

Decentralized Distributed Generation Growth in Pakistan: A Review

Situation Brief

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1. Introduction

In the economic growth and development of a country, a resilient and cost-effective energy supply plays a significant role. Arguably, Decentralized Renewable Energy (DRE) configurations have many benefits for the Global South and for a country like Pakistan offer a potent option for an affordable, sustainable and climate-safe energy system. Pakistan holds one of the largest unserved populations globally and so has a genuinely high potential for bottom-up solar photovoltaic (PV) technological leapfrogging.

To promote small-scale distributed renewable energy generation, National Electric Power Regulatory Authority (NEPRA) introduced the Net-Metering Regulation in 2015¹. The regulations enabled on-site renewable energy generation up to 1MW capacity.

In this brief, we analyze the current state of the art with respect to Distributed Generation (DG) growth up till June 2022. For the analysis, data till October 2021 was used from the Alternative Energy Development Board (AEDB) net-metering database², whereas data from November 2021 onwards was extracted from individual generation licenses as uploaded on NEPRA's website³.

2. DG in Pakistan: Status and Outlook

Distributed generation refers to electricity generated from sources, often renewable energy sources, near the point of use instead of centralized generation sources from power plants. The benefits offered by these systems are several, including but not limited to grid support, supply reliability and most importantly

devolution of capacity payment charges to the end-users or investors.

As per NEPRA's Distribution and Net-metering regulation 2015, all end-users having a three-phase connection can avail the net-metering facility for small-scale (1kW-1MW) renewable energy installation⁴. The DG facility must fulfill all the requirements according to NEPRA's regulations. Initial requirements include a non-objection certificate by the electrical inspector, single line diagrams for interconnection, technical standards, load flow study, mandatory safety requirements, safety measurements and extra precautions.

Applicants who meet the requirements of DG, as defined by the NEPRA, submit their application along with all the necessary documents to their designated distribution company (DISCO). Within five business days, the respective DISCO acknowledges receipt of the application and provides an update to the applicant about the status of their application, whether it is complete or not. Initial review of the application gets completed in 20 days and DISCO determines whether the applicant fulfills all the requirements and qualifies for the interconnection facility. If the proposed facility is not technically feasible, the DISCO returns the application and communicates the reason to the applicant within three business days after the initial review. If the applicant meets all the requirements and the facility is technically feasible, the DISCO and applicant enter into an agreement within 10 business days of review. Within seven days of signing the agreement, DISCO sends a copy of the agreement along with the application for issuance of a generation license to NEPRA. The applicant pays a one-time

1. "Net Metering Reference Guide for the DISCOs" <https://www.aedb.org/images/NetMeteringReferenceGuideforDISCOs150118.pdf>

2. "Progress of Net-Metering in Pakistan" <https://www.aedb.org/articles-list/344-net-metering-progress-in-pakistan>

3. Net-Metering Progress beyond October 31,2021 is from individual NEPRA generation Licenses. The licenses issued for DG in Pakistan are regularly uploaded by NEPRA on its official website.

4. " Net-Metering reference guide for Electricity consumers" <https://www.aedb.org/component/jdownload/root/38-distributed-generation/107-net-metering-reference-guide-for-eletricity-consumer?Itemid=101>

fee for the issuance of the generation license and is responsible for all the costs associated with the interconnection facility up to the interconnection point, which includes meter installation. Right after the agreement, if DISCO feels that network modification/upgradation is required, the DISCO issues Connection Charge Estimation (CCE) to the applicant for the proposed interconnection facility up to the interconnection point including the installation of the meter. After the fee deposit, the applicant notifies the DISCO (in writing) about the payment within 20 days of its issuance. Within 30 days of payment by the applicant, the DISCO installs and commissions the interconnection facility after the confirmation of the issued generation license to the DG by NEPRA.

NEPRA and the Board of Investment (BOI) have alleviated the process of obtaining a three-phase electric connection for net-metering. Previously, three-phase electric connection was mandatory for a single-phase consumer before applying for net-metering. The cost of the three-phase electricity connection was PKR 15000/ and the process was tiresome. With this regulatory reform, consumers can now directly apply for the bi-directional meter to avail of the net-metering facility⁶. For the quick disposal of net metering connections, NEPRA has also recently eliminated the requirement of a generation license for DG facilities using wind and solar power generation up to 25kW, connected to the distribution network through net-metering⁷.

3. Total Installed DG Systems and Capacity

3.1-Year-wise DG Growth

If we look at the year-wise growth of DG installations, it was very slow in the early years

5. "To boost solar energy consumption: Process for net-metering simplified <https://www.brecorder.com/news/40111420>

6. "Solar Net-metering connections being provided on priority: NEPRA" <https://www.dawn.com/news/1682044>

Although the DG solar growth rate is increasing yearly, the overall contribution in national grid however is still negligible i.e., approximately 0.99%.

i.e., 2016-19. However, these systems started picking up growth in 2020-21, reaching 141 MW of installed capacity. In the first three quarters of 2021, the total installations reached 268.69 MW, whereas, in the last quarter of 2021 and the first quarter of 2022, 125.96 MW was installed. The total installed capacity of distributed solar as of June 2022 stands at approximately 386 MW. Figure 1 shows the year-wise growth of DG installed capacity (MW).

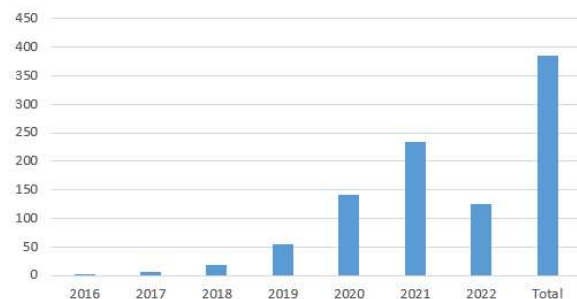


Figure 1. Year wise distributed generations installed capacity (MW) Source: Compiled by author from AEDB and NEPRA website

3.2-DISCO-wise DG Growth

Despite the launching of this net-metering facility country-wide, its growth has remained uneven across the utilities. Lahore Electric Supply Company (LESCO) and Islamabad Electric Supply Company (IESCO) were the first two distribution companies that embraced net-metering regulations and allowed for on-site generation. K-Electric (KE) also joined their league in 2018. These three DISCOs (LESCO, IESCO and KE) collectively account for ~62% of the total installed capacity of DG. Faisalabad Electric Supply Company (FESCO), Gujranwala Electric Power Company (GEPCO) and Peshawar Electric Supply Company (PESCO) have also shown significant progress in recent years by adding 32 MW, 32MW, and 14MW respectively. Whereas, in the first two quarters of 2022,

Multan Electric Power Company (MEPCO) also added 34.42 MW of installed capacity. The detailed DISCO-wise DG installed capacity (MW) could be seen in figure 2.

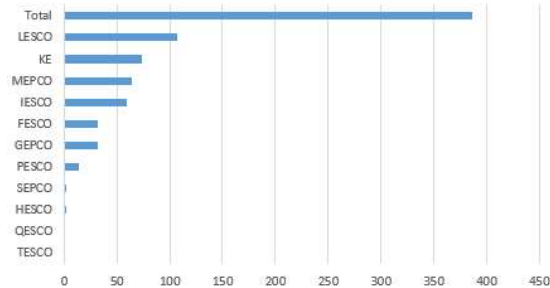


Figure 2. DISCO wise Distribution of DG. Source: Compiled by author from NEPRA website

3.3-Year and DISCO-wise DG Licenses

If we look at the distribution of licenses issued so far for DG, IESCO and LESCO have so far issued the highest number of licenses for the net-metered system. Figure 4 shows year wise progress of DISCOs in the issuance of net-metering licenses. Table 1 illustrates the total number of licenses issued for DG under each utility company and the number of net-metering licenses issued. If we look at the distribution of licenses

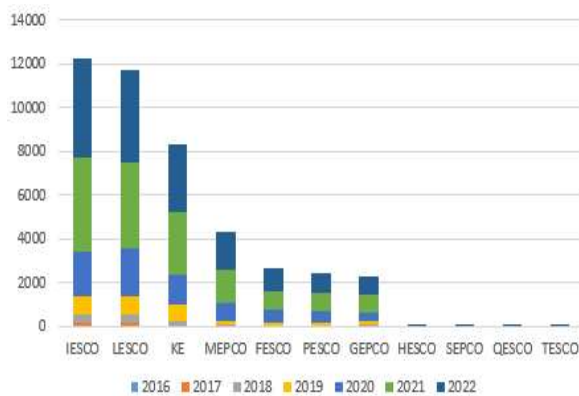


Figure 4. DISCO and year wise licenses of Net-Metering Source: Compiled by author from AEDB and NEPRA website

DISCO	Total No. of Connections	Net-Metering License
IESCO	3261112	4500
LESCO	5527859	4225
KE	3184342	3100
MEPCO	6518207	1760
FESCO	4341618	1010
PESCO	3484150	924
GEPCO	3816224	873
HESCO	1173063	14
SEPCO	805769	18
QESCO	640530	4
TESCO	442401	2

Table 1. DISCO-wise licenses issued to distribution generation. Source: NEPRA

It is important to note here that Tribal Electric Supply Company (TESCO) has not so far embraced DG whereas Hyderabad Electric Supply Company (HESCO), Sukkur Electric Supply Company (SEPCO), and Quetta Electric Supply Company (QESCO) have issued less than 50 licenses respectively in the past six years.

4. Conclusion

DG growth is dominated by three key DISCOs namely LESCO, IESCO, and KE. Few DISCOs such as SEPCO, HESCO, and QESCO have also made slight progress in recent years. Whereas TESCO has yet not issued a single license. Overall, the utilization of DG in Pakistan is still at a very initial stage. This contrasts quite poorly with the broader regional picture such as China and India reaching 17.9 GW and 4.4 GW of distributed solar respectively at the end of 2019, while Vietnam installed more than 9 GW of rooftop solar in 2020 alone through its FIT policy. The analysis shows that although Pakistan has started its expedition toward DG, however, this

One net-metering distribution generation license was issued to TESCO in 2021 and one in 2022 but the systems have not been commissioned yet.

growth so far is insignificant, also limited to a few DISCOs.

The increasing cost of electricity, inefficient transmission and distribution system, excessive energy losses, and significant solar irradiation make a strong economic case for DG solar in Pakistan. Pakistan's transmission and distribution infrastructure are also not adequate to serve the expected demand, and losses on both infrastructures are high, leading to wastage and lingering revenue shortfalls at the DISCOs. The constraints of distribution infrastructure signify an opportunity to promote net-metering and address some of the issues in current system by providing additional capacity to reduce electricity shortage, alleviate losses, and network congestion. Net-metering can also aid in voltage regulation of overloaded feeders.

To increase the penetration of DG in national grid, well-defined, consistent and ambitious targets should be set for DG. Obviously, targets need to be complemented by rigorous measures such as simplification of installation process, viable business case for DG investment which incentivize investment and provide easy authorizations to investors, special financial mechanisms supporting participation from marginalized groups and households, and broader awareness programs to the public.

The integration of DG in national grid will reduce the price of electricity, cater the bottlenecks of transmission network, and enforce energy security. Declining cost of DG solar makes a strong economic case for DG. In addition to its being a least cost generation option, it is also environmentally friendly, reduces transmission investment cost and provide functional support to the grid.

With active participation from all the DISCOs, the weightage of DG can be increased in the energy mix of Pakistan. To summarize, there is an imperative need for targeted policies, new

strategies, and models for scaling up net-metering growth