

Terms of Reference for SHURA's next study on

“Policies for accelerating the integration of renewables with the help of system flexibility options in Turkey's power grid”

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1. Background

SHURA's grid integration study (released in May 2018) and an optimal capacity mix study (released in July 2020) demonstrated the ability of Turkey's power system to integrate over 50% renewables at relatively little additional costs until 2030 (including 30% wind and solar energy). The result of these studies show that renewable energy investments will make up for the majority of the new investments for power sector in the next decade. In order to integrate this amount of renewable capacity in the system, policies and regulations will be the main instrument. Whilst the higher amount of renewable energy may cause challenges to the overall power system, this unique characteristic should be orchestrated in the optimal sequence of policies and regulations to maximise the benefits and improve the cost effectiveness on the power system.

There are many options such as flexible generation, grid extension, smart grid technologies, and storage technologies as well as market design that can help to accelerate the integration of the variable renewable energy (VRE) sources into the power grid. In addition to these technological options, managing the flexibility through demand response via new electricity loads (such as E.V's, heat pumps) is also a crucial option for reaching higher shares of solar and wind in the grid. Integration of distributed energy resources coupled with behind the meter energy storage to the market becomes another important issue as the shift from centralised to decentralised systems occurs. All these aspects on the supply and demand sides are adding complexity to the power industry. So, the policies should build a framework for wind and solar grid integration that is based on the current characteristic of the system, while developing technological opportunities with considering long-term impacts and targets. Policy makers should adopt a long-term vision for the transition towards renewables and set regulatory frameworks and market designs to foster both renewable development and management of greater system variability. Such regulatory frameworks will need to be understood to include new markets like ancillary services etc. and price signals for renewable energy power generators that incentivise the reduction of integration costs.

2. Objective and tasks

The objective of the study is to understand the Turkish renewable regulatory and policy framework and its dynamics considering current power market and system flexibility, pricing policies, distributed energy resources (including electric vehicles, heating & cooling as well as battery energy storage systems), power to X, and then to investigate policy actions and regulatory vision to increase the renewable energy capacity supported by system flexibility options.

The aim of this assignment is to identify the policies and possible actions for each segment of how grid integration of VRE sources can be enabled. The consultant will contribute to the evaluation of the grid integration policies for VRE sources (such as pricing policies for both grid-scale and distributed generation, renewable PPAs, financial and fiscal incentives, etc.), battery energy storage technologies (both grid scale

and behind the meter), demand response with the new electricity loads (EVs, etc.), renewable transport and heating & cooling and other flexibility options (such as market design, power plants, power grid, hydrogen, etc.) and identifying the possible measures and strategies that needed to undertake to reach higher shares of renewable energy in such systems.

In doing so, the following tasks will be carried out:

Task 1: Assessing the current regulatory and policy framework for the integration of renewables and flexibility options in Turkey's power system

This task will develop an understanding of the existing regulatory and policy framework including:

- current status of incentives provided for specific types of generation (renewables etc.),
- functions of power market design (e.g. does it incentivise renewables, batteries, demand response including smart charging etc.)
- pricing policies and regulations both for transmission, distribution level and behind-the-meter technologies such as renewables, batteries, demand response measures, EV's
- non-regulatory policies for all installations (e.g. encouraging the voluntary purchase of renewable electricity).

The understanding of the current regulatory and policy framework will be developed using a range of approaches:

- review of existing literature on the Turkish power sector and SHURA's prior studies
- stakeholder engagement meetings with both energy sector corporations, additional private sector corporations outside the energy sector, individuals, communities, energy regulatory bodies, cities and local governments in order to identify the key regulations and policy needs

Task 2: Defining possible improvements in Turkey's regulations and policies for accelerating the integration of renewables with flexibility options in Turkey's power system

Based on the review of the existing regulatory and policy framework in Turkey and the analysis of international best practices, a number of potential regulation and policies for accelerating the integration of renewables in Turkey's power grid will be developed. These will be presented as a set of clear recommendations for policy reforms. The recommendations should also address other social and economic impacts such as reducing import cost and CO₂ emissions, mitigating climate change, security of supply, energy efficiency and consumer benefits.

The set of recommendations will be presented as part of a roadmap that lays out the measures to adopt in the short/medium/long-term to be part of the energy transition progress going forward. The roadmap will provide an indication of timescale and the relevant actors.

Task 3: Providing an outlook that demonstrates the policies to accelerate the variable renewable energy integration with the help of flexibility options

This task will describe the adaptation process of the recommendations for facilitating VRE integration in Turkey's power grid and their impact on power (mainly) and other related sectors. Impact assessment will

be conducted qualitatively while considering all expected results in the power sector. This will result in a summary chapter that provides the key messages of this work stream, making the case for power sector reform.

Task 4: Preparing technical and policy maker friendly report

Finally, the project will yield a report that includes dedicated material for policy makers which explains the possible policy suggestions in order to integrate more renewable electricity and system flexibility in the grid. A policy-maker friendly technical report will be prepared in English and in Turkish, including an Executive Summary, along with a slidedeck and a set of infographics with their content to be agreed with the SHURA team

3. Deliverables and timeline

Deliverables	Timeline
Contract starts	January 2022
Tasks 1 Assessing the current regulatory and policy framework for the integration of renewables and flexibility options in Turkey's power system	January 2022
Task 2 Defining possible improvements in Turkey's regulations and policies for accelerating the integration of renewables with flexibility options in Turkey's power system	January 2022
Tasks 3: Providing an outlook that demonstrates the policies to accelerate the variable renewable energy integration with the help of flexibility options	January-February 2022
Review of Tasks 2 & 3 DRAFT by SHURA and through involvements of selected stakeholders from the private and public sectors as well as the academia	March-2022
Task 4: Final version of the report, detailed and well-structured final outcomes, along with a slidedeck and a set of infographics with their content to be agreed with the SHURA team	April - 2022

4. Qualifications

The consultant must be a firm or a group of firms with project experience in:

- Thorough understanding of energy sector policies and regulations, renewable energy, energy efficiency and demand management, electrification, distributed energy resources, power system transformation, flexibility options, market needs, and their system-wide and value chain impacts,

- Engagement with stakeholders from Turkey's energy sector, including various public sector actors (e.g. Ministry of Energy and Natural Resources), private sector (e.g. suppliers, distribution companies) and civil society (e.g. Consumer associations).

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

- One or more Team Leader(s), with preferably at least 12 years of professional experience in

- Turkey's power sector and of other key countries, good knowledge in renewable energy integration and system flexibility options covering areas from policy, regulation to operational level
- Proven record in drafting policy-maker friendly report in Turkish energy sector
- Fluency in both Turkish and English

-Expert(s) and preferably a project team, fluent in English and Turkish, with preferably at least 5 years of professional experience and knowledge in; regulations and policies in power sector, renewable energy, distributed energy resources, strategy and approaches, system flexibility, advanced analytics.

The consultant's qualifications should be demonstrated by solid experience, previous work and the proposal that will be submitted as part of the tender offer for the consultancy. The proposal to be submitted as part of the tender offer 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.