

## SHURA's next study

### “Transformation of the Turkish distribution grids for accelerating the integration of distributed energy resources”

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#### 1. Background

Historically, power systems followed a centralized model that consists of generation, transmission, and distribution, with end-users positioned at the end of the ecosystem. This conventional setup featured a one-way flow, where electricity generated by large power plants was conveyed through transmission and distribution networks before reaching consumers. Nevertheless, the last few decades, marked by the transition to a low-carbon economy lead to the rise of distributed energy resources (DERs), including rooftop solar PV installations, micro wind turbines, (behind the meter) battery energy storage systems, electric vehicles, heat pumps and demand response. These entities are now actively engaging as integral components of the power system. The increasing penetration of decentralised energy resources and the emergence of new market players necessitate a significant overhaul of distribution systems.

The integration of distributed energy resources into the distribution grid has a number of benefits for the energy transition, particularly in terms of enabling demand side participation and energy efficiency. Grid integration of distributed energy resources will enhance system efficiency and result in many benefits, such as system support and power quality effects. Some examples of these impacts include loss reduction, improved utility system reliability, voltage support and improved power quality, transmission and distribution capacity release, deferrals of new or upgraded transmission and distribution infrastructure, easy and quicker installation on account of prefabricated standardized components, lowering of costs by avoiding long distance high voltage transmission, and running cost to become more or less constant over the period of time with the use of renewable sources.

Türkiye's current distribution grids offer limited opportunities for integrating distributed energy resources, which restricts the options available to various market players, including distribution companies, generators, and consumers. Therefore, it is essential to understand the future roles of distribution system operators to accelerate the energy transition. This study aims to facilitate the transformation of Turkish distribution grids to accommodate the increasing penetration of decentralized energy resources (DERs), enhance grid resilience and reliability, maximize the benefits of renewable energy, optimize grid operations, and empower Distribution System Operators (DSOs). Additionally, it seeks to offer policy recommendations for the short, medium, and long term to guide decision-makers in implementing necessary reforms and initiatives.

#### 2. Objective and tasks

The objective of the study is to assess the required transformation of Turkish distribution grids in line with Türkiye's 2053 net zero target focusing on grid improvements, energy management systems, smart grids, micro grids and demand side optimization. The report will also illustrate in detail the potential roles of Distribution System Operators (DSOs) within energy transition of Türkiye and will provide policy recommendations for the short, medium and long term.

### **Task 1: Understanding current status of DSOs and distribution grid regulations in Türkiye**

This task will focus on general understanding of DSOs regulation framework and impacts of increasing levels of distributed energy resources on grid in Türkiye. Based on a review of published reports and regulations, it will be identified what the key issues are.

### **Task 2: Review of the international experiences related to distribution grid and distributed energy resources in terms of implementations, policies and regulations**

Although the role of Distribution System Operators (DSOs) is evolving, they will continue to be regulated in the coming years. Consequently, regulations should facilitate this transformation by clearly outlining the roles and responsibilities of DSOs and the owners of distributed energy resources. This task will analyze international experiences of DSOs in integrating increasing shares of distributed energy resources, including rooftop solar PV installations, micro wind turbines, behind-the-meter battery energy storage systems, electric vehicles, heat pumps, and demand response, addressing the associated concerns.

### **Task 3: Defining key transformational steps being taken by DSOs and main drivers in Türkiye**

Following the review of global best practices, this task will define key aspects of the emerging role of distribution system operators in Türkiye. This includes the deployment of smart meters, real-time monitoring systems, creating a level playing field for aggregators, establishing local marketplaces, network capacity deferral, local congestion management, DSO-TSO cooperation, and the need for voltage control in light of increasing shares of renewable energy generation. Additionally, the task will qualitatively analyze the impact of smart grids, digital technologies, and communication with consumers on grid quality.

### **Task 4: Defining possible improvements of Türkiye's regulatory and policy framework for DSOs**

Following the review of the benefits of increasing levels of distributed energy resources and the transformational steps for DSOs, a number of concrete policy recommendations will be developed. These recommendations will focus on maximizing potential benefits and minimizing costs within distribution grids and the entire power system.

### **Task 5: Preparing policy maker friendly report**

A policy-maker-friendly report will be developed, outlining major policy recommendations for policy makers and other stakeholders (primarily DSOs) regarding the transformation of DSOs. This transformation is necessary for the deployment of distributed energy resources and their implementation to maximize benefits in the power sector.

### 3. Deliverables and timeline

Deliverables	Responsible*	Timeline
Project kick off	SHURA	November 2024
Task 1: Understanding current status of DSOs and distribution grid regulations in Türkiye	Consultant	November – December 2024
Task 2: Review of the international experiences related to distribution grid and distributed energy resources in terms of implementations, policies and regulations	SHURA	November – December 2024
Task 3: Defining key transformational steps and drivers being taken by DSOs in Türkiye	SHURA/Consultant	January 2025
Tasks 4: Defining possible improvements of Türkiye's regulatory and policy framework for DSOs	SHURA/Consultant	February 2025
Review of Task 3&4: Through involvements of selected stakeholders from the private and public sectors	SHURA	March 2025
Tasks 5: Preparing policy maker friendly report	SHURA	April 2025

**\* The Consultant shall also review the outputs of the tasks performed by SHURA and actively participate in stakeholder meetings organized by SHURA as part of the project.**

### 4. Qualifications

The project will be based on assessment of distribution grid and distributed energy resources. The consultant must have demonstrated expertise in R&D Projects on distribution ancillary services: The consultant and company must have a proven track record of successfully completing a minimum of two R&D projects with a primary focus on distribution ancillary services. These projects should encompass regulatory studies conducted in collaboration with Turkish electricity distribution companies. The consultant must also have experience working in close partnership with International Financial Institutions (IFIs) and have a documented history of involvement in international projects specifically related to distributed energy resources.

The consultant must have project experience in:

- distribution system and DSOs for Türkiye's power system
- energy efficiency, electrification, renewable energy, flexibility technologies such as batteries and grid integration policies and regulation in Türkiye or in countries that have similar characteristics to Türkiye's power system,
- comprehensive planning and optimization for distribution grid.
- engagement with stakeholders from Türkiye's energy sector, regulator, DSOs, private sector,
- drafting policy-maker friendly reports.

Consultant's team members should have the following minimum key expertise:

- Team Leader, with at least 15 years of professional experience in
  - Leading / supporting large projects with large data inputs, where multiple stakeholders with different views are involved and where the final goal is to create impact on policy making
  - Proven record in drafting policy-maker friendly reports
  - Fluency in both Turkish and English
- At least two experts, with minimum 8 years of professional experience in
  - Knowledge of power distribution grid, regulations, strategy, policy and approaches
  - Proven skills in power distribution system projects
  - Fluency in both Turkish and English

The consultants' qualifications should be demonstrated by solid experience and previous work and the proposal that will be submitted as part of the offer for the consultancy. The proposal to be submitted should clearly state and elaborate the methodology and types of background data to be used in the study and include information regarding the qualifications stated above.