SHURA's next study

"Grid and market integration of distributed generation"

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1. Background

We assume that the theoretical potential of rooftop PV systems in Turkey is around 41 GW. In addition, the technical potential for the installation of a roof-top PV capacity is about 11.4 GW to be calculated according to the appropriate roof area ratios. This potential is remarkable compared to about 6 GW existing total PV installed capacity in Turkey. Currently, approximately 15% of this capacity (0.9 GW) is provided by roof-top PV systems (distributed generation).

The integration of distributed generation into the grid system has a number of benefits for the energy transition, particularly in terms of enabling demand side participation and energy efficiency.

Grid and market integration of distributed generation 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, deferments 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.

Turkey's current market design provides limited opportunities for the integration of distributed generation through markets limiting the options for different market players, namely distribution companies, generators and consumers. Thus, it is necessary to understand the current distributed generation regime and possible improvements in order to help strengthen the current state of the market and support the integration of more variable renewable energy.

2. Objective, policy goals and tasks

The objective of the study is to address concerns commonly voiced by DSOs and other stakeholders in Turkey about the impacts of increasing distributed generation. The study will engage with those concerns in two ways: a) it will focus on the benefits increasing levels of distributed generation can bring to the power system and specific stakeholders and b) it will review the evidence on the identified concerns and provide a counter narrative.

The current links about the above-mentioned energy transition policies are:

- Contributing to increasing the share of renewable electricity generation share to 38.8% by 2023.
- Contributing to increase distributed generation used for the self-consumption in parallel with Turkey's eleventh development plan.
- Contributing to further strengthening the flexibility of the power system via smart grids in parallel with Turkey's eleventh development plan.

Keeping these underlying targets and policy links and aims in mind, the project is planned to be carried out through the following tasks:

Task 1: Understanding commonly voiced concerns about increasing DER penetration

This task will develop an understanding of the commonly voiced concerns about increasing levels of distributed generation. Based on a review of published comments and reports we will identify what the key concerns are so that we are able to address them in the final report.

Further information will be obtained from interviewing stakeholders and running stakeholder engagement meetings in order to identify key issues related to distributed generation.

Task 2: Review of the international experience related to the costs and benefits integration of distributed generation

This task will analyse international experience with integrating increasing shares of distributed generation regarding the associated costs and benefits. There are two steps involved in this task:

1) Review of evidence on each of the concerns identified with the aim to debunk some of the arguments, in particular looking for case studies that are comparable to Turkey (in terms of DER resources, grid situation, urban and rural contrasts) and therefore that are more relevant to Turkey than just 'global front runners' might be.
2) Review of evidence on the benefits of increasing levels of distributed generation in order to showcase how increasing levels of distributed generation can benefit the power system and particular actors within it.

This analysis will then form the basis for developing policy recommendations.

Task 3: Defining possible improvements of Turkey's regulatory and policy framework for distributed generation

Following the review of the benefits of increasing levels of distributed generation a number of concrete policy recommendations will be developed. Those policy recommendations will focus on how the potential benefits can be maximised and the costs minimised.

Task 4: Preparing technical and policy maker friendly reports

Finally, the project team will prepare reports including dedicated material for policy makers that demonstrate the benefits of distributed generation and addresses the concerns identified.

3. Deliverables and timeline

Deliverables	Responsible	Timeline
Project starts (process related to contracting the consultant starts)		May/June 2020
Task 1: Understanding commonly voiced concerns about increasing DER penetration	SHURA + RAP + Consultant	June 2020
Task 2: Review of the international experience related to the costs and benefits integration of distributed generation	RAP + SHURA + Consultant	July-August 2020
Task 3: Defining possible improvements of Turkey's regulatory and policy framework for distributed generation	SHURA + RAP + Consultant	August-October 2020
Tasks 4: Preparing technical and policy maker friendly reports	SHURA + RAP + Consultant	October-December 2020
Review of Task 3&4: Through involvements of selected stakeholders from the private and public sectors	SHURA + Consultant	December 2020 – January 2021
Tasks 5: Final version of the report, detailed and well-structured of the improvements, along with a slide deck and a set of infographics with their content to be agreed with the SHURA team	SHURA + RAP + Consultant	January-February 2021

4. Key research questions

a) What are the challenges often discussed in conjunction with more DERs?
   - Discuss the challenges and risks often raised in opposition to DERs from DSOs and others to set the scene for addressing those concerns and highlighting the benefits.

b) What are the potential opportunities and benefits for DSOs (and TSOs?) that emerge from increased DERs? An initial list to be adapted and expanded includes:
   - Reduced peaks
   - Reduced transmission losses
   - Avoided network infrastructure costs
   - Prevention of blackouts
   - Lower planning risks

   Other system benefits (beyond networks) include:

   - Reduced reserve capacity requirements
   - Reduced generation capacity requirements
   - Reduced payments from consumers for capacity if CM is present
   - Lower wholesale market price

c) How can those benefits be leveraged through incentive regulation?
   - examples from other countries

d) What does this mean for Turkey?
    - Use what early experience on NEM reveals
    - How could network company regulation be reformed?

Key messages:

- DERs can deliver substantial grid benefits.
- DERs can reduce risk to DSOs.
- DERs can offer new opportunities for DSOs.

Incentive regulation and enable DSOs and consumers to reap those benefits