From Climate Risk to Resilience: Strengthening India's Power Systems

Roundtable Discussion

Date: August 6, 2026
Time: 10:30 hrs. to 14:30 hrs.
Venue: The Claridges, Delhi

About Climate Policy Initiative (CPI)

CPI is an analysis and advisory organization with deep expertise in finance and policy. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has seven offices around the world in Brazil, India, Indonesia, South Africa, the United Kingdom, and the United States.

Background

India's power sector is undergoing a historic expansion, to cater the growing urbanization, economic growth, and large-scale electrification of households, transport, and agriculture. Installed generation capacity, currently around 520 GW, is projected to cross 900 GW by 2031–32, with power demand estimated to reach ~2,473 TWh[1]. This growth spans across thermal, solar, and wind generation assets alongside an expanding transmission and distribution network that already stretches across more than half a million circuit-kilometers[2]. Plans include the addition of over 191,000 circuit-kilometers of transmission lines and 1,274 GVA of transformation capacity by 2031–32[3]. This infrastructure is capital-intensive, has a long-life, and geographically dispersed across diverse and climatic regions from arid heat zones in Rajasthan to coastal regions in Odisha and Andhra Pradesh. As a result, the sector faces growing exposure to extreme climate events-related risks.

According to the Germanwatch Climate Risk Index (2025), India ranked 6th globally among nations hardest hit by extreme weather over the past 30 years[4]. Between 1993 and 2022, the country endured more than 400 extreme events including floods, heatwaves, and cyclones[5]. Given that India operates as one of the world's largest synchronized grids, localized disruptions from these extreme weather event have the potential to cascade into system-wide issues.

India is not alone in this situation and across Asia, major utilities already incurred losses of ~USD 6.3 billion annually due to climate hazards, with projections indicating a 33% rise by 2050[6]. In India, Cyclone Fani (2019) damaged 75 high-power transmission towers, 84,000 km of low-tension power lines, and over 11,000 distribution transformers in Odisha[7]. The Kerala floods (2018) flooded 50 substations and severely impacted five major hydroelectric stations[8]. In 2016, water shortages at Parli thermal power plant resulted in 196 days of thermal plant downtime, leading to estimated revenue losses of USD 455 million[9].

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[1] **Powerline |** Power Projections: CEA issues draft National Electricity Plan
[2] **Ministry of Power |** India's Power Transmission Network Crosses 5 Lakh Circuit Km
[3] **Ministry of Power |** Government of India Strategizes Power Capacity Expansion to Meet Growing Peak Demand
[4] **Germanwatch |** Climate Risk Index 2025
[5] **Business Standard |** India among most affected countries by climate change from 1993-2022: CRI
[6] **Downtoearth |** Asia's power giants already losing $6.3 billion a year to climate hazards, report warns
[7] **The Hindu |** Long wait for power in Odisha after Cyclone Fani snaps transmission lines
[8] **KSEB |** Annual Administration Report
[9] **WRI |** Droughts and Blackouts: How Water Shortages Cost India Enough Energy to Power Sri Lanka

Climate-related extreme weather events affect power infrastructure through differentiated engineering stresses across different asset types. Importantly, climate stresses often occur simultaneously and interact across the entire power system. For instance, flood events can submerge substations and distribution transformers, damage intake pumps at thermal plants, and interrupt transmission corridors, all at once. As India's energy mix diversifies and climate variability intensifies, there is a growing need to incorporate the technical thresholds, engineering parameters, and failure mechanisms specific to each category of power asset. This could enable utilities, regulators, and financiers to systematically quantify climate impact exposure, prioritize resilience investments, and make informed decisions on capital allocation across the entire power sector value chain.

Objective of the Event

Against the above backdrop, CPI released a discussion paper, "*Assessing Climate Risks to India's Power Sector: A District-Level and Asset-Level Methodology for Climate-Resilient Power Systems*". The paper provides a new methodology for quantifying climate risk at the district and asset levels within India's power sector.

CPI's vision for this roundtable event is to convene leaders from policy, finance, industry, academia, and civil society organizations to deliberate on the urgent need for climate-resilient power systems. The event will serve as a platform to foster dialogue among these stakeholders to align on resilience planning, identifying priority actions for integrating climate risk considerations into decision-making, and explore pathways for building a more resilience, reliable and future-ready power system.

The discussion will aim to:

- **Understand the impact of climate-induced extreme weather events** on India's power assets, including solar, wind, thermal, transmission and distribution infrastructure.
- **Seek expert input on CPI's proposed climate-risk assessment methodology**, including hazard selection, district-level hazard assessment, asset exposure, vulnerability parameters, engineering thresholds, failure mechanisms, downtime assumptions, and risk outputs.
- **Explore technical and operational resilience measures** required to safeguard power sector assets against physical climate stress, along with indicative cost implications

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Agenda

PARTICULARS	TIME
Registration	10:30 - 11:00
Welcome Address	11:00 - 11:10
Keynote Address	11:10 - 11:20
Context Setting Presentation: *Towards Climate Resilient Power Systems*	11:20 -11:30
Roundtable Discussion: From Climate Risk Assessment to Resilience Planning and Financing	
Key points for discussion: • Impact of chronic and acute climate stress on thermal, solar, wind, transmission, and distribution assets. • Generation loss, efficiency derating, equipment failure, network disruption, outage duration, restoration challenges, and energy not served. • Relevance of district-level climate-risk assessment and asset-specific exposure metrics for generation, transmission, and distribution infrastructure. • Vulnerability parameters, engineering thresholds, derating assumptions, failure probabilities, downtime estimates, and data availability. • Technical and operational resilience measures to safeguard power-sector assets against physical climate risks. • Prioritization of resilience measures based on avoided losses, asset criticality, outage reduction, and benefit-cost considerations. *Followed by Q&A*	11:30-13:15 (105 mins)
Vote of Thanks and Closing Remarks	13:15-13:30 (15 mins)
Networking Lunch	13:30-14:30