**Grid vs rooftop: the energy debate**

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The recent hype and chaos around net-metering and the roof-top solar taxation fiasco has brought the power sector of Pakistan to the brink of another planning conundrum.

Pakistan’s total electricity consumption, as measured in terms of sales, has decreased to 112.9 TWh in FY2023 from 124.6 TWh in FY2022. This 10 per cent decrease in electricity consumption is causing screens to flash red warning at the NTDC and DISCOs. Given the nature of take-or-pay contracts, the government is bound to pay capacity charges to power plants, and any decrease in the national grid’s demand will cause financial instability.

According to some estimates, around 6000 MWs worth of solar panels were imported by Pakistan last year. As the prices of solar panels continue to drop in the international and local markets, the electricity demand of Pakistan’s national grid may decline and cause the famous solar duck curve phenomenon.

The solar duck curve is like a rollercoaster for electricity. During the day, when the sun is shining bright, solar power generation goes way up, making a big hump in our energy supply graph that looks like a duck’s back. But as the sun sets, solar power drops off, and we get a dip in the graph that looks like the duck’s belly. This curve shows how our energy supply from solar power changes throughout the day.

The solar duck curve would show a big hump during sunny hours when solar panels are generating lots of electricity, and then a dip in the evening when the sun goes down and solar power decreases. This curve helps us understand when we have large amounts of solar energy available and when we might need to rely on other sources of power to meet our electricity needs.

In Pakistan, we are victims of myopic planning and stop-gap public policies. Back in 2007-08, when there was an accessibility crisis on account of a widening supply demand gap, the government invested in long-term power purchasing agreements (PPAs) indexed with dollar and interest rates, causing the affordability crisis. On the contrary, consumers invested in uninterrupted power supply (UPS) invertors. Due to the lack of any policy, UPS arrangements acted as tools of electricity hoarding, deepening the power sector crisis and causing inequalities in society.

Now, in the era of expensive electricity, we are once again faced with short-sighted planning arrangements. First, the government gave incentives to net-metering, causing an exponential increase in roof-top solar. This made many investors break-even in a short period. However, the declining demand is now compelling the government to introduce measures to discourage net-metering as a tool.

Solarization at the household level is not going to stop, as most of it is financed by remittances and post-retirement financial benefits. Simultaneously, the rates of solar panels are declining globally. Any measure to introduce taxation, decline in buy-back rates or dis-incentivization will be counterproductive. In the case of highly inflated electricity tariffs, even if the government decides to reduce the buy-back rates, solar will be an economically feasible option for people.

Hence, the way forward is not to kill the duck, but to feed it more in terms of encouraging additional electricity consumption in day hours and adding more electrified household energy services such as electric cooking and EV charging. The following suggestions can be beneficial in this regard.

In the broader scope of public policy formulation in the power sector, there is a need to reconsider the traditional emphasis on the national grid. Instead, there should be a push to mainstream distributed generation and community grids. It is important to note that electricity tariffs should not be utilized as a means of revenue collection.

Moreover, in contrast to the National Electricity Plan (2024-2027), fixed costs should be decreased by introducing competition and enhancing efficiency in the power market, instead of imposing additional burdens on distributed generators (those who consume the electricity they generate and those who use net-metering). Moreover, efficient, liberalized, and competitive DISCOs will see increased roof-top solar as an opportunity to attract more electricity demand for their systems.

Given the inevitability of solar rooftops, policymakers should encourage this tool as a means to navigate a way out of Pakistan’s multifaceted crisis of economy, energy and environment. To further enhance the utilization of solar energy and add additional demand for the national grid, Pakistan should encourage additional industrial demand.

This can be achieved by incentivizing industries, not just by providing them with competitive tariffs, but also by ensuring reliability. Innovative tariff structures should be introduced to reward industrial consumers for shifting their consumption to align with solar generation peaks. Moreover, the implementation of power wheeling mechanisms can allow industries to procure solar power directly from renewable energy installations. This is especially relevant in the context of the carbon border adjustment mechanism (CBAM), as the cleaner (renewables dominated) grid will help in reducing carbon footprints and add productive demand to the national grid.

Second, the existing distributed generation and net-metering regulations should be amended to incorporate new global innovations and best practices, ensuring an enabling environment for sustainable energy transition. These regulations should be updated in accordance with Pakistan’s commitments to the Paris Agreement to reduce emissions via the integration of distributed energy resources (DERs) into the grid and off-grid.

For example, spreading awareness of electrification of energy services at the household level, particularly at the rural level, will cause reduction in use of firewood and traditional fuels. Hence, linking net-metering licences to electrification of cooking preferences can be a game changer for Pakistan.

Third, a strategy should be formulated by the Alternative Energy Development Board (AEDB) now merged in the Private Power Infrastructure Board (PPIB), in coordination with DISCOs and provincial governments to capture the penetration of installed DERs in the system.

This strategy should enable system visibility and informed system planning at short – to long-term horizons, including assessments of DER imports, sales, technology, and location.

Fourth, to promote the distributed induction of renewable energy, the PPIB should design programmes and schemes in coordination with relevant stakeholders. These programmes should prioritize distributed induction over utility-scale procurements and set annual targets for distributed renewable energy inductions determined by DISCOs.

Fifth, dedicated programmes and instruments should be developed for the provision of distributed generation to subsidized consumers and communities, such as lifeline, protected and agricultural consumers. This approach will improve the financial viability, resilience and losses of the power sector. DISCOs should identify clusters of consumers and communities for programme design and explore innovative business models and financing options.

To reduce societal inequalities through improved energy access, Pakistan should implement targeted programmes that provide marginalized communities with affordable and reliable energy. Community-owned solar projects should be promoted to empower local communities and reduce disparities. Policies and programmes should prioritize the energy needs of vulnerable populations, including women, children, and the elderly.

Lastly, as mentioned in the National Electricity Plan, the central e-platform for consumer facilitation related to DERs should be upgraded to include dedicated facilities for registration and allied services. This platform should be integrated with the business processes of respective entities to improve consumer access to DER-related information and services.

Integrated policy should focus on adding additional productive industrial demand to the grid through market-based interventions and deregulations not via more regulations.

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