



FINANCING PAKISTAN'S DECENTRALISED ENERGY FUTURE

From private escape to a shared energy market

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Pakistan's energy transition is already underway, although not how most official plans anticipated. The most visible additions are not large plants connected to the transmission system. They are solar panels in houses and factories, pumps on farms, batteries in commercial premises and, gradually, electric vehicles. The scale is no longer marginal. The Pakistan Economic Survey 2025-26 records 7,319 megawatts (MW) of net-metered capacity in March 2026, close to 15 percent of total installed capacity. Yet finance has largely supported the purchase of individual systems rather than their integration into a shared power system. Pakistan is acquiring decentralised assets faster than it is developing the networks, markets and institutions required to coordinate them^{1,2}.

That imbalance has distributional consequences. Households and firms that finance their own daytime supply buy fewer grid units but still depend on the network at night and during failures. Where reduced revenue exceeds avoided variable costs while fixed network costs remain, future

tariffs shift unrecovered costs towards non-adopters, especially tenants, small firms and low-income households. Decentralised energy can strengthen energy security and reduce fuel-import exposure. Poorly designed financing and tariffs, however, could weaken grid revenue and make the shared network more expensive for those who cannot invest.

Pakistan must therefore move from financing private escape from the grid to financing participation in a shared energy market.

The transition is ahead of the institutions.

The Pakistan Economic Survey 2025-26 reports installed capacity of 49,651 MW in March 2026, including 10,101 MW classified as renewable and 7,319 MW from net metering. Yet its non-hydro renewable category accounted for only 4.5 percent of recorded generation during July-March. This capacity includes net-metered assets, while behind-the-meter output appears not to be fully captured in system generation. Pakistan, therefore, cannot yet see what its decentralised assets generate, supply to licensees or provide as grid services.³

1 Dr. S. M. Naeem Nawaz, "Energy Transition: What It Means, What the Evidence Shows, and What It Implies for Pakistan," PIDE Knowledge Brief No. 2026:158, July 2026.
2,3 Government of Pakistan, Pakistan Economic Survey 2025-26, Chapter 14, "Energy," pp. 244-245.

Households accounted for 47.5 percent of recorded electricity consumption during July-March fiscal year 2025-26 (FY2026), while industry accounted for 31.5 percent. Both have strong incentives to reduce exposure to high tariffs and unreliable supply. Their response is rational. Policy failure lies in treating thousands of private investments as exceptions to the power system rather than as components of it⁴.

Power systems globally are increasing investment in both integration and generation. The International Energy Agency expects global spending on electricity grids to approach US\$550 billion in 2026 and battery-storage investment to exceed US\$100 billion. In Pakistan, however, discussion has narrowed to what a rooftop producer should receive for surplus power. That is only one price in a much larger financing problem. The grid must also pay for metering, feeder reinforcement, storage, data systems and flexible demand, while lenders need workable products for households, communities and small businesses⁵.

WHY DECENTRALISED ENERGY IS DIFFICULT TO FINANCE

Four weaknesses in the present arrangement explain why finance has not kept pace with adoption.

Small loans carry large appraisal costs. Before financing a rooftop or battery system, a bank has to assess the customer, installer, equipment, warranty, output estimate and regulatory treatment. The loan amount is modest, but the checks are much the same as for a larger project. Inconsistent equipment standards and little operating data add to the uncertainty, so lenders shorten tenors or stay out altogether.

The second problem is regulatory risk. Net billing is no longer a proposal. The Prosumer Regulations issued by the National Electric Power Regulatory

Authority (NEPRA) took effect on 9 February 2026 and provide that the kilowatt hours (kWh) supplied by the licensee to the prosumer shall be billed at the applicable tariff, while the kWh supplied by the prosumer to the licensee shall be billed at the national average energy purchase price. The April amendment protected the earlier terms of valid pre-9 February agreements until expiry, unless a significant change increases the facility's maximum output. What investors still cannot see clearly is how the national average energy purchase price applicable to the kWh supplied by prosumers to licensees will be revised, how expiring agreements will be treated, and whether future network charges will be predictable. These questions affect monthly cash flow and therefore loan size, tenor and interest cost. For an asset paid for upfront but earning over many years, uncertainty is not an abstract concern; it enters the financing rate^{6,7}.

The third constraint lies in the condition of the power sector itself. Circular debt stood at Rs 1.614 trillion as of 30 June 2025. The Power Division subsequently confirmed a Rs 1.225 trillion Circular Debt Settlement Plan, under which existing circular debt is to be refinanced on favourable terms and repaid over six years. This is a system-wide liability rather than the debt of any one distribution company (DISCO). Nevertheless, weak recoveries, distribution losses and limited investment budgets leave DISCOs with little room to modernise feeders. Two-way power flows require smart meters, stronger transformers and digital control. Without that investment, distributed resources remain visible on customer premises but largely invisible to system operators⁸.

Finance also reaches the wrong households. Ownership-based solar naturally favours people with a suitable roof, savings, collateral and a formal credit history. Tenants, apartment residents, small farmers, public facilities and poorer consumers cannot participate on the same terms, even when their electricity costs are high. If policy recognises only individual systems, the transition will widen access to equipment without widening access to its savings.

4 Government of Pakistan, Pakistan Economic Survey 2025–26, Chapter 14, "Energy," p. 245.

5 International Energy Agency, "Impacts of Middle East Conflict Set to Reshape Energy Investment Plans as Disruptions Put Focus on Security," 28 May 2026.

6 National Electric Power Regulatory Authority, Prosumer Regulations, 2026, S.R.O. 251(I)/2026, 9 February 2026; and Amendment in Prosumer Regulations, 2026, S.R.O. 547(I)/2026, 2 April 2026.

7 International Energy Agency, Reducing the Cost of Capital, Paris, 2024.

PUT THE SHARED GRID AT THE CENTER OF REFORM

Pakistan's tariffs already contain fixed charges, including those recently introduced or revised for non-lifeline domestic consumers, as well as demand-based charges for other categories.⁹ The task is therefore to allocate network costs transparently rather than add an unexplained solar charge. Any connection or capacity charge should follow a cost-of-service assessment, reflect sanctioned capacity or measured demand, and protect lifeline consumers. The applicable tariff for kWh supplied by the licensee to the prosumer and the national average energy purchase price for kWh supplied by the prosumer to the licensee should reflect the time and system value of electricity. This is more defensible than either loading every cost into the per-unit tariff or treating solar users as the sole cause of the grid's financial weakness.

Transition arrangements are as important as the tariff formula. Existing agreements protected under the April amendment should be honored, while future changes follow a pre-announced schedule. Lifeline consumers should remain protected from regressive fixed charges. Prosumers should also be treated as providers of verified grid services. Battery discharge during feeder peaks, load shifting by factories, and voltage support can create measurable system value and should be compensated when independently measured and verified.

DISCO network finance should be linked to measurable outputs. Each DISCO should be required to make public feeder capacity hosting maps, connection queues, investment plans, and reliability goals. Sukuk and performance-related borrowing could finance metering equipment, transformer banks, and control systems. Such a facility should be required to disclose its sponsor, the use of the funds, source of repayment, and an independent verifier. Repayment should come from ring-fenced regulated network revenues, and independent verification should confirm the improvements in losses, interruptions, and hosting capacity.

BUILD A PORTFOLIO BEFORE APPROACHING CAPITAL MARKETS

A Clean Energy Asset Warehouse could fill this gap without becoming another lending institution. It would standardise and pool qualifying retail loans for solar, batteries, efficient equipment, electric vehicles, and small commercial installations.

The Warehouse should be an open-access, special-purpose entity that sets eligibility and data standards, verifies compliance and pools qualifying loans, but does not originate them. Participating conventional and Islamic banks would use standardised loan documents, equipment and installer requirements, warranties and reporting rules while retaining a meaningful share of the credit risk. Seasoned conventional receivables could back asset-backed securities. Islamic asset pools could support green sukuk, subject to Shariah requirements governing asset composition and tradability. The State Bank of Pakistan (SBP) and the Securities and Exchange Commission of Pakistan (SECP) would supervise these instruments within their respective statutory mandates.

The government had announced the Pakistan Green Taxonomy in 2025, with SBP distributing it in December. From July 2025 to March 2026, SECP had granted Shariah compliance certificates for 53 corporate sukuk issuances worth Rs 229.6 billion. Hence, there are mechanisms for green classification and Islamic issuance. However, what is missing is a standardised and verifiable portfolio of small-scale clean energy assets for evaluation by institutional investors.

8 Ministry of Energy, Power Division, "Rebuttal: Claims of Rs. 223 Billion in Circular Debt Are Wrong and Misleading," 2026; National Electric Power Regulatory Authority, State of Industry Report 2024, sections on distribution losses, recoveries and investment requirements.

9 National Electric Power Regulatory Authority, "Rationalization of Tariff for XW DISCOs and K-Electric," determination dated 11 February 2026.

At the outset, the public sector should absorb risks that private investors cannot yet assess or price. A government- or development-partner-backed facility could provide limited first-loss protection while the Warehouse builds a verifiable performance record. This protection should be capped, time-bound and conditional on participating lenders retaining a meaningful share of the credit risk.

PAY BATTERY OWNERS FOR MEASURABLE GRID SERVICES

Batteries are now contributing to backup power, improved solar self-consumption, and better bill management. In addition, battery ownership may help avoid feeder peaks, voltage stabilization, absorption of surplus solar photovoltaic (PV) generation, and deferred investments in the distribution network. Nevertheless, there are no commercial terms and pricing for these grid services in Pakistan, meaning that storage plays only the role of a personal resilient asset and not that of grid infrastructure.

The Market Commercial Code of NEPRA provides a framework for bilateral wholesale agreements but no way for small-scale distributed assets. A functional aggregation regime will require licenses, interconnection, metering, baseline setting, dispatching, and settlement mechanisms. The solution for Pakistan will be the creation of a new type of legal and regulatory status for aggregators, which combine batteries, PV, electric vehicle charging stations, and flexible industrial/commercial loads into a virtual power plant. Aggregators will be able to provide firm capacity, balancing services, or demand reduction when any single customer cannot participate in the electricity market by himself.

Pakistan needs to implement this idea in three different districts of the distribution network, including industrial, urban residential, and agricultural areas. Competitive contracts have to compensate measurable peak reduction and feeder assistance. Every test has to define the baseline, metering, settlement, and verification procedure before the test. The results need to be published. If

the price of service will be cheaper than that of regular network expansion or peaking capacity, the model must be expanded.

MAKE DECENTRALISATION INCLUSIVE

Community energy should become a recognised asset class. Under a new virtual-credit and community-energy framework, a solar project on a school, hospital, market, or public building could sell subscriptions to nearby consumers who lack their own roofs. Small firms could join an energy-purchasing cooperative. Municipalities could pool public sites and procure solar, storage, and efficiency through energy service contracts, with repayments linked to verified savings.

An amount of validated savings generated by improved loss recovery and reduction in peak investment can form the basis of a Community Energy Account for lifeline customers. Transfer should be made only when the savings are accounted for in the audited cash flow. This account will fund the purchase of energy-efficient devices and wiring safety. Criteria for eligibility and auditing standards need to be clearly published.

Pakistan's decentralised energy transition will succeed not when more consumers escape the grid, but when finance, regulation and markets enable every rooftop, battery and flexible load to strengthen a shared, reliable and inclusive power system.

Pakistan's current take-or-pay power purchase agreement approach necessitates careful sequencing. Distributed power supply should not be thought of as simply another capacity expansion plan. The capacity payments already made will continue to come due until new contracts have been negotiated and old ones have expired, even if rooftop power cuts into network power sales. Thus, the Warehouse needs to admit resources only where the savings in fuel, losses, peak demand, network cost avoidance, and improved reliability are more than offset by higher integration costs and the cost of any increase in fixed costs left unrecovered. The priority has to

go to storage, efficiency, load management, and solar power with productive daytime use. The distributed resources need to be incorporated in the Indicative Generation Capacity Expansion Plan.

A DECENTRALISED ENERGY FINANCE COMPACT

The Power Division should lead a two-year implementation compact with NEPRA, SBP, SECP, DISCOs, provinces, the market operator and private lenders. The first six months will cover the methodology and timeline for reviewing and amending the national average electricity purchasing price, contracts' expiry, standard documentation, equipment certification, and feeder data specification. The next six months will kick off the pilots for the Warehouse, portfolio guarantees, hosting capacity maps, and network finance. The second year of the project will see an evaluation of virtual power plants and community energy.

The measures of success will include capital mobilisation, cost of financing, reliability, storage integration, and participation of under-served communities. However, the aim of the project is not to create more uncoordinated electricity generation or make consumers electricity traders but to bring together dispersed assets without creating overproduction or compromising the common grid.

The future is already arriving, one roof and one battery at a time. Policy, regulation and finance must now catch up.

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