# Climate READi: Power

## Initiative Overview

September 2023

Resources: www.epri.com/READi
Get in touch: ClimateREADi@epri.com

# EPRI: Leading Collaborative Energy R&D Around the World

EPRI advances energy technologies and informs decision-making through ~$420M in collaborative annual research involving nearly 400 entities in ~40 countries - spanning the generation, delivery, and use of electricity.

## ENGAGING

- Utilities
- Academia
- OEMs
- Regulators

## LISTENING

- Financial Community
- Policy Makers
- Consumer Advocates
- Media

CLIMATE READi
RESILIENCE AND ADAPTATION INITIATIVE

| Workstream 1 | Workstream 2 | Workstream 3 |
|---|---|---|
| **Physical Climate Data & Guidance** | **Energy System & Asset Vulnerability Assessment** | **Resilience / Adaptation Planning & Prioritization** |
| • Identify climate hazards and data required for different applications<br>• Evaluate data availability, suitability, and methods for downscaling & localizing climate information<br>• Address data gaps | • Evaluate vulnerability at the component, system, and market levels from planning to operations<br>• Identify mitigation options from system to customer level<br>• Enhance criteria for planning and operations to account for event probability and uncertainty | • Assess power system and societal impacts: resilience metrics and value measures<br>• Create guidance for optimal investment priorities<br>• Develop cost-benefit analysis, risk mitigation, and adaptation strategies |

# EPRI Climate Resilience and Adaptation Initiative (READi)

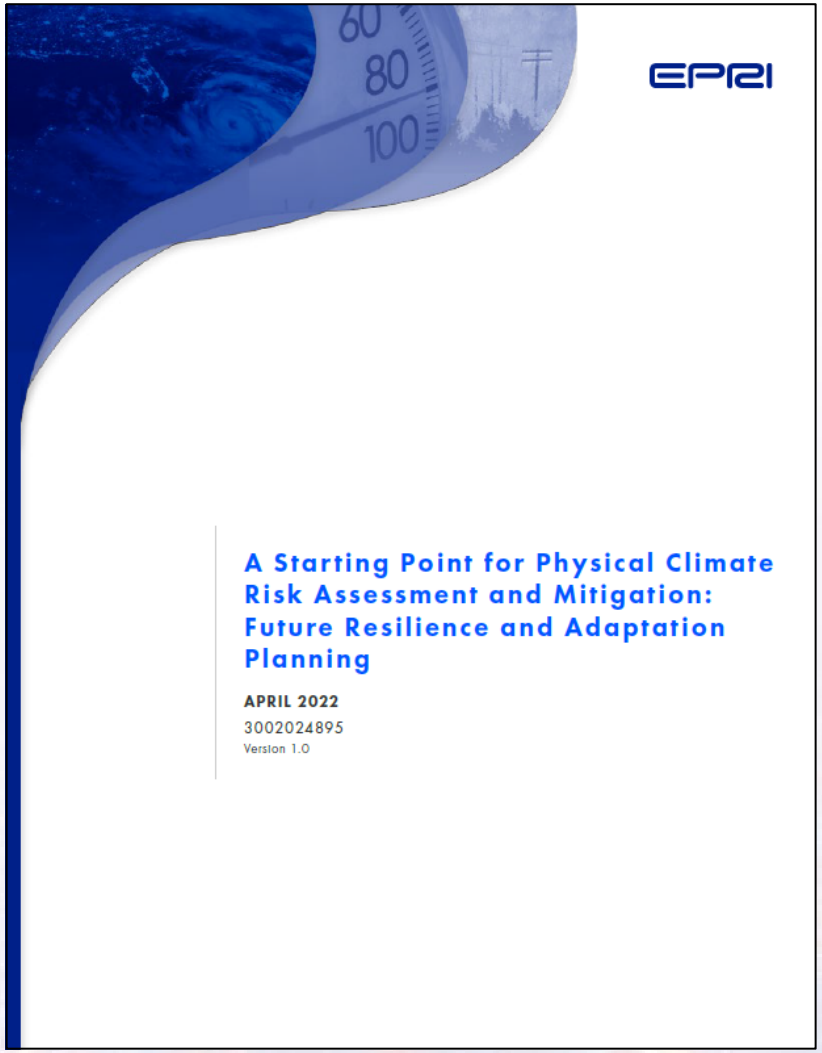
- **COMPREHENSIVE:** Develop a *Common Framework* addressing the entirety of the power system, planning through operations
- **CONSISTENT:** Provide an informed approach to climate risk assessment and strategic resilience planning that can be replicated
- **COLLABORATIVE:** Drive stakeholder alignment on adaptation strategies for efficient and effective investment


## Deliverables: Common Framework "Guidebooks"

- Climate data assessment and application guidance
- Vulnerability assessment
- Risk mitigation investment
- Recovery planning
- Hardening technologies
- Adaptation strategies
- Research priorities

# The EPRI Differentiator: Power System Application

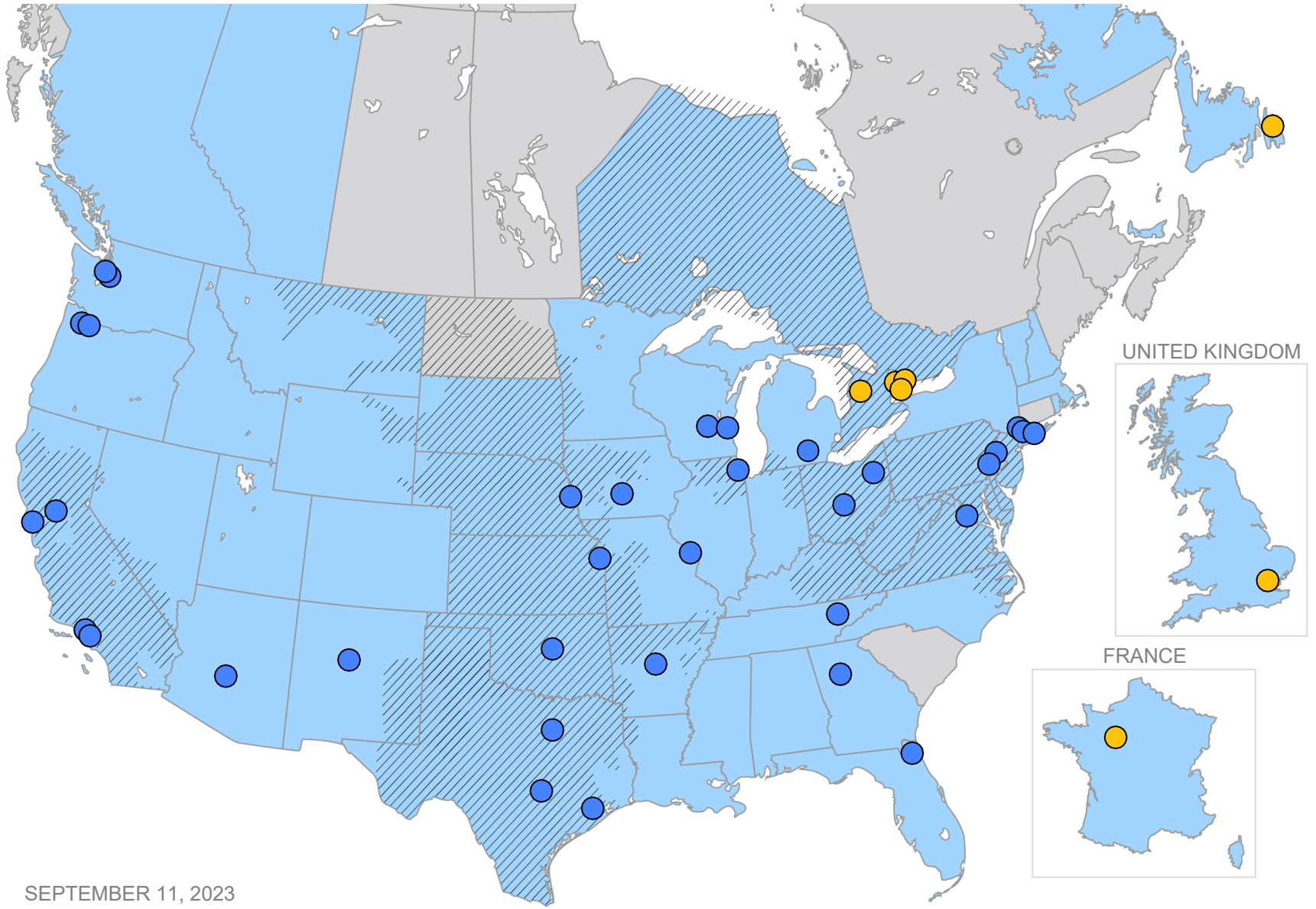
*Generation Impacts*




3002024895

*This white paper examines the current knowledge base of potential climate-related impacts on all facets of the power sector, to serve as a foundation for a standardized and consensus-based framework to inform infrastructure investment and deployment.*

# Climate READi Members

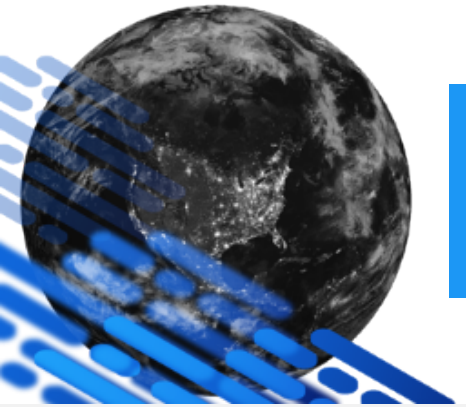



○ Member Headquarters  ▭ Member Operating States/Provinces  ▨ ISO Service Territories  *(only HQ location shown for IPPs)*

aes Indiana · exelon · PG&E · aes Ohio · FirstEnergy · pjm · Alliant Energy · FORTIS INC. · hydro one · PNM · Ameren · ieso Connecting Today. Powering Tomorrow. · ppl · American Electric Power Boundless Energy · JEA · PSE Puget Sound Energy · Berkshire Hathaway Energy · LA DWP Los Angeles Department of Water & Power · Bonneville Power Administration · Rte · LIPA Long Island Power Authority · SRP · BrucePower · nationalgrid · Seattle City Light · California ISO · New York State of Opportunity NY Power Authority · Southern California Edison · CenterPoint Energy · OG&E · Southern Company · Consumers Energy · your energy partner OPPD Omaha Public Power District · SPP Southwest Power Pool · conEdison · ONTARIO POWER GENERATION · TVA Tennessee Valley Authority · ercot Your Power. Our Promise. · PGE · VISTRA · evergy · WEC Energy Group

# Climate READi Affinity Group

The Climate READi Affinity Group (CRAG) is comprised of individuals from academia, consulting, finance and insurance institutions, non-governmental organizations, national labs, regulators and government— among others—bringing their expertise to address the critical challenge around resilience and adaptation to the energy sector.



***Embracing a 'Big-Tent' Approach to Framework Development***

- Accenture
- ADEX
- Alison Silverstein (Consultant)
- Andre Dessler (Consultant)
- Applied Weather Associates
- Argonne National Laboratory
- Baringa
- Battelle
- Black & Veatch
- Brookhaven National Laboratory
- CAMPUT
- Canadian Climate Institute
- CANDU Owners Group
- CarbonPlan
- CDP North America
- Center for Climate & Energy Solutions
- Chemonics
- Clark Miller (Consultant)
- Clean Air Task Force
- Climate Risk Institute
- Columbia University
- Copperleaf Technologies
- CSA Group
- Desert Research Institute
- Disaster Tech
- Eagle Rock Analytics
- Eaton
- Electricity Canada
- Energy Systems Integration Group
- Energy Networks Association
- Enline Transmission
- Exponent
- Grid Lab
- Grid2.0
- Guidehouse
- Houston Advanced Research Center
- ICF
- IEEE
- Imperial College London
- King Abdullah Petroleum Studies and Research Center
- Institute of Nuclear Power Operations
- Jacobs Engineering
- Khalifa University
- King Abdullah University of Science and Technology
- King's College London
- Lawrence Berkeley National Laboratory
- Lawrence Livermore National Laboratory
- McCormick Taylor
- Midwest Climate Collaborative
- Model World Consulting
- National Association of Regulatory Utility Commissioners
- National Association of State Energy Officials
- National Center for Atmospheric Research
- National Oceanic and Atmospheric Administration
- National Renewable Energy Laboratory
- North American Electric Reliability Corporation
- North American Transmission Forum
- Nuclear Energy Institute
- Nuclear Electric Insurance Limited
- National Renewable Energy Laboratory
- Oak Ridge National Laboratory
- Oregon State University
- Pacific Northwest National Laboratory
- Pacific Northwest Utilities Conference Committee
- Power Systems Engineering Research Center
- Quanta Services
- RAND Corporation
- Resources for the Future
- RS Poles
- RUNWITHIT Synthetics
- Sharply Focused
- SLR Consulting
- Storm Impact
- Sunairio
- Union of Concerned Scientists
- Universidad Pontificia
- University of Albany
- University of Illinois
- University of Michigan
- University of Nottingham
- University of Reading
- University of Saskatchewan
- Verdantas

# Recent Deliverables

### READi Insights: Extreme Heat Events and Impacts to the Electric System

Evaluates severity of recent extreme heat events in the context of historical records and climate change and potential future implications of extreme heat for the power system (300202552)

### Costs & Benefits of Proactive Climate Adaptation in the Electric Sector

Outlines how proactively implementing adaptation strategies is expected to result in a more resilient power system, avoided damages, and reduced societal impacts (3002025872)

### Workstream 2 Asset Literature Review Series

Five volumes of literature reviews that characterize asset vulnerability to climate change for nuclear, non-nuclear, cross-cutting topics, and transmission and distribution assets. (3002025313, 3002026314, 3002026315, 3002 026316)

### Climate-Informed Planning & Adaptation for Power Sector Resilience

Compilation of literature from researchers and industry stakeholders on climate risk, power system impacts, and current practices to address power system resilience against climate hazards (3002026317)

### Physical Climate Data 101

Over 250 comments from 19 EPRI members and 10 CRAG organizations during review period for the first training in the Climate 101 series (3002026223, 3002026297, 3002026298, 3002026296)

### READi Insights: Extreme Winter Weather Challenges for the Power System

Evaluates severity of recent extreme winter events in the context of historical records and climate change and potential future implications of extreme heat for the power system (3002027393)

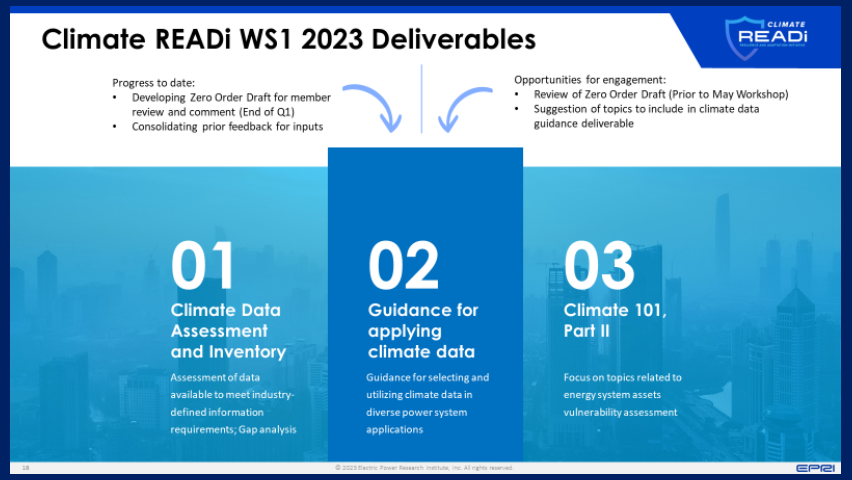

### Year One Annual Report

Overview from the first year of activity, summarizing current progress and the plan ahead for the remaining two years. (3002027401)

# ONE 2023 Highlight per Work Stream

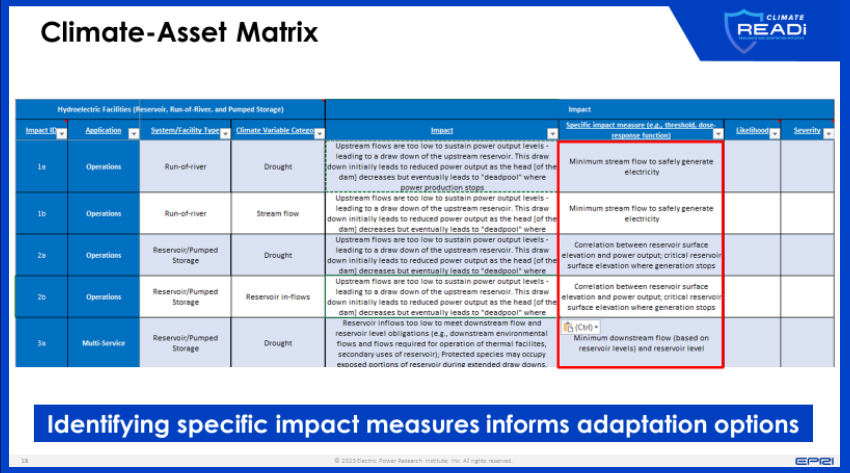
## WS1 - *Climate Data & Guidance*

### Climate Data Guidance Document & Phase 1 Inventory



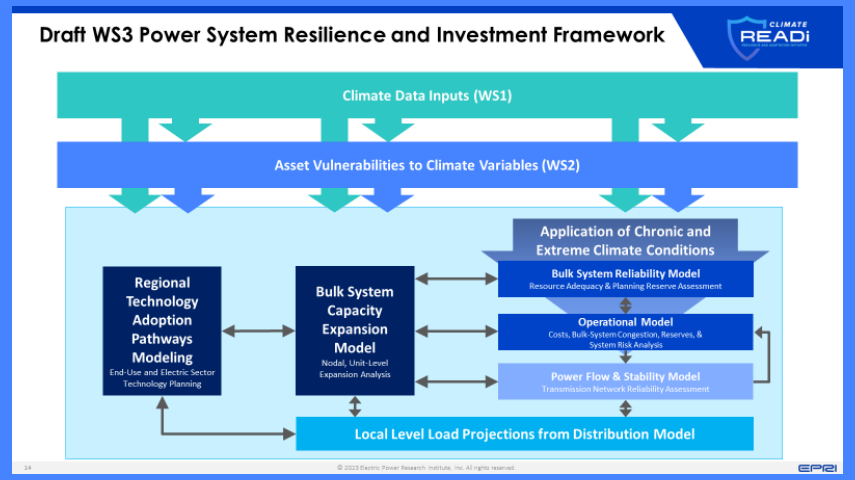

## WS2 - *Exposure & Vulnerability*

### Climate Asset Matrix Development




## WS3 - *Planning & Prioritization*

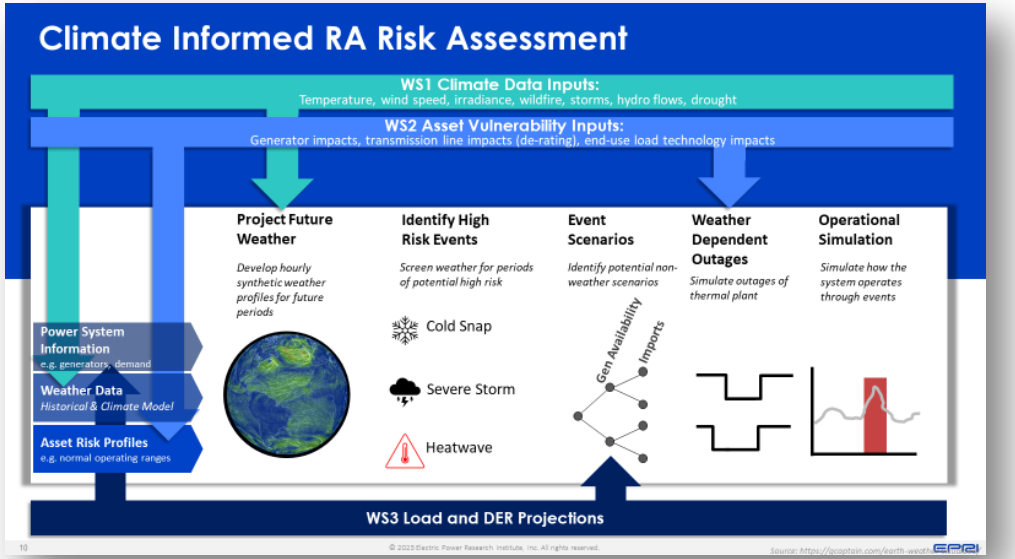
### Texas A&M Synthetic T&D Model Case Study



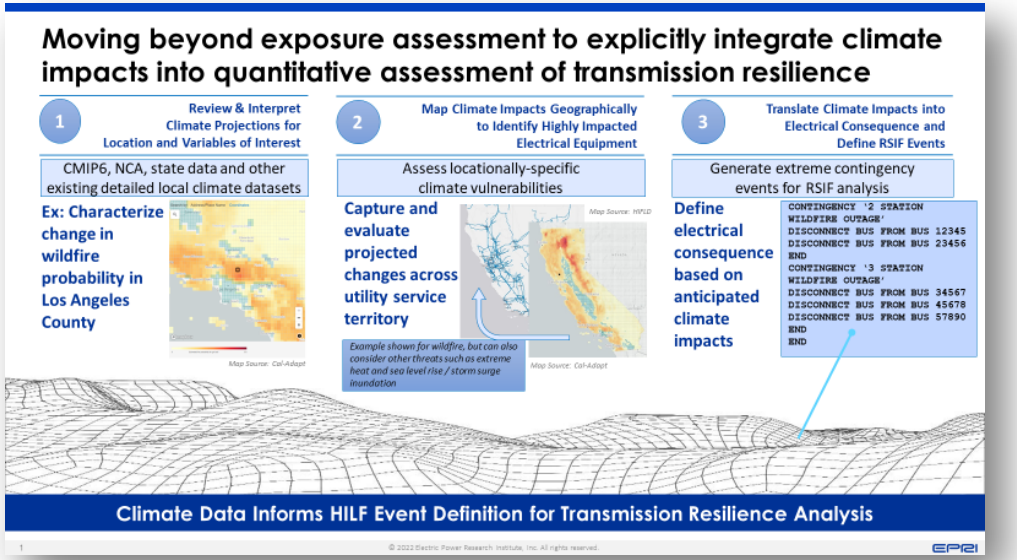

***Several Workshop Opportunities to Engage!***

# Addressing Extreme Weather Challenges

- READi working at developing a comprehensive framework that leverages existing tools and processes
- Framework can be implemented based on need and structure of the planning entity




Risk screening for resource adequacy and transmission planning assessments

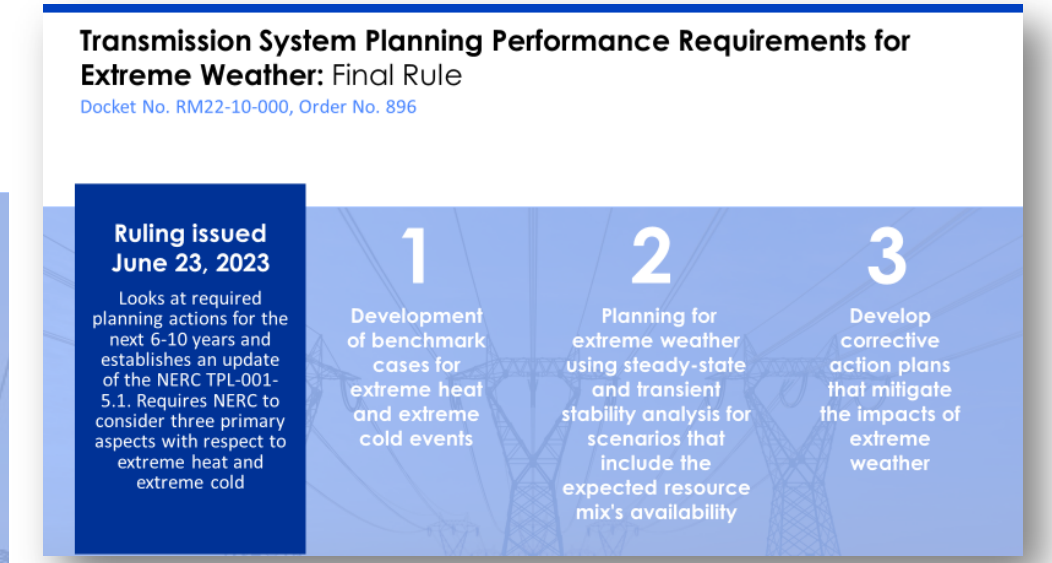


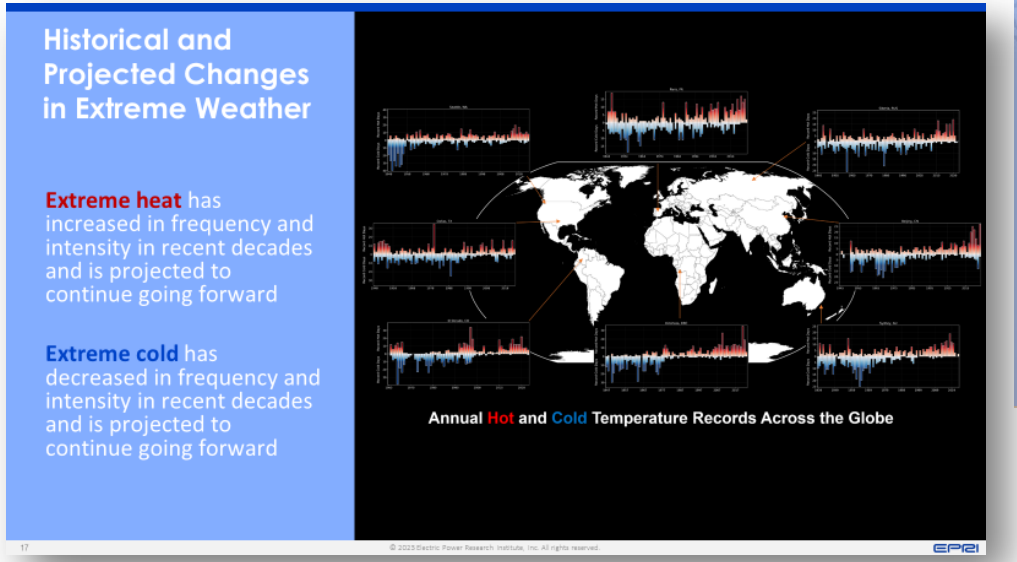

Can capture impacts on initial conditions and acute destructive events

# Addressing Extreme Weather Challenges

- **Addresses challenges in the short-term as well as the long-term impacts of climate change**
- **FERC Order 896 is an example of where READi learning can be leveraged in the short-term**

Public EPRI webcast broke down the impacts of the order




Understanding weather and impacts on the power system is critical

# Together...Shaping the Future of Energy®