

Flipping the Climate Coin DECARBONIZATION & RESILIENCE

9th Annual EPRI-IEA Challenges in Decarbonization Workshop A Window into the Global Energy Transition

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October 7, 2022

Decarbonization Pathways Enabled by Innovation

Decarbonization

Accelerate economy-wide, low-carbon solutions

- Electric sector decarbonization
- Transmission and grid flexibility: storage, demand, EVs
- Efficient electrification

Achieve a net-zero clean energy system

- Ubiquitous clean electricity: renewables, advanced nuclear, CCUS
- Negative-emission technologies
- Low-carbon resources: hydrogen and related, low-carbon fuels, biofuels, and biogas



Decarbonization Pathways Enabled by Innovation



Climate Shock: IPCC 2022 Report



*IPCC Climate Change 2022: Impacts, Adaptation and Vulnerability. Data visualization adapted from Visual Capitalist.

A Global Challenge: Extreme Heat (2020-Present)



The Costs of Severe Weather



Grid of the Future Prepared for Weather of the Future





Climate change requires updating the technical basis for designing, planning, and operating the grid.

The EPRI Differentiator: Power System Application Impact on T&D Asset Ratings





Overhead Lines Ratings Limited by Conductor Temperature



NESC Clearance



Conductor & Hardware Failure



Results from One Regional Study

Weather Condition	Impact on Ratings
Increased # of hot days	3 - 7% decrease
Increase in peak temp	1 - 5% decrease
Increased # of low wind days	2 - 10% decrease

2050 Weather Projections

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CLIMATE **RESILIENCE AND ADAPTATION INITIATIVE**

EPRI Climate <u>Re</u>silience 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

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 Evaluate data availability, suitability, and methods for downscaling & localizing 	 Evaluate vulnerability at the component, system, and market levels from planning to operations Identify mitigation options from system to customer lovel 	 Assess power system and societal impacts: resilience metrics and value measures Create guidance for optimal investment priorities 	PHYSICAL CLIMATE HAZARD
 Address data gaps 	 Enhance criteria for planning and operations to account for event probability and uncertainty 	 Develop cost-benefit analysis, risk mitigation, and adaptation strategies 	 Climate data as application guid Vulnerability as Risk mitigation



Common Framework "Guidebooks"

- sessment and dance
- sessment
- investment
- Recovery planning
- Hardening technologies
- Adaptation strategies
- Research priorities



ENHANCING GRID RESILIENCE FOR WEATHER OF THE FUTURE

Hetter temperatures can increase electricity demand for air conditioning. If the heatware occurs early in the season (e.g., late spring), communities may not yet be acclimatized to these temperatures, which increases the potential for heatwatresevalated injuries.

padmeent equipment (such as transformers) that were not designed to be submersible. This could result in widespread equipment failure in a short time; it may also accelerate degradation mechanisms resulting in reduced life.

> Debris flows following heavy precipitation events

heavy precipitation events can clog cooling-water intake structures.

Increased variability in ambient temperatures (and loading) could result in more severe or frequent temperature cycling on Increased drought may impact efficiency and operating range of hydroelectric turbines which are designed for specific net head conditions. If the heatware occurs in a drought-prone region, hydro availability may be constrained.

<u>epei</u>

HEAT

REACTIVE TO PROACTIVE APPROACH

EXTREME

PRECIPITATION

CLIMATE

RESILIENCE AND ADAPTATION INITIATIVE



Together...Shaping the Future of Energy®

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