



Disaster Management and Climate Readiness of Utilities

Disaster resilience planning pre to post-disaster under Disruption Risk Management

Presented By

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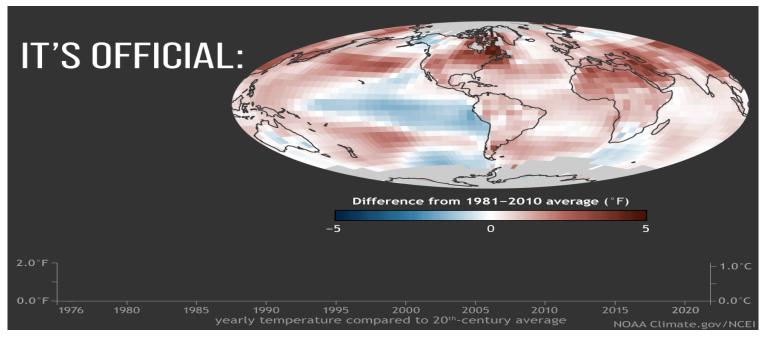


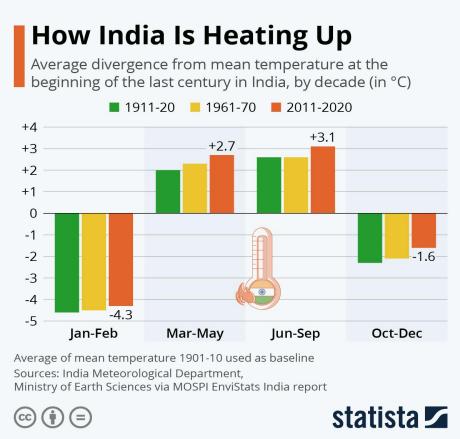




Temperature Change

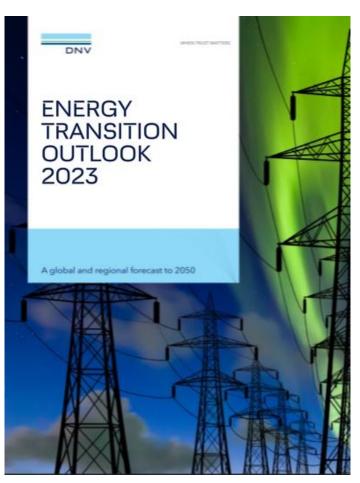


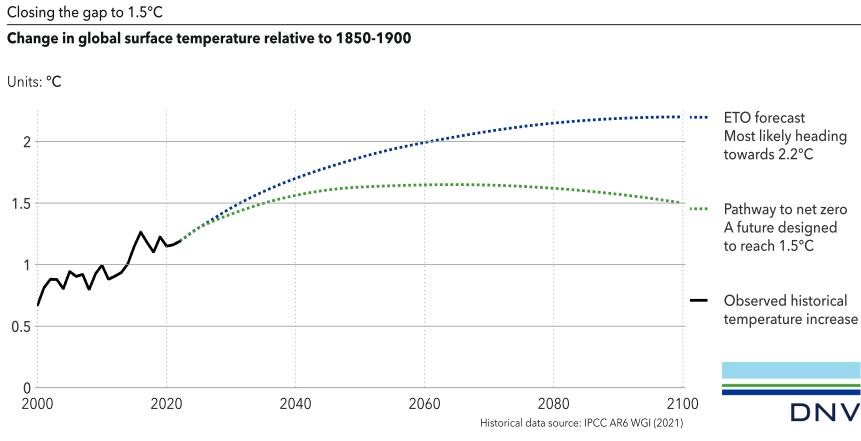




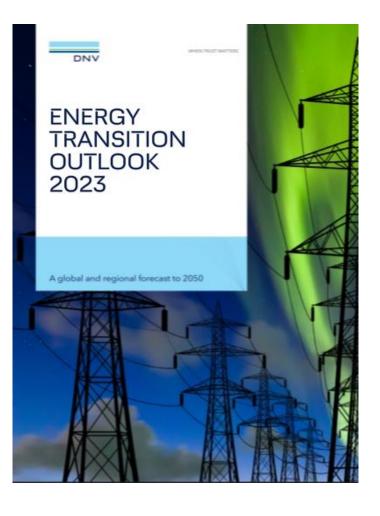
Temperature Change







Temperature Change



Emissions key findings

- 70% of annual greenhouse gas emissions are from the energy sector of which most are CO₂ from burning fossil fuels
- Global energy-related CO₂ emissions likely to fall only 4% to 2030 and 46% to 2050
- We exhaust the 1.5°C carbon budget in 2029 and 2°C budget in 2054; and are heading towards global warming of 2.2°C by 2100





Impact and Measures

	Key impacts	Impacted segment	Adaptation strategies
	 Lower generation efficiency Decreased coal-togas conversion efficiency Decreased combined cycle gas turbine efficiency Decreased solar PV efficiency 	Generation	 Implement air chillers or more efficient chillers Site new generation in cooler locations Implement more effective cooling for Assets i.e. Generators
Increased Air Temperatures	 Reduced carrying capacity of lines and transformers Increased losses in lines and transformers 	Delivery-Transmission & Distribution	 Underground hardware Use more heat-resistant materials Implement more effective cooling for Assets i.e. transformers
	 Increased peak demand and total energy demand for cooling 	Demand-End Use	 AC energy efficiency Building thermal efficiency Peak load shifting

	Key impacts	Impacted segment	Adaptation strategies
	 Reduced combustion efficiency due to increased moisture content of coal 	Generation	 Protect coal stockpiles Switch to fuel that is more moisture resistant (e.g., natural gas)
Increased Precipitation	 Damaged power lines from snow and ice Flooding of underground infrastructure Damaged towers due to erosion 	Delivery-Transmission & Distribution	 Improved flood protection for equipment at ground level Use covered and/or insulated conductors Include lightning protection (e.g., earth wires, spark gaps) in the distribution network

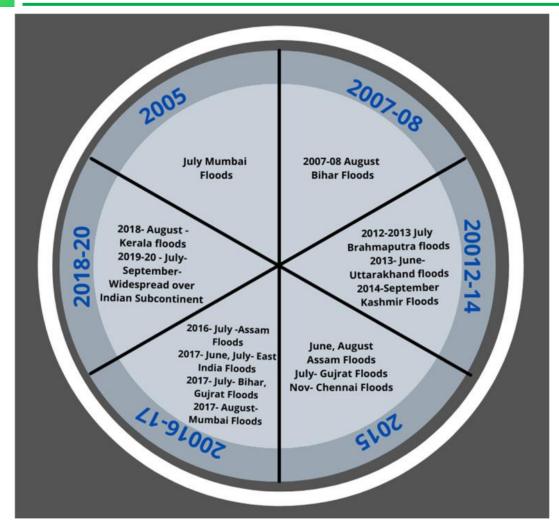
Impact and Measures



	Key impacts	Impacted segment	Adaptation strategies		Key impacts	Impacted segment	Adaptation strategies
Decreased Precipitation	 Decreased availability of freshwater for thermal cooling 	Generation	 Switch to recirculating or dry cooling Switch to more "water-efficient" fuels (e.g., natural gas, wind, solar) Increase volume of water treatment system Restore/reforest land 	More frequent, severe extreme	 Damaged 		 Same as above Concrete-sided buildings instead of metal Implement more rigorous structural standards Implement porous
Sea level rise, Increased storm surge during hurricanes and tropical storms, Increased flooding during high tides	lying infrastructure	Generation/delivery- Transmission and Distribution Demand-End use	 Implement flood control (dams, dikes, reservoirs, polders, etc.) Improve coastal defenses (seawalls, bulkheads, etc.) Build in and/or relocate to less exposed locations Raise structure levels Improved drainage systems Protect fuel storage 	events (floods, Storms typhoons, drought, high winds, etc.)	 infrastructure Disrupted supply chains and offshore activity Damage to facilities related to soil erosion 	Generation Delivery-Transmission and Distribution	 Implement porous materials for better wind flow Increased decentralized energy generation Cite infrastructure away from heavily wooded areas/rigorously prune trees ?

Evident Impact - Floods in India







Source: Long-term impacts of climate change on coastal and transitional ecosystems in India: an overview of its current status, future projections, solutions, and policies - PMC (nih.gov)



Coasts	Coastal states in India	Main area of impact	Trend (mm per 100 year) by 2100
East coast	West Bengal	Kolkata	830.316
		Diamond harbour	582.58
		Haldia	332.05
		Sager	-401.45
	Andhra Pradesh	Visakhapatnam	53
West coast	Maharashtra	Mumbai	77
	Gujarat	Kandla	335
	Karnataka	Mangalore	-148
South coast	Tamil Nadu	Chennai	24
	Kerala	Cochin	126

Evident Recent incident - Sikkim's Glacier Lake Outburst Flood DUM 2023

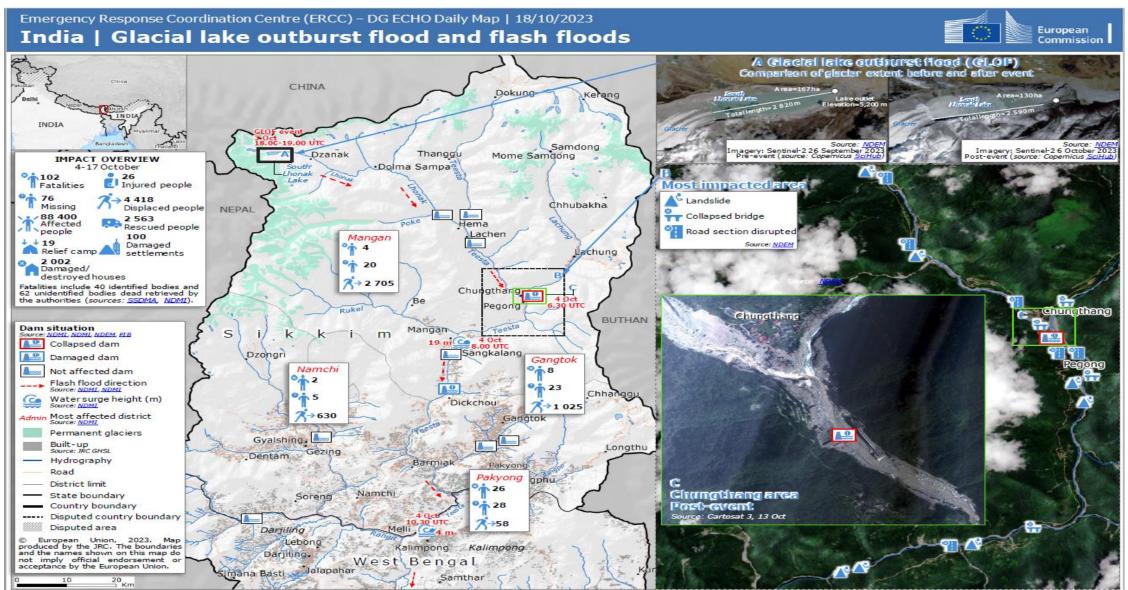






Sikkim's GLOF





Measures





- Ambient temperature adjusted power equipment rating
- Dynamic power equipment rating (ambient temperature and load adjusted)
- Updating equipment standards to align with evolving weather patterns
- Prioritizing resilience and adaptability in equipment specifications
- Strategies for timely revision of standards

2. Infrastructure Redesign for Flood Protection

- · Redesigning infrastructure for flood protection
- Innovative engineering solutions
- Balancing climate resilience with cost-effectiveness
- Successful case studies

Cyclone-Resistant Pole and Tower Designs

- Designing cyclone-resistant utility poles and towers
- Robust materials and engineering practices
- · Practical examples of cyclone-resistant designs

Undergrounding Distribution Lines

- Evaluating the merits and challenges of undergrounding distribution lines
- Urban planning considerations
- · Lessons from successful undergrounding projects
- · New methods of cabling snap pipes
- Cost management strategies

5. Advanced Weather Forecasting and Emergency Plans

- Leveraging advanced weather forecasting for disaster preparedness
- Developing comprehensive action plans based on accurate forecasts
- Role of communication and coordination in emergency response
- Effective disaster response examples

6. Collaboration and Resource Sharing

- Promoting cross-utility collaboration in addressing climate emergencies
- Sharing best practices in resource allocation and mutual assistance agreements
- Benefits of inter-utility cooperation
- Overcoming collaboration challenges

7. Investment in Emergency Equipment and Reserves

- Importance of proactive investment in emergency equipment
- Establishing regional equipment reserves for rapid disaster response
- Financial and logistical considerations
- Long-term benefits of disaster resilience investments.























Element of surprise

Short decision time

Need for change Threat to Business

Challenges for Distribution Utilities?





- Standard
 - Policies
 - Procedures
 - Practices
 - Delegation
 - Stakeholders
 - Mode of communication
 - FamiliarInfrastructure

Normal Business

Management

- Situational
- Emergency
 Procedures can't be standardised
- Change in delegation
- Large number of Stakeholders
- Communication
- Logistics
- Infrastructural changes or localised collapse
- Changed asset condition
- Localised / Global
- ?

Key to Disruption Management System

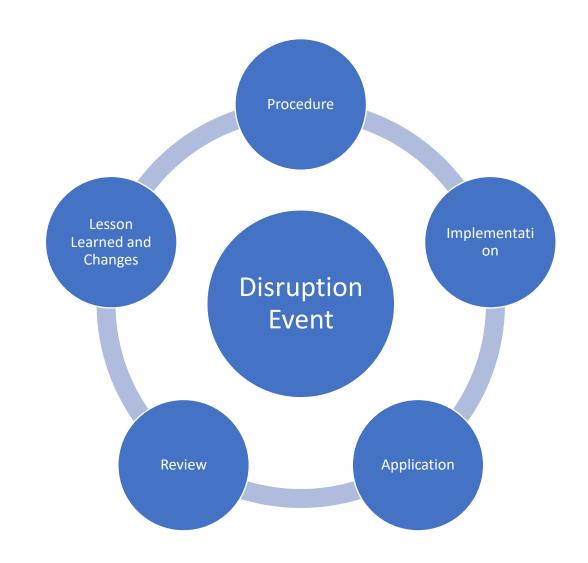


Disruption Training of **Philosophies** Critical Alarm Selection of key Personnel and Management Critical Loads and Strategies selections personnel Resources Simulations Mobile Generating List of priorities unit resources Testing of the Spokesperson Fast and procedure Simple for Media Hierarchical Hospitals sufficient fuel Classification resources **Government Building Technical** Transmission/distribu Key supply Demonstration tion resources **Operators** area Train stations/Airport communication resources Geographic Municipalities **Focus** Communication location Coordination headquarters chain mutual assistance Civil service for info arrangements

Key to Disruption Management – what more?



Innovative localised solutions shall be worked out from the lessons learnt to upgrade the Established Disruption (asset) Management System







THANK YOU

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