



WECC

The Changing Needs
of the
Western Interconnection

March 18, 2019

Byron Woertz
Manager of
System Adequacy Planning

Who We Are

Not-for-Profit Organization

- Assure reliable bulk power system in the Western Interconnection

Regional Entity

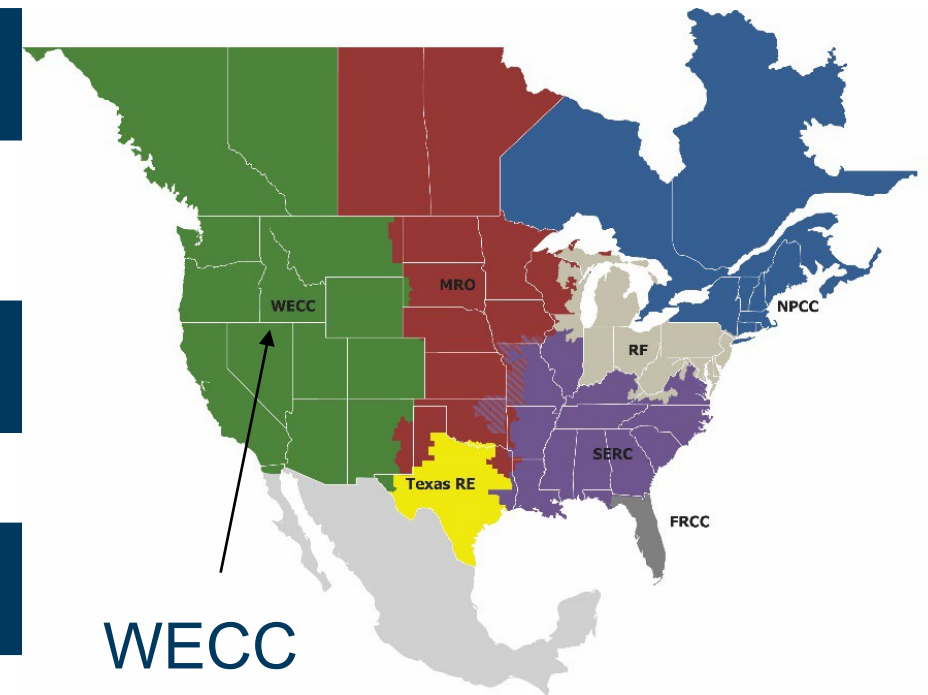
- Approved by FERC
- Largest of seven

Authority delegated by NERC

- Create, monitor, and enforce reliability standards

Unique Perspective

- Both Region and Interconnection



What We Do

Compliance

- Ensure compliance with NERC reliability standards
- Conduct audits every 1-3 years

Planning

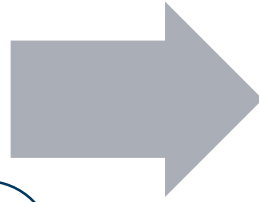
- Reliability Assessments 0-20 years in the future
- Essential Reliability Services, Economics and Policy Impacts
- Event Analysis
- Situational Awareness
- Performance Analysis



From Past to Future

Tool-Based Approach

- What can we learn from PCM analyses?
- What can we learn from power flow analyses?



Risk-Based Approach

- What potential future reliability risks should we be thinking about?
- How can we study them?



How Are Things Changing?



System Adequacy Planning

Anchor Data Set

Datasets

Environmental and Cultural Considerations

Gas-Electric Interface Study

Probabilistic Assessments

Reliability Analysis and Reporting

Round-Trip

Scenario Planning

Study Program

Scenario Planning

Scenario Planning is a technique for making long-term investments must be evaluated. Scenarios are not developed or used to evaluate the Western Interconnection. When used to evaluate emerging risks to the reliability of the Western Interconnection, making on actions that may be needed.

WECC Scenario Development is a learning cycle (learning cycles). WECC Scenario Development tracks and changes to the Western Interconnection that occur over time and builds upon lessons learned from previous study cycles. The process begins with a focus question and a set of key drivers and is refined through stakeholder engagement, to produce a set of Scenario Planning narrative upon which scenarios are crafted to assess risks to the reliability of the Western Interconnections and to inform decision makers of actions that may be needed to assure the future reliability of the Western Interconnection.

Current events submitted by WECC staff, stakeholders and consultants

APPROVED DOCUMENTS

DISCUSSION ITEMS

EPS CURRENT EVENTS

Event/Pattern/Structure (EPS) is a methodology used in WECC Scenario Development to track, organize, and analyze current events in a way that focuses on how the constituent parts of an event interrelate and how a collection of events interrelates in the broader context of the Western Interconnection as a whole. The



WECC EPS Issues

SUBMIT AN EPS CURRENT EVENT

VIEW SUBMITTED EPS EVENTS

National Survey of Electric Utilities Indicate Market Uncertainty as Leading Issue

Title	Created
California Judge Rules Utilities Must Open Bids for Storage Investments	... February 28
National Survey of Electric Utilities Indicate Market Uncertainty as Leading Issue	... February 28
EIA's new Key Statistics and Indicators section highlights long-term state energy data	... February 26
Arizona Public Service to install 850 MW of storage, 100 MW of solar	... February 26
The world's largest shipping company says a global trade war has just begun	... February 26
Once hailed as unhackable, blockchains are now getting hacked	... February 26
Europe Looks Like the Real Weak Link in the Global Economy	... February 26
Traditional Oil and Gas Companies Buying into EV Technology	... February 26
Vehicle-to-Grid Testing Comes to Texas	... February 26
Alberta to double solar power capacity	... February 26
California ISO board acts to bring generation and storage projects online	... February 26
Industry Stunned as Mexico Cancels Clean Power Auction	... February 26
Most U.S. utility-scale solar photovoltaic power plants are 5 megawatts or smaller	... February 26
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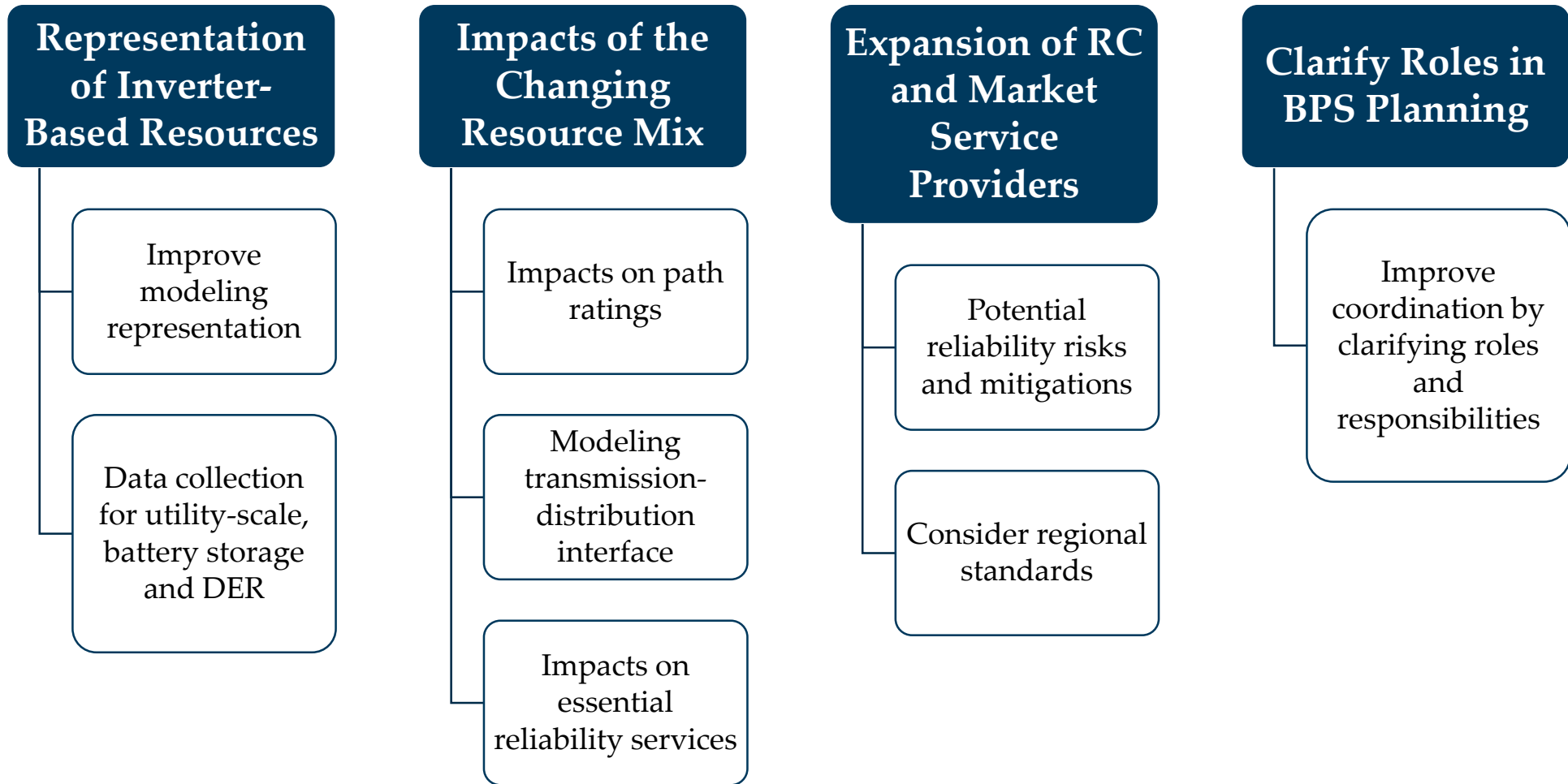
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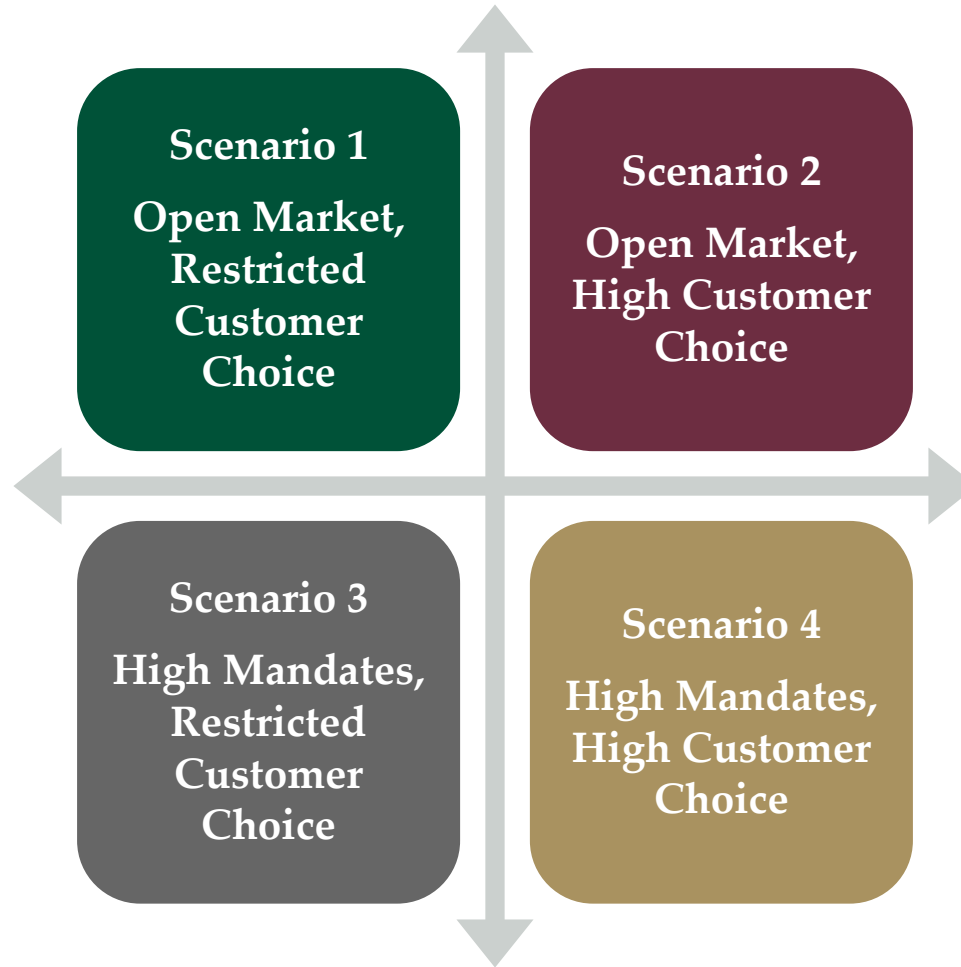
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WECC Near-Term Priorities



WECC Scenarios



2019 Reliability Assessments

Changes to System Inertia with High Renewable Implementation

- How would major changes to system inertia affect Essential Reliability Services such as frequency response?
 - Retirement of 90 to 100% of the coal fleet
 - Increase in renewable penetration

Significant Electrification

- What reliability risks could be created by large-scale electrification?
 - ⑩ High market penetration of passenger and commercial electric vehicles
 - ⑩ Significant effort to electrify non-electrical energy uses
 - ⑩ Increasing penetration of electronically interfaced end-use loads?

System Resilience Under Extreme Natural Disaster

- What are the reliability impacts, regionally and systemwide, of a major natural disaster such as a wildfire or earthquake?



2019 Reliability Assessments

El Paso Natural Gas Pipeline Disruption

- Would an interruption in gas supply from the El Paso Pipeline, as described in WECC's Gas-Electric Interface Study, create stability risks in Southern California or Arizona?

Water Availability Issues

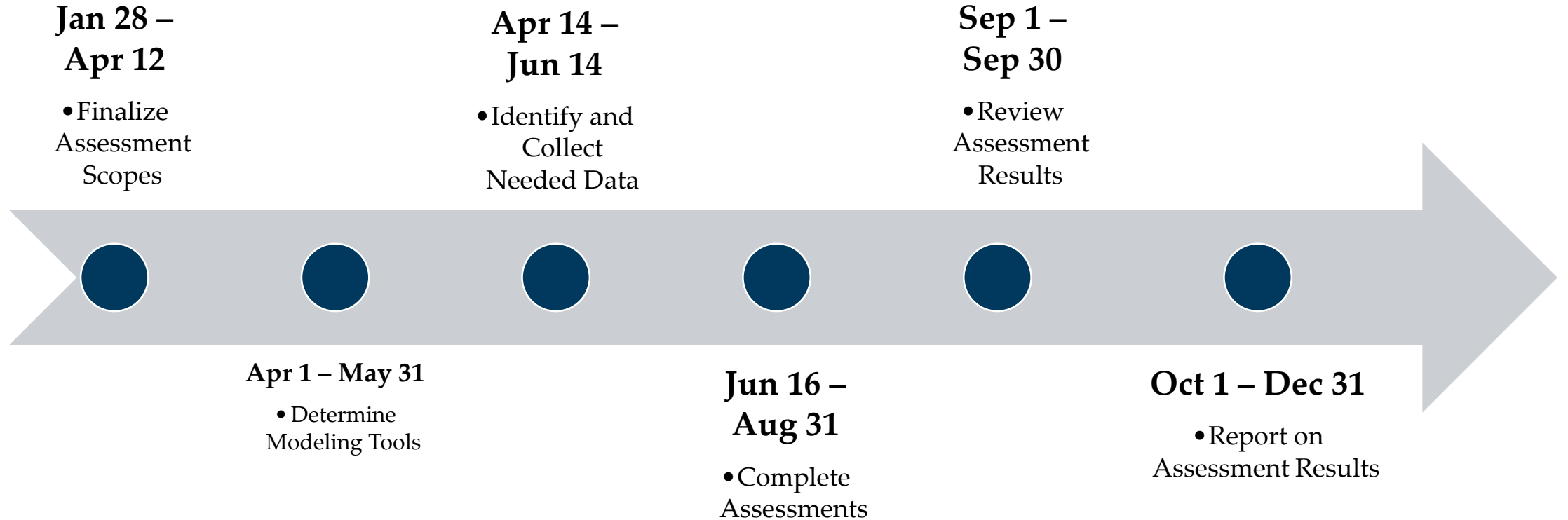
- How will limitations on water availability in the next 10-20 years impact reliability?

Reliability Impacts of Most Likely Year 10 Future

- In the Year 10 "Base Case" (2028), are there any reliability risks associated with path flows, resource adequacy, system stability or other parameters?



WECC 2019 Assessments Schedule





Electric Reliability and Security for the West

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