



Policy Paper

**Assessing Opportunities and Barriers for Consumers to
Benefit from Integrated Electricity and Gas Sector Solutions
in Pakistan**

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Executive Summary

Pakistan's electricity sector is undergoing a significant transformation driven by rising tariffs, abundant solar resources, and growing consumer interest to offset energy inflation through self-generation. Consumers are increasingly becoming "**prosumers**," generating electricity via rooftop solar and interacting with the national grid through net metering or net-billing. Emerging technologies such as battery storage, hybrid systems, electric vehicles, and smart energy management offer further opportunities for cost reduction, energy independence, and grid flexibility. Recent regulatory updates, including NEPRA's Prosumer Regulations 2026¹, have shifted compensation for new installations toward a net-billing model. The energy ecosystem is shaped by international conditions, national policies, day-to-day operational adjustments, and close interlinkages with the gas sector regulated by OGRA.²

A clear illustration of these interlinkages emerged in July 2026: non-availability of Qatar's contracted LNG forced expensive spot-market purchases and limited furnace-oil use, raising the actual fuel cost of electricity generation in June 2026 to Rs 8.9 per unit against a reference cost of Rs 7.714 per unit. This necessitated a proposed Rs 1.20 per unit Fuel Cost Adjustment (FCA) for consumers. At the same time, electricity demand declined by over 3 percent, partly due to solar net metering and other distributed solutions, prompting the government to work on a new power tariff package addressing time-of-use rates, captive power, and battery energy storage systems.³

This paper assesses the benefits of greater consumer engagement in grid-related solutions and identifies priority policy actions. A consumer-focused One-Stop-Shop (OSS) platform can provide trusted, independent information, decision-support tools, and guidance on technologies, financing, and regulations—helping households and businesses participate confidently while advancing affordability, reliability, and sustainability.

¹ [National Electric Power Regulatory Authority \(Prosumer\) Regulations, 2026](#)

² [Oil and Gas Regulatory Authority \(OGRA\)](#)

³ [Govt hints at new tariffs Dawn](#)

1.Introduction

Consumers in Pakistan are transitioning from passive electricity users to active participants in the energy system. Through rooftop solar, battery storage, and other distributed energy resources (DERs), they can lower costs, improve resilience, and support a more flexible national grid.

This paper provides a structured assessment of current opportunities, associated benefits, and key barriers. It proposes targeted policy recommendations to maximise consumer value and system-wide outcomes. The analysis supports the objectives of the Consumer One-Stop-Shop (OSS) Project by highlighting the importance of accessible, neutral consumer support mechanisms.

2. Background

Pakistan's electricity sector faces persistent challenges, including rising demand, tariff pressures, dependence on imported fuels, transmission and distribution losses, and the management of circular debt. At the same time, the country possesses excellent solar resources, making distributed generation increasingly attractive for consumers and the system as a whole.⁴

2.1 Historical Evolution

The sector was long dominated by the Integrated Water and Power Development Authority (WAPDA). Major reforms in the 1990s led to the unbundling of WAPDA's power wing in 1998 into Generation Companies (GENCOs), the National Transmission and Dispatch Company (NTDC), and Distribution Companies (DISCOs), creating the current unbundled structure. Private Independent Power Producers (IPPs) were

⁴ [World Bank. \(2026, July 9\)](#)

introduced to expand capacity, and the generation mix has diversified from hydro and oil/diesel to include natural gas, coal, nuclear, and growing renewables.

2.2 Gas Sector Challenges and Interlinkages

OGRA regulates midstream and downstream oil and gas activities ⁵, including pricing, licensing, infrastructure standards, and consumer protection for natural gas, LPG, and petroleum products. Declining domestic gas production and heavy reliance on imported LNG create supply risks and price volatility that affect both power generation and end-use consumers. These pressures directly raise electricity costs and strengthen the economic case for switching from gas to electricity-based solutions. A concrete recent example occurred in June–July 2026.

Non-availability of Qatar’s contracted LNG led to expensive spot-market LNG purchases and minor use of furnace oil. As a result, the actual fuel cost of electricity generation rose to Rs 8.9 per unit against the reference fuel cost of Rs 7.714 per unit. The Central Power Purchasing Agency sought a Rs 1.20 per unit Fuel Cost Adjustment (to recover approximately Rs 15.7 billion) in August bills for June consumption. This episode demonstrates how gas-sector supply disruptions immediately translate into higher electricity tariffs for consumers.⁶

At the same public hearing in NEPRA, electricity demand was reported to have declined by over 3 percent (approximately 5 percent below estimates and 3.3 percent year-on-year), with solar net metering, weather, and the transfer of tube wells to solar cited among contributing factors.

The government indicated it is developing a new power tariff package covering time-of-use rates, captive power plant requirements, and battery energy storage systems—measures that directly affect consumer-level DERs and the electricity–gas interlinkage. These developments reinforce the value of DERs (rooftop solar PV, battery energy storage systems, electric vehicles, and demand flexibility) as tools for households and businesses to reduce dependence on both grid electricity and gas while interacting productively with the national system.

⁵ [Oil and Gas Regulatory Authority \(OGRA\)](#)

⁶ [Govt hints at new tariffs Dawn](#)

3. Current Opportunities for Consumers

3.1 Rooftop Solar and Grid Interaction (including Plug-in Solar with Batteries)

Rooftop solar remains the most established grid-related opportunity for residential and commercial consumers. Pakistan's framework (now evolving under updated Prosumer Regulations from NEPRA) enables eligible consumers to install systems and interact with the grid through bi-directional metering.⁷

Key benefits include:

- Reduction in electricity bills through self-consumption
- Protection against future tariff increases
- Greater energy independence
- Contribution to national renewable energy goals
- Indirect relief from gas-sector pressures by enabling electric alternatives to gas appliances

Recent regulatory refinements have adjusted compensation mechanisms for surplus electricity exported to the grid for new installations (shifting toward net-billing). This evolution encourages optimised system sizing with a focus on self-consumption while maintaining support for existing participants. To make it easier for consumers to get plug-in solar panels with batteries, hybrid systems combining solar PV with battery storage are increasingly available. These allow consumers to store excess solar generation for later use, provide backup power during outages, reduce reliance on grid electricity during peak periods, better manage consumption under evolving export compensation arrangements, and support fuel-switching from gas to electricity (e.g., electric cooking or heating). Declining global battery costs are improving the economics of these hybrid solutions.

⁷ [National Electric Power Regulatory Authority \(Prosumer\) Regulations, 2026](#)

3.2 Enabling Consumers to Sell Electricity Back into the Grid (Net Metering / Net Billing)

Consumers can sell surplus electricity generated from rooftop solar back into the national grid. Under the previous net metering regime, exported units were fully offset against imported units. The NEPRA Prosumer Regulations 2026 have introduced a net-billing model for new installations, where exported electricity is compensated at a regulated rate (currently linked to the national average energy purchase price), while imported electricity is charged at the full retail tariff. Existing licensed prosumers continue under their original net metering agreements until expiry. This arrangement still enables consumers to earn credits or payments for surplus generation, supporting the economic case for rooftop solar.

3.3 Electric Vehicles and Current Financial Incentives

Pakistan's National Electric Vehicle (NEV) Policy 2025–30⁸ supports the transition to electric mobility. EVs can also act as mobile batteries through Vehicle-to-Grid (V2G) potential in the future. Current financial incentives being offered by the Government of Pakistan include:

- Direct purchase subsidies: An initial allocation of Rs. 9 billion in FY 2025-26 to support the purchase of approximately 116,053 electric motorcycles and 3,171 electric rickshaws (with 25% of the subsidy reserved for women).
- Reduced sales tax (as low as 1% for certain locally manufactured EVs).
- Removal or reduction of additional customs duties and sales tax on EV imports and parts.
- Exemption from registration fees and annual token tax in many jurisdictions.
- Reduced toll charges (50% or full exemption on selected NHA roads in some cases).
- Support for local manufacturing and assembly.

While EV adoption is still developing (particularly for two- and three-wheelers), these current incentives make ownership more affordable and position EVs as a growing area for consumer participation in the energy system, including future integration with home solar and grid services.

⁸ [Uddin, M. \(2020, January 10\). Pakistan's National Electric Vehicle Policy: Charging towards the future. International Council on Clean Transportation \(ICCT\).](#)

3.4 Demand-Side Response and Flexible Electricity Use

Consumers can increasingly shift electricity consumption to periods of lower system demand or higher renewable availability. Examples include operating appliances during daytime solar production or using batteries to manage evening peaks. While formal programmes are still emerging, enabling infrastructure such as smart metering will support greater future participation.

Practical Examples

Instead of...	Try...	Why it helps
Running the washing machine during the evening peak	Run it during the middle of the day if solar energy is available	Makes better use of renewable energy and reduces peak demand.
Charging your EV immediately after arriving home	Charge overnight or during midday when renewable generation is high	Helps balance electricity demand and reduces pressure on the grid.
Heating water during busy evening hours	Use a timer to heat water during off-peak periods	Reduces demand when the electricity system is under the most strain.
Running the dishwasher after dinner	Schedule it to run later at night or during the day	Helps spread electricity demand more evenly throughout the day.

4. Consumer Benefits

Greater consumer participation in grid-related energy solutions can deliver multiple benefits across economic, security, environmental, and national dimensions — with growing relevance to gas-sector challenges as well.

Economic Benefits

- Lower and more stable electricity bills
- Improved returns on investments in solar and storage
- Reduced vulnerability to tariff volatility (electricity and gas)
- Potential savings from switching gas-intensive activities to solar-powered electric alternatives

Energy Security Benefits

- Backup power through batteries and hybrid systems
- Reduced dependence on the central grid during disruptions
- Enhanced resilience for households and businesses

Environmental Benefits

- Lower greenhouse gas emissions
- Improved local air quality
- Increased share of renewable energy in the overall mix

National and System Benefits

- Contribution to reduced peak demand (electricity and gas)
- Better integration of variable renewable generation
- Support for grid stability and reduced reliance on imported fuels (oil, gas/LNG)
- Alleviation of pressure on both electricity and gas infrastructure through consumer-level diversification

5. Key Barriers

Several barriers currently constrain broader consumer participation.

Regulatory Barriers

- Recent changes to net metering and prosumer frameworks have introduced adjustment periods for new installations
- Lengthy or complex approval processes in some cases
- Limited dedicated policy support for demand response, storage incentives, and gas-to-electric switching
- Need for greater long-term regulatory predictability across electricity and gas sectors

Financial Barriers

- High upfront costs, especially for battery storage and hybrid systems
- Limited access to affordable, consumer-friendly financing options
- Insufficient targeted support mechanisms for lower-income households

Technical Barriers

- Uneven rollout of smart metering infrastructure
- Distribution network constraints in areas with high DER penetration
- Developing infrastructure for battery end-of-life management

Consumer Awareness and Informational Barriers

Many consumers lack clear, independent information on:

- Technology options and appropriate system sizing
- Updated regulatory procedures and economics (electricity and gas)
- Financing availability
- Certified installers and equipment standards
- Opportunities for gas-to-electric transitions

Institutional Barriers.

Coordination among government agencies, regulators NEPRA, utilities (DISCOs and gas distribution companies), financial institutions, and other stakeholders can be further strengthened to support scaled adoption of consumer-level DERs.

This often leads to delayed decisions or suboptimal investments. Institutional Barriers: Coordination among government agencies, regulators (NEPRA), utilities (DISCOs), financial institutions, and other stakeholders can be further strengthened to support scaled adoption of consumer-level DERs.

6. Future Opportunities and Enablers

Pakistan has substantial potential to expand consumer participation through several enabling developments.

Smart Metering and Digital Infrastructure

Accelerated deployment of smart meters will provide consumers with better consumption data and enable future Time-of-Use tariffs and demand response programmes.⁹

Time-of-Use Tariffs

Well-designed ToU tariffs can incentivise consumers to shift usage toward periods of abundant renewable generation or lower system costs, supporting both individual savings and stability in electricity and gas networks.

Demand-Side Response Programmes

Future voluntary programmes could reward consumers for flexible behaviour, such as charging EVs or operating appliances during optimal periods, or using batteries to support peak management — helping ease pressure on gas-fired generation as well.

⁹ [International Renewable Energy Agency \(IRENA\). Innovation Landscape for a Renewable-Powered Future.](#)

Digital Consumer Services via One-Stop-Shop Platforms

Independent OSS platforms can deliver:

- Neutral, accessible information
- Financial and technical guidance
- Support with regulatory processes
- Decision-support tools (e.g., savings estimators, including gas-to-electric comparisons)
- Connections to verified service providers

The government's ongoing work on a new tariff package that includes time-of-use rates and battery storage creates an important near-term window for consumer-oriented design and clear communication.

7. Policy Recommendations

To maximise consumer benefits and support a modern, consumer-centric electricity system (while addressing interlinked gas challenges), the following actions are recommended:

Recommendation 1

Strengthen and expand independent One-Stop-Shop information platforms to provide consumers with trusted, neutral guidance on technologies, regulations, financing, and service providers — with specific modules on plug-in solar + battery hybrid systems.

Recommendation 2

Simplify and digitise application and approval processes for rooftop solar, hybrid systems with batteries, and prosumer connections, ensuring clear communication of current net-billing arrangements under the 2026 Prosumer Regulations ¹⁰.

Recommendation 3

Expand access to affordable green financing through banks, microfinance institutions, and innovative models, with particular attention to hybrid solar + battery systems, gas-to-electric appliances, and support for lower-income consumers.

Recommendation 4

Accelerate the rollout of smart meters to enable better consumer information, Time-of-Use tariffs, and future demand-side management across electricity and gas.

Recommendation 5

Develop pilot programmes for Time-of-Use tariffs and voluntary demand response, with appropriate consumer protections and clear benefit mechanisms.

Recommendation 6

Promote battery storage and smart hybrid (plug-in solar + battery) systems through supportive standards, streamlined approvals, incentives where appropriate, and integration with consumer information platforms.

Recommendation 7

Build on current EV incentives by expanding the subsidy programme beyond two- and three-wheelers, maintaining or enhancing tax exemptions, registration/token fee waivers, and toll reductions, while introducing additional support for Vehicle-to-Grid

¹⁰ [Ministry of Energy \(Power Division\), Government of Pakistan. Energy sector policies and reports.](#)

capable EVs that can act as batteries. Provide clear information on existing incentives through the OSS platform.

Recommendation 8

Enhance consumer protection through improved installer certification, equipment quality standards, warranty enforcement, and accessible redressal mechanisms.

Recommendation 9

Enhance coordination among NEPRA, OGRA, the Ministry of Energy, DISCOs, gas distribution companies, financial institutions, and other stakeholders to support integrated electricity–gas solutions and monitor outcomes—particularly in light of recent LNG-driven fuel-cost impacts and the emerging tariff package ¹¹.

8. Conclusion

Pakistan has a significant opportunity to place consumers at the centre of its clean energy transition. Rooftop solar, battery storage, electric vehicles, and demand flexibility can help households and businesses reduce costs, improve energy resilience, and contribute to a more efficient and sustainable electricity system. These consumer-level solutions also offer an important pathway to ease pressure on the gas sector by enabling gradual fuel switching and reducing overall dependence on imported LNG and other fossil fuels — a linkage made clear by the recent rise in electricity fuel costs driven by LNG supply disruptions.

Realising these benefits, however, requires more than technology alone. It demands supportive and predictable policies, improved consumer awareness, easier access to affordable finance, modernised grid infrastructure (including smart metering), and stronger coordination among institutions such as NEPRA, OGRA, the Ministry of Energy, DISCOs, and gas distribution companies. The government’s ongoing work on a new power tariff package — incorporating time-of-use rates and battery storage — presents a timely window to design consumer-friendly rules that reward flexibility and self-generation.

¹¹ [Govt hints at new tariffs Dawn](#)

In this evolving landscape, a well-functioning Consumer One-Stop-Shop (OSS) platform can serve as a critical bridge. By providing trusted, independent information, practical decision-support tools, and clear guidance on technologies, regulations, financing options, and certified service providers, the OSS can help households and small businesses participate with confidence. With targeted policy action and effective consumer support, Pakistan can unlock substantial economic, environmental, and energy-security value for its citizens while advancing national objectives of affordability, reliability, and sustainability.

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