Climate Resilience Plan

Elektrodistribucija Srbije

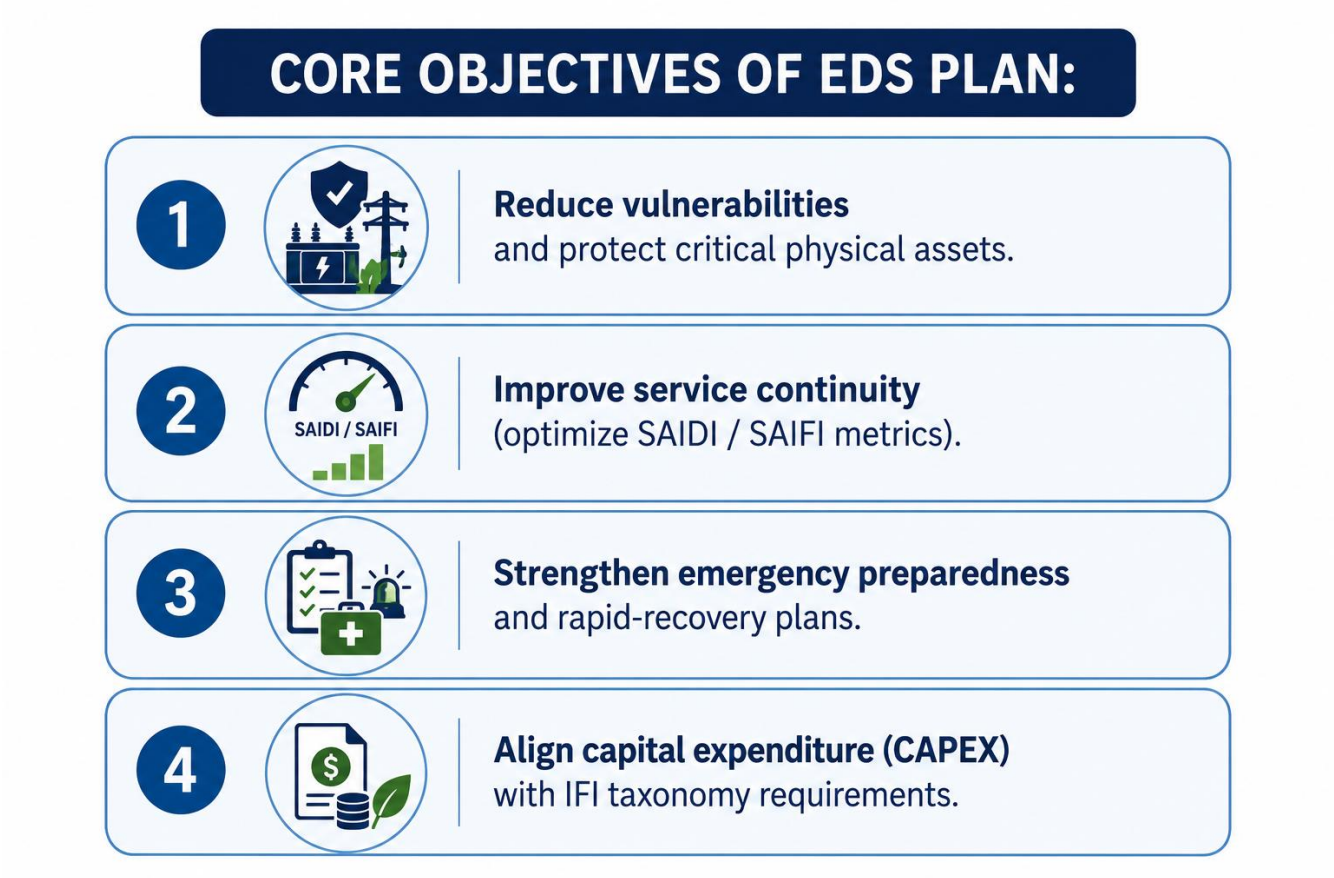
Version 1.0

July 2026.

1. Executive Summary

Elektrodistribucija Srbije (EDS) operates critical electricity distribution infrastructure that supports economic development, public services, and social well-being across the Republic of Serbia. Climate change is increasing the frequency and intensity of extreme weather events, including floods, heatwaves, storms, droughts, and wildfires. These hazards present growing risks to the reliability, safety, and operational performance of the distribution network.

This Climate Resilience Plan establishes a strategic framework for improving the resilience of EDS assets, operations, and organizational capabilities. The plan aligns with European Union climate adaptation objectives, the Serbian National Climate Change Strategy, Energy Community recommendations, and the expectations of international financial institutions (IFIs) financing energy-sector modernization projects.



Implementation of the measures described in this plan will contribute to improved reliability indicators, reduced outage duration, lower recovery costs, and enhanced protection of employees and customers.

2. Introduction and Strategic Context

One of the most important tasks of EDS is to provide reliable and secure supply of customers in the Republic of Serbia (RoS), so that they are supplied with electricity under equal terms.

The transfer of ownership, as a final step of the unbundling of the EDS from EPS, began in 2015 and completed in April 2021, when the Republic of Serbia adopted two new laws, the Law on Renewable Energy Sources and the Law on Energy Efficiency, as well as amendments to the Energy and Mining Laws. These laws will enable significant growth in renewable energy sources, promote rational use of energy, ensure climate change actions are taken, and enable introduction of prosumers in the system. Moreover, adopted amended Energy Law proposes to determine the binding share of renewable energy in gross final consumption and transport in the upcoming National Energy and Climate Plan (NECP)

The Western Balkans regional energy sector faces a number of challenges due to years of underinvestment and slow progress in the implementation of reforms resulting in high carbon-intensity, low energy efficiency, and a high level of energy losses. The Western Balkans 6 (WB6) economies signed a Sustainability Charter in July 2016 to pursue transition towards a low carbon and sustainable energy sector, where one of the priorities is to improve energy efficiency governance.

Climate change is no longer a future risk but a present operational challenge. Recent events across Europe have demonstrated the vulnerability of energy infrastructure to severe weather conditions. Distribution system operators (DSOs) are increasingly expected to incorporate climate risk considerations into planning, investment, and maintenance processes.

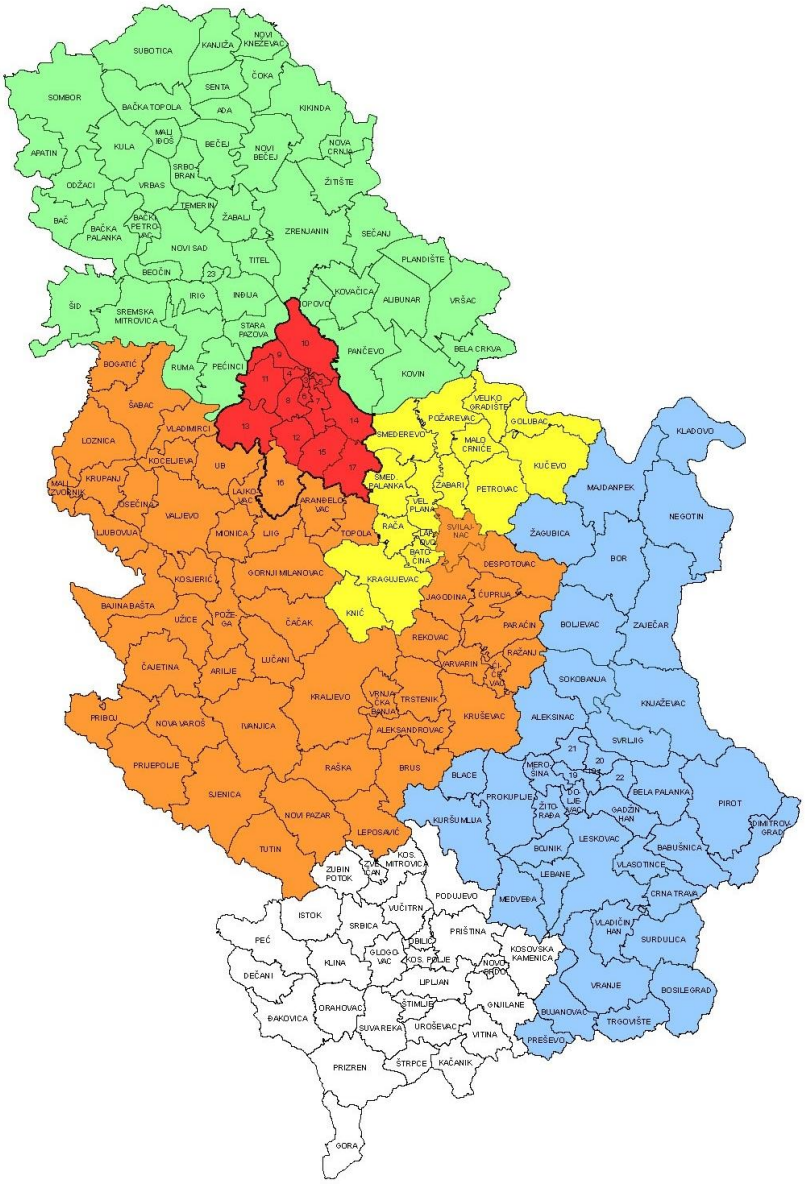
2.1 Basic data on the “Elektrodistribucija Srbije” (EDS)

“Elektrodistribucija Srbije” (EDS), performs the activities of electricity distribution and distribution system management for the territory of Republic of Serbia. Within EDS there are five Distribution Areas (DA) for electricity distributions, respectively:

Electricity distribution activities in 2025 were carried out through 33 branches, organized within 5 distribution areas (DA) established on a territorial basis: DA Novi Sad, DA Belgrade, DA Kraljevo, DA Niš and DA Kragujevac.

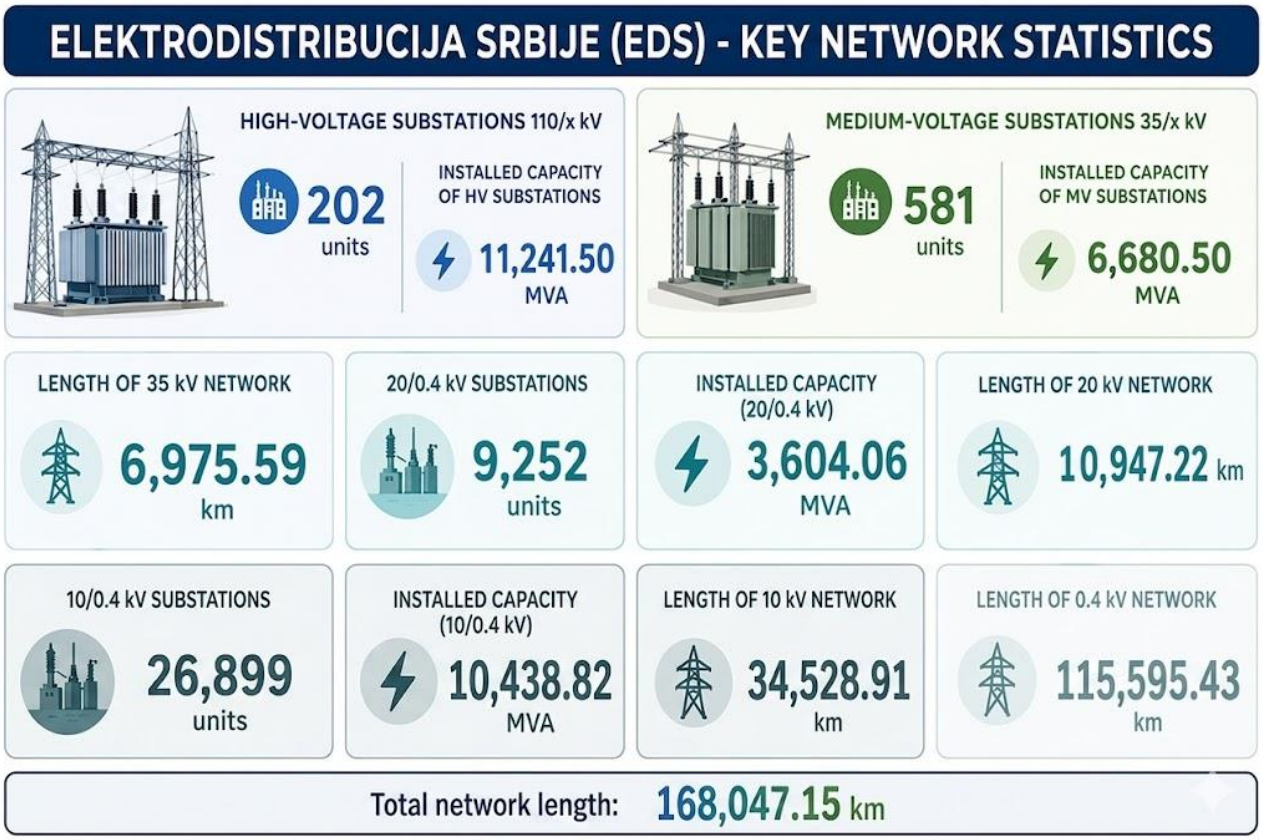
- DA Belgrade (marked in red color on map bellow) divided into branches: Belgrade - Center, Banovo Brdo, Zemun, Krnjača,
  Mladenovac and Obrenovac;
- DA Novi Sad (marked in green color on map bellow) divided into branches: Novi Sad, Pančevo, Zrenjanin, Subotica, Sombor,
  Sremska Mitrovica and Ruma;
- DA Kraljevo (marked in orange color on map bellow) divided into branches: Kraljevo, Aranđelovac, Čačak, Kruševac, Jagodina,
  Lazarevac, Loznica, Novi Pazar, Šabac, Užice and Valjevo;

• DA Niš (marked in blue color on map bellow) divided into branches: Niš, Leskovac, Vranje, Pirot, Prokuplje and Zaječar and
• DA Kragujevac (marked in yellow color on map bellow) divided into branches: Kragujevac, Smederevo and Požarevac.



Map of Republic of Serbia with distribution areas marked in colors

The total electricity taken over in 2025 for the distribution consumption of Elektrodistribucija Srbije amounted to 30,161 GWh, representing an increase of 2.21% compared to 2024 (29,509 GWh).

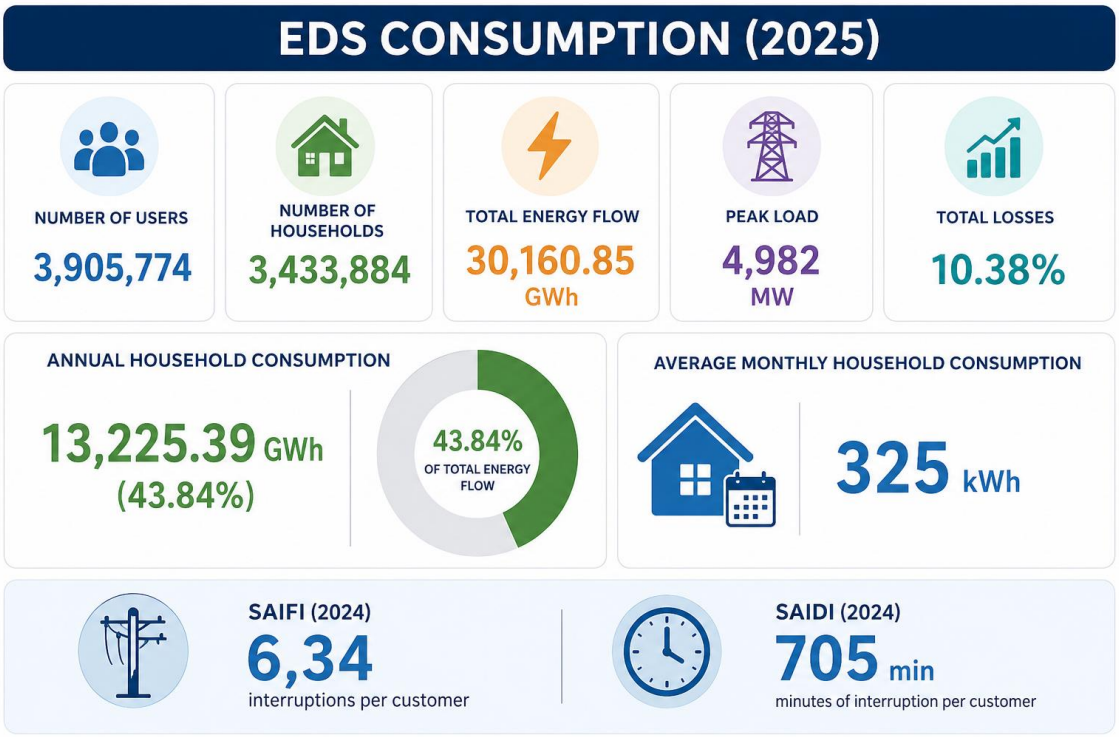


Elektrodistribucija Srbije (EDS) key network statistic (2025):

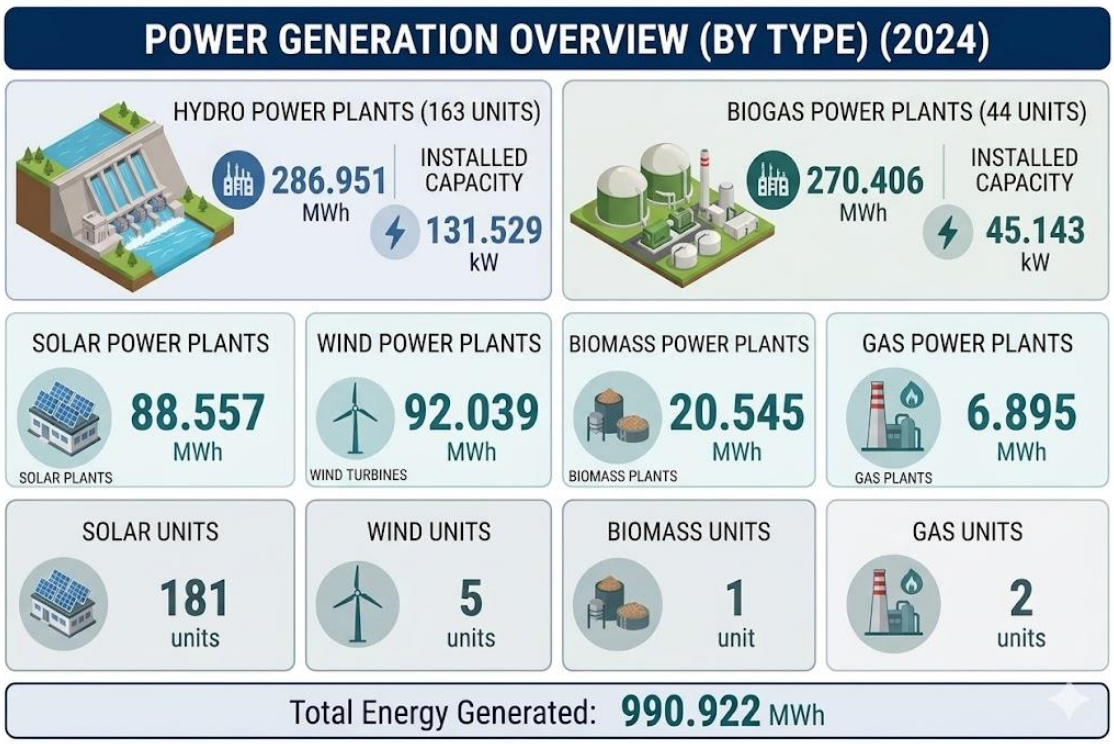
- High-voltage substations 110/x kV: 202 units
- Installed capacity of HV substations: 11,241.50 MVA
- Medium-voltage substations 35/x kV: 581 units
- Installed capacity of MV substations: 6,680.50 MVA
- Length of 35 kV network: 6,975.59 km
- 20/0.4 kV substations: 9,252 units
- Installed capacity of 20/0.4kV substation: 3,604.06 MVA
- Length of 20 kV network: 10,947.22 km
- 10/0.4 kV substations: 26,899 units
- Installed capacity 10/0.4kV of substation: 10,438.82 MVA
- Length of 10 kV network: 34,528.91 km
- 0.4kV-voltage network length: 115,595.43 km
- Total network length: 168,047.15 km

Registered energy consumption (withdrawn energy) and trends (compared to 2024) for Elektrodistribucija Srbije and the distribution areas (DA) look as follows::

1. DA Novi Sad	8.462 GWh	3,28%
2. DA Beograd	8.258 GWh	6,32 %
3. DA Kraljevo	6.789 GWh	2,97 %
4. DA Niš	4.627 GWh	1,18 %
5. DA Kragujevac	2.037 GWh	2,32 %
Elektrodistribucija Srbije (EDS):	**30.161 GWh**	**2,21 %**



A total of 413 power plants are connected to the distribution system, with total installed capacity of 354,075 kW and production of 990,922 MWh. The majority of energy (96.60%) was taken from the transmission system, while 3.3% came from distributed generation. Total number of prosumers: 4,745 with total installed capacity of 96,260.74 kW.



Power generation type	No of units	Installed capasity (kW)	Energy generated (MWh)
Cogeneration	17	42.127	225.529
Solar	181	95.167	88.557
Biogas	44	45.143	270.406
Gas	2	3.409	6.895
Wind	5	34.320	92.039
Hydro	163	131.529	286.951
Biomass	1	2.380	20.545
Total	**413**	**354.075**	**990.922**

2.2 Regulatory Alignment Matrix

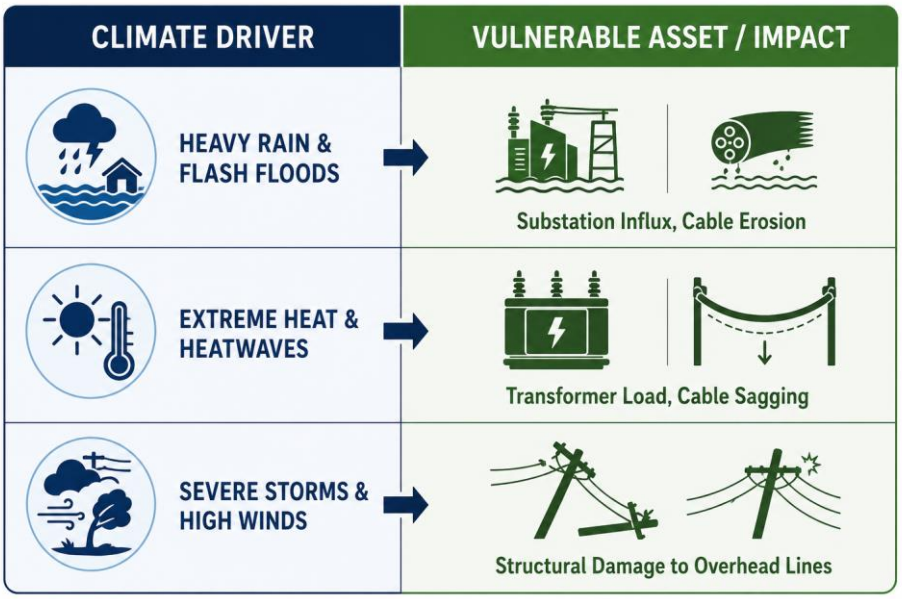
To secure modern international financing, EDS must align its operational frameworks with both domestic and international climate benchmarks:

Regulatory Body / Framework	Core Requirement for EDS	Compliance Mechanism
EU Climate Law & Adaptation Strategy	Integration of climate risk screenings into critical national infrastructure management.	Deployment of physical climate risk assessments (CRAs).
Serbian National Climate Change Strategy	National decarbonization and grid adaptation to secure energy independence.	Hardening of rural distribution lines against seasonal hazards.
IFI Requirements (EBRD, EIB, WB)	Compliance with 'Do No Significant Harm' (DNSH) principles and Climate Proofing guidelines.	Mandatory climate-resilience criteria embedded in procurement.

EDS manages a geographically diverse network serving urban, rural, and mountainous areas. Such diversity exposes the company to a broad spectrum of climate hazards. This document provides a structured approach to identifying, assessing, and managing those risks. It serves as a living document that will be periodically reviewed and updated as new climate information becomes available.

3. Climate Risk Assessment

Climate projections for Serbia indicate increasing average temperatures, more frequent heatwaves, changing precipitation patterns, and a higher probability of extreme weather events.



Key Regional Climate Hazard Mapping

The distribution network features localized vulnerabilities that require geographically distinct mitigation approaches:

Region	Coverage Area	Key Hazards	High-Risk Critical Assets
Belgrade	Urban, Suburban	Heat, Flood, Storm	Underground cable networks, low-voltage substations, urban transformers.
Novi Sad	North, Vojvodina	Flood, Storm	Open-plain transmission towers, high-voltage substations near Danube basin.
Niš	South,and east Serbia, Hills	Storm, Heatwave	Rural overhead distribution poles, valley line splices.
Kraljevo	Central Serbia	Flood, Landslide	Mountainous distribution line corridors, pole foundations in erosion zones.

Kragujevac	Central and East Serbia	Storm, Heatwave	Rural overhead distribution poles, valley line splices

Impact of Severe Weather on Grid Reliability Indicators

Historically, unmitigated climate events correlate with sharp spikes in grid instability. Projections indicate a baseline escalation of SAIDI (System Average Interruption Duration Index) if no adaptation measures are deployed. Active investments under this framework aim to flatline climate-related outages by 2030, keeping index metrics within baseline operational limits even during severe peak weather seasons.

Geographic information systems (GIS), historical outage records, and climate projection data should be integrated into a comprehensive vulnerability mapping process. Particular attention must be given to critical assets whose failure could affect large customer populations, hospitals, industrial facilities, or strategic national infrastructure.

4. Adaptation and Mitigation Measures

Physical Infrastructure Hardening

Infrastructure hardening represents a core element of resilience building. Flood-prone substations should be elevated where feasible, protected through permanent or deployment-ready flood barriers, or relocated when long-term exposure becomes unacceptable. Drainage systems must be upgraded to accommodate projected increases in precipitation intensity.

Overhead networks should be reinforced using climate-resilient design standards. Pole replacement programs should prioritize high-risk corridors, transitioning from traditional timber poles to composite or reinforced concrete alternatives. Lightning protection systems should be modernized and vegetation management practices enhanced to reduce outage risks during storms.

Digitalization and Smart-Grid Technologies

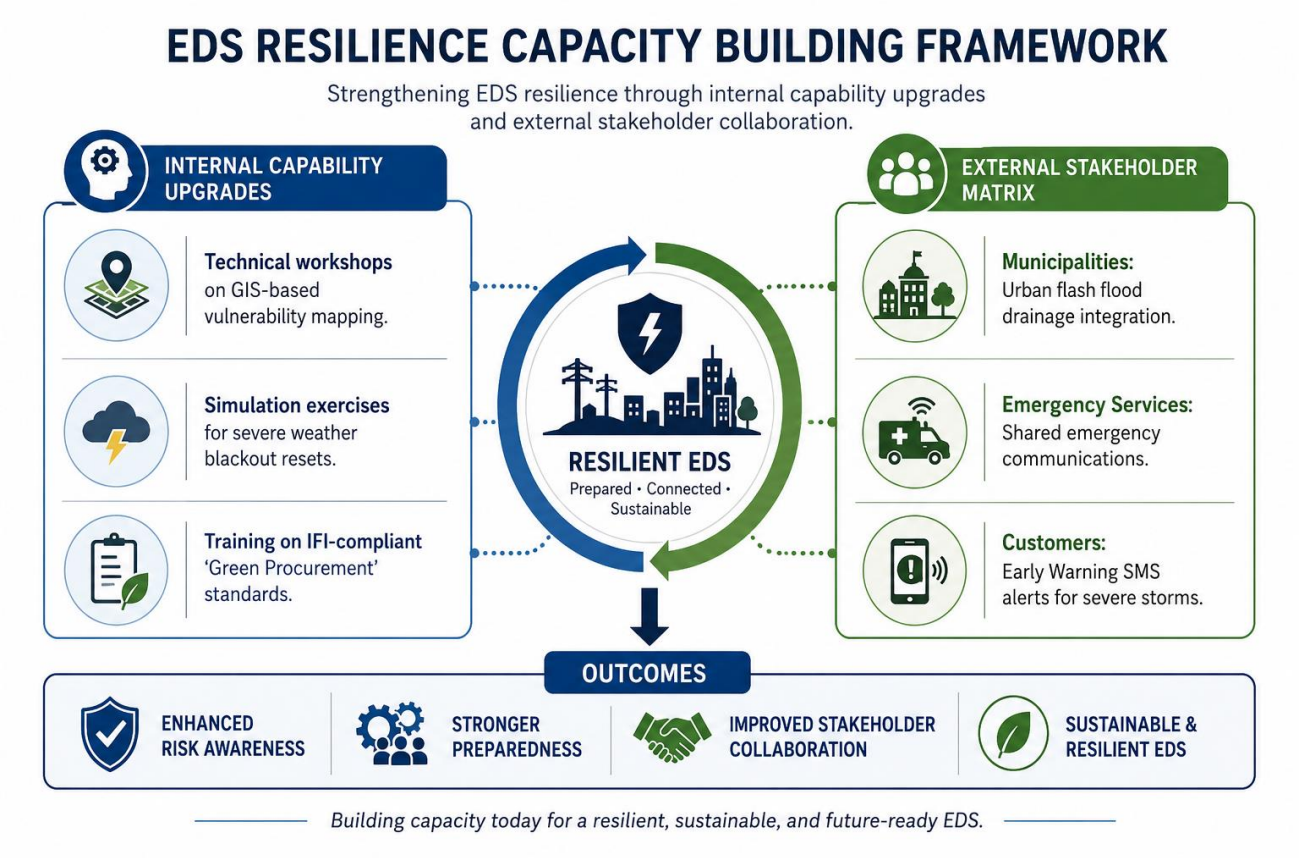
- Advanced Distribution Management Systems (ADMS): Enables real-time balancing and automated grid reconfiguration during localized disruptions.
- Remote Monitoring & Automation: Deployment of remote monitoring, advanced fault detection, automated switching, and predictive maintenance solutions will improve situational awareness and reduce restoration times.
- Weather Data Integration: Integration of real-time weather feeds and predictive AI modeling into operational decision-making supports proactive risk management and asset pre-dispatching before severe storms.

Nature-Based Solutions (NbS)

Nature-based solutions may complement traditional engineering measures. Erosion control via targeted bio-engineering, sustainable drainage systems (SuDS) around perimeter substations, and ecosystem-based flood management along river basins can contribute to long-term risk reduction while providing environmental benefits.

5. Capacity Building and Stakeholder Engagement

Climate resilience requires both technical and organizational capacity. EDS should establish a structured training program covering climate risk assessment, emergency response, resilience planning, and adaptation financing. Regional operational teams should participate in regular workshops and simulation exercises. Climate considerations should be integrated into engineering design, procurement processes, and project appraisal methodologies.



Stakeholder engagement is essential for effective implementation. Coordination with municipalities, emergency services, water management authorities, and environmental institutions can improve preparedness and response capabilities. Transparent communication with customers before, during, and after extreme weather events contributes to public trust and operational effectiveness.

6. Implementation Roadmap

The transition to a climate-resilient distribution network is structured across three distinct phases to ensure optimal CAPEX efficiency and deployment continuity: Short-Term Actions (Years 1–2) focusing on quick-win vulnerability diagnostics; Medium-Term Actions (Years 3–5) for core infrastructure hardening rollouts; and Long-Term Actions (Years 5–10) targeted at absolute asset system integration.

Phased Action Matrix

Timeline	Action Item	Primary Responsibility	Key Performance Indicator (KPI)
Short-Term (Y1–2)	Complete climate vulnerability assessments and establish governance arrangements.	Strategy & Corporate Affairs / Climate Working Group	Comprehensive GIS Asset Vulnerability Map published.
Short-Term (Y1–2)	Identify priority investments, enhance monitoring, and initiate pilot resilience projects.	Engineering Dept / Distribution Asset Management	3 Pilot Substations retrofitted with flood barriers.
Medium-Term (Y3–5)	Implement infrastructure upgrades in high-risk locations and expand digitalization.	Regional Operational Teams / IT & Grid Telecom	15% reduction in storm-related rural line outages.
Medium-Term (Y3–5)	Strengthen emergency response capabilities and integrate resilience criteria into capital planning.	Executive Management / Investment Dept	Resilience score embedded in 100% of new procurement.
Long-Term (Y5–10)	Achieve full integration of climate resilience into asset management systems.	Asset Management Department	Dynamic ISO 55001-aligned climate asset register.
Long-Term (Y5–10)	Deploy advanced monitoring technologies and continuously update risk assessments.	Climate Working Group / R&D Division	Climate scenarios updated using CMIP6 localized data.

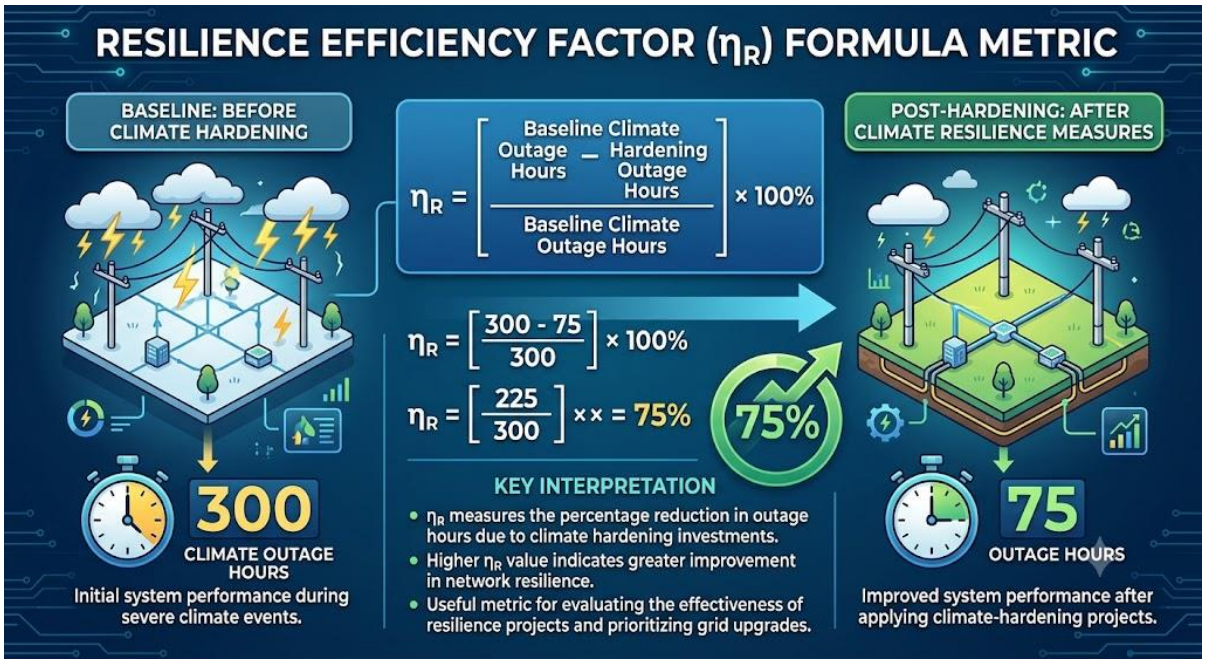
7. Governance and Responsibilities

Effective governance is necessary to ensure successful implementation. Executive management should provide strategic oversight and ensure adequate resource allocation. A dedicated Climate Resilience Working Group will serve to bridge standard multi-departmental activities.

- Engineering Departments: Will lead technical implementation, equipment design adjustments, and structural infrastructure hardening.
- Environmental and Regulatory Affairs Units: Coordinate policy compliance, alignment with EU adaptation taxonomies, and required IFI reporting.
- Regional Offices: Responsible for local implementation, real-time asset monitoring, and ground-level stakeholder engagement.
- Internal Audit Functions: Periodically review implementation progress, track milestones, and report on adaptation effectiveness.

8. Monitoring, Evaluation and Reporting

Monitoring and evaluation activities should measure both implementation progress and resilience outcomes. Key performance indicators will track outage frequencies (SAIDI/SAIFI), climate-driven structural defects, and emergency system reset run-times.



Annual resilience reviews should assess progress against targets and identify opportunities for improvement. Climate risk assessments should be updated periodically to reflect new information, operational experience, and evolving climate scenarios. Independent external

reviews may be undertaken as part of IFI-financed projects to validate progress and support continuous improvement.

9. Financing Considerations

Implementation of resilience measures will require a combination of internal resources, regulatory investment mechanisms, and external financing. Opportunities should be explored through EU funding instruments, Energy Community initiatives, climate finance facilities, and international financial institutions (such as EBRD, EIB, and World Bank loans).

All major investments should include climate risk screening and resilience assessments to ensure long-term sustainability and value for money. Cost-benefit analyses (CBA) must account for avoided outage costs, reduced emergency recovery expenditures, and protected asset values over their lifecycle.

10. Conclusion

Climate resilience is an essential component of the long-term sustainability of Elektrodistribucija Srbije. By systematically addressing climate risks and integrating adaptation measures into planning, investment, and operations, EDS can improve reliability, reduce vulnerabilities, and support Serbia's energy transition objectives.

The measures presented in this plan provide a practical roadmap for strengthening the resilience of the distribution network while aligning with European standards and international financing requirements. Continuous improvement, stakeholder cooperation, and sustained investment will be critical to achieving long-term success.