resilience of grid and provides a clean, low cost source of energy.
- ✓ Roadmap supports initial R&D needs associated with better understanding cyber vulnerabilities specific to wind power and has potential to lead to development of mitigation strategies and best practices to combat cyber threats.



Project Objectives

- ✓ Evaluate industry cybersecurity preparedness.
- ✓ Enhance information sharing and situational awareness.
- ✓ Promote dialogue among industry, academia, and government.
- ✓ Coordinate and moderate 1st ever AWEA cybersecurity panel session at WINDPOWER 2019.
- ✓ Facilitate coordination of future cybersecurity workshops.

The Cyber Threat Landscape for Distributed Energy Resources (DER)

Colleen Glenn
Control Systems Cyber Security Analyst
Idaho National Laboratory

www.inl.gov

Timeline of Cyber Events

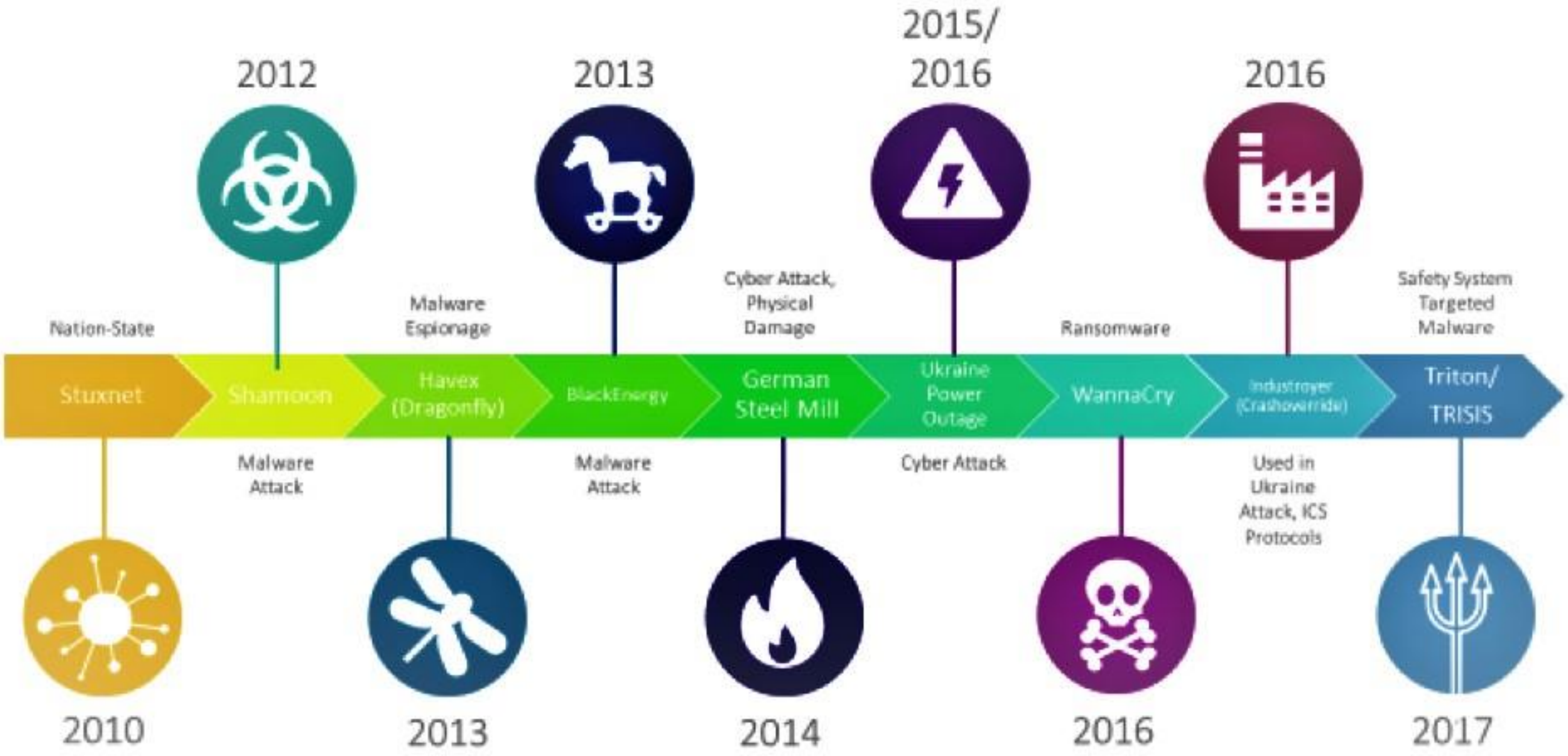


Image from DiFazio, G. (2019). Triton, BlackEnergy, WannaCry – Has Your Behavior Changed?. *Tripwire.*
https://www.tripwire.com/state-of-security/ics-security/triton-blackenergy-wannacry-behavior-changed/

Anatomy of an OT Cyber Attack: The ICS Cyber Kill Chain

Stage 1 details the steps an attacker generally takes in <u>IT environments</u>

Stage 2 details the <u>additional</u> steps an attacker takes in an <u>OT environment</u>

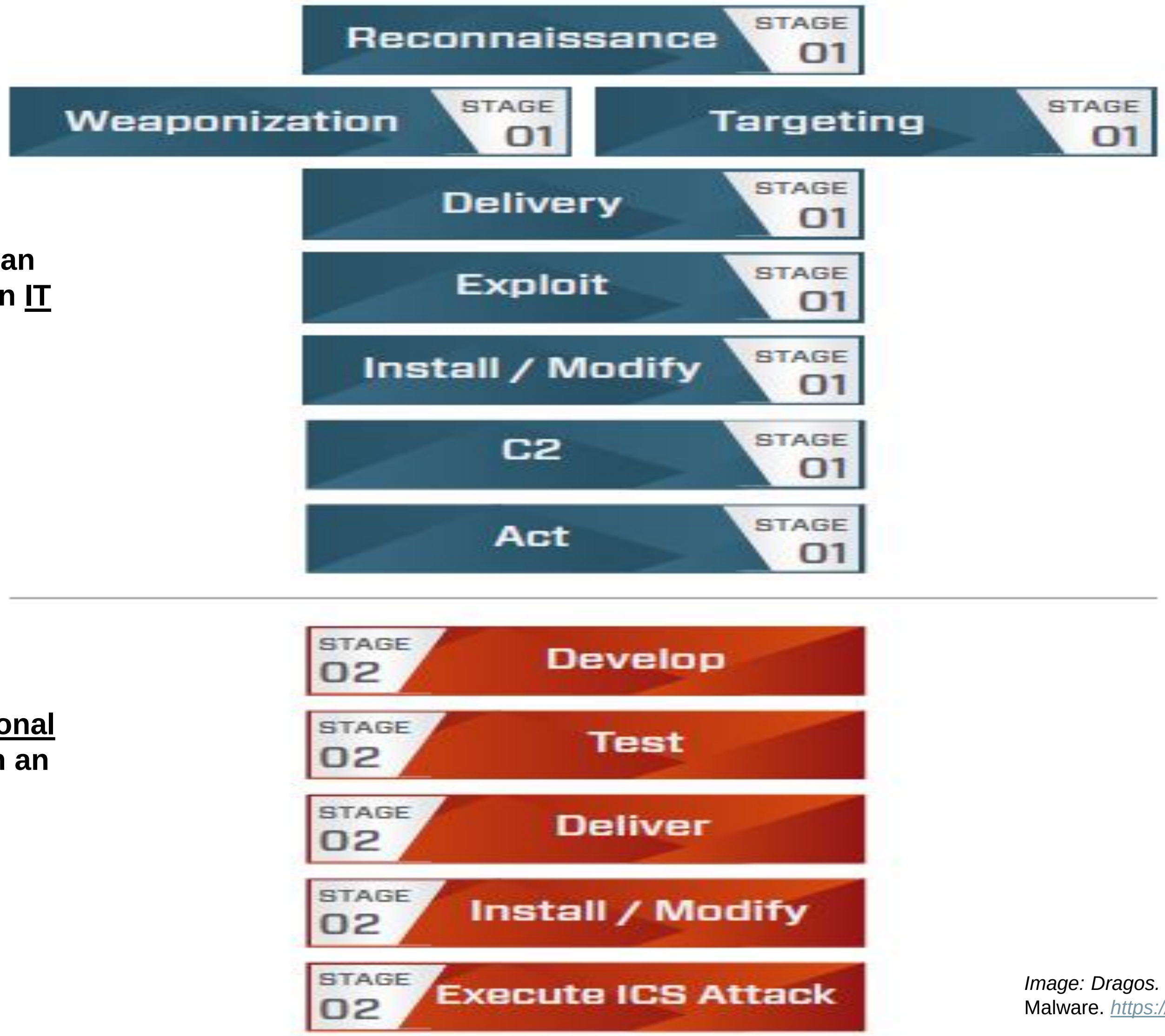
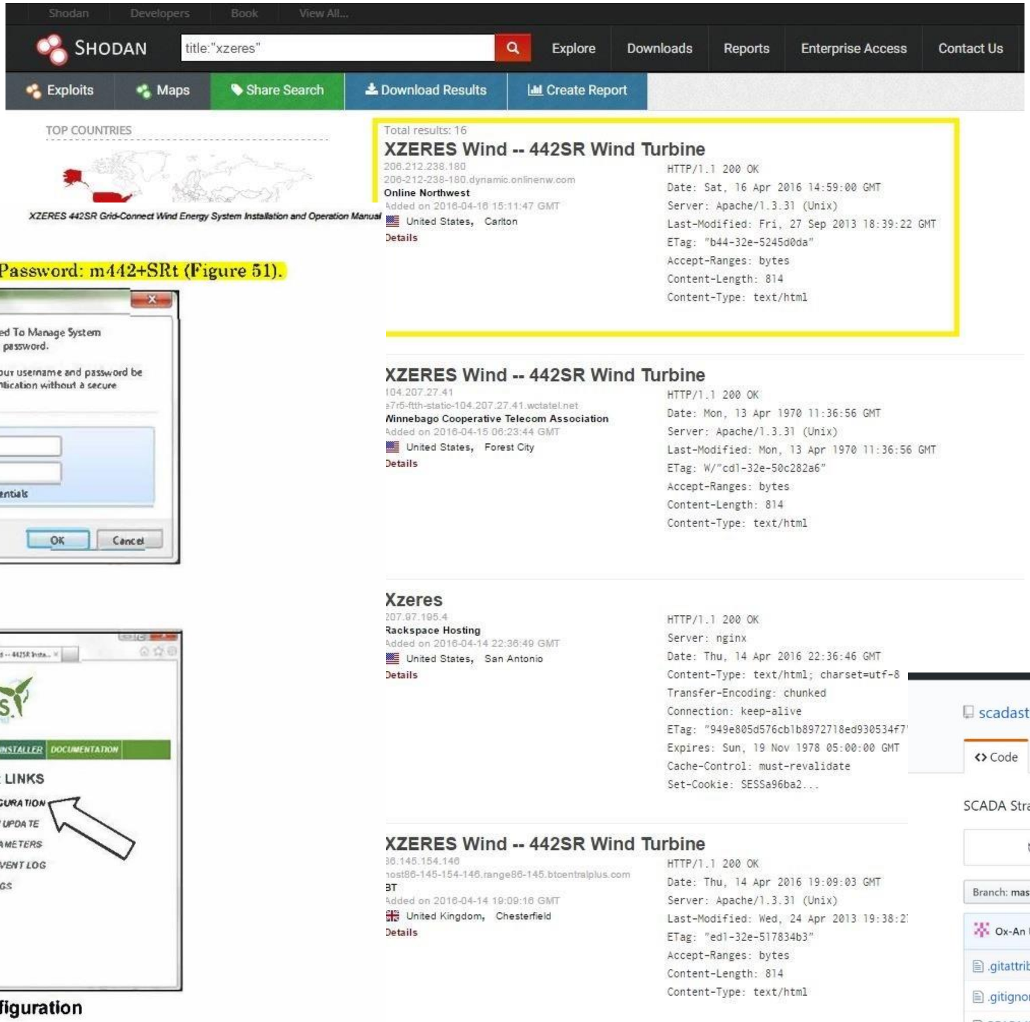
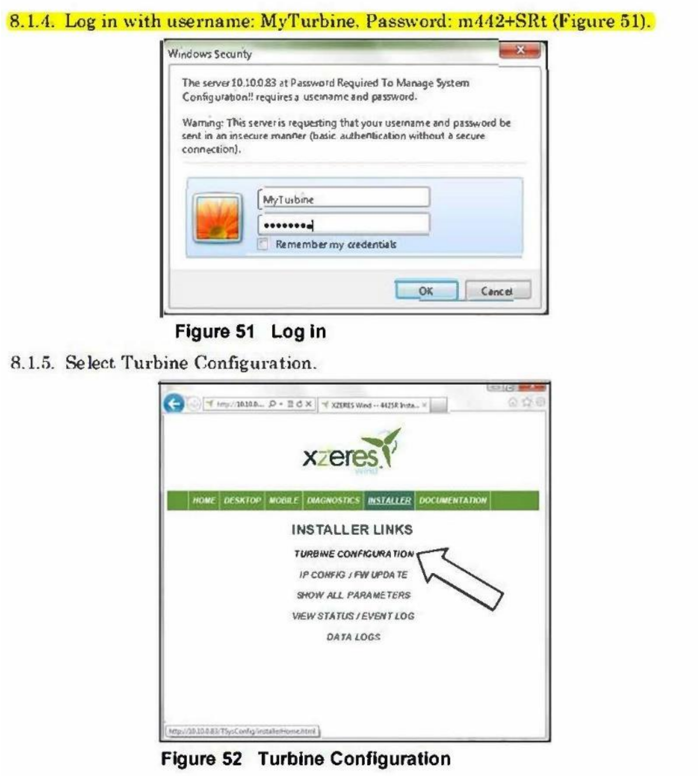


Image: Dragos. (2017). TRISIS Malware: Analysis of Safety System Targeted Malware. *https://dragos.com/wp-content/uploads/TRISIS-01.pdf*.

Open Source is Everything





XZERES 442SR Grid-Connect Wind Energy System Installation and Operation Manual

8.1.4. Log in with username: MyTurbine. Password: m442+SRt (Figure 51).

Windows Security

The server 10.10.0.83 at Password Required To Manage System Configuration!! requires a username and password.

Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).

MyTurbine

Remember my credentials

OK Cancel

Figure 51 Log in

8.1.5. Select Turbine Configuration.

xzeres

HOME DESKTOP MOBILE DIAGNOSTICS INSTALLER DOCUMENTATION

INSTALLER LINKS

TURBINE CONFIGURATION

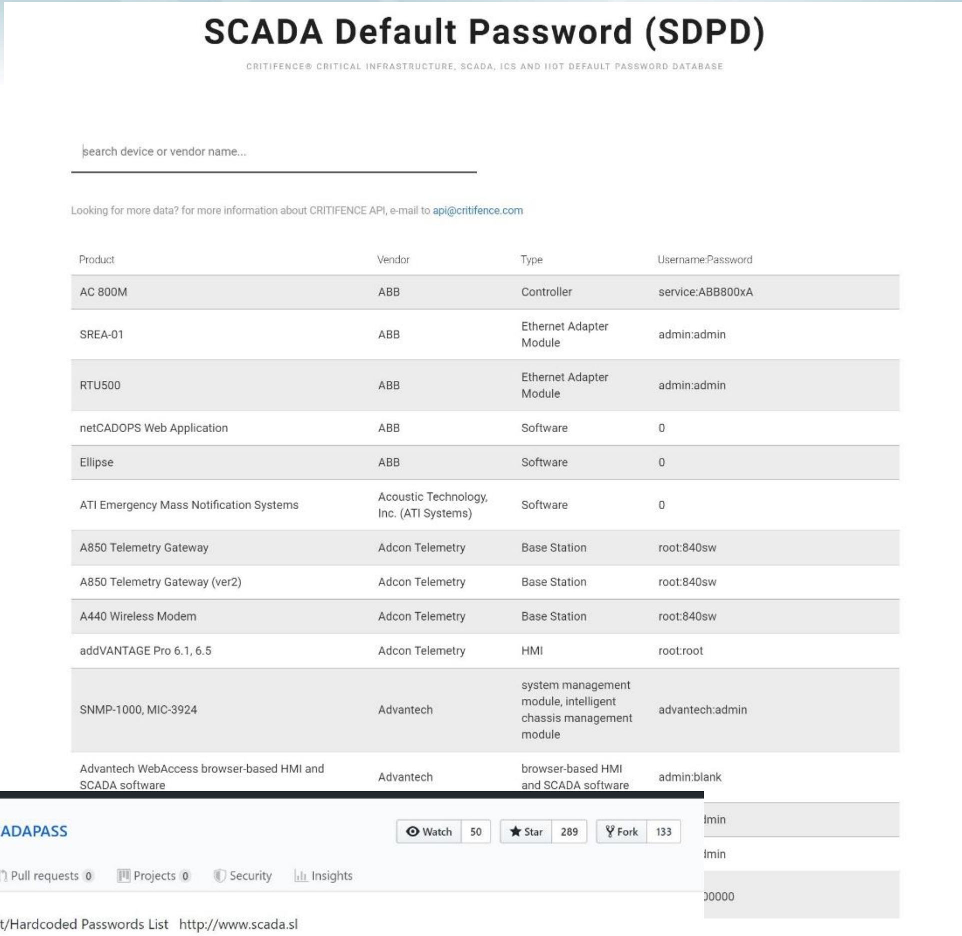
IP CONFIG / FW UPDATE

SHOW ALL PARAMETERS

VIEW STATUS / EVENT LOG

DATA LOGS

Figure 52 Turbine Configuration



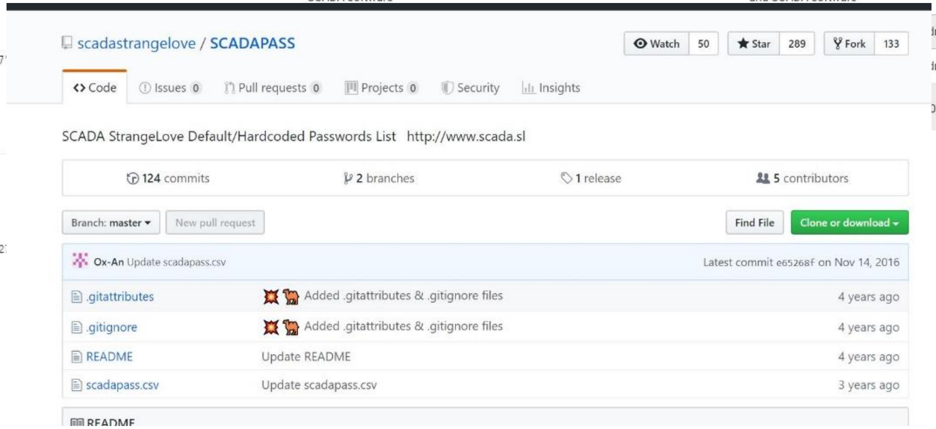
SCADA Default Password (SDPD)

CRITIFENCE® CRITICAL INFRASTRUCTURE, SCADA, ICS AND IIOT DEFAULT PASSWORD DATABASE

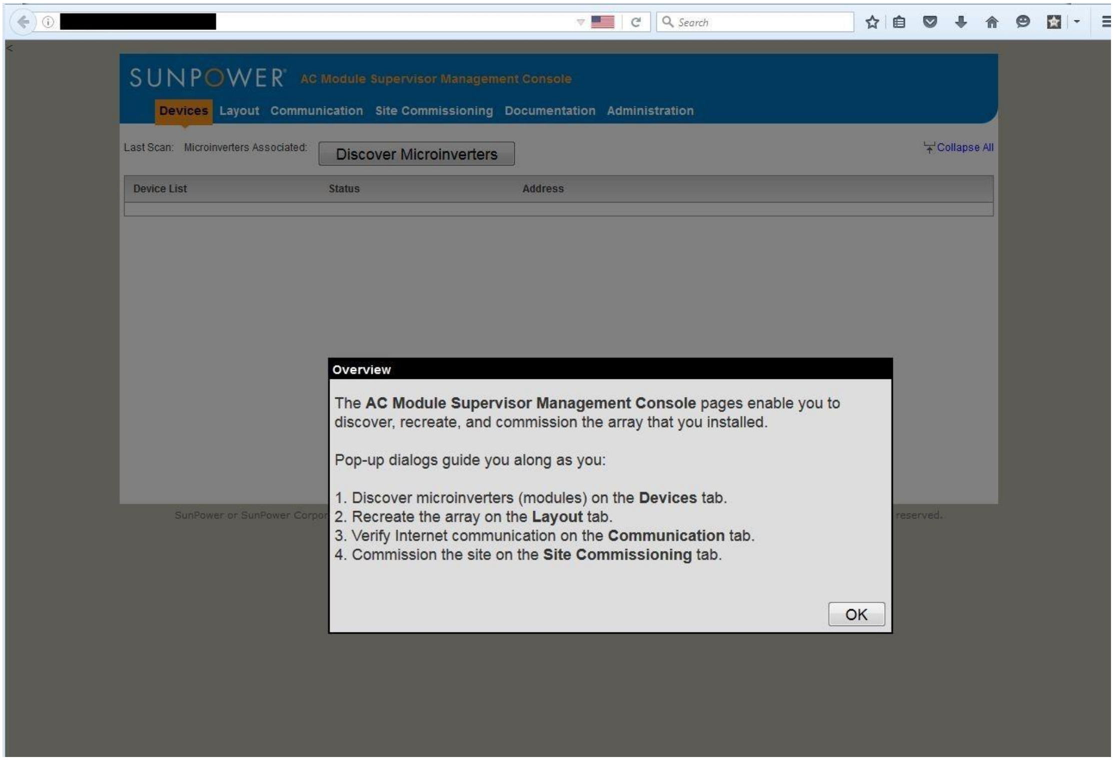
search device or vendor name...

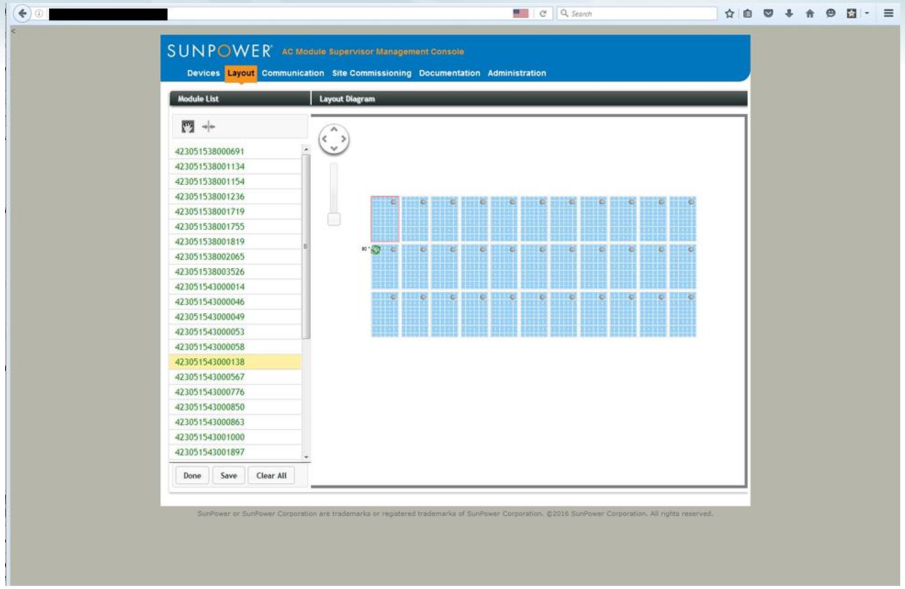
Looking for more data? for more information about CRITIFENCE API, e-mail to api@critifence.com

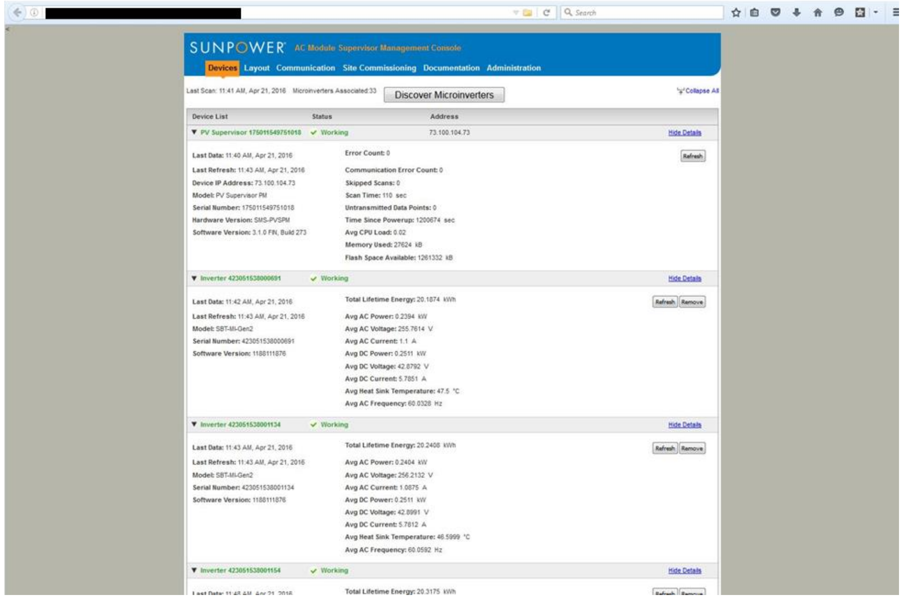
Product	Vendor	Type	Username:Password
AC 800M	ABB	Controller	service:ABB800xA
SREA-01	ABB	Ethernet Adapter Module	admin:admin
RTU500	ABB	Ethernet Adapter Module	admin:admin
netCADOPS Web Application	ABB	Software	0
Ellipse	ABB	Software	0
ATI Emergency Mass Notification Systems	Acoustic Technology, Inc. (ATI Systems)	Software	0
A850 Telemetry Gateway	Adcon Telemetry	Base Station	root:840sw
A850 Telemetry Gateway (ver2)	Adcon Telemetry	Base Station	root:840sw
A440 Wireless Modem	Adcon Telemetry	Base Station	root:840sw
addVANTAGE Pro 6.1, 6.5	Adcon Telemetry	HMI	root:root
SNMP-1000, MIC-3924	Advantech	system management module, intelligent chassis management module	advantech:admin
Advantech WebAccess browser-based HMI and SCADA software	Advantech	browser-based HMI and SCADA software	admin:blank



Web-accessible Platforms are Common

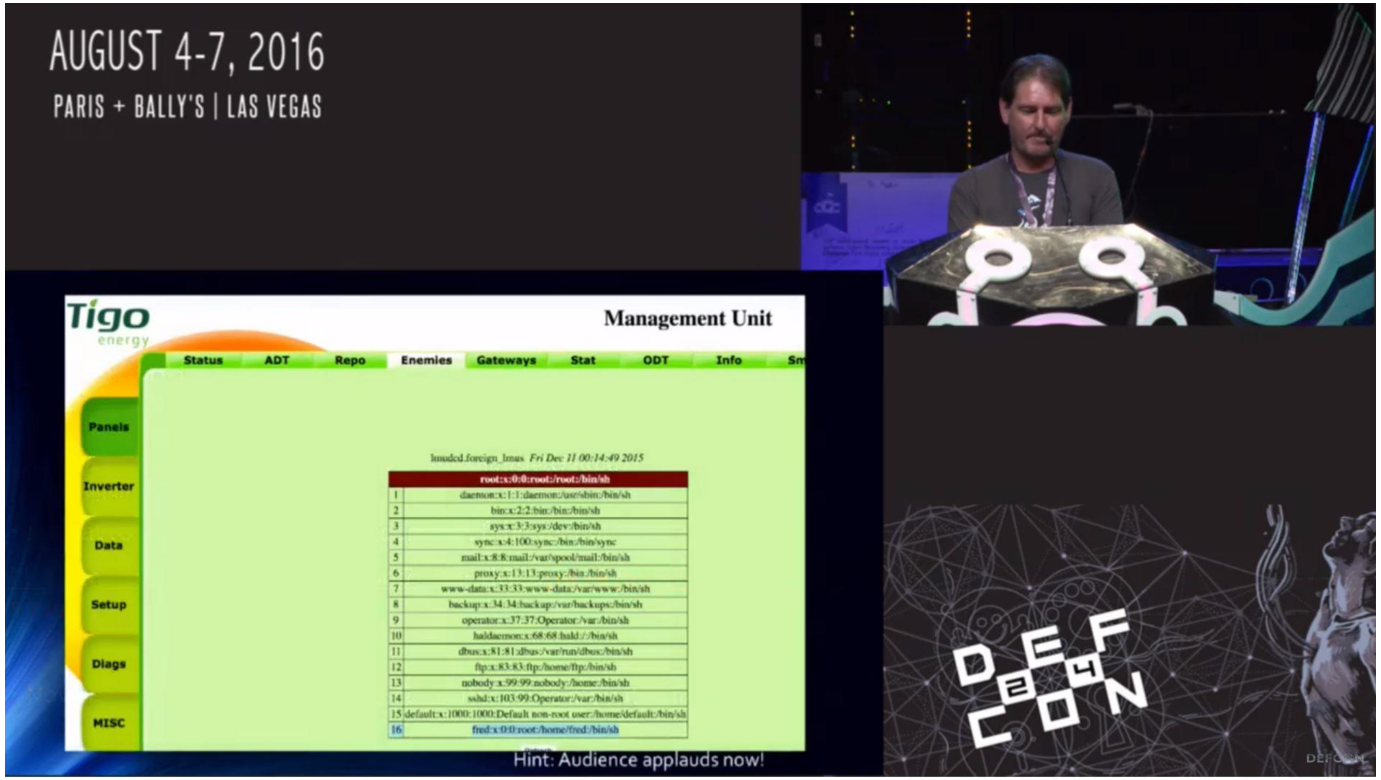






Idaho National Laboratory

Researchers are Interested…



Video/Presentation: Bret-Mounet, F. (2016). All Your Solar Panels are Belong to Me. *DEFCON 24. Aug 4-7 2016, Las Vegas, Nevada.* https://www.youtube.com/watch?v=OB5lAtLG4WU.

ANDY GREENBERG SECURITY 08.28.17 07:00 AM

RESEARCHERS FOUND THEY COULD HACK ENTIRE WIND FARMS

Over two years, University of Tulsa researchers performed penetration tests on five different wind farms. (Not this one.) ROSS MANTLE FOR WIRED

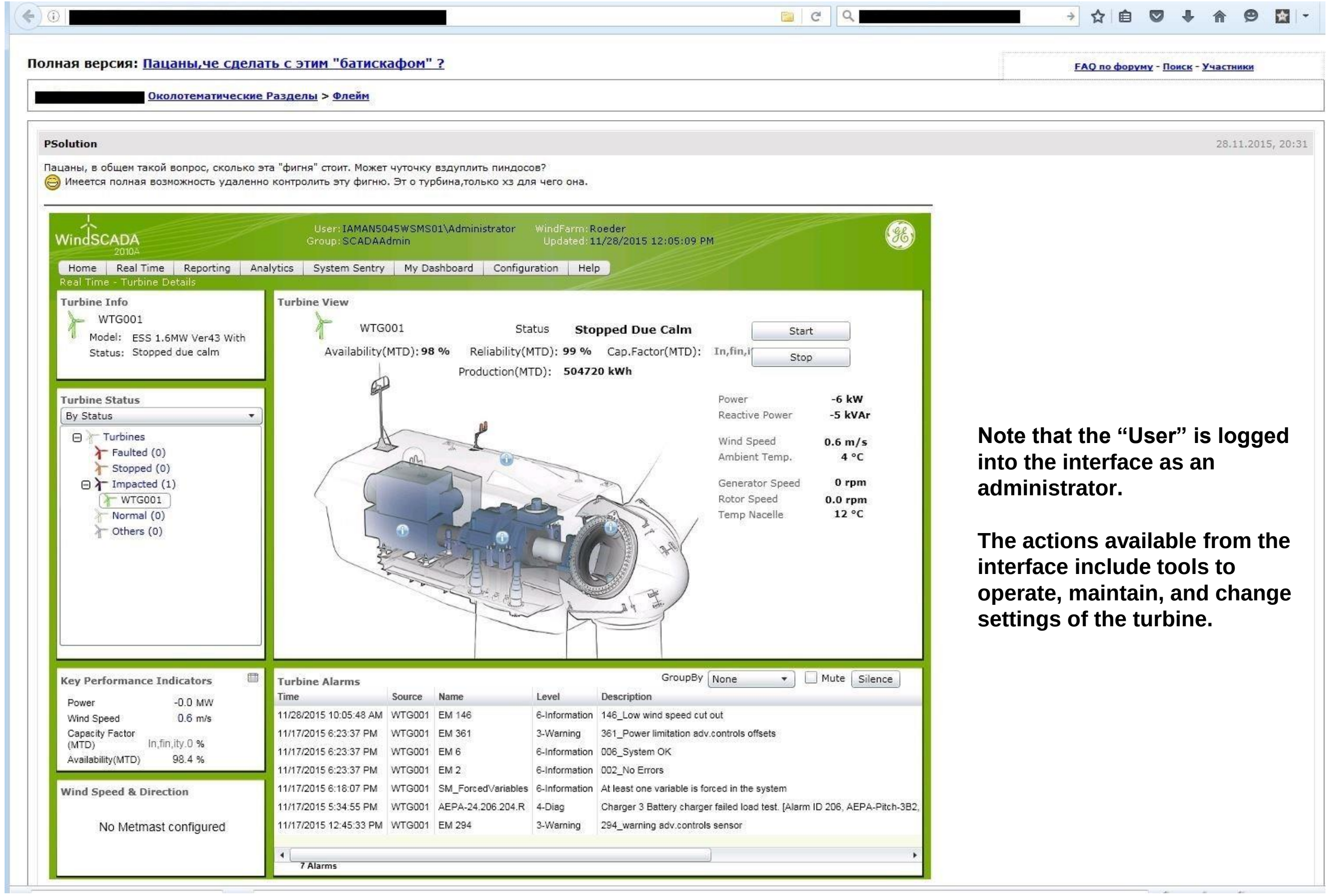
ON A SUNNY day last summer, in a vast cornfield somewhere in the large, windy middle of America, two researchers from the University of Tulsa stepped into an oven-hot, elevator-sized chamber within the base of a 300-foot-tall wind turbine. They'd picked the simple pin-and-tumbler lock on the turbine's metal door in less than a minute and opened the unsecured server closet inside.

Jason Staggs, a tall 28-year-old Oklahoman, quickly unplugged a network cable and inserted it into a Raspberry Pi minicomputer, the size of a deck of cards, that had been fitted with a Wi-Fi antenna. He switched on the Pi and

Article: Greenberg, A. (2017). Researchers Found They Could Hack Entire Wind Farms. *Wired.* https://www.wired.com/story/wind-turbine-hack/.

CYBERCORE integration center

Malicious Actors are Interested…



Note that the "User" is logged into the interface as an administrator.

The actions available from the interface include tools to operate, maintain, and change settings of the turbine.

WSJ › Annotations

Iranian Hackers Infiltrated New York Dam in 2013

DANNY YADRON DECEMBER 20, 2015

Iranian hackers infiltrated the control system of the Bowman Avenue Dam, a small structure used for flood control, near Rye, N.Y., in 2013.

Iranian hackers infiltrated the control system of a small dam less than 20 miles from New York City two years ago, sparking concerns that reached to the White House, according to former and current U.S. officials and experts familiar with the previously undisclosed incident.

The breach came amid attacks by hackers linked to Iran's government against the websites of U.S. banks, and just a few years after American spies had damaged an Iranian nuclear facility with a sophisticated computer worm called Stuxnet. In October 2012, then-Defense Secretary Leon Panetta called out Iran's hacking, prompting fears of cyberwar.

The still-classified dam intrusion illustrates a top concern for U.S. officials as they enter an age of digital state-on-state conflict. America's power grid,

Yadron, D. (2015). Iranian Hackers Infiltrated New York Dam in 2013. *Wall Street Journal.* https://www.wsj.com/articles/iranian-hackers-infiltrated-new-york-dam-in-2013-1450662559.

NREL
Transforming ENERGY

Cybersecurity Requirements, Regulations and Standards for Distributed Energy Resources

Danish Saleem, DER Cybersecurity Standards Lead
National Renewable Energy Laboratory

7/23/2019

Background

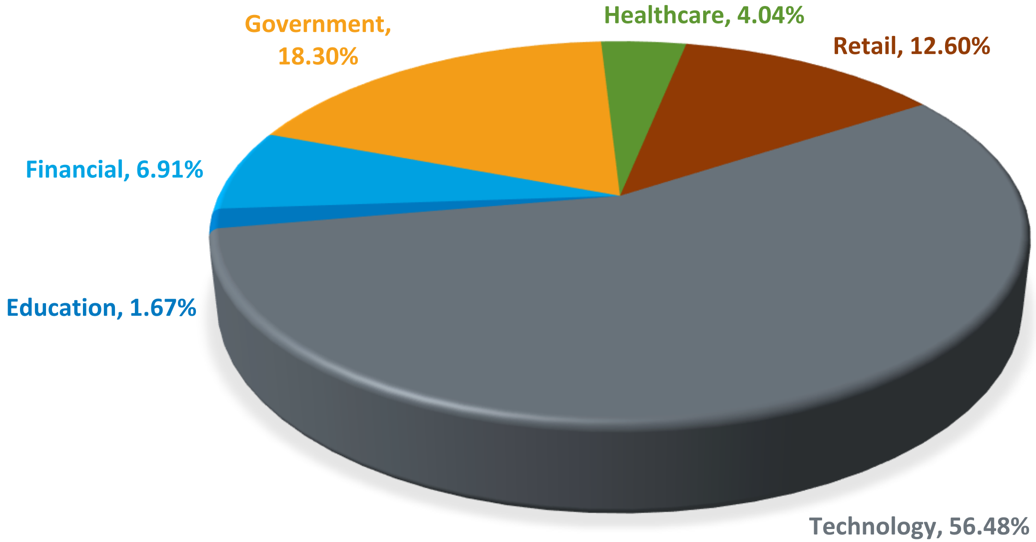
In last six years, more than 14 billion data records were lost or stolen

There is a need to secure DERs and their communications

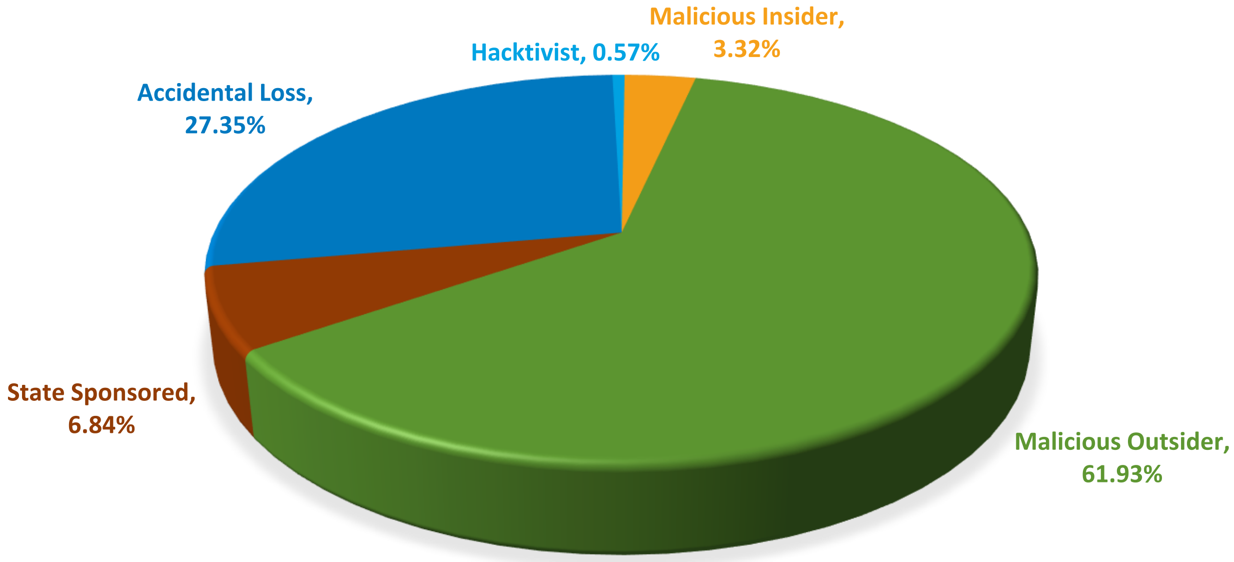
- Bi-directional communication
- No standard security practices
- Lack of situational awareness
- DERs connected to home

Ukraine Power plant
DoS on one of the western utility
Dragon fly 2.0
WannaCry ransomware

RECORDS LOST/STOLEN BY INDUSTRY



RECORDS LOST/STOLEN BY SOURCE



DER Cybersecurity Working Group

SECURING DER DEVICES & SERVERS

Define standardized procedure for DER and server vulnerability assessments.

- Leads: Danish Saleem (NREL) and Cedric Carter (MITRE).
- Cases advised from known equipment vulnerabilities.
- Transferring to UL STP and will likely be UL 2900-2-4.

SECURE NETWORK ARCHITECTURE

Create DER control network topology requirements and interface rules.

- Lead: Candace Suh-Lee (EPRI)
- Perimeter controls
- Segmentation requirements

Data-in-flight requirements

Define common set of encryption, authentication and key management requirements for DER communications

- Leads: Nicholas Manka (GridSME) and Ifeoma Onunkwo (Sandia).
- Update protocol and interconnection requirements and standards.

ACCESS CONTROLS

Classify data types, associated ownership, and permissions and define set of protection mechanisms.

- Starting Oct 2019
- Lead: TBD
- Access control list taxonomy, principle of least privilege.
- Password control and data privacy expectations.

Patching Requirements

Establishing patching guidelines for DER equipment

- Starting Oct 2019
- Lead: TBD
- Requirements for patching (e.g. update rates, expected mitigation timelines).
- Maintenance guidelines.

Utility/Aggregator Auditing Procedure

Create recommended auditing practices for DER networks

- Planned Oct 2020
- Lead: TBD
- Step-by-step auditing procedure for internal or external compliance review.
- Recommended data for forensics

IEEE 1547.3 Working Group

NREL

Certification Procedures for Data and Communication Security of Distributed Energy Resources

Saleem Danish
National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
Operated by the Alliance for Sustainable Energy, LLC

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at www.nrel.gov/publications.

Technical Report
NREL/TP-5D00-71224
April 2018

Contract No. DE-AC36-08GO28308

IEEE 1547.3

Type of Project: New IEEE
Standard **PAR Request Date:**

PAR Approval Date:

PAR Expiration Date:

Status: Not approved

1.1 Project Number: 1547.3
1.2 Type of Document: Guide
1.3 Life Cycle: Full Use

2.1 Title: Guide for Cybersecurity of Distributed Energy Resources Interfaces with Associated Electric Power Systems

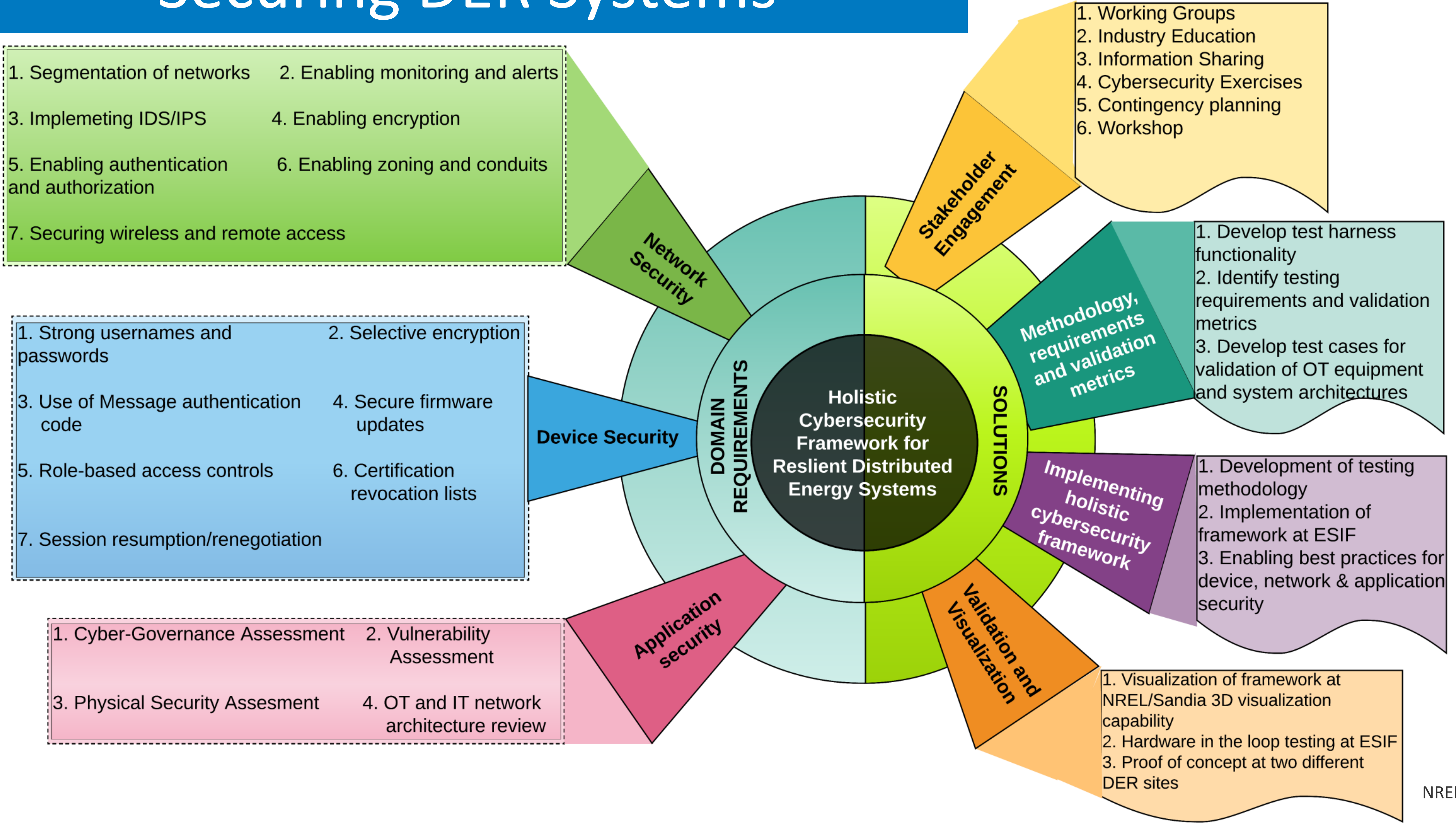
3.1 Working Group:

3.2 Sponsoring Society and Committee: IEEE-SASB Coordinating Committees/SCC21 - Fuel Cells, Photovoltaics, Dispersed Generation, and Energy Storage (SASB/SCC21)
Contact Information for Sponsor
Chair Name: Janette Sandberg
Email Address: janette.sandberg@pgn.com
Phone: 5036126119
Contact Information for Standards Representative
Michael Kipness

4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: 07/2021
4.3 Projected Completion Date for Submittal to RevCom 12/2021
Note: Usual minimum time between initial sponsor ballot and submission to RevCom is 6 months.:

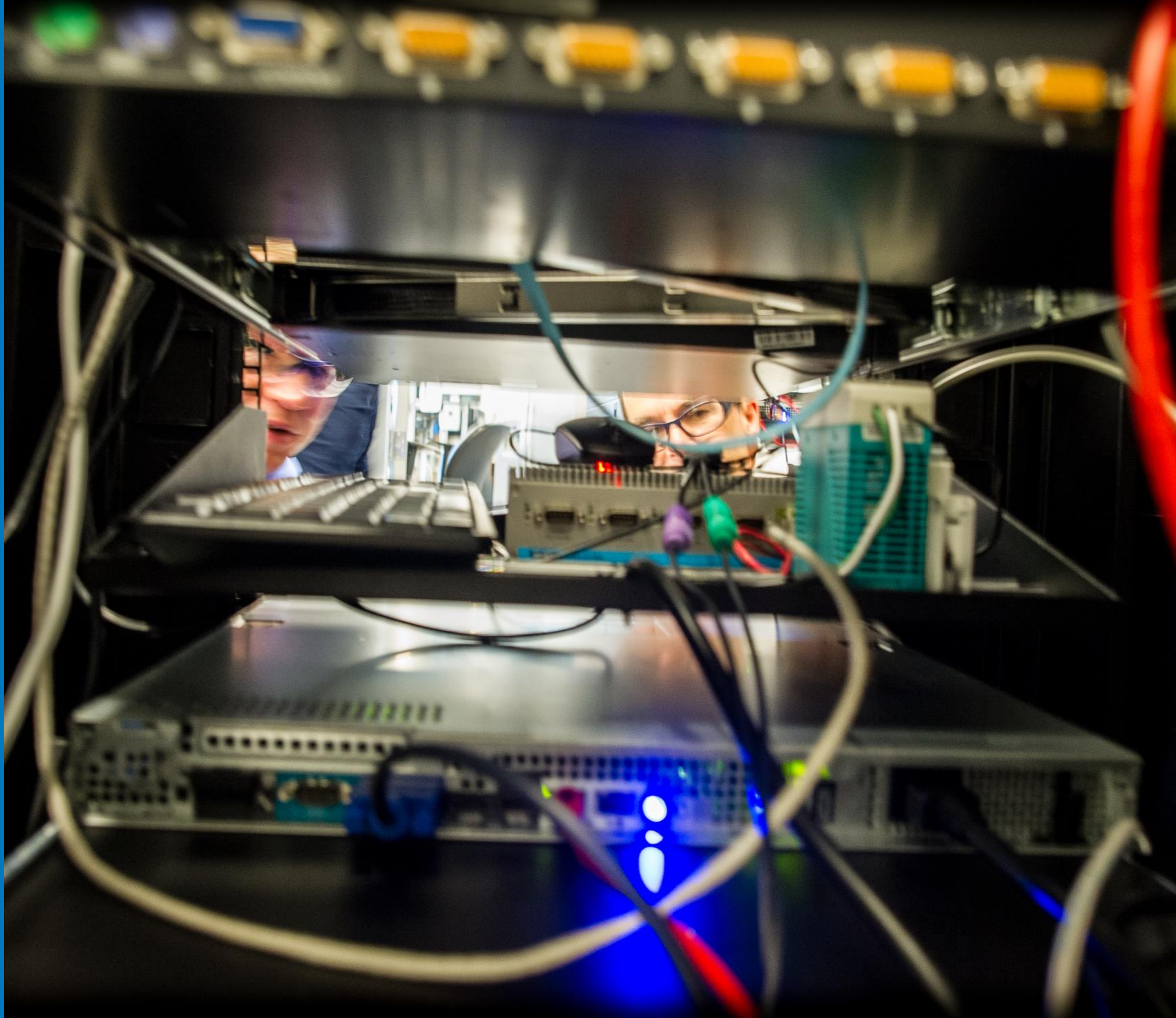
5.1 Approximate number of people expected to be actively involved in the development of this project: 40
5.2 Scope: This document provides guidelines for Cybersecurity of Distributed Energy Resources (DER) interfaces with the Electric Power Systems (EPS).
5.3 Is the completion of this standard dependent upon the completion of another standard:
5.4 Purpose: This document provides guidelines for cybersecurity for one or more distributed resources that are interconnected with electric power systems. DER include systems in the areas of fuel cells, photovoltaics, wind turbines, microturbines, other distributed energy sources, and distributed energy storage systems. The revision will focus on updating the guidelines on mitigating cybersecurity risks at the individual DER device level that may be introduced by enabling communication capability at the DER interface, by utilizing the resources and standards that have been developed in the past 10 years.

Recommended Approach for Securing DER Systems



Six Cybersecurity Principles

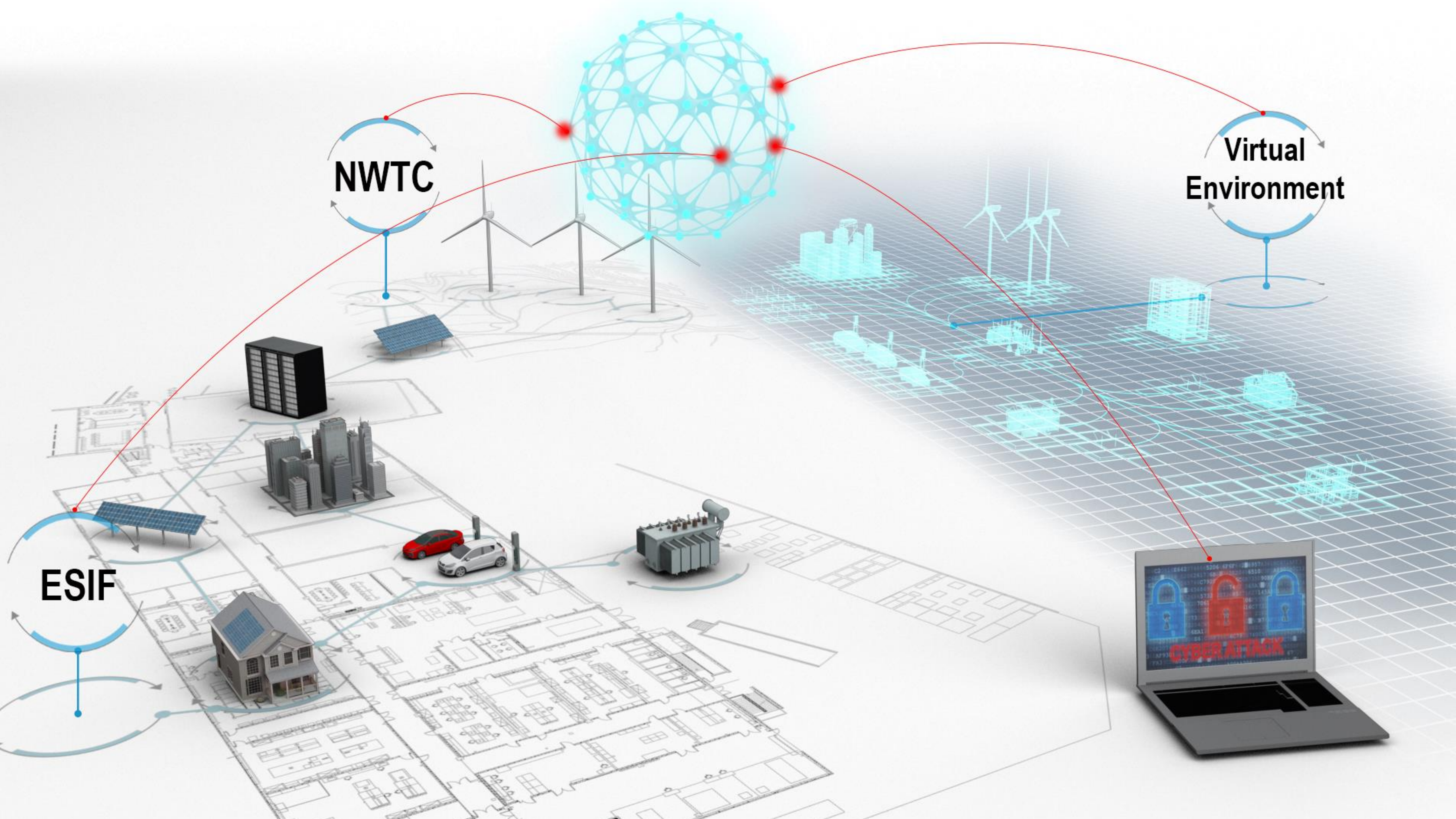
1. Incorporation of security at the design level
2. Advance security updates and vulnerability management
3. Build on proven security measures
4. Prioritize security measures according to potential impact
5. Promote transparency across grid
6. Connect carefully and deliberately



NREL's Cybersecurity Focus

NREL works to identify, anticipate, detect, protect against, and respond to today's biggest threats to the energy grid, primarily the renewable energy sector, offering a strong foundation of tools, expertise, and capabilities that support systems security and innovation, resilience science, and advanced visualization for decision support:

- Modeling and co-simulation
- Cybersecurity evaluation
- Unique facilities
- Collaborations to advance resilience science.


NWTC
Virtual Environment
ESIF
CYBER ATTACK

Thank You

www.nrel.gov

Contact Info:

Danish Saleem
danish.saleem@nrel.gov | 720-404-5912

Electricity Committee

Up Next at 1:30…

Business Meeting,
featuring remarks
by John Bear, CEO, MISO

NARUC Summer Policy Summit

Electricity Committee Business Meeting

Honorary Resolutions

Edward S. Finley, Jr.
John R. Rosales

Remarks

John Bear, MISO

NARUC Summer Policy Summit

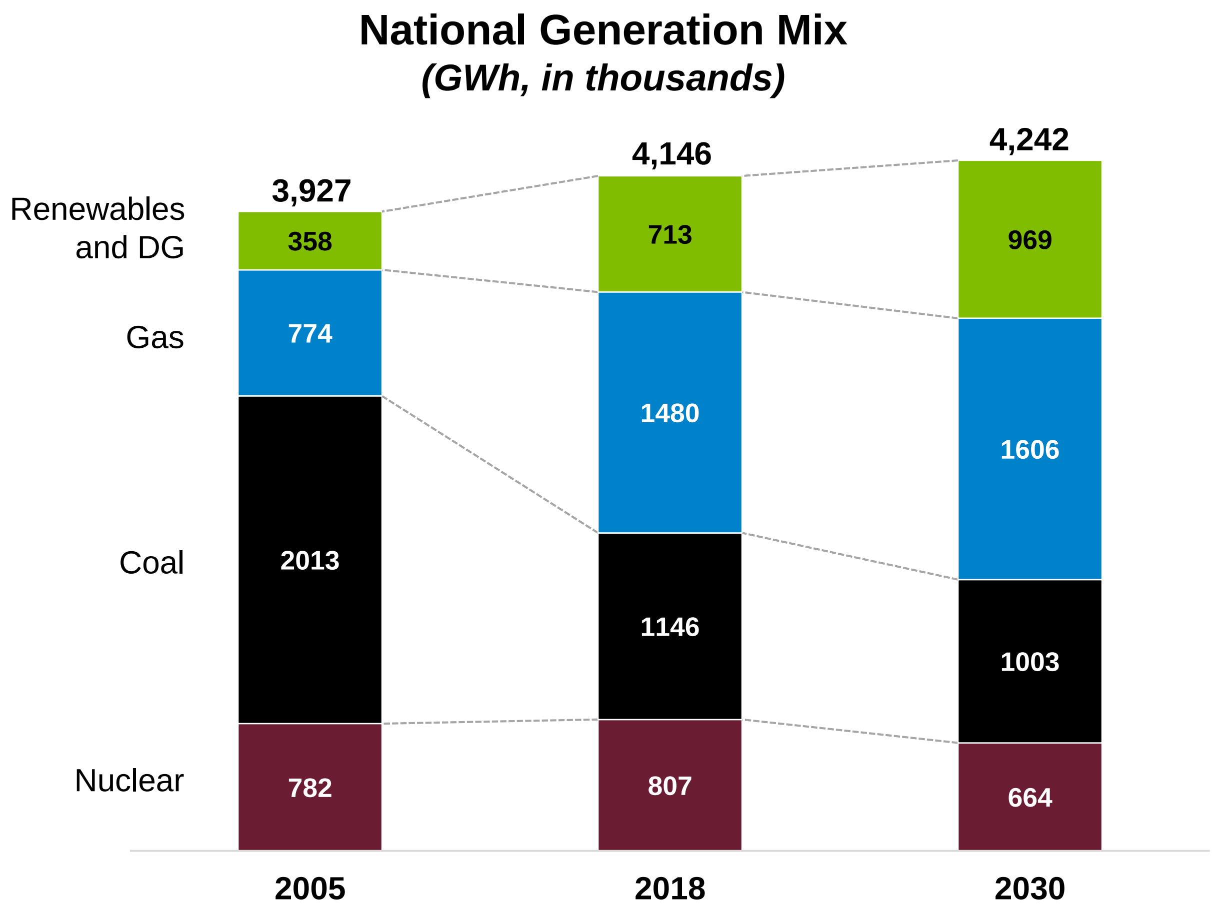
MISO Update

NARUC Electricity Committee

John Bear, CEO

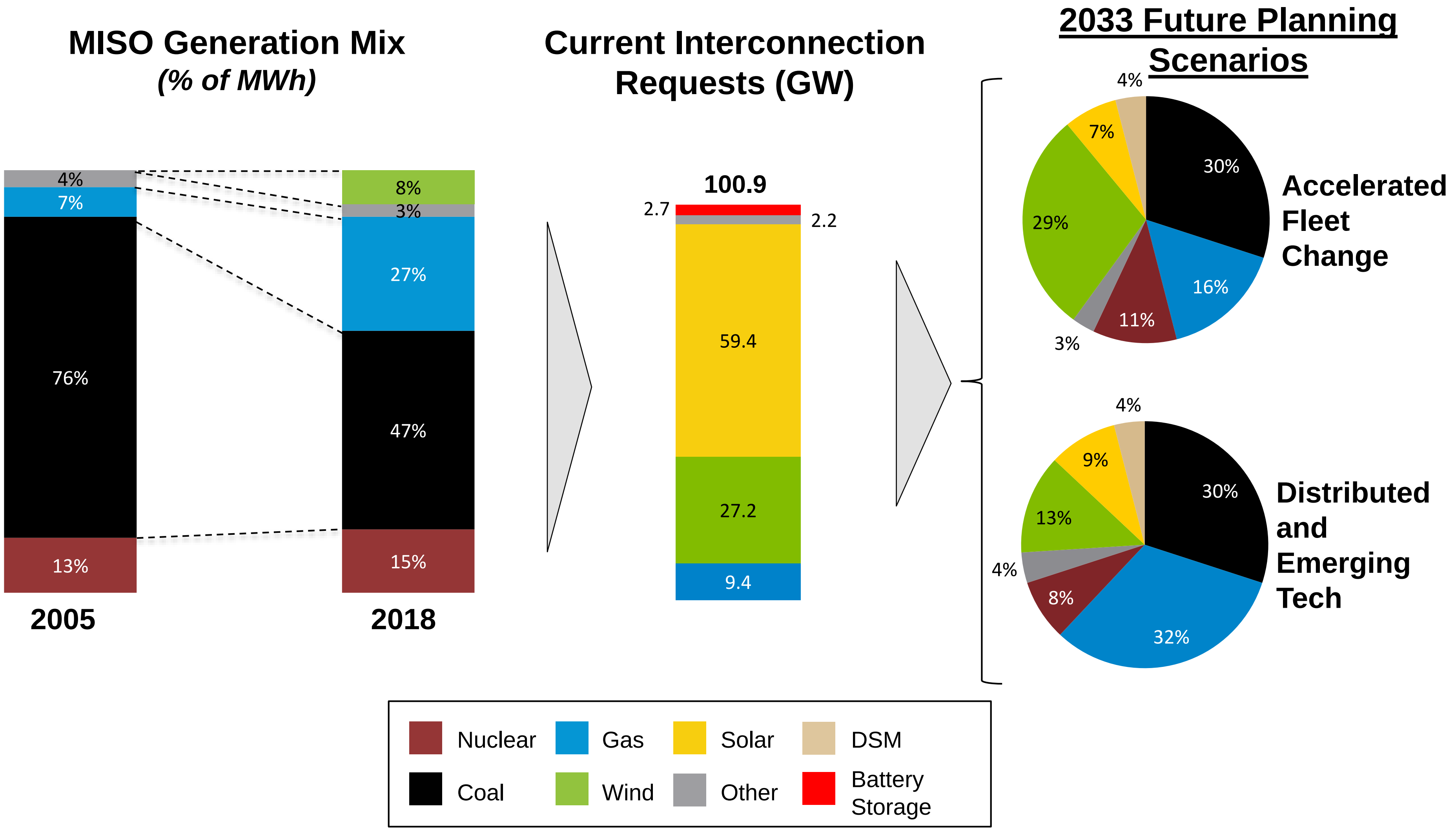
July 23, 2019

The US generating fleet has seen considerable change in the last 15 years, and this change will continue in the years to come

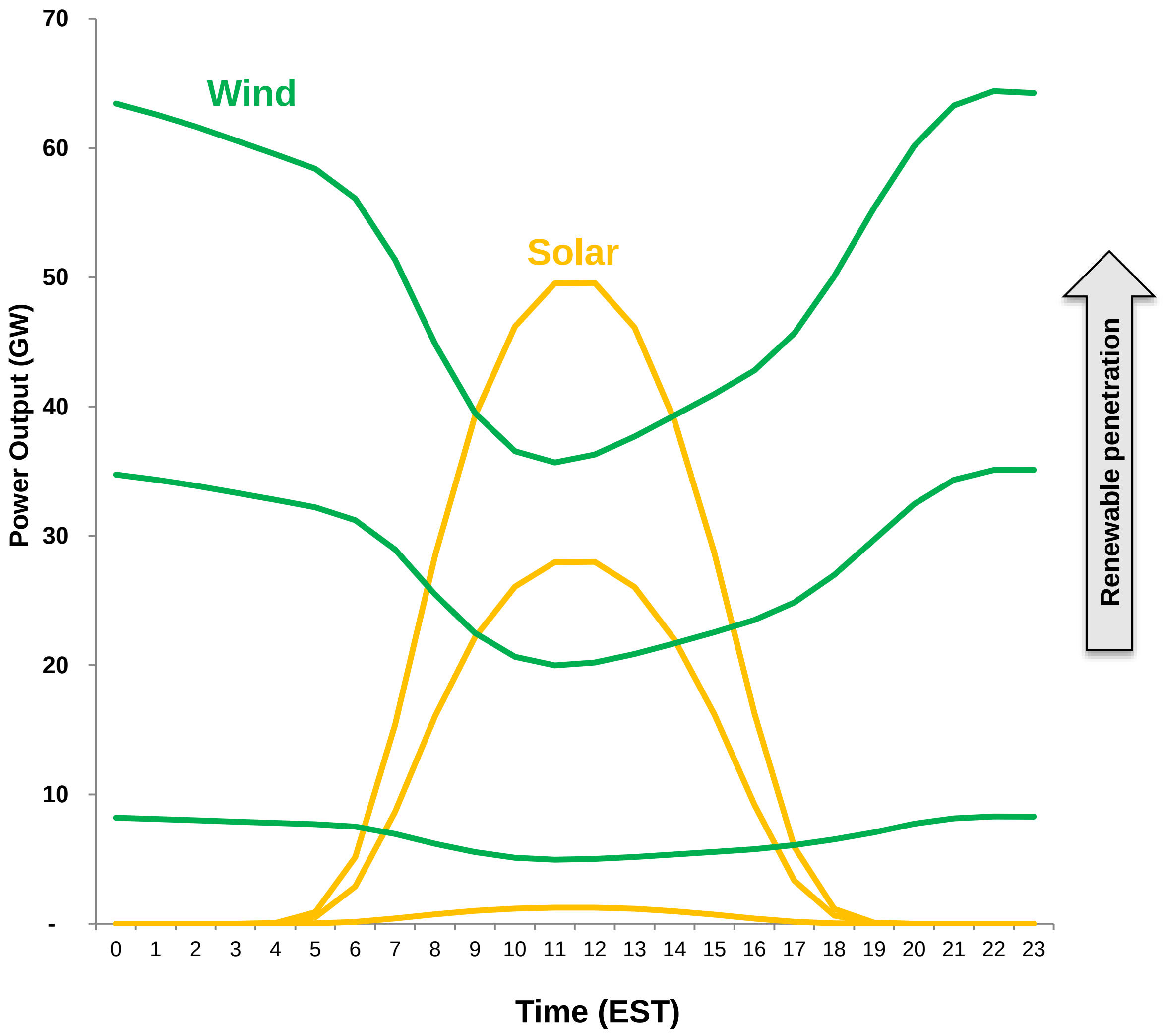


Source: US Energy Information Administration Annual Energy Outlook 2019 and US Energy Information Administration May 2019 Monthly Energy Review

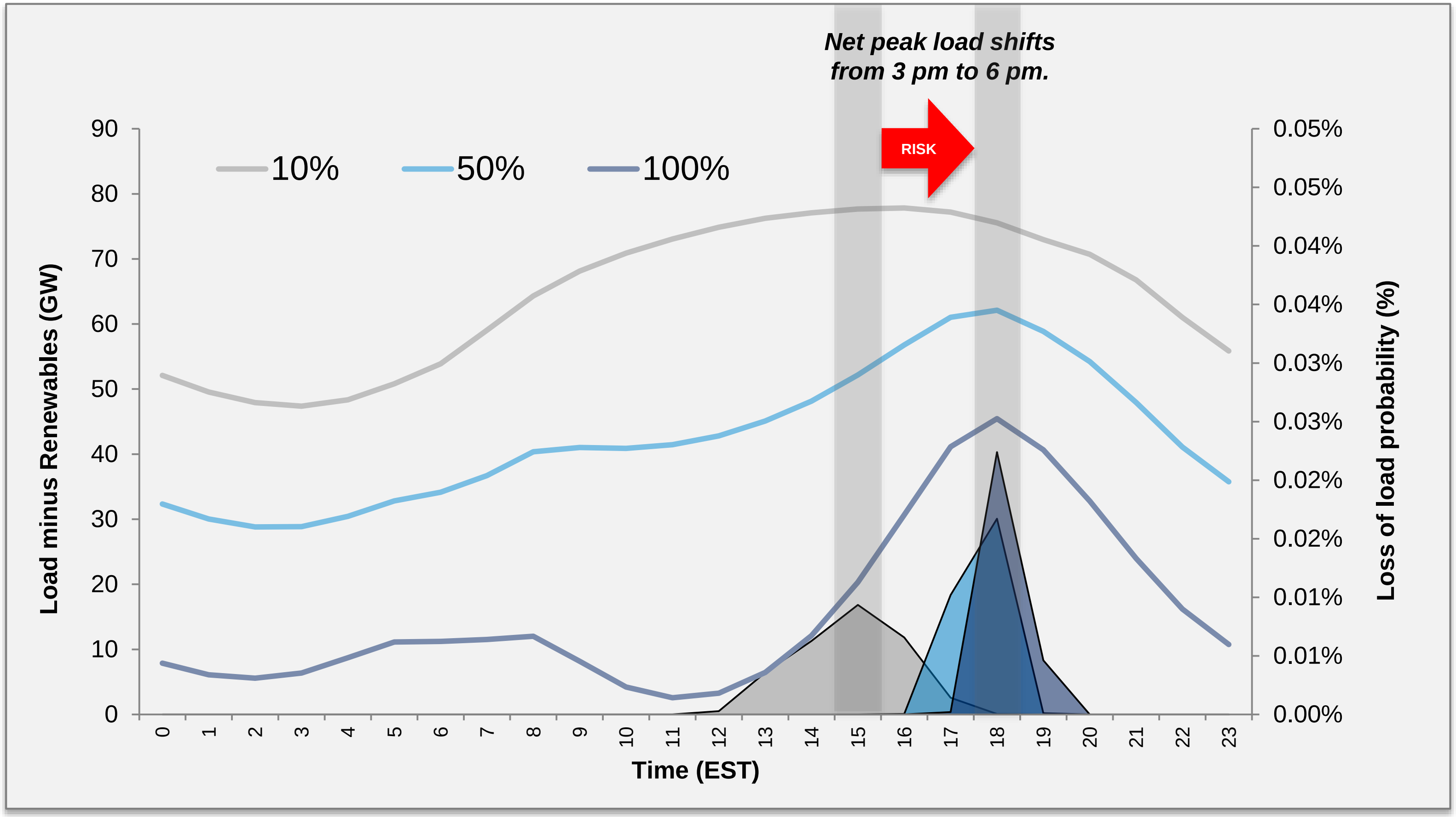
The generation fleet in the MISO Region is evolving, with the pace accelerating toward more renewables



As renewable penetration increases, wind and solar generation become complimentary



This growth in renewables causes operating risks to shift and become more acute, even on an average day



This ongoing portfolio change is part of three broad trends that are impacting the grid

De-marginalization

The modified set of resources that provide the next increment of energy at zero (e.g. renewables) or very low additional costs. Costs are incurred up front to cover high capital requirement.

Decentralization

The shift away from large, central-station power plants to smaller, often variable resources that are located behind the transmission meter at homes and businesses.

Digitalization

The revolution in information and communication technologies and platforms that will continue to disrupt nearly everything in our economy, including energy services.

Exploring the trend of de-marginalization raises interesting questions for the industry

How will the system flexibility and stability needs be met?	What products and pricing will be needed to provide incentives?
What transmission will be necessary to reliably access resources?	What tools and processes will be needed to manage volatility of supply and load?

Decentralization, while not happening as quickly in the MISO footprint, also has intriguing challenges

How are all resources enabled in the wholesale market?

How can retail and wholesale stay aligned on policy and incentives?

What are the signposts for electrification and decentralization growth?

How can load growth and the impact of decentralized resources be monitored and forecast?

Finally, digitization raises interesting questions at the wholesale / retail interface

What are the interoperability requirements and roles?	What are the interfaces with load serving entities?
What are the communication standards and protocols?	How do traditional wholesale and retail platforms evolve?

The MISO Forward report outlines three key requirements to address these trends

The ability of transmission and energy resources to meet requirements at all hours.

The ability to see and coordinate relevant resource, demand, and power flow attributes in operating and planning horizons.

The ability to anticipate and adapt to frequent and significant changes in resource output and demand, including the enabling of new sources of flexibility.

Electricity Committee

Up Next at 2:45…

Commissions' Role Implementing the
New Distributed Energy Resource Standard
(IEEE 1547-2018)

NARUC Summer Policy Summit

Commissions' Role Implementing the new Distributed Energy Resource Standard (IEEE 1547-2018)

Tuesday July 23, 2019

2:45 – 3:45 PM

NARUC Summer Policy Summit

Highlights of IEEE Standard 1547™-2018 for State Public Utility Commissions

David Narang
Principal Engineer, NREL Power Systems Engineering Center
Working Group Chair, IEEE Std 1547-2018 revision

NARUC 2019 Summer Policy Summit

July 23, 2019

Acknowledgments

- *Many thanks to IEEE P1547 officers, working group members, and balloters who contributed their time and effort to develop the revised standard.*

- *Thanks also to the U.S. Department of Energy (DOE) Solar Energy Technologies Office for supporting the author's participation in standards development.*

What is IEEE Standard 1547?

Title: Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces

- A technical standard sponsored and published by IEEE
- Cited in Federal law (EPACT 2005) as intended technical basis for local interconnection agreements, procedures and best practices
- Follows IEEE's rigorous consensus-based standards development process (for 2018 revision ~130 members of working group, >380 public balloters)
- All IEEE standards are voluntary (regulatory action from state energy commissions is needed to make part of interconnection practice)

Interconnection System

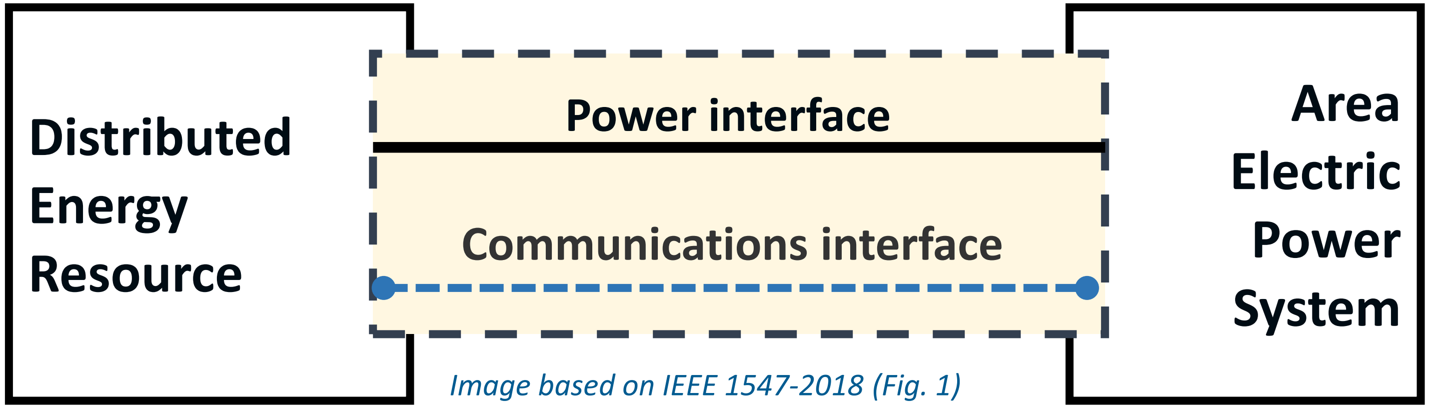


Image based on IEEE 1547-2018 (Fig. 1)

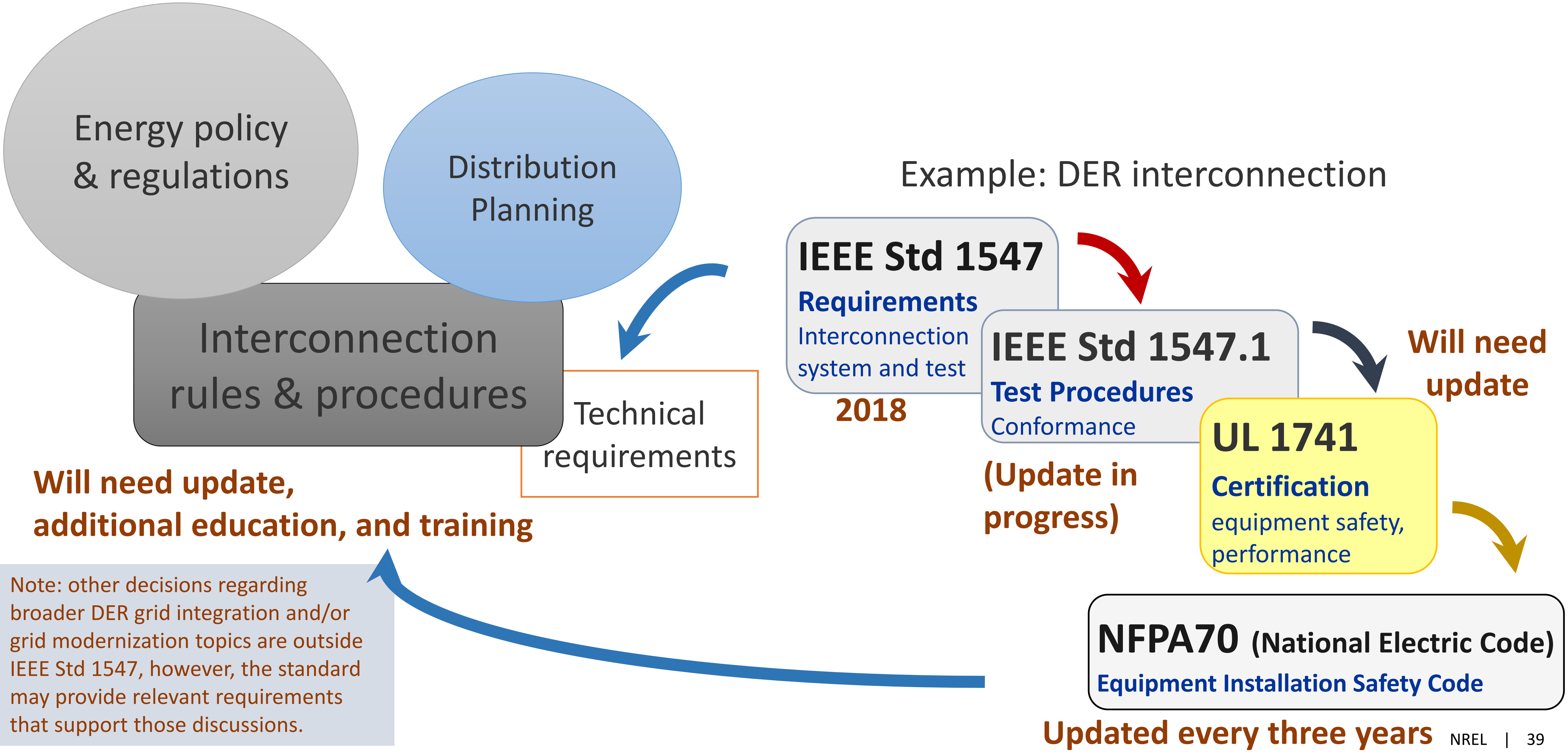
Scope:

- Specifies **functional requirements** for **capabilities** that all DER must have.
- Applies to **all DER, regardless of size** - synchronous, induction and inverter-based resources interconnected with a distribution grid (Area EPS).

Limitations:

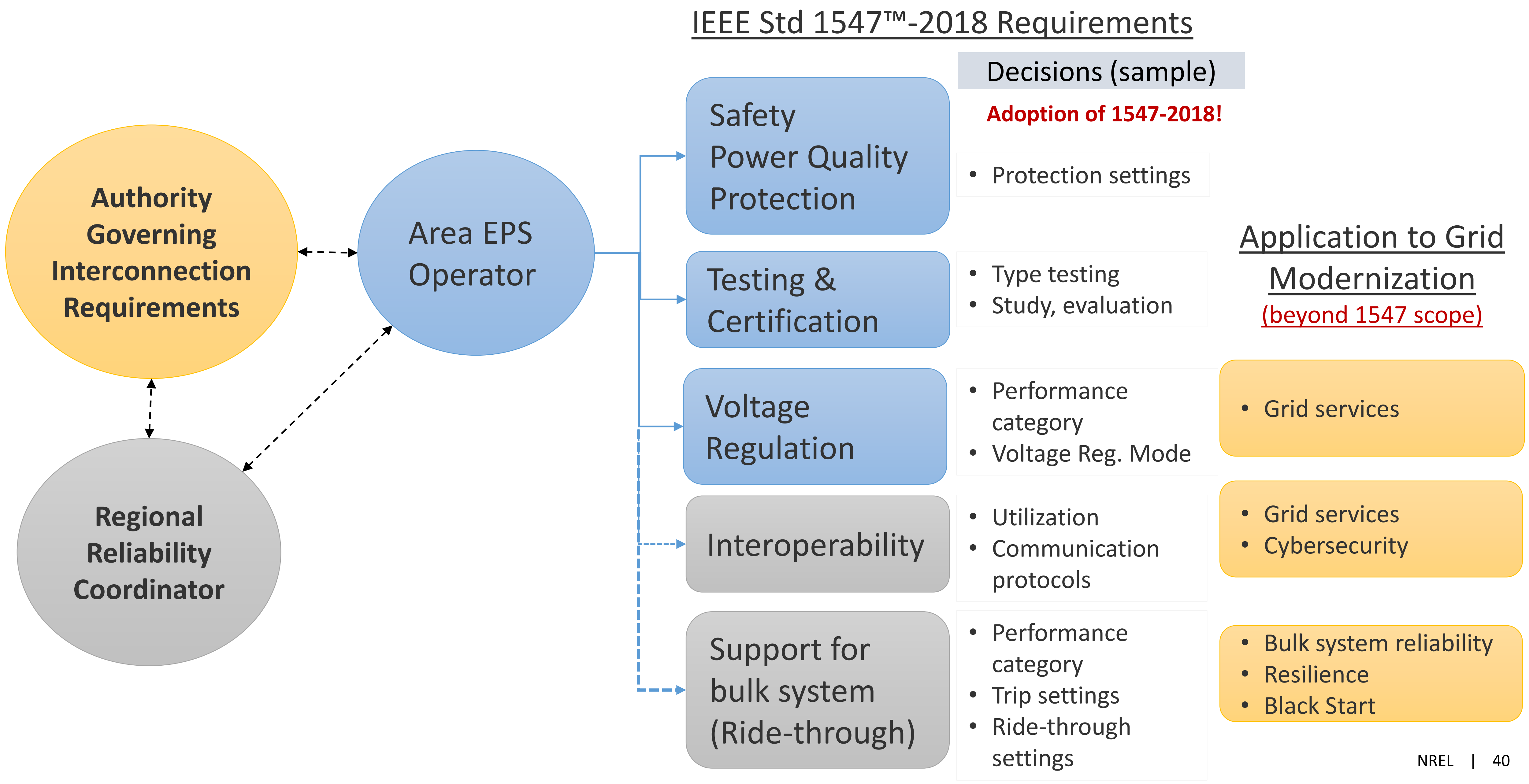
- **Does not apply to resources directly connected to the bulk power system** (New standards activity - IEEE P2800 for Transmission and Networked Sub-transmission Inverter-based Resources)
- NOT a design handbook
- NOT an application guide
- NOT an interconnection agreement
- NOT prescriptive—i.e., it does not prescribe other important functions and requirements.

Context for implementation



Note: other decisions regarding broader DER grid integration and/or grid modernization topics are outside IEEE Std 1547, however, the standard may provide relevant requirements that support those discussions.

IEEE Std 1547™-2018 Requirements Context



NREL Project: Stakeholder Educational Materials on IEEE Std 1547-2018

- Developing website for IEEE Std 1547-2018 educational materials
- Conducting gap analysis of existing educational materials
- Developing new educational materials, as needed
- Preparing guide for "Authorities Governing Interconnection Requirements" (AGIRs)
- Providing direct technical assistance

Provide your input to the gap analysis:
https://www.surveymonkey.com/r/IEEE-1547-2018

National Renewable Energy Laboratory – Golden, Colorado
Photo: Dennis Schroder

Thank You

David Narang | David.Narang@NREL.gov

www.nrel.gov

This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided by U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Solar Energy Technologies Office. The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains and the publisher, by accepting the article for publication, acknowledges that the U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

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Transforming ENERGY

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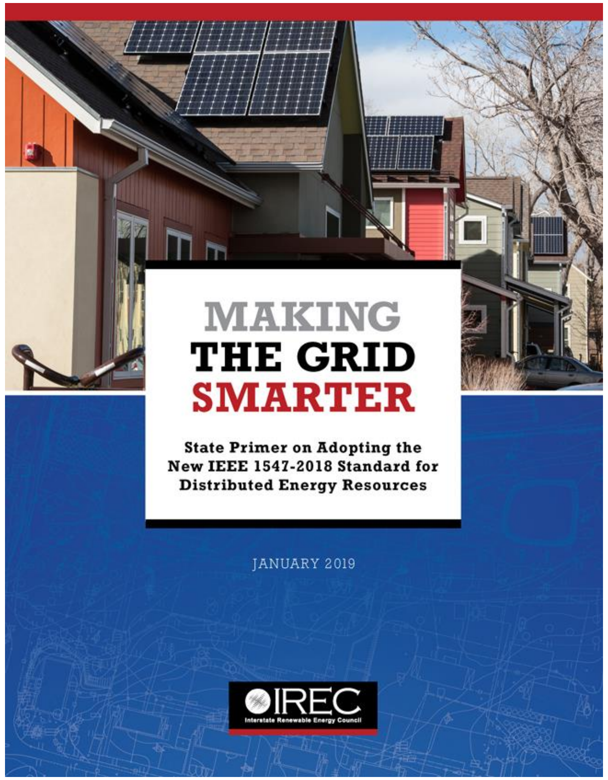

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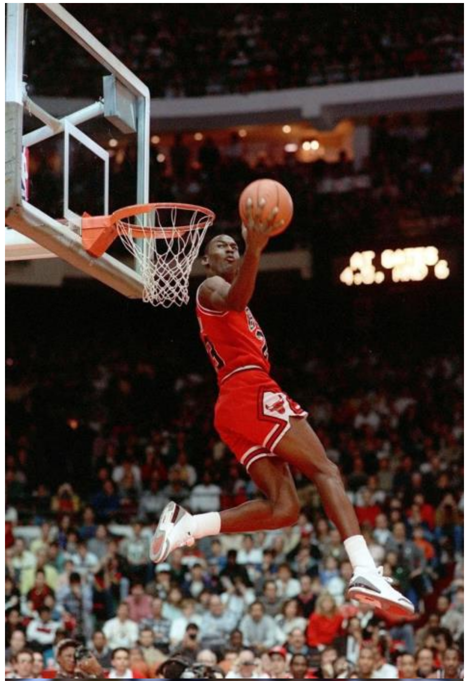


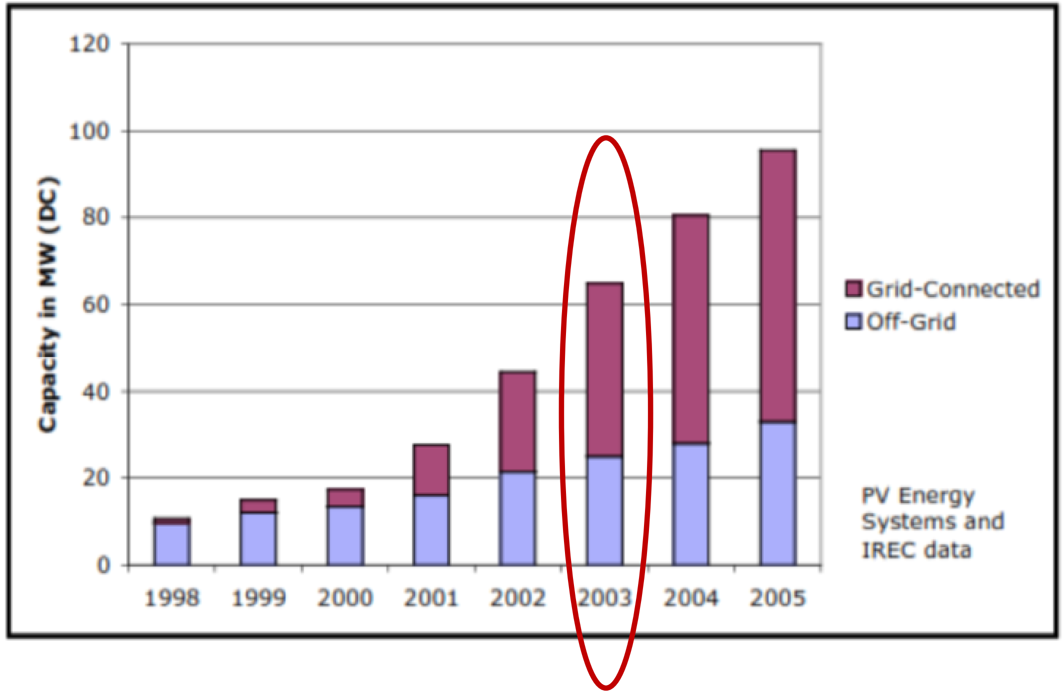
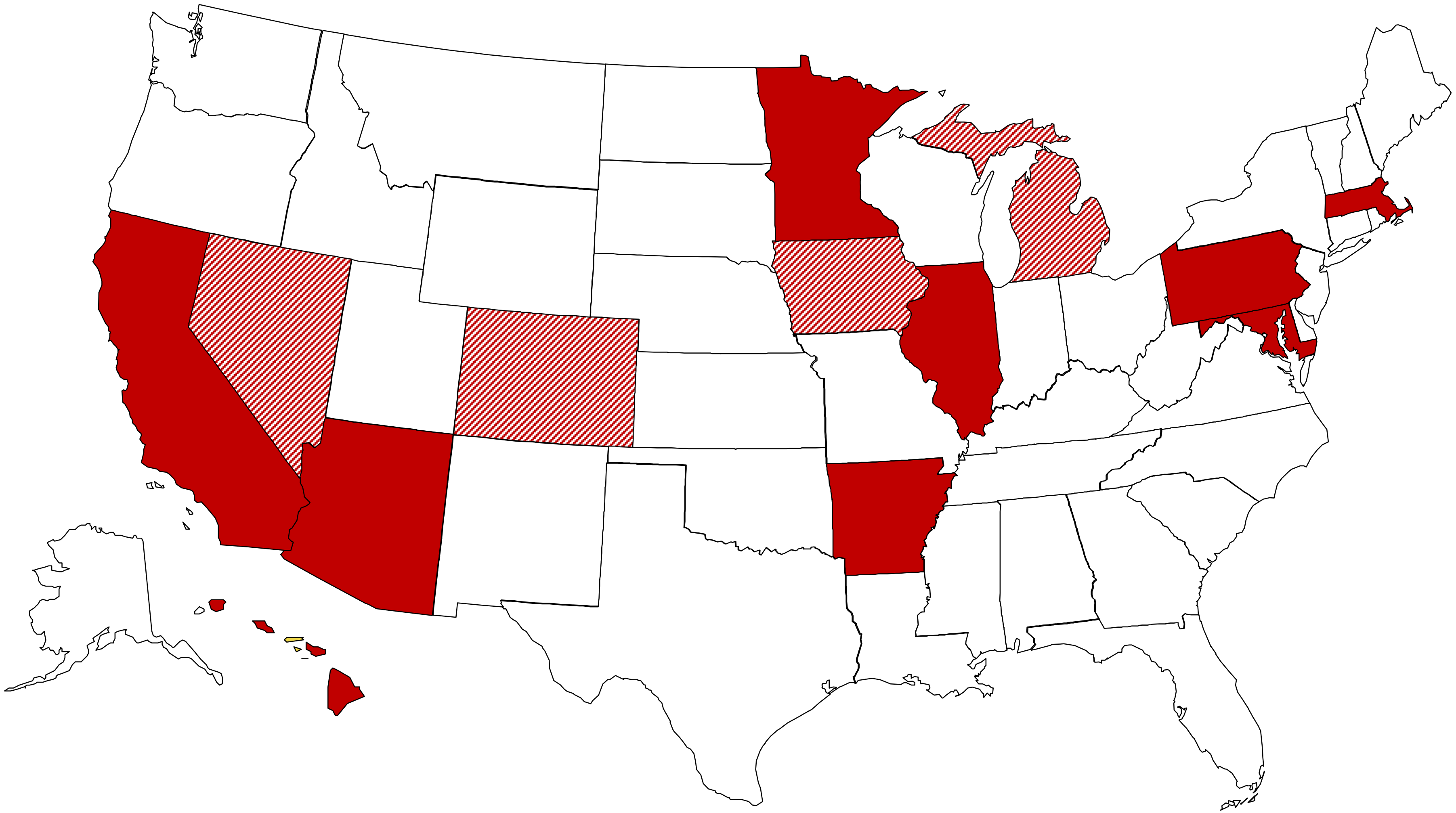


Figure 1: Annual Installed Photovoltaic Capacity (MW) in the U.S., 1998-2005[9]

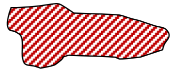
Source: Hart, David and K. Birson, Schar School of Policy and Government George Mason University, *Deployment of Solar Photovoltaic Generation Capacity in the United States*, Prepared for Office of Energy Policy and Systems Analysis U.S. Department of Energy June 2016,

State Activity* on IEEE 1547-2018



Active effort underway

Pending or related effort underway

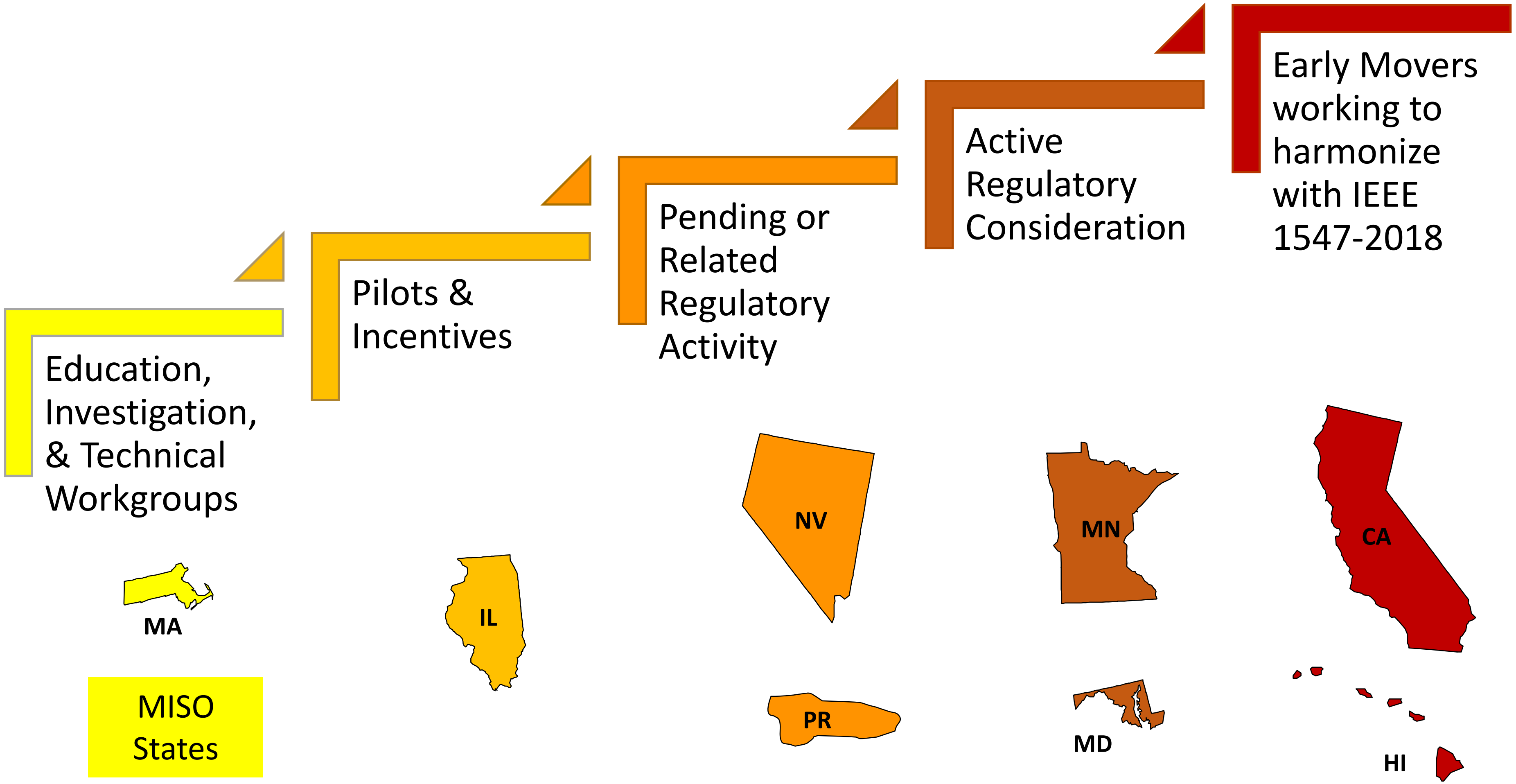


*Map does NOT reflect ISO/RTO Activity

IREC

Updated July 2019

Spectrum of IEEE 1547-2018 Activity



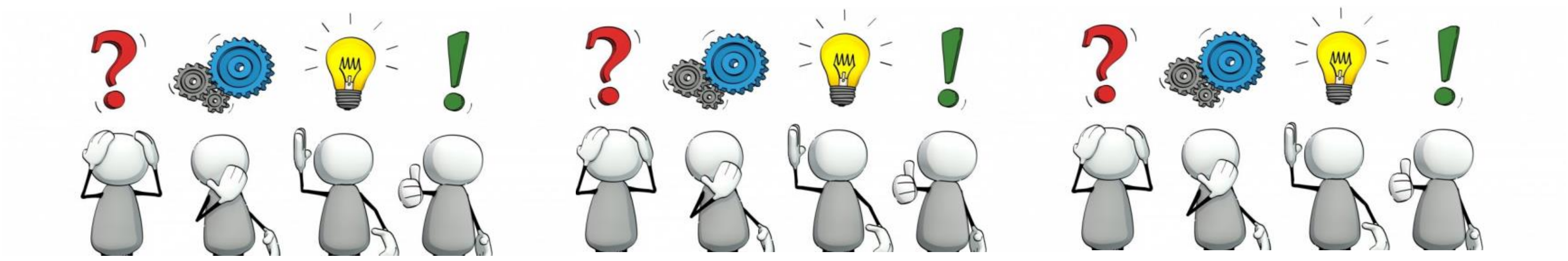
*Plus, state engagement and coordination with ISO/RTO activities

Process Steps & Considerations

Stakeholder Engagement	Who should be involved? How will they be engaged in the process?
Education	What do the different components of the standard mean? What are the implications for the utility, DER developers, and customers?
Drafting	Where will the technical requirements reside? Who will draft? What is the schedule?
Implementation	What is the process for adoption? What is the timeline for rollout and future revision/review?

Considerations for adopting IEEE 1547-2018

- Impact on interconnection process
- Testing, Commissioning and Verification
- Consumer awareness, impacts, and protections
- Implementation of communications requirements
- Dispute resolution
- Timing considerations with UL 1741



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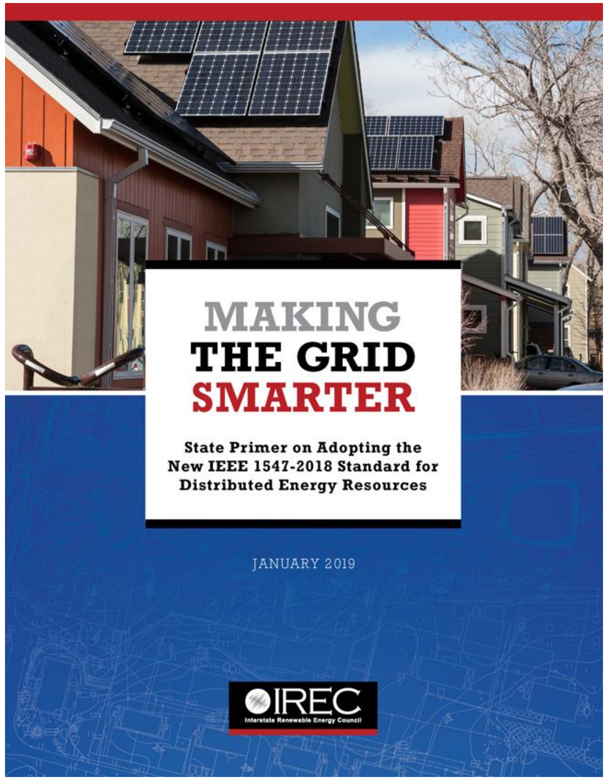

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IEEE Std 1547™-2018

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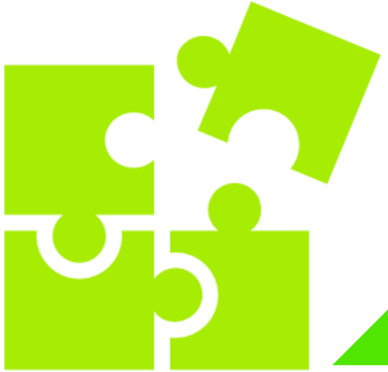
Steps to Unlock Benefits of IEEE 1547™-2018

Specify **DER** Performance and Functional **Capabilities**

- e.g., adopt IEEE Std 1547-2018

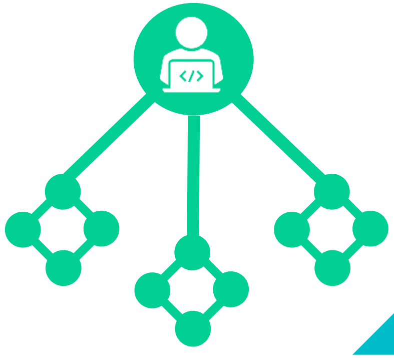


Update interconnection agreements

- e.g., allow for **utilization** of DER capabilities

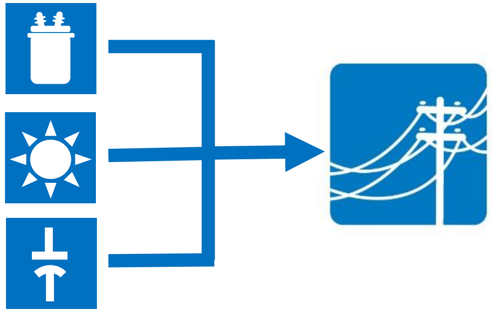
Design architecture and deploy DER **communication infrastructure**

- e.g., start with utility-scale DER before integrating retail-scale DER



Specify DER Management System and select **DER Aggregations/Group Management** Functions

- e.g., codify messages to be exchanged across the T&D interface



Design **market** and integrate DER into **grid operations**

- e.g., energy products, capacity products, re-dispatch, regulating reserves

IEEE 1547™-2018 Provides the Foundation for a Broad Set of Capabilities

EPRI Engagement in Support of IEEE 1547™-2018

Education

- *Active participation in standards development*
- *Training classes*
- *Industry engagement*

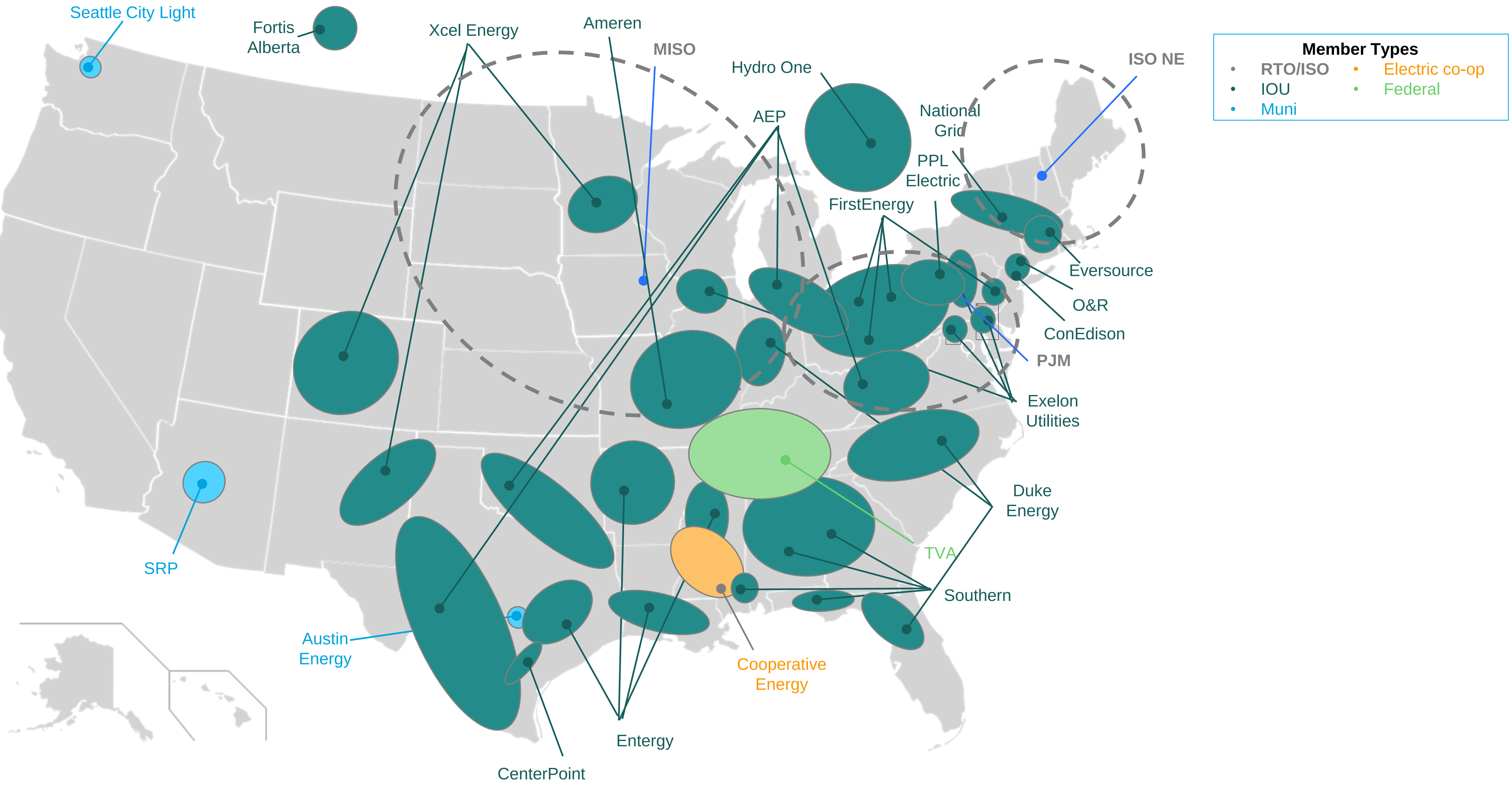
Research

- *Advanced function research and testing*
- *Application considerations*
- *Bulk system impacts*
- *Demonstration projects*

Coordination and Collaboration

- *Interest and working groups*
- *T&D interface and system operator considerations*
- *State interconnection working groups*

Broad Utility Engagement: EPRI Project Highlight - Navigating IEEE 1547



Summary: IEEE 1547™-2018 — Key Considerations

Adoption

- **Opportunities** to integrate DER reliably, securely, and efficiently into the grid
- **Key Considerations**
  - Consider adoption of standard at state-level
  - Specify "preferred" utility-required DER functional settings
  - Specify certification for DER equipment and potentially verification for DER facilities

Coordination

- **Opportunities** to utilize advanced DER capabilities
  - Increase distribution hosting capacity
  - Improve bulk system reliability
- **Key Considerations**
  - Functional settings
  - Performance categories
  - Communication interface
- **Coordinate across T&D**

Education

- **Opportunities** to engage a broad set of stakeholders
- **Key Considerations**
  - Understand the key implications of the changes to the standard
  - Engage all parties in the education process
  - Learn how the standard may influence past regulatory decisions

Collaboration

- **Opportunities** to work collaboratively to solve issues
- **Key Considerations**
  - Engage state and federal agencies to advance understanding
  - Developers, utilities, and regulators collaborating to solve interconnection challenges
  - Perform research to understand best practices and develop policy objectives

Thank You. Questions?

Commissioner Matt Schuerger (MN) - Moderator

Speakers:

David Narang, Section Manager, Applied Power Systems – Distributed Energy Systems Integration Group at National Renewable Energy Laboratory (NREL)

Sara Baldwin, Vice President, Regulatory at Interstate Renewable Energy Council (IREC)

Devin Van Zandt, Technical Executive at Electric Power Research Institute (EPRI)

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Up Next at 4:00…

The State of Nuclear Waste Transportation and Best Practices Across the Country

Subcommittee on Nuclear Issues – Waste Disposal

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The State of Nuclear Waste Transportation and Best Practices Across the Country

Subcommittee on Nuclear Issues – Waste Disposal

NARUC Summer Policy Summit

Moderator:

Hon. Anthony O'Donnell, MD

Dr. Kelly Horn,
Illinois Emergency Management Agency

Steven Edwards, Duke Energy

Pamela Prochaska, Xcel Energy

NARUC Summer Policy Summit

NEI Used Fuel Transportation Table Top

Pam Gorman Prochaska
Director, Nuclear Policy & Strategy
Xcel Energy

Used Fuel Storage at Xcel Energy

30 loaded canisters on site

- Supports operations to 2030

44 loaded casks stored on site

- 64 approved to 2033-2034

Monticello to Morris

Transportation of Used Fuel

Why do we care?

- Total Value Proposition
- “Back End” Actions Impactful
- Transportation will be challenged

Key Objectives of Used Fuel Table Top

- Demonstrate understanding of the transportation processes and requirements
- Replicate the communication, planning and decision-making needed to move fuel
- Facilitate stakeholder involvement
- Identify opportunities for improved efficiencies

Key Take-Aways

- Private shipment model new concept
- Early planning is necessary
- Relationships and communication with all stakeholders will be key to shared success
- Table Top is beginning of dialogue with principal parties

Next steps?

Thank you

Electricity Committee

NARUC Summer Policy Summit