

IEC Online Working Group for TSOs/DSOs: Mitigating the Impact of Extreme Weather Events on Power Systems

1. Introduction

Extreme weather events—ranging from floods, wildfires, and severe storms to heatwaves and cold snaps—are becoming more frequent and intense due to climate change. These events can severely disrupt power systems, causing outages, infrastructure damage, and significant economic loss. Transmission and Distribution System Operators (TSOs/DSOs) play a pivotal role in ensuring the resilience of the electrical grid, but the complexity of modern power systems and the increasing frequency of extreme weather demand innovative approaches to risk management and mitigation.

Due to the escalating risks, Israel Electric Corporation (IEC) is establishing a working group to explore strategies for enhancing grid resilience and managing extreme weather events. This working group will bring together a select group of experts, decision-makers, and thought leaders from DSOs, academia, regulatory agencies, and technology providers. The goal is to collaboratively develop strategies and share solutions for enhancing the resilience of the power system against extreme weather events.

To address the complex nature of this issue, the working group will start with a broad perspective. This approach will help us collaboratively outline and refine the discussion points for each meeting. As our understanding evolves, we can deep-dive into specific areas, aiming to produce concrete recommendations. The final number of session and topics will be decided after our first meeting.

2. Goals

- **Identify and prioritize** the most critical gaps in TSOs/DSOs' current capabilities for extreme weather mitigation.
- **Develop strategies** for addressing these gaps, including investments in infrastructure, improved data and forecasting, enhanced coordination, and innovative approaches to RES integration.
- **Facilitate knowledge sharing** and best practices among TSOs/DSOs to foster a more resilient and adaptable grid.
- **Strategic Partnerships:** Foster collaborations between TSOs/DSOs, regulatory bodies, technology firms, and academic institutions to address shared challenges.

3. Target Audience

- Senior decision-makers from TSOs/DSOs
- Grid reliability and resilience experts.
- Government and regulatory officials responsible for energy policy
- Representatives from technology companies focused on grid infrastructure.
- Academic and research professionals in the field of power systems and climate resilience

4. Working Group (WG) Structure:

1. Approximately 10-15 participants representing power utilities from various countries.
2. Guest lectures of industry experts and innovative solution providers.
3. Pre/Post session surveys.
4. 6-8 online sessions, each lasting 120 minutes.
5. Active participation and contribution to discussions is requested.

5. Proposed Sessions

Session 1: Introduction, Challenges, and Gap Identification

- **Objective:** Kick off the working group by setting expectations, presenting challenges, and identifying resilience gaps.
- **Key Topics:**
 - **Welcome and Objectives:** Introduction to the working group's mission and goals.
 - **Participant Presentations:** Each participant presents their TSOs/DSO's unique challenges and gaps in grid resilience, particularly with regard to extreme weather.

- **Open Discussion:** Group discussion to highlight common themes and challenges across TSOs/DSOs.
- **Follow-Up Action:** A post-session questionnaire will be distributed to participants to identify common gaps, challenges, and priorities. Responses will be analyzed to build the working group's plan, which will be presented at the start of Session 2.

Session 2: Analyzing Common Gaps; Risk Assessment & Vulnerability Analysis

- **Objective:** Present and discuss the results of the gap analysis survey; Explore the methodologies for assessing the vulnerability of power systems to extreme weather events.
- **Key Topics:**
 - **Presentation of Findings:** Summary of the common challenges and gaps identified through the questionnaire and agree on focus areas.
 - Tools and methodologies for weather risk assessment.
 - Predictive analytics and weather modeling for power grid planning.
 - Asset-level vulnerability assessments: Prioritizing critical infrastructure.

Session 3: Infrastructure Hardening & Grid Modernization

- **Objective:** Explore strategies for reinforcing physical grid infrastructure to withstand extreme weather conditions.
- **Key Topics:**
 - Physical upgrades: Undergrounding, storm-hardening of poles, and substation reinforcements.
 - Modernizing infrastructure: Implementing smart grids, automation, and advanced sensors.
 - Resilient design: Using innovative materials and solutions to protect against specific weather events.
 - DERs and microgrids: Enhancing system flexibility with distributed energy resources and microgrid solutions.

Session 4: Integration of Renewable Energy and Storage for Resilience

- **Objective:** Examine how renewable energy and energy storage solutions can enhance resilience in the face of extreme weather.
- **Technology Showcase**
 - **Presentation of the latest developments in renewable energy and storage integration for microgrids and distributed systems, including invited manufactures and service suppliers**
- **Group Discussion: Opportunities and Challenges**
 - **Identifying opportunities for the integration of these technologies into existing grids (gap analysis and "must have").**
 - **Addressing challenges such as grid stability, scalability, and economic feasibility. Identify common issues that need cooperation and mutual assistance.**
 - Coordinating between DERs and grid operators to ensure reliability during extreme events.
 - Regulatory and financial challenges of integrating renewables and storage into resilience planning.

Session 5: Communication and Collaboration During Extreme Weather Events

- **Objective:** Strengthen TSOs/DSOs' ability to communicate and collaborate effectively with external organizations during crises.
- **Key Topics:**
 - Coordination with emergency services, local governments, and first responders during extreme weather.
 - Real-time communication with customers: Ensuring accurate, timely information during outages.
 - Cross-sector collaboration: Partnering with other critical infrastructure sectors (water, telecommunications, etc.) for coordinated disaster response.
 - Case studies: Lessons learned from past successful collaborative efforts.

Session 6: Strategies for Enhancing Grid Response and Recovery Capabilities

- **Objective:** Develop comprehensive strategies for emergency preparedness and recovery in response to extreme weather events.
- **Key Topics:**
 - Creating and updating disaster recovery plans to ensure operational continuity.

- Monitoring, control, and situational awareness: Utilizing advanced technologies like drones, AI, and predictive analytics.
- Rapid response mechanisms: Optimizing crew mobilization, equipment availability, and logistics during and after an event.
- Post-event recovery strategies: Restoring grid functionality, addressing customer needs, and preventing future outages.

Session 7: Regulatory, Financial, and Policy Considerations

- **Objective:** Explore the role of policy, regulation, and financing in supporting resilience measures.
- **Key Topics:**
 - Overview of successful regulatory frameworks and incentives for resilience.
 - Policy advancements: Encouraging sustainable, resilient practices.
 - Policy Needs and Gaps Analysis
 - Participants outline existing policies in their regions.
 - Identification of policy gaps that need addressing to foster adoption of new technologies and resilience.
 - Public-private partnerships for resilience funding.

Session 8: Final Workshop & Action Plan Development

- **Objective:** Synthesize the insights from the previous sessions and develop a concrete action plan.
- **Key Topics:**
 - Recap of key insights from each session.
 - Development of a resilience roadmap for TSOs/DSOs.
 - Identifying short-term and long-term actions to implement recommendations.
 - Establishing working group follow-up processes for tracking progress.
- **Outcome:** A final report with summary of meeting sessions, presentations, and technologies introduced. The summary of meeting sessions may include recommendations, frameworks, and guidelines for mitigating the impact of extreme weather events on power systems, along with some actionable action items.