

# EPRI CLIMATE RESILIENCE ANALYSIS:

Preparing Energy Systems For a Low-Carbon Transition and Climate Change

2022

**CHANGING CLIMATE**, including the potential for more frequent and/or intense weather and a growing dependence on electricity through the clean energy transition, makes ensuring power sector climate resilience and adaptation a societal imperative. Climate and weather extremes present a potentially significant and escalating risk within the electric power and energy systems because of their broad and compounding effects on power generation, transmission systems, distribution networks, and customer usage. Utilities often face these evolving challenges with limited climate analysis resources and varying levels of scientific expertise needed to identify vulnerabilities, assess adaptation options, and develop comprehensive plans for asset and system resilience.

As the leader in energy industry research, the Electric Power Research Institute (EPRI) brings together in-house climate,

engineering, operations, and planning experts to assist utilities with proactively assessing climate-related risk. EPRI works with utilities to characterize current and projected trends in relevant climate variables, complete quantitative climate risk assessments, identify potential impacts, and assess possible response strategies. Our diverse group of experts have the scientific literacy needed to interpret and evaluate climate data to identify and project how current and future events could impact the energy sector. EPRI's unique capabilities also allow for integration of climate projection data and characterization of future weather and climate patterns into a suite of industry-specific models, including capacity expansion and transmission planning models, to help utilities systematically plan for climate change alongside other drivers of change for the industry.

## BUILDING CLIMATE LITERACY AND TECHNICAL FOUNDATION

EPRI experts help build climate literacy and a technical foundation for addressing climate-related risk through scientific assessments, guidance, and education. These resources help utilities and key stakeholders increase understanding and literacy of scientific data and outcomes to aid and inform planning and modeling opportunities.

## INTERPRETING CLIMATE DATA AND ANALYSIS

EPRI experts compile and analyze raw weather and climate data to provide regional or localized assessments of potential hazards and extremes relative to the historical baseline. Historical data sources include satellite reanalysis and surface station observations; projection data sources are derived from global climate models (GCMs) developed as part of the Coupled Modeling Intercomparison Project (CMIP) including statistical, dynamical and hybrid downscaled products.

### CLIMATE RESILIENCE FOCUS AREAS

EPRI research is designed to support utilities and energy stakeholders at any phase of climate assessment or adaptation planning. Our work informs and facilitates evaluation and communication of both transition risks (risks to companies from low-carbon transition, including from policy design, technology availability, and market uncertainties) and physical risks (climate change hazards, impacts, vulnerabilities, and potential adaptations) through assessment of scientific knowledge, and development of guidance, methodologies, data, and tools.

## INTEGRATING CLIMATE DATA INTO ENERGY SYSTEM MODELING

Leveraging EPRI's advanced energy system modeling capabilities, including the US Regional Economy, Greenhouse Gas, and Energy (US-REGEN) model for capacity expansion, dispatch, and end-use demand; steady state operation and production cost models; transmission resilience and power flow models; and resource adequacy models, this research interprets and integrates climate variables into electric sector models to deliver more integrated assessment for generation, transmission, and distribution planning for future climate conditions.

## PREPARING FOR LOW CARBON TRANSITION & CLIMATE IMPACTS

Building upon climate risk and vulnerability assessments and energy system modeling, this focus area helps utilities and stakeholders proactively adapt and respond to potential climate change impacts and low carbon transition. EPRI provides a forum for sharing best practices and actionable guidance to harden assets, evolve electric sector processes, and adapt to the new realities of extreme weather events or changes in chronic climate conditions. Research contextualizes risks to inform priorities for investment and strategic planning.

### RESEARCH OPPORTUNITIES

#### BUILDING CLIMATE LITERACY AND TECHNICAL FOUNDATION

#### INTEGRATING CLIMATE DATA INTO ENERGY SYSTEM MODELING

EPRI's Annual Energy and Climate Seminar

Global Drivers and Climate Impacts Analysis Shaping Company Decisions (Program 201-E)

Exploring Climate Impacts in Utility Operations & Planning Interest Group

#### INTERPRETING CLIMATE DATA AND ANALYSIS

#### PREPARING FOR LOW CARBON TRANSITION & CLIMATE IMPACTS

Assessing Transmission Resilience to Future Climate Risk and High-Impact Low-Frequency (HILF) Events

Understanding the Social Cost of Carbon

Climate Vulnerability Analysis for the Bulk Power System in Transition through 2050 with US-REGEN – Custom Analysis

Anticipating Climate Change Impacts to Nuclear Plants: Site-Specific Climate Hazard Information and Projection

Company-Specific Assessment of Climate Vulnerabilities and Physical Risk – Custom Analysis

Exploring the Role of Greenhouse Gas Emissions Offsets to Achieve Corporate Decarbonization Goals

### FEATURED PUBLICATIONS

Extreme Weather and Climate Resilience

IPCC's 2021 Climate Science Assessment Report: High-Level Technical Summary and Perspectives

Grounding Decisions: A Scientific Foundation for Companies Considering Global Climate Scenarios and Greenhouse Gas Goals

Review of 1.5°C and Other Newer Global Emissions Scenarios: Insights for Company and Financial Climate Low-Carbon Transition Risk Assessment and Greenhouse Gas Goal Setting

Technical Insights on Localizing Climate Change Information for Company Strategic Planning

Historical Trends and Projected Changes in U.S. Wind and Solar Resources

Understanding the Social Cost of Carbon: A Model Diagnostic and Inter-Comparison Study

Repairing the Social Cost of Carbon Framework: Immediate and One Year Steps for Scientifically Reliable Estimates and Use

Temperature Impacts on Electricity Demand: US-REGEN Load Projections for Climate Resilience

EPRI-NYSERDA Project "Climate Change Vulnerabilities of NY's Future Electric System"

Methods to Incorporate Climate Resilience Analysis into Transmission Planning

Exploring the Impacts of Extreme Events, Natural Gas and Other Contingencies on Resource Adequacy

Quick Insight: Extreme Cold Events, Changing Climate Threats, and Power System Infrastructure Resiliency

Library of Potential Types of Climate-Related Impacts and Response Options for the Electric Power System

LADWP Climate Assessment and Transmission Resilience Analysis

Nuclear Plant Resilience in the Face of Climate Change

Evaluation of Hydrological Models for Climate-Based Assessments

Evaluation of Flood Risk Tools, Models, and Services for Physical Climate Risk Assessments

### TO LEARN MORE ABOUT EPRI'S CLIMATE RESILIENCE CAPABILITIES CONTACT:



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