PRED
Policy Research Institute
for Equitable Development

THE CAPTIVE
POWER DILEMMA

Does the new levy fix the grid or punish the industry?

Authors

Haris Sohail - Associate, Energy Economics
Muqaddas Ashiq - Associate, Energy Systems

Reviewers

Aurangzaib Khan, Muhammad Badar Alam

Design

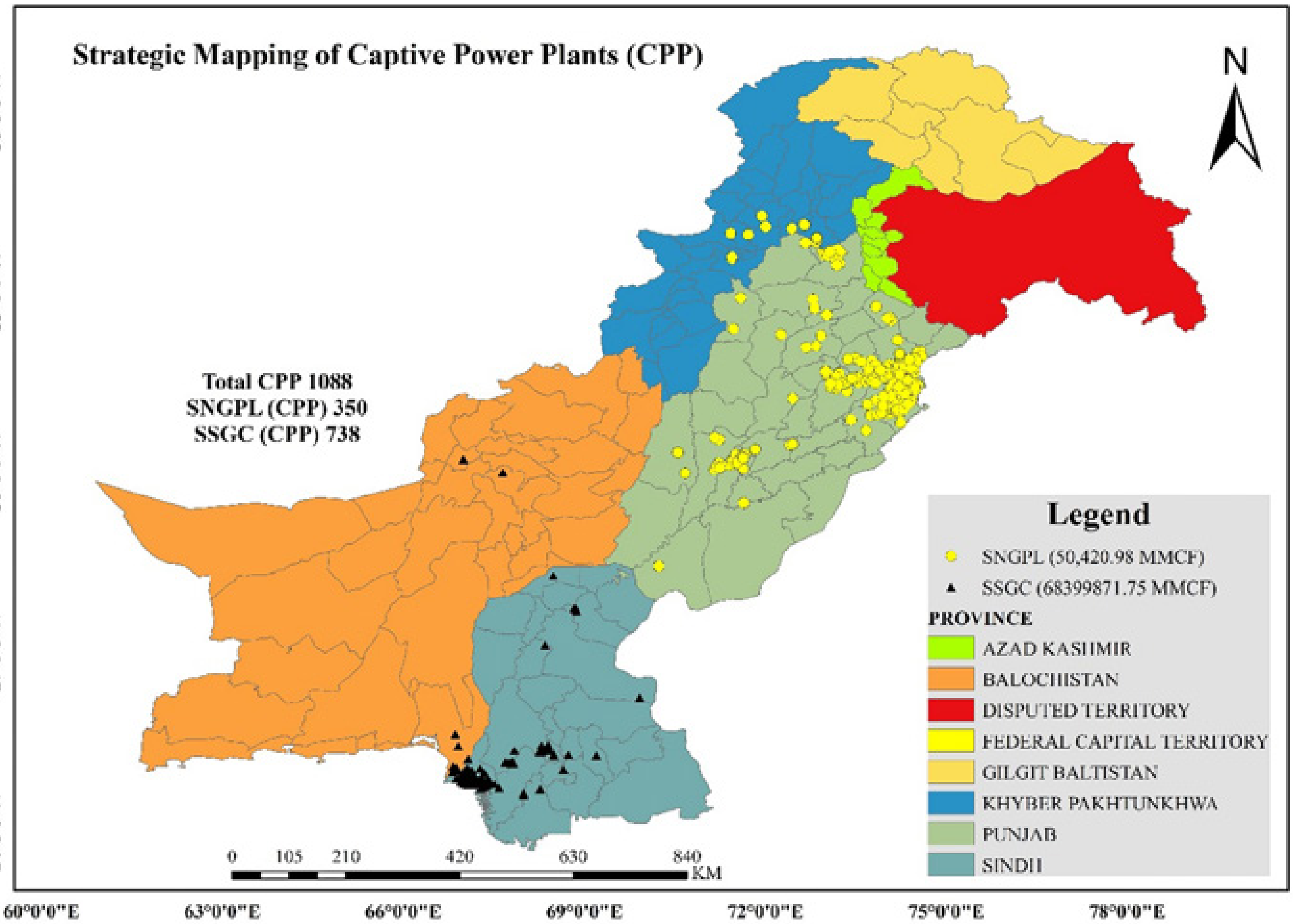
Dot Advertising

Acknowledgement

Thanks are due to Shahjahan Mirza (former head of the Private Power and Infrastructure Board), Ameena Sohail (formerly of the National Electric Power Regulatory Authority), Asad Mahmood (a former staffer of the National Energy Efficiency and Conservation Authority), Asim Riaz (a representative of the All Pakistan Textile Mills Association), Muhammad Ali (a senior staff member at Fatima Fertilizer), Sarah Arshad (a staff member at Sapphire Group), Muhammad Abdul Rafe (a senior staff member at the Alternative Law Collective), and several other industry executives and representatives for their helpful inputs and constructive feedback during the writing of this report.

List of Abbreviations

ADB	Asian Development Bank
B3 Tariff	Industrial electricity tariff category applicable to medium and large industrial consumers
CCGT	Combined Cycle Gas Turbine
CPL	Captive Power Transition Levy
CPP	Captive Power Plant
DISCO	Electricity Distribution Company
EFF	Extended Fund Facility
FY	Fiscal Year
IEA	International Energy Agency
IMF	International Monetary Fund
IPP	Independent Power Producer
kV	Kilovolt
LNG	Liquefied Natural Gas
MMBtu	Million British Thermal Units
MW	Megawatt
MWh	Megawatt Hour
NEECA	National Energy Efficiency and Conservation Authority
NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission and Despatch Company
OGRA	Oil and Gas Regulatory Authority
O&M	Operations and Maintenance
PPIB	Private Power and Infrastructure Board
PSEDP	Private Sector Energy Development Project
RLNG	Regasified Liquefied Natural Gas
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SPA	Sale and Purchase Agreement
SPP	Small Power Producer
SSGCL	Sui Southern Gas Company Limited
SNGPL	Sui Northern Gas Pipelines Limited
WAPDA	Water and Power Development Authority


Strategic Mapping of Captive Power Plants (CPP)
N
Total CPP 1088
SNGPL (CPP) 350
SSGC (CPP) 738
Legend
SNGPL (50,420.98 MMCF)
SSGC (68399871.75 MMCF)
PROVINCE
AZAD KASHMIR
BALOCHISTAN
DISPUTED TERRITORY
FEDERAL CAPITAL TERRITORY
GILGIT BALTISTAN
KHYBER PAKHTUNKHWA
PUNJAB
SINDH
0 105 210 420 630 840
KM
36°0'0"N
33°0'0"N
30°0'0"N
27°0'0"N
24°0'0"N
60°0'0"E
63°0'0"E
66°0'0"E
69°0'0"E
72°0'0"E
75°0'0"E
78°0'0"E

Contents

Foreword

Captive power within the equitable, just energy transition context

Pakistan's captive power levy, imposed under a law called Off the Grid (Captive Power Plants) Levy Act, 2025,[1] is branded by the government as a progressive piece of legislation which will rationalise the usage of both natural gas and Regasified Liquefied Natural Gas (RLNG) by localized electricity generation facilities built within industrial units. Such facilities, – owned, and operated by industrial or commercial enterprises — are technically referred to as Off-grid Captive Power Plants. By nudging industries to shift to the national electricity grid, the Captive Power Levy (CPL) is aimed at diverting surplus gas capacity to the national grid for power generation, resolve power sector liquidity issues, and lower overall power tariffs. On these counts, CPL appears a technically defensible, fiscally rational and financially prudent measure. And, yet, it rests on a legally and economically contested ground. If for nothing else, the same state machinery is imposing it which has consistently failed to supply reliable and affordable electricity to the industry, making captive power necessary; this same machinery made policy and planning decisions which have contributed to the national electricity grid's overcapacity trap that the levy is now designed to address. Until the relevant institutions and organizations of the state acknowledge this history and create specific, verifiable, and measurable preconditions for the success of the levy, this measure risks becoming less a transition instrument than a mechanism for transferring the costs of state's failure onto those who set up captive power plants in order to survive that failure.

Globally, too, captive power plants occupy an increasingly complex position within the energy transition context. While many countries seek to reduce dependence on fossil-fuel-based self-generation, the dominant trend is not the elimination of captive power itself but its transformation into cleaner and more sustainable forms of power generation. Even when captive and behind-the-meter power generation are often viewed as tools for improving energy resilience, industrial competitiveness and local energy autonomy, global frameworks for a just energy transition insist that these electricity sources must be progressively decarbonized. Rather than forcing industries back into the centralized grid systems, many countries are, therefore, encouraging them to replace fossil-fuel captive plants with renewable energy, battery storage and micro-grid solutions that remain integrated with broader national decarbonization goals.

Germany stands out as a major exponent of this approach. Under its *Energiewende* (energy transition) strategy, it has encouraged distributed generation through industrial rooftop solar, combined heat and power (CHP) systems, and local energy communities, allowing businesses to generate their own electricity while remaining connected to the grid. Denmark, too, has promoted decentralized energy systems through industrial cogeneration and community-owned renewable projects,

1. https://pakistancode.gov.pk/english/UY2FqaJw1-apaUY2Fqa-apaUY2Npa5tlaA%3D%3D-sg-jjjjjjjjjjjj

emphasizing participation, local control and system flexibility. In both cases, the objective has been to integrate distributed generation into the national energy transition rather than penalize it, reflecting the broader just-transition principle that decentralization can complement, rather than undermine, an efficient and equitable energy system.

Although the Paris Agreement – the legally binding international treaty on climate change adopted by 195 Parties at the United Nations Climate Change Conference in 2015 – does not explicitly require decentralized energy systems, its underlying architecture is broadly consistent with this principle. The agreement emphasizes nationally determined pathways to reduce greenhouse gas emissions while promoting sustainable development, energy access and climate resilience, encouraging many countries to expand distributed renewable energy, embark on community-based energy projects, and devise local ownership models. The fundamental assumption behind encouraging these steps is that they can accelerate decarbonization of the energy sector while improving energy access and climate resilience. In other words, the agreement supports outcomes associated with decentralization even if it does not prescribe a specific governance model for energy systems.

Taking as its normative framework the Ten Principles for the Rapid, Equitable and Just Transition to Renewable Energy Systems developed by the Global Working Group on Just Energy Transition.[2] This energy monitor examines whether Pakistan's Captive Power Levy is consistent with the principles of a just energy transition. Principle 3 particularly states:

"*The transition to renewable energy is not just about replacing old energy sources with new ones—it is about building democratic, more decentralized and distributed energy systems and moving away from traditional centralized energy models that concentrate ownership, control and power in the hands of a few.*"

The principle is especially pertinent because captive power plants *are* a form of distributed generation. As is obvious from the above text, it endorses decentralized energy systems, local generation, and greater energy autonomy for communities and productive enterprises, on the premise that distributed systems can enhance resilience, reliability, efficiency, and local control. A levy designed to make captive generation less economically attractive may, on the other hand, encourage a return to a more centralized electricity model. Seen this way, the levy financially penalizes decentralized power generation rather than enabling it, potentially running contrary to the spirit and intent of Principle 3 – as well as the energy frameworks implicit in the Paris Agreement.

Principle 2, which calls for *efficient, equitable, and sufficient energy production, distribution, and consumption*, also has similar concerns. If the national grid remains more expensive, less reliable, or less efficient than captive power generation for major industrial consumers, then taxing captive power plants may be discouraging efficiency rather than promoting it.

Industrial consumers also argue that they invested substantial capital in self-generation not as a matter of preference but as a response to persistent failures of the public electricity utilities to provide affordable and reliable power. In their view, taxing those investments imposes additional costs on them without guaranteeing corresponding improvements in the grid electricity's prices, reliability, and system efficiency.

2. Ten Principles for the Rapid, Equitable, and Just Transition to Renewable Energy Systems https://equitablejustenergytransition.org/ten-principles-renewable-energy/

Principle 1, in contrast, offers a pro-levy lens. It emphasizes equitable access to sufficient energy. Its proponents may argue that the migration of large industrial consumers to captive power generation weakened the financial base of the national electricity grid, leaving its costs to be borne by a shrinking pool of consumers, including households and small businesses with limited or no alternatives. From this perspective, the levy is not a punishment for decentralization but a corrective measure intended to ensure that a major portion of energy users continues to contribute to the shared costs of maintaining the national electricity grid. The levy, thus, can be seen as advancing energy equity rather than undermining it.

The levy essentially sits at the intersection of competing conceptions of justice: centralized versus decentralized energy systems; collective system sustainability versus individual energy autonomy; industrial competitiveness versus public-sector financial viability; and historical accountability versus future reform. It also raises fundamental questions about the obligations of a state seeking to reclaim consumers it previously failed to serve.

This energy monitor examines the captive power levy not merely as a fiscal or regulatory instrument but also as a test case in energy-transition governance. It asks whether a state can legitimately compel the consumers to return to its centralized system before demonstrating the capacity to provide them with reliable, affordable, and efficient electricity. It also asks whether the costs of power-sector reform are being distributed fairly among stakeholders and whether the levy advances or undermines the principles of a just energy transition.

And, finally, the monitor seeks to determine whether the levy represents a necessary step towards a more equitable and financially sustainable electricity system, or whether it risks reproducing and even multiplying existing inequities by requiring industries, workers and consumers to bear the costs of failures for which they were not responsible. In doing so, the monitor explores what justice requires when the transition is not from one energy source to another but from a system of institutional failure towards one that has yet to earn public trust.

Muhammad Badar Alam
CEO, PRIED

Executive Summary

The captive power levy, introduced in January 2025, is the latest attempt by the government to address a crisis that has been decades in the making. The levy seeks to phase out self-generation of power by the industrial sector through progressively increasing cost of gas supplied to captive power plants, thereby encouraging industries to reconnect to the national electricity grid. The measure forms part of Pakistan's reform commitments under its ongoing program with the International Monetary Fund (IMF) and reflects a broader effort to restore the financial viability of the power sector.

The policy has its roots in the power-paradox whereby Pakistan does not suffer from a shortage of electricity generation capacity but from an excess of it. Following a major expansion of generation after 2015, the country's installed capacity nearly doubled to approximately 46,000 megawatts (MW). Yet demand failed to keep pace with it. Average system demand remains closer to 18,000 MW,[3] leaving a large volume of generation capacity idle. Because power-sector costs are heavily fixed, the burden of financing this unused capacity has been spread across a fixed – even shrinking – number of electricity consumers. The result has been a steady increase in electricity tariffs which, in turn, further depletes an already thin demand while encouraging more consumers, particularly large industrial users, to seek alternatives outside the grid.

Captive power generation emerged as one such alternative. For many industries, self-generation was not primarily a matter of preference but of necessity. Years of unreliable electricity supply, frequent outages, voltage fluctuations and rising tariffs pushed private industries to invest in their own power generation facilities. Captive power became a form of industrial self-insurance against the risks associated with dependence on the costly and unreliable national grid. Over time, some of Pakistan's largest exporting and manufacturing sectors came to rely heavily on self-generation to maintain operational continuity and remain internationally competitive.

It is precisely this migration away from the grid that the government now seeks to reverse. Policymakers argue that large industrial consumers have effectively exited the national electricity grid while continuing to benefit from other state-provided infrastructure and economic policies. By bringing these consumers back onto the grid, the government hopes to increase electricity sales, spread fixed costs over a larger customer base, improve capacity utilization of the existing generation system and ultimately reduce per-unit electricity prices for all consumers. From this perspective, the captive power levy is not simply a tax. It is more of a mechanism for correcting distortions that are increasingly contributing to the power sector's persistent financial crisis.

Industrial consumers view the matter differently. They argue that they are being penalized for responding rationally to the failures of the state. Having invested heavily in captive power generation primarily because the grid was unreliable and expensive,

3. National Electric Power Regulatory Authority (2024) State of Industry Report

they now face a policy that makes those investments almost unviable – and that too without addressing the underlying problems that made those investments inevitable.

Textile exporters also warn that the levy could increase their energy costs, eroding their international competitiveness at a time when their regional competitors continue to enjoy lower production costs. Industries that require uninterrupted electricity supply in their processes – such as chemicals, fertilizers and cement – voice an equally serious concern: even short interruptions in electricity supply can impose substantial operational and financial losses on them. Far from being a luxury, these industries argue, captive power is a risk-management necessity.

The challenge is further complicated by developments in Pakistan's gas sector. While the power sector struggles with excess electricity generation capacity, the gas sector faces a parallel problem of surplus supply. Long-term liquefied natural gas contracts with Qatar have committed Pakistan to purchasing volumes of gas that increasingly exceed its demand (though the present and the future of these contracts and supply remains doubtful due to the war in the Persian Gulf). Industrial captive power plants have historically absorbed a significant portion of this excess supply. As industries reduce gas consumption and shift to grid electricity, the gas sector may be left with unallocated surpluses, deepening financial losses of the gas utilities and adding to circular debt that has already exceeded 3 trillion rupees. A policy designed to improve the financial position of one part of the energy sector may therefore worsen the financial position of another.

This, then, reveals the deeper dilemma at the heart of the captive power levy. The levy is often presented as a straightforward reform, but in practice it redistributes costs and benefits across different parts of the energy system. Moving industry onto the grid may improve electricity-sector finances while weakening the economics of the gas sector. It may increase power-sector efficiency while raising production costs for exporters. It may help address one form of circular debt while exacerbating another. In this sense, the levy does not resolve Pakistan's energy crisis so much as expose the interdependence of the crises embedded within it.

The central question, therefore, is not whether the levy is technically justified. It is: can a policy designed to solve one institutional failure succeed without simultaneously addressing the other? Without integrated planning across electricity, gas, industry and trade policies, the levy risks functioning less as a structural reform than as a transfer mechanism through which the costs of past policy failures are shifted from one sector, institution, or set of consumers to another. The challenge for policymakers is not simply to move industry back to the grid but to ensure that doing so forms part of a coherent strategy that improves the performance of the energy system as a whole rather than merely redistributing its burdens.

Introduction

A manufacturing facility near Karachi, Pakistan's largest city and industrial hub, draws electricity from multiple sources. One part of its power comes from the national grid; another from solar panels installed on the facility's rooftops, a third from a wind turbine and the fourth from a gas-fired power plant located within the facility. For many years, this gas-based captive power plant has provided for most of its electricity requirements. This is one of more than a thousand such captive power plants across Pakistan which industries use to self-generate electricity to meet their energy needs.

The number of these captive power plants has expanded over several decades as a response to persistent weaknesses in the national electricity system. Frequent outages, voltage fluctuations, load shedding, and rising electricity tariffs created strong incentives for industries to become self-reliant in their energy supply. For many industrial units, particularly those which have to operate continuous industrial processes or which compete in international export markets, reliable electricity is not merely a matter of convenience but a prerequisite for survival.

While this transition towards self-generation was primarily a response to the grid and market conditions, public policy also duly encouraged it. Incentives for industrial self-generation were first introduced under the 1994 Power Policy at a time when Pakistan faced chronic electricity shortages due to an expanding gap between demand and supply. Industries were permitted to generate their own electricity and, in some cases, sell their surplus power back to the grid.

Perhaps all this started as a temporary solution to a temporary shortage but gradually it evolved into a permanent feature of Pakistan's energy landscape. Today, nearly 1,200 captive power plants operate on Pakistan's gas supply network with an estimated combined generation capacity of 4,000 MW.[4] Three decades later – and after the investment of billions of rupees – public policy is now taking an opposite direction ostensibly to absorb the excess electricity in the system. The origins of this policy shift lie elsewhere – in the conditionalities for the Extended Fund Facility (EFF)[5] loan that the IMF is providing to Pakistan. One of these conditionalities binds Pakistan to eliminate its gas-based captive power generation gradually because, argues IMF, providing gas to captive power plants is not its most efficient and most economically productive use. To fulfil this condition, the government of Pakistan introduced the captive power levy in January 2025,[6] increasing the cost of gas being supplied to captive power plants. The rationale for imposing the levy was to reduce the financial incentives for captive power generation and encourage industries to shift their electricity consumption back to the national grid. In simple terms, the policy sought to make captive power less viable to make grid electricity more attractive.

4. See Section 5.
5. The EFF is a longer-term IMF financing facility designed to help countries address medium-term balance of payments problems arising from structural weaknesses in the economy.
6. The levy is applied to the gas sold to industries for captive power generation.

Table 1: Timeline of the Captive Power Transition Levy (Source: PRIED's research)	
October 2024	Pakistan commits, under the IMF's Extended Fund Facility (EFF) program, to a gradual elimination of gas-based captive power generation.
January 2025	The captive power levy is introduced through a Presidential Ordinance as a pricing mechanism to encourage industries to shift from captive power generation to grid electricity.
June 2025	The Levy is formalized into statute books through *Off the Grid (Captive Power Plants) Levy Act, 2025,* passed by the parliament.

At first glance, the levy makes eminent sense. Pakistan's electricity sector is burdened by a large volume of underutilized generation capacity as the country has invested heavily in new power plants over the last decade. Much of this generation capacity was contracted under arrangements that require the government to make payments – known as capacity payments – to power producers regardless of whether their electricity is actually consumed. These capacity payments are designed to ensure that investors can recover their costs and receive a return on their investment even when demand for their generation fluctuates.

Electricity demand, however, has not grown as anticipated. Pakistan today possesses far more installed generation capacity than it can use. The average electricity demand is, in fact, less than half of the total generation capacity[7] which means the fewer the units of electricity consumed, the higher the cost per unit. As a result, electricity prices have more than doubled between 2021 and 2024,[8] with capacity charges now constituting the single largest component of the average electricity tariff.[9]

These developments have created what is often described as a utility 'death spiral'. Higher tariffs encourage consumers to reduce their reliance on the grid through such means as energy conservation, solar power and/or captive generation. As demand falls, fixed costs are spread across a shrinking number of units, pushing tariffs higher still. The captive power levy is intended to break this cycle by encouraging large industrial consumers to return to the grid, thereby increasing electricity sales and spreading fixed costs across a larger customer base.

The apparent simple solution, however, conceals a complicated reality. Industrial consumers argue that the levy addresses the symptoms of Pakistan's energy problems rather than their causes. In their view, industries invested billions of rupees in captive power generation because the national grid failed to provide them with affordable and reliable electricity. The levy now penalizes those investments without correcting the conditions that made them necessary in the first place. Textile exporters specifically argue that going back to the grid will increase their electricity costs and, thus, reduce their competitiveness against regional competitors. Industries requiring uninterrupted power supply warn that grid electricity remains unreliable and could cause interruptions, leading to substantial

7. National Electric Power Regulatory Authority (2024) State of Industry Report
8. Policy Research Institute for Equitable Development (2025) Solar Adoption Patterns in Pakistan
9. National Electric Power Regulatory Authority (2025) State of Industry Report

operational losses, equipment damage and production delays. Many industries, therefore, see captive power not as a luxury but as a form of insurance against operational risks.

The imposition also creates challenges for the gas sector which is simultaneously grappling with excess supply. This surplus has contributed significantly to the gas sector's circular debt, now estimated at roughly 3 trillion rupees.[10] Long-term contracts for imported liquefied natural gas (LNG) were signed back in the mid-2010s based on expectations of future demand growth which has not materialized. Historically, captive power plants have absorbed a significant portion of the gas available in the country. As industries reduce their gas consumption in response to the levy, surplus gas will accumulate elsewhere in the system, contributing to rising financial losses and circular debt in the gas sector. A policy designed to improve the financial position of one part of the energy sector may, in effect, worsen the financial position of another. Though the conflict in the Persian Gulf has eased the excess supply pressure to a significant extent by cutting down Pakistan's gas imports from Qatar, this situation is certainly temporary. Once the conflict ends and Qatar resumes normal gas supplies as per its contracts with Pakistan, the problem is sure to crop up again.

This points to a deeper issue – one that is beyond electricity tariffs or gas pricing – and pertains to the stability, continuity and reliability of long-term energy planning. This issue has three components which are as follows:

1. The state that once encouraged industries to invest in self-generation is now forcing them to reverse the course and abandon their captive power plants, not because these power plants are the only – or even a major – cause of the falling electricity demand in the country but because the IMF program dictates it to do so;
2. The same government institutions that have persistently failed to provide reliable and affordable electricity to industries are now pushing them back to the national grid without having addressed their structural shortcomings and without guaranteeing the supply of affordable and reliable electricity.
3. The imposition of levy is not a holistic solution. It is only shifting the supply of excess anomalies – and financial stress – from one energy source to another.

The imposition of levy, therefore, raises the following questions:

i. Can industries be compelled to return to a system they previously abandoned because it failed to meet their needs?

ii. Should the costs of correcting previous planning mistakes be borne by industrial consumers who adapted to those mistakes?

iii. How can a policy constitute genuine reform if it only results in shifting the problem from place to another?

Our energy monitor examines the levy within this broader context. It looks at the historical evolution of captive power in Pakistan, analyzes the structural challenges facing both the power and gas sectors, critiques the rationale underpinning the IMF-mandated changes in the use of gas for captive power generation and evaluates the concerns raised by the industrial consumers. Drawing on policy analysis, sectoral data and interviews with industrial stakeholders, we assess whether the levy is likely to achieve its stated objectives and whether its costs and benefits are being distributed fairly across the economy.

10. Profit (2026) Pakistan's gas circular debt rises to Rs3,200 billion; govt proposes measures to tackle it

Based on the policy contradictions and questions given above, we can argue that the question central to our analysis is not whether captive power plants should exist indefinitely. It is also not how the power sector's financial problems can be addressed. The question we are dealing with here is whether the government can successfully persuade industries to return to the grid before resolving the affordability, reliability, and governance concerns that led them to leave the grid in the first place.

The answer to this question will determine not only the future of captive power plants but also the credibility of Pakistan's broader energy transition.

SECTION 1

Power sector’s excess capacity and declining grid demand

Power sector's excess capacity and declining grid demand

Pakistan's power sector is trapped in a cycle of rising costs and declining demand. Policymakers frequently refer to this problem as a "capacity trap." In simple terms, the trap means that Pakistan has built significantly more electricity generation capacity than it can actually consume under contracts that bind it to pay for that capacity regardless of whether it is used or not. While these capacity costs have risen, electricity demand has barely nudged upwards in the last five years. In fact, it is less than what it used to be in 2021.[11] There are several reasons for this declining demand – including lower than anticipated economic growth, slower industrial activity, rising costs of electricity and a massive shift to distributed solarization in residential, industrial, commercial and agriculture sectors. Looking into these reasons is beyond the scope of this monitor but it is important to emphasize here that a lower demand for electricity means that its capacity costs have to be recovered from a shrinking pool of consumers, necessitating a further rise in electricity tariffs which, in turn, encouraged even more consumers to seek alternatives to the national grid.

Understanding how and why Pakistan arrived at this point requires tracing the historical evolution of the power sector over the past three decades.

Until the early 1990s, Pakistan's electricity sector was dominated by a single state-owned institution: Water and Power Development Authority (WAPDA). It was responsible for almost every function within the sector, including generation, transmission, distribution, planning and investment. This vertically integrated model was in line with the approach adopted by many newly independent developing countries at the time. This was mainly because electricity was viewed in these countries as a public service to be provided by the state.

By the late 1980s, however, the limitations of this model had become increasingly apparent. Pakistan's economy was growing, urbanization was increasing, and electricity demand was rising faster than public investment could keep pace with. Consequently, electricity shortages became a recurring constraint on economic activity. Estimates at the time suggested that Pakistan faced a generation deficit of approximately 2,000 MW -- a shortfall expected to increase to more than 6,000 MW in subsequent years.[12] The public sector lacked both the fiscal resources and institutional capacity required to bridge this gap on its own.

To respond to this challenge, international financial institutions, particularly the World Bank, advocated a restructuring of the electricity sector. Through the Private Sector Energy Development Project (PSEDP), the Bank encouraged Pakistan to attract private investment into power generation. Its underlying logic was straightforward: since the state could no longer finance the expansion of power generation capacity, private investors should fill the gap.

This marked the beginning of a fundamental transformation in Pakistan's energy sector.

11. National Electric Power Regulatory Authority (2024 & 2025) State of Industry Report
12. See the 1994 Power Policy of the Government of Pakistan.

As part of the reform process, WAPDA's functions were gradually separated or 'unbundled', assigning them to several new entities created out of WAPDA. Separately, the Private Power and Infrastructure Board (PPIB) was established within the Ministry of Energy to facilitate private investment in power generation projects. At the same time, many of the World Bank's recommendations were incorporated into the government's 1994 Power Policy, a landmark reform package that reshaped Pakistan's electricity sector for decades to come.

The primary objective of the 1994 Power Policy was to rapidly increase generation capacity. To attract private investors, the government offered them generous incentives and contractual guarantees. Consequently, Pakistan contracted more than 9,000 MW[13] of new generation capacity between 1994 and 2004 under this framework. Importantly, these contracts were denominated in US dollars and were based on a 'take-or-pay' structure. This meant that power producers would receive payments for making their plants available, regardless of whether the electricity they generated was ultimately consumed or not.

At the time, these arrangements appeared justified. Pakistan was experiencing persistent shortages and policymakers were primarily concerned with ensuring sufficient future supply. The possibility that the country might one day face excess capacity received little attention then. The priority was to attract investment quickly even if that meant acquiring significant long-term financial obligations.

Yet the 1994 Power Policy did more than expand generation capacity. It also laid the foundations for the growth of captive power. This aspect of the policy is often overlooked in contemporary debates. The prevailing narrative today suggests that captive power generation emerged as a distortion that undermined the financial viability of the grid. Historically, however, captive power generation was actively encouraged by policymakers, particularly back in the late 1990s and early 2000s.

The reason was simple: increasing power generation capacity at the utility scale level alone could not solve the problems faced by industry. Even as new power plants were being constructed, industrial consumers continued to experience frequent outages, voltage fluctuations, poor power quality, and operational disruptions. These problems imposed substantial costs on manufacturing firms, particularly those running continuous production processes. A process factory can tolerate expensive electricity relatively easily compared to unreliable electricity. Uncertainty in energy supply creates production risks, damages equipment, disrupts delivery schedules, and undermines competitiveness.

Recognizing these realities, policymakers concluded that industrial self-generation should also be encouraged alongside utility scale increases in power generation.

The 1994 Power Policy, therefore, introduced incentives that allowed industries to generate electricity for their own use and, in certain cases, sell their surplus power back to the grid. This was not viewed as a temporary emergency measure but as a legitimate component of Pakistan's broader energy strategy. Captive power plants were supposed to improve industrial productivity, strengthen energy security, and reduce pressure on an already strained electricity system.

Importantly, this policy direction reflected concerns that had already been articulated in Pakistan's 1992 National Energy Conservation Policy which emphasized the need to improve

13. World Bank Group (2001) Implementation Completion and Results Report of PSEDP

energy reliability and efficiency for industrial sectors of the economy. Captive generation was, therefore, presented and seen as part of the solution to Pakistan's overall energy challenges.

This distinction matters because it fundamentally alters how the captive power levy should be understood. The levy is often presented as a corrective measure designed to address an anomalous market distortion. Yet, historically, captive power plants were not supposed to be distorting the market but rather supplementing and augmenting it. Their emergence was a state-sanctioned response to deficiencies that the state itself had acknowledged. In the 2004 edition of the State of the Industry Report, for instance, the National Electric Power Regulatory Authority (NEPRA) observed that industrial consumers continued to suffer because of what it described as "inefficient services by utilities, frequent power breakdowns and heavy load shedding." This acknowledgement demonstrates that captive power generation was not premised solely on industrial sector's preferences or private calculations.

The same report also provides a glimpse into the scale at which industrial self-generation had already developed by 2004. Having divided industrial self-generation facilities into two groups -- Small Power Producers (SPPs) and Captive Power Plants (CPPs) – NEPRA reported that they had an estimated combined capacity exceeding 3,000 MW, including roughly 2,000 MWs of SPP capacity and around 1,000 MW of captive generation capacity. In other words, within a decade of the 1994 policy changes, a substantial parallel electricity system had emerged and developed alongside the national grid. The contradiction embedded within the current debate over captive power plants can, therefore, be traced back to the very reforms that shaped the power sector as it existed now.

These developments make it clear that, far from being a commercial choice and a market distorting anomaly, captive power generation was introduced as a form of industrial risk management. For many industrial firms, generating electricity internally was no longer merely a means of reducing costs but a way of protecting their production processes from the uncertainties associated with grid supply.

The significance of this shift would become even more apparent by the middle of 2000s when Pakistan's economic conditions improved considerably.[14] Rising incomes, expanding industrial activity, and increasing household consumption all contributed to growing electricity demand that, once again, began to exceed the available generation capacity.[15] The shortages that policymakers had hoped to eliminate during the 1990s re-emerged, and load shedding returned as a defining feature of daily life across much of the country.

For industrial consumers, the consequences were particularly severe. Production schedules became increasingly difficult to maintain. Export-oriented firms faced delays and higher operating costs. Industries that depend upon uninterrupted power supply for their processes encountered growing operational risks. As the reliability of the national grid deteriorated, the incentives to use captive power generation increased correspondingly.

The government's response was not to discourage captive power plants. The state institutions rather moved to strengthen it. To cite the most important instance of this trend,

14. Final consumption expenditure came to account for more than 90% of GDP (source: The World Bank).
15. Pakistan Institute of Development Economics (2022) Power Sector: An Enigma With No Easy Solution

the government formally allocated natural gas to captive power plants under the Natural Gas Allocation and Management Policy in 2005. It was a highly significant policy decision since indigenous natural gas is one of Pakistan's most valuable energy resources so allocating it to captive power generators effectively signaled that self-generation was regarded as an important component of Pakistan's energy strategy. If nothing else, the allocation recognized that the grid alone could not reliably meet the industry's electricity needs.

In 2007, formal strengthening of captive power generation took another big leap forward as the government permitted its electricity distribution companies (DISCOs) to procure electricity from the captive power generators.[16] The buyback arrangements allowed industries to sell their electricity to the grid under predefined tariff structures. These tariffs incorporated both fuel-cost and fixed-cost components, creating a framework through which captive power generators could participate actively in the broader electricity system.

This historical context is important because contemporary discussions often portray captive power plants as an obstacle to electricity tariff and market reforms. In reality, captive power generation expanded largely because successive governments concluded that it served a legitimate economic purpose. The state not only permitted industries to invest in self-generation but repeatedly created incentives that made those investments rational and productive.

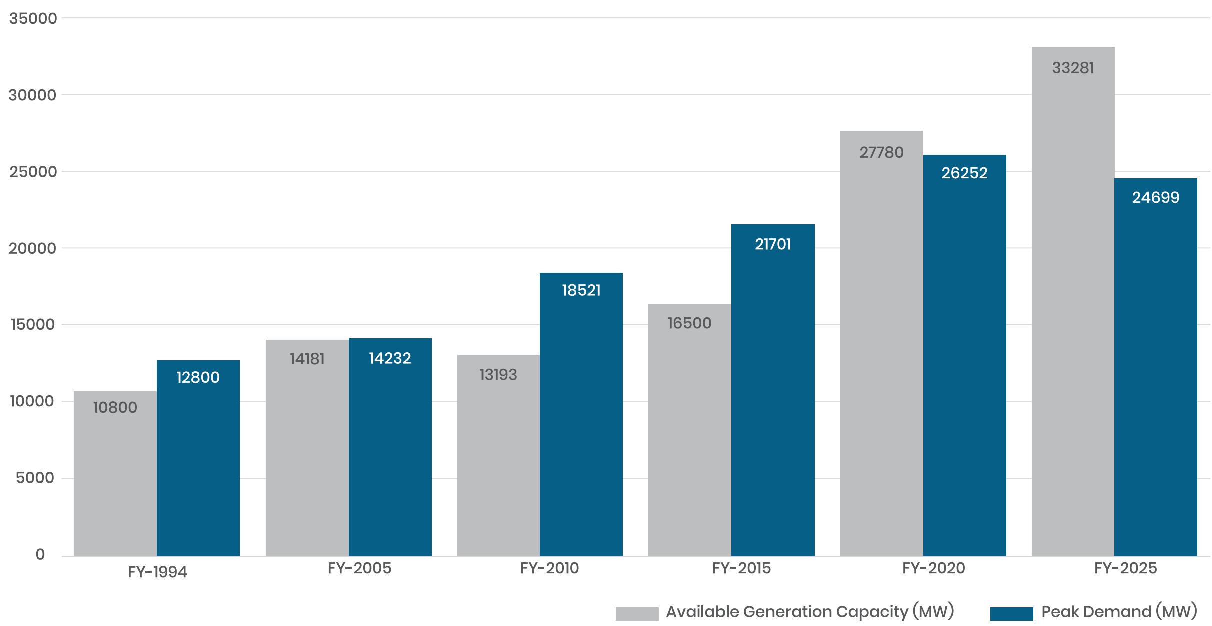
The two policy decisions -- mentioned above and taken in 2005 and 2007 -- helped institutionalize captive power generation within Pakistan's energy architecture more than anything else. Captive power plants were no longer an emergency measure; they had become an officially recognized part of the national energy policy and an active part of the electricity generation market.

The years that followed only strengthened this rationale. By 2012, for instance, Pakistan's electricity crisis deepened dramatically and electricity shortages started becoming longer as investors remained hesitant to invest in power generation projects.[17] Available generation capacity stood at approximately 12,000 MW, while peak demand approached 19,000 MW.[18] The resulting shortfall translated into widespread load shedding across the country. In some areas, electricity outages lasted for many hours each day. For households, these outages disrupted daily life. For businesses, they imposed substantial economic costs.

The social and political consequences were equally significant. Protests against load shedding spread across major cities.[19] In several instances, demonstrations turned violent, with protesters targeting the offices of electricity distribution companies. Consequently, electricity shortages emerged as a major political issue during the 2013 general election.

16. Business Recorder (2007) Nepra offers to buy electricity from 'captive power'
17. Pakistan Institute of Development Economics (2022) Power Sector: An Enigma With No Easy Solution
18. National Electric Power Regulatory Authority (2013) State of Industry Report
19. See, for example, https://www.dawn.com/news/727263

Figure 1: The Evolution of Available Generation Capacity vs. Peak Demand (Source: NTDC)



The significance of this period in shaping the relationship between industry and the national grid cannot be overstated. For many industrial consumers, electricity shortages reinforced an outlook that had been in the making for years: dependence on the grid electricity system carried highly costly risks. Consequently, while policymakers viewed captive generation as a supplement to the grid, many industrial firms increasingly viewed it as their primary source of energy security.

The government that came to power in 2013 responded to the crisis by pursuing one of the largest electricity generation expansion programs in Pakistan's history. Ending load shedding became its central political objective. New generation projects were commissioned across multiple technologies, including coal, gas, hydropower, and renewable energy. Supported in part by investments associated with the China-Pakistan Economic Corridor (CPEC), installed power generation capacity expanded rapidly.

The strategy succeeded in achieving one of its primary objectives. By the early 2020s, the severe electricity shortages that had characterized the previous decade largely disappeared. Pakistan effectively solved its generation deficit.

But in solving one problem, policymakers inadvertently created another. Over the decade following the introduction of the 2015 Power Generation Policy, installed capacity nearly doubled to approximately 46,000 MW. This expansion was based on projections developed in 2013 which anticipated that peak electricity demand would approach 40,000 MW by 2025. Actual demand, however, evolved very differently. By 2024, average annual electricity demand remained closer to 18,000 MW, while peak demand rarely exceeded 30,000 MW.[20] Several factors contributed to this outcome. Economic growth remained weaker

20. National Electric Power Regulatory Authority (2025) State of Industry Report

than anticipated. Industrial expansion fell short of expectations. Rising electricity tariffs suppressed its consumption. Improvements in energy efficiency also reduced demand growth. More recently, the rapid adoption of rooftop solar systems reduced dependence on grid electricity during daylight hours. The result was a system that possessed far more generation capacity than it could utilize.

This imbalance lies at the heart of the contemporary power sector crisis. Much of the generation capacity added after 2013 was contracted under arrangements requiring capacity payments regardless of utilization. The problem with these payments is that the only way to recover these costs is through electricity tariffs. As electricity demand declined, the burden of these costs fell on a shrinking volume of electricity sales. The fewer the units sold, the higher the tariff required to recover the fixed costs. Higher tariffs then encouraged more consumers to reduce their consumption of the grid electricity whether through conservation measures, solar installations, or captive power generation. This, in turn, further reduced electricity sales and pushed tariffs even higher. Pakistan thus entered what economists commonly describe as a utility death spiral.[21]

There are, broadly speaking, only two ways to escape this spiral. The first is to reduce the fixed costs embedded within the system – a supply side solution premised on lowering electricity tariffs by cutting down the capacity costs. Recent renegotiations with some Independent Power Producers (IPPs), for example, are expected to save consumers from the payment of approximately 60 billion rupees annually by reducing future capacity payment obligations.[22] Such measures attempt to address the problem from the supply side by lowering the costs that must be recovered through tariffs.

The second approach is a demand side solution to the problem. If more electricity is sold, fixed costs can be spread across a larger number of units, reducing the cost per unit for all consumers. It is within this second strategy that the Captive Power Transition Levy should be understood.

The captive power levy forms part of a broader effort to increase demand for the grid-supplied electricity by discouraging alternatives that reduce electricity consumption from the national grid. Similar logic informs the recent policies that affect the grid-connected rooftop solar consumers through changes in their billing regime. In both cases, the objective is the same: to bring consumers back onto the grid so that existing generation capacity can be utilized more fully and its fixed costs can be distributed more broadly.

Viewed from the perspective of the power sector alone, every industrial consumer that shifts from captive power generation to the grid contributes additional demand, increases electricity sales and helps improve capacity utilization. Yet this perspective captures only one side of the story because it misses the challenges being faced by the gas sector.

21. The Utility Death Spiral is a self-reinforcing downward trend where rising customer rates, often driven by falling demand or high fixed costs, cause more users to adopt self-generation or disconnect, reducing the customer base further and forcing even higher rates on remaining users.
22. National Electric Power Regulatory Authority (2025) State of Industry Report

PRIED
Policy Research Institute
for Equitable Development
Private Limited

SECTION 2

Gas sector surplus and rising circular debt

Gas sector surplus and rising circular debt

While the power sector is struggling with excess electricity generation capacity, the gas sector is facing a structurally different but closely connected problem: surplus supply commitments that exceed actual demand. Understanding these parallel imbalances is essential to understanding why the captive power levy is creating cross-sector tensions rather than resulting in straightforward gains.

Pakistan's gas sector is dominated by two state-owned transmission and distribution companies: the Sui Northern Gas Pipelines Limited (SNGPL) and the Sui Southern Gas Company Limited (SSGCL). These utilities manage the bulk of domestic gas distribution and are responsible for supplying gas to households, industry and power plants. While around three-quarters of the country's gas demand is met through domestic production, the remainder is covered through imported liquefied natural gas (LNG), which is re-gasified and supplied as Regasified Liquefied Natural Gas (RLNG).

Pakistan entered into long-term LNG contracts with suppliers including QatarGas and Italy's (ENI - *Ente Nazionale Idrocarburi* or the National Hydrocarbons Authority) committing itself to receiving around 10 LNG cargoes per month.[23] These contracts were designed to ensure energy security but, in practice, they have created rigid supply obligations that are difficult to adjust when demand patterns change.

They were also premised on the assumption that demand from both industry and power generation would continue to grow steadily over time. As it happened, that assumption did not materialize. Industrial growth slowed down rather than increasing and the power sector started shifting away from gas-fired generation due to the increasing availability of alternative sources including coal and solar power.[24] As a result, Pakistan found itself contractually obligated to import more gas than its system could absorb.

Figure 2: Gas Sector Dynamics
(Source: Energy Year Book 2024-25)

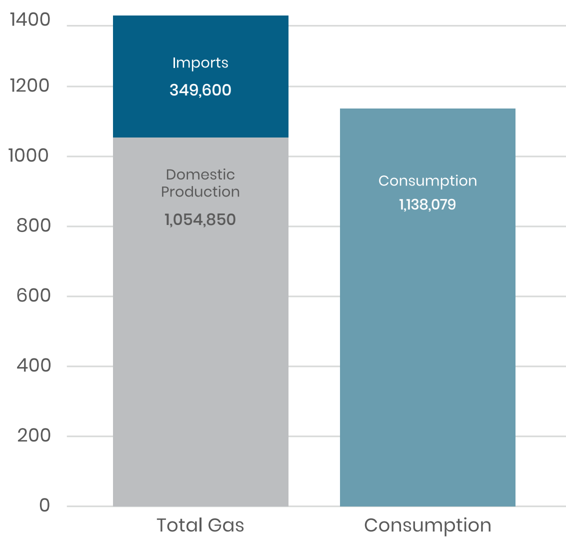


Table 2: Pakistan's RLNG Contracts
(Source: QatarGas, ENI, and Pakistan State Oil)

Company	Duration	Monthly Quantity
QatarGas 1	2016 - 2031	5 cargoes
QatarGas 2	2021 – 2031	4 cargoes
ENI Italy	2018 – 2032	1 cargo

23. The Annual Downward Flexibility Quantity is a clause in LNG contracts that allows the buyer to reduce or defer a limited portion of contracted volumes each year.
24. See, for example, Pakistan Looking to Sell Excess LNG - Reuters

Historically, captive power plants have played a crucial role in absorbing this excess gas. In fact, industrial facilities using gas-fired captive power generation constituted one of the most flexible and reliable sources of demand for RLNG. This source, however, started losing its significance as policy shifted towards discouraging captive power generation through the imposition of captive power levy.

The consequences of this loss is now becoming visible across the gas sector. Before the war in the Persian Gulf began in late February 2026, Pakistan was sitting on a large natural gas surplus. This was despite the fact that domestic production of gas had been curtailed and LNG cargoes were either being diverted to other markets or their reception was being deferred. A Petroleum Division report stated that Pakistan would receive around 30 more cargoes every year than it needed until the expiry of its import contracts with Qatar.[25] In other words, it would not need at least one in every four cargoes.

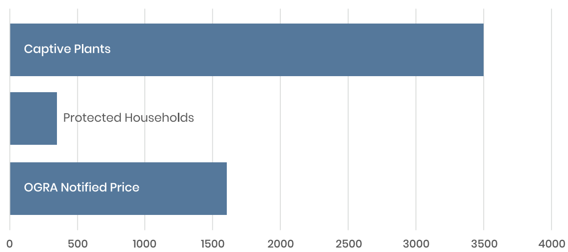
As demand fell below contracted supply volumes, Pakistan was left with limited options to utilize the imported gas. It could divert excess gas to domestic consumers at a subsidized tariff, sell surplus cargoes at the international spot markets (often at a loss) or accumulate financial liabilities within the gas sector. None of these options have been economically efficient. Together, they have contributed to a rapidly growing circular debt in the gas sector – now exceeding 3 trillion rupees.[26]

This supply glut changed for the better to a large extent in March 2026 when Qatar's largest LNG production facility was closed down after it was hit in an Iranian attack during the Gulf war. Consequently, Pakistan's import of LNG cargoes decreased from 10 cargoes a month to just two or three a month – a level that is insufficient even to meet the shrunken demand. So, as long as Qatar's production facility remains un-operational, policymakers in the gas sector can breathe relatively easily. The supply glut, however, will make a comeback as soon as Qatari supplies resume in the coming months.

This, then, is the context in which the captive power levy came into effect. It, indeed, is interacting directly with these pre-existing constraints. As industrial consumers reduce their gas consumption in response to higher effective costs resulting from the imposition of the levy, surplus gas volumes will increase further. This will intensify pressure on LNG contract management and worsens the financial position of the gas utilities.

An additional and often underappreciated dimension of this shift is related to cross-subsidization within the gas tariff structure. Industrial consumers typically pay higher gas tariffs than residential consumers – effectively subsidizing gas consumption by households. A falling industrial demand for gas weakens this cross-subsidy system, either building upward pressure on domestic gas tariffs or increasing the financial burden of the state-owned gas utilities because they will then have to finance the subsidies from their own resources . The

Figure 3: Gas Sector Pricing (Source: OGRA)



25. Profit (2025) Pakistan to propose LNG cargo rationalization to Qatar amid RLNG surplus
26. Profit (2026) Pakistan's gas circular debt rises to Rs 3,200 billion

latter problem is already showing up in the balance sheets of the gas utilities. A 2024 report by Socioeconomic Insights and Analytics (SIA) estimates that a complete phase-out of captive power plants could result in revenue losses of approximately 391 billion rupees for SNGPL and SSGCL. There is also evidence, in the Sui companies' annual reports, that declining gas sales are contributing to the reduced profitability and increased operational strains at the two utilities.

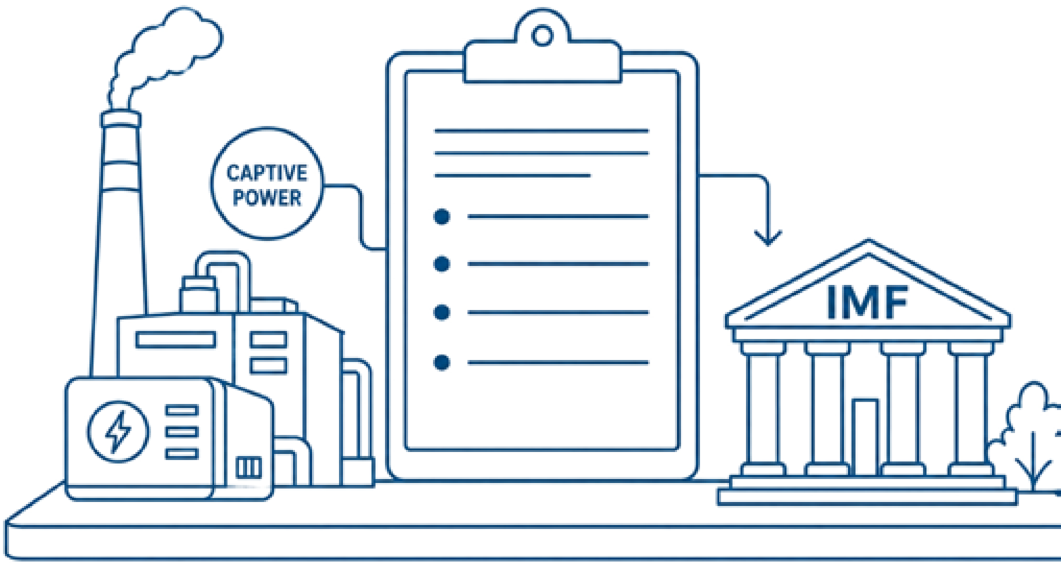
The gas sector, therefore, has started mirroring the structural problem observed in the power sector. While the power sector suffers from excess capacity and insufficient demand, the gas sector suffers from excess contracted supply relative to actual consumption.

Since the levy sits astride these two mismatched systems, it creates a fundamental policy dilemma. Any shift by industrial consumers from gas-based captive power generation to grid electricity will improve the financial position of the power sector by increasing electricity demand. Simultaneously, however, it will weaken the gas sector by reducing the gas offtake. Conversely, maintaining captive power generation can increase gas consumption but leads to the underutilization of the electricity grid.

The levy, then, does not offer a neat policy choice between good and bad outcomes. It only redistributes stress within the energy system.

SECTION 3

The IMF's rationale for the captive power levy



The IMF's rationale for the captive power levy

Pakistan's ongoing engagement with the International Monetary Fund (IMF) provides the immediate policy context for the imposition of the captive power levy. Over the past decade, the government has experienced repeated macroeconomic crises, characterized by low foreign exchange reserves, fiscal imbalances, and external financing constraints. Between 2017 and 2025, economic growth averaged just over 3 percent,[27] while the country continued to face multiple internal and external shocks, including devastating floods in 2022 and 2025.

In the last seven years, Pakistan has also entered into three major IMF programs: A 2019 Extended Fund Facility (EFF), a 2023 Stand-By Arrangement, and a new EFF in 2024 which is providing Pakistan with more than 7 billion US dollars to carry out structural reforms in taxation, economic governance, monetary policy and the energy sector.[28]

Within the energy sector, one of the key structural conditions of EFF is the gradual elimination of gas-based captive power generation. IMF's rationale for this policy change is premised on efficiency considerations. Captive power plants typically use open-cycle gas turbines which usually have an efficiency of just over 30 percent (though our interviews with the industry executives suggest that this is not true for all the captive power plants). On the other hand, the grid-connected RLNG plants use combined-cycle gas turbines that can achieve efficiencies of close to 60 percent.[29] Seen from this perspective, captive power generation represents an inefficient allocation of a scarce resource. The Fund, therefore, argues that gas should be allocated to the most efficient generation technologies available.

This efficiency argument, however, has a narrow focus on fuel conversion efficiency rather than on system-wide economic efficiency. The IMF framework assumes that grid-connected electricity generation is more fuel-efficient and, thereby, could provide the industries with a competitive alternative to captive power generation. This assumption is precisely where divergence emerges between policy design and industrial reality. For industrial consumers, efficiency is not measured in fuel conversion ratios but in production costs and continuities. A power plant operating at a relatively lower thermal efficiency but running without interruption may be economically more useful for an industry than a more efficient plant that is prone to outages or voltage instability. IMF's efficiency logic and the industry's operational logic, therefore, are premised on two different conceptions of performance.

The policy implication of the IMF approach is clear and straightforward: increase the cost of captive gas use through mechanisms such as the levy. This is supposed to achieve two objectives: gas will flow to more efficient generation systems and electricity demand will shift to the grid, improving the power sector's financial position.

Yet this approach has generated what in economics is called 'second order' – or consequences that are unintended but are

27. World Bank Group (October, 2025) Pakistan Development Update
28. International Monetary Fund (2024) EFF Program Document
29. See, for example, Asian Development Bank (2021) Role of Captive Power Plants in Bangladesh.

tied closely to a policy decision. In the case of the captive power levy, here is how the second order has come about: demand for gas has weakened, pressure has increased on LNG contract management, and structural imbalances in the gas sector have been exposed.

This approach also assumes that the grid is capable of absorbing additional industrial demand for electricity without compromising its reliability or cost competitiveness—something that remains contested by many industry representatives.

PRIED
Policy Research Institute
for Equitable Development
Private Limited

SECTION 4

The pushback from the industry

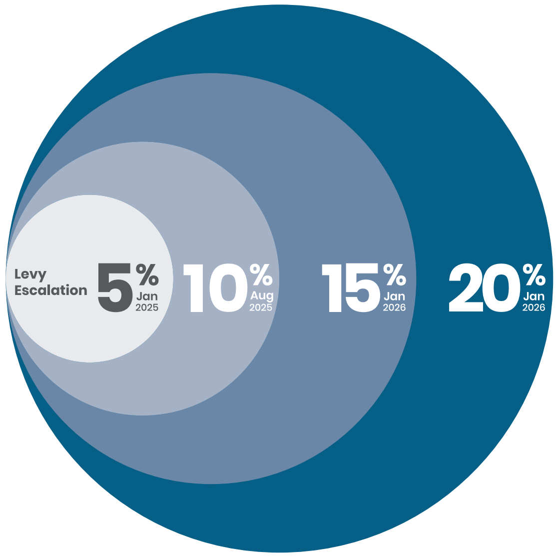
The pushback from the industry

Industrial consumers have consistently resisted the elimination of captive power plants. Their opposition is not ideological but is premised on operational and financial considerations rooted in decades of experience with an electricity system that has often failed to provide reliable and affordable electricity supply.

The dominant argument by the industry is that captive power plants were not a choice they made on their own. These were a response necessitated by the structural failures of the national electricity grid. The industry representatives argue that industries invested heavily in captive power generation because the grid was hamstrung by high tariffs, frequent outages, and unpredictable supply conditions. These investments, they contend, are now being devalued by policy changes that do not[30] adequately address the underlying problems that necessitated those investments in the first place.

The industry, therefore, engaged with the government very strongly to oppose an immediate elimination of captive power generation – as was originally recommended by the IMF. Instead, it convinced the government to adopt a phased approach, arguing that the national grid's infrastructure constraints and firm-level readiness issues will make prompt compliance unfeasible. Consequently, a phased, levy-based approach was adopted[31] that resulted in the introduction of the captive power levy – in the form of *Off the Grid (Captive Power Plants) Levy Act, 2025* -- as a gradual pricing mechanism rather than an abrupt elimination measure.

Figure 4: Captive Levy Infographic
(Source: Ordinance No.1 of 2025)



Levy Calculation:
Levy Required =
(Target Captive Cost After Levy - Current Captive Cost) × (Units Produced per MMBtu)

Levy's revenue utilization:
The revenue collected through it is to be used by the government to reduce overall tariffs for all consumer categories across the power sector.

Enforcement Mechanism
Non-payment of the levy will result in the termination of gas supply for the defaulting plants.

30. Business Recorder (2025) Pakistan's power sector held captive, now there are signs of breaking loose
31. See the First Review of the Extended Fund Facility - International Monetary Fund (May, 2025)

To say the least, the levy remains a contested policy intervention. Seen from the perspective of policymakers, it is designed to provide a predictable transition path, avoiding sudden shocks to industrial production. Viewed from the perspective of the industry, it represents a steadily increasing cost burden imposed without corresponding improvements in grid reliability or affordability. Consequently, the levy is being actively debated and opposed more than a year after its introduction. The industry, in fact, has consistently lobbied for its reduction or removal.

It was because of this opposition that the government reportedly asked the IMF in March 2026 to ease the levy. The request was rejected.[32]

To capture the industry's perspective, PRIED's research team conducted interviews with plant engineers and finance executives across several industrial sectors, including those working with some of the largest conglomerates in the country. Below are the summarized results of these interviews:

As is obvious, the industries have two dominant concerns: electricity cost and reliability. Export-oriented textile firms report that the grid electricity's prices are significantly higher than those for their regional competitors, reducing their ability to remain internationally competitive. Industries that require continuously running processes -- such as chemicals, fertilizers, and cement -- highlight a different problem: Even brief interruptions in electricity supply could cause production delays and losses and damage to machinery.

Some industries report that restarting production after an interruption sometimes takes several hours or even days, depending on the process. This transforms electricity reliability from a technical issue into a core determinant of industrial viability.

The industry stakeholders also question the assumption that captive power plants are significantly less efficient than the grid-connected ones. Some firms contend that they have invested heavily in efficiency improvements after the energy audits conducted by the National Energy Efficiency and Conservation Authority (NEECA), a federal department. These improvements, they say, have narrowed the efficiency gap assumed while designing and imposing the levy.

Table 3: Captive Power vs. The Grid
(Source: PRIED's research)

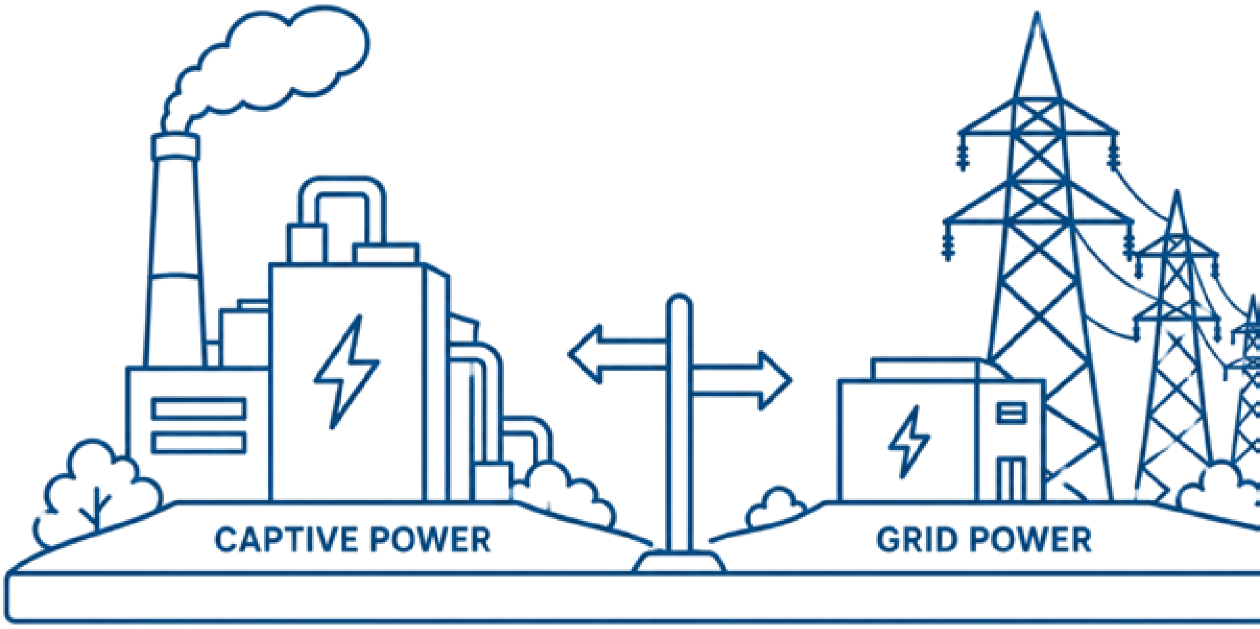
Comparative Sector Analysis

Question	Fertilizer Sector Response	Textile Sector Response
Captive plant type	Combined-cycle	Combined-cycle
Have you shifted to the grid in response to the Levy?	No	Only temporarily, exploring options to diversify fuel mix
What's your main concern with grid electricity?	Grid is unreliable	Grid tariffs are too high

32. Profit (2026) IMF rejects Pakistan's request to ease gas levy on captive power plants

SECTION 5

The Captive–Grid Trade-off



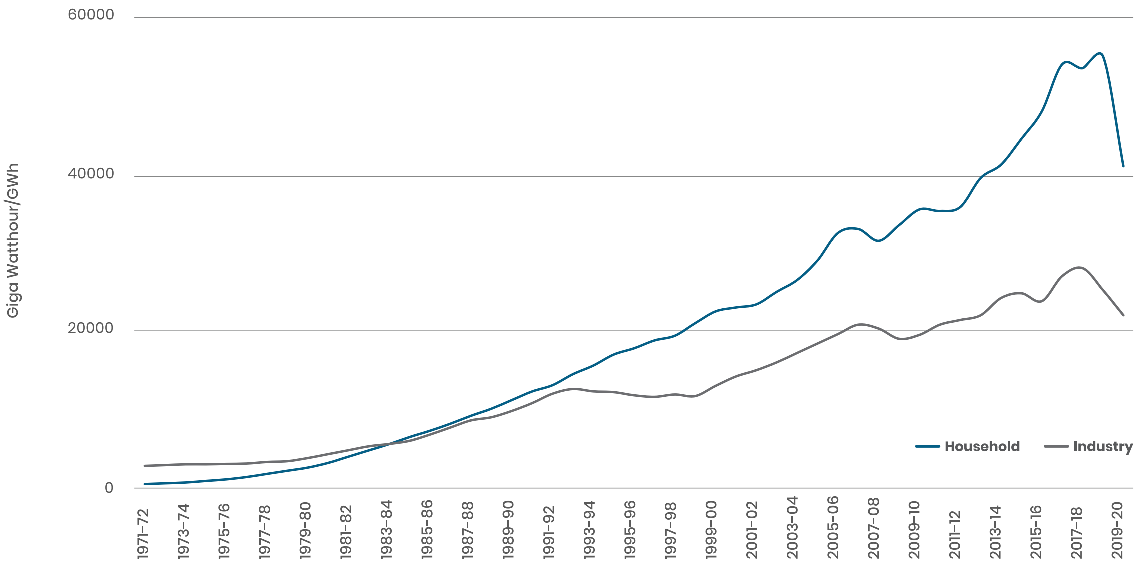
The Captive-Grid Trade-off

The captive power levy sits at the centre of a much larger story than signifying a simple policy shift in gas pricing or industrial electricity sourcing. It can be better understood as one of the measures being taken as a long chain of policy decisions which aim to correct a previous imbalance in the energy sector only to generate a new distortion elsewhere in the system. The result is not a linear transition towards efficiency but a layered accumulation of failed or at best half successful fixes over decades, each addressing symptoms rather than the underlying structural problems built into the system.

This chain started with the 1994 Power Policy, shaped under the World Bank's guidance. It simultaneously expanded power generation and incentivized captive power plants. Faced with high tariffs of the grid electricity and active incentives for self-generation, industries invested in their own plants rather than drawing from the grid, leaving the expanded capacity underutilized. The same mistake was made after 2013 when power generation capacity was nearly doubled but incentives for captive power generation also remained in place, leaving a large part of the large-scale industries to continue relying on captive power.

The decision to incentivize captive power has had one major consequence, as shown in the figure above. While industrial and household electricity demands were roughly equal until the early 1990s, household demand significantly outpaced the industrial demand after the introduction of the 1994 Power Policy. The shrinking of the industrial demand has had two important implications for the power sector. Firstly, it has complicated system planning and system operations, with the national grid increasingly relying on volatile residential demand which is prone to changes not across seasons but also across different hours of the day. Industrial demand, on the other hand, remains stable regardless of weather and

Figure 5: Industrial and Household Electricity Consumption, 1971–2020
(Source: State Bank of Pakistan)



time changes. Secondly, since industries are charged a higher tariff to cross-subsidize the residential sector's electricity consumption, the decrease in the industrial demand and consumption of electricity has resulted in the deterioration of the power sector's finances.

The argument in the levy's favor is straightforward: If industries use the grid instead of their own captive generation facilities, this will increase electricity's demand and consumption by the industrial sector and will lower electricity prices for every consumer, improving the viability of the power sector. The proponents of this argument say that the installed capacity of captive power plants is approximately 4,000 MW (as reported in the Oil and Gas Regulatory Authority (OGRA)'s annual report for 2023-24[33] and measured on the basis of gas consumption by the captive power plants). If only 1,000 MW of this capacity is replaced by the grid electricity, it will result in about 9 billion additional units of grid electricity sold each year. Taken at an average tariff of 40 rupees per unit, this additional sale will generate roughly 360 billion rupees in extra revenue. This shift will also help spread the grid's fixed costs over a larger consumer base, reducing the per-unit cost of electricity.

The reality is not as simple as the argument above suggests. What makes it complicated is a structural contradiction that has defined Pakistan's energy economy for more than a decade. As has been explained in detail in the earlier sections, the electricity sector suffers from excess installed capacity and the gas sector is locked into long-term import commitments that assume demand levels higher than what has actually materialized. These two imbalances do not operate independently.

The industrial sector's electricity consumption links the two. If industries use more electricity from the grid, it might benefit everyone except that the industry itself neither likes the idea of cross-subsidizing other consumers nor does it feel satisfied that the grid can come up to its affordability and reliability requirements. On the flip side, the industry's shift to the grid aggravates the supply glut of the tax sector and increases its financial problems.

Continuing with captive power plants also has its own ups and downs. Historically, these plants have acted as a buffer, absorbing excess gas supply but the departure of industrial consumers from the grid has had serious technical and financial implications for the grid – as has been amply discussed in earlier sections.

Seen in this light, captive power plants served to connect the two mismatched systems as long as the grid's electricity was in short supply. It converted stranded gas into usable industrial energy and provided industrial firms with a hedge against unreliable grid supply while also reducing pressure on an overstretched national grid.

The imposition of the levy to address the national grid's overcapacity problem has directly disrupted this arrangement and, therefore, the levy's consequences extend across both the power and the gas sectors simultaneously.

This is where the first layer of tension emerges. From the perspective of the power sector, the levy is a policy tool that helps reverse the demand contraction that has driven tariff escalation in recent years.

The industry contends that this interpretation only holds if the grid is both affordable and

33. A total of 287 MMCFD of gas was consumed by captives over the fiscal year 2024, which corresponds to 1,308 MW of power generation, assuming an efficiency of 36 percent.

reliable enough to cater to the industrial demand. This is precisely where the policy begins to encounter friction with the industrial reality -- because energy is not simply a cost input for the industries; it is an operational factor that determines productivity and continuity.

This distinction explains why the industrial response to the levy has been cautious. If captive power generation was merely a cheap substitute for the grid electricity, upward adjustments in the price of gas through the imposition of the levy would likely have produced a rapid industrial shift to the grid. Instead, many industries are maintaining their captive power capacity even when they are partially shifting their electricity consumption to the grid. This reflects a deeper concern: the perceived risk of the grid dependence has not been eliminated even if the price differential between captive power and the grid electricity has been narrowed.

There are real risks. Even a World Bank assessment[34] of Pakistan's power sector shows that most of the electricity distribution companies (DISCOs) have been unable to meet the two key metrics that reflect the quality of their electricity supply: System Average Interruption Frequency Index (SAIFI) and the System Average Interruption Duration Index (SAIDI).

Our own analysis suggests that these longstanding problems remain unaddressed. System-level interruption data across all DISCOs shows that unplanned interruptions are exceptionally high during the summer months when electricity demand is at its peak. They, however, also occur at a high rate during the winter months. More importantly, though, most of the disruptions were concentrated at the 11 kV and lower voltage levels which directly supply electricity to industrial and commercial consumers.

Table 4: System Interruption Data Table
(Source: NEPRA Performance Evaluation Report 2024)

	Winters	Summers
11kV dedicated	2,132	55,438
11kV shared	29,296	613,958
Below 11kV	77,601	565,275

34. World Bank Group (October, 2024) Pakistan Development Update

Table 5: Operational risk table

Risk Category	Operational Impact	Immediate Effect	Secondary/ Long-Term Effect	Cost Implication
Production disruption	Process stops abruptly	Loss of ongoing production	Missed delivery timelines, backlog	Lost revenue per hour
Equipment stress	Sudden shutdown and restart cycles	Thermal/ mechanical stress on boilers, motors, furnaces	Reduced equipment life, higher failure probability	Increased maintenance & replacement cost
Energy surge during restart	High startup load	Spike in fuel and electricity demand	Reduced energy efficiency	Higher energy bills
Product quality loss	Interrupted process conditions	Off-spec batches, scrap generation	Customer dissatisfaction, reprocessing	Material waste & rework cost
Raw material loss	Material stuck in process lines	Disposal or reprocessing needed	Supply chain inefficiencies	Direct material loss
Safety risks	Sudden system instability	Pressure or temperature imbalances	Accident probability increases	Safety compliance & insurance cost
Workforce disruption	Emergency operational response	Overtime, rescheduling	Productivity decline	Additional labor cost
Utility system imbalance	Steam, compressed air, water systems affected	Pressure drops, system instability	Auxiliary equipment damage	Utility restoration cost
Contractual & supply risks	Delivery commitments affected	Penalties, contract non-compliance	Reputation loss, client churn	Financial penalties & opportunity loss
Grid interaction penalties	Demand spikes at restart	Peak demand charges	Tariff implications	Higher electricity cost
Maintenance backlog	Need for inspections after restart	Downtime for checks	Higher lifecycle O&M burden	Increased annual O&M cost
Reliability degradation	System instability exposure	Increased probability of repeated tripping	Lower plant availability	Long-term operational inefficiency

The policy, therefore, operates in a space where economic signals and operational risks are misaligned. While prices can be adjusted relatively quickly, reliability and trust cannot be generated immediately. It is obvious that the levy is trying to influence consumer behavior primarily through price signals, ignoring the fact this behavior has been heavily shaped by non-price factors experienced over long periods of institutional memory. This is why we are witnessing a structural divide between the policy intent and the behavioral response.

A second layer of complexity emerges when the gas sector is brought into the picture. Even if the industries decrease their gas consumption, this does not translate into financial relief for the economy because of the long term contracts that mandate that Pakistan must import a certain amount of gas regardless of whether it can be consumed or not. Not just that: The gas surplus to be caused by the shutting down of captive power plants will have to be either redirected or absorbed somewhere. The options already being utilized are providing to residential consumers at a discounted price or sell it on the international spot market – also at a discount. Both these options carry heavy financial costs.

The immediate effect of the levy, therefore, is not system-wide efficiency but redistribution of pressure: the electricity sector might gain while the gas sector will lose. Circular debt in the gas sector will expand as its revenues. In parallel, the electricity sector will experience marginal relief through increased sales but it will continue to carry the burden of fixed capacity payments for the foreseeable future, making it difficult for the industrial consumers to flock back to the grid en masse.

These imbalances highlight a deeper structural problem: Pakistan's energy sector is not governed as a unified system but as two parallel systems with often conflicting logics. Electricity planning is driven primarily by capacity expansion and recovery of fixed costs. Gas planning is driven by long-term import-based security and contractual stability. Industrial consumption of electricity sits at the intersection of these two logics yet is governed by neither in an integrated way. The captive power levy might be seen as an attempt to align these disparate pressures but it is certainly do so without fully reconciling the underlying institutional fragmentation that produced the misalignment in the first place.

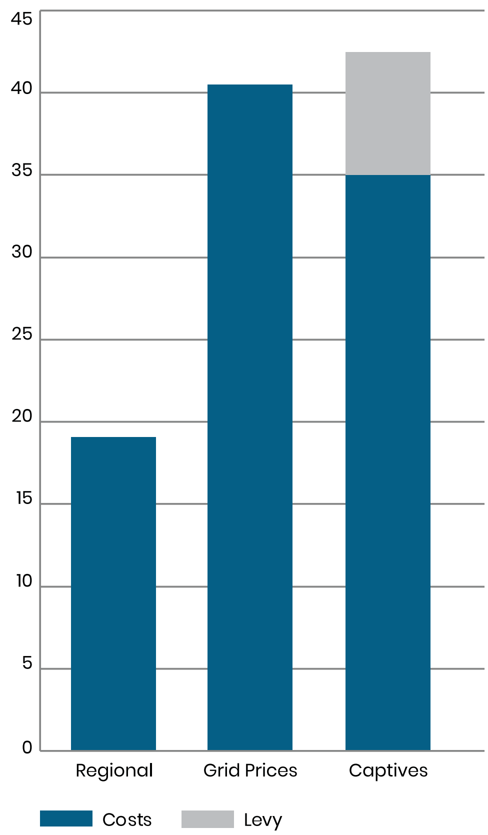
The IMF's justification for the levy introduces a third dimension to this discussion. The Fund seems to be assuming that grid electricity is sufficiently affordable and reliable to meet the industrial requirements. If industrial tariffs, particularly the B3 tariff category[35] applicable to many industries, which remain significantly higher than those in Pakistan's competitor economies, export-oriented industries could lose competitiveness by shifting to the grid, potentially forcing them to reduce their production.

Data from the International Energy Agency (IEA) suggests that industrial electricity tariffs in Pakistan's competitor regional economies are around 7–8 cents per unit which translates to approximately 20 rupees per unit. Pakistan's industrial B3 tariff, on the other hand, is close to double that level at roughly 36 rupees per unit.

35. In Pakistan, the **B3 tariff** category applies to industrial supply consumers with a sanctioned load ranging between 25 kW and up to 5000 kW, operating on 11 kV or 33 kV distribution lines. It is specifically designed for medium-to-large industrial setups and manufacturing facilities.

Cost per unit of electricity, captive generation:		
a.	Captive Plants Efficiency	36%
b.	Number of Units Produced (a x 293KWh/MMBTu)	105 KWh
c.	Gas Sale Price for Captives (July 2025)	3,500 rupees/MMBTU
d.	Per unit cost of electricity from captive (c / b)	33.2 rupees/KWh
e.	Fixed Costs per unit (by NEPRA)	1.6 rupees/KWh
f.	Total costs per unit (d + e)	34.8 rupees/KWh
Levy calculation:		
g.	Current Grid Price (B3) (2025)	40.3 rupees/KWh
h.	Margin of Levy (g + 15%)	46.4 rupees/KWh
i.	Difference (h-f)	11.6 rupees
j.	Levy Required (i x b)	1,218

Figure 6: Comparison of Electricity Costs. Source: Authors' calculations based on data from the IEA, OGRA, and NEPRA.



From a technical standpoint, IMF's argument is premised on efficiency: gas should be allocated to the most thermally efficient generation technologies and combined-cycle plants in the grid clearly outperform open-cycle captive power plants. Yet, efficiency here is being defined partially. It measures fuel conversion efficiency but does not incorporate system reliability, industrial continuity and/or macroeconomic output stability. For the industrial firms, the relevant unit of efficiency is not kilowatt-hours per unit of gas but output per unit of operational risks. A slightly less efficient energy source that ensures uninterrupted production may be economically superior to a more efficient system that introduces uncertainty and downtime. This divergence in efficiency frameworks is central to understanding why the policy is contested even when it appears sound technically.

Over time, this divergence creates a gap between system design and system experience. Policymakers evaluate energy systems through aggregated technical and financial metrics while the industry evaluates them through operational continuity and exposure to risks. Captive power levy is a manifestation of this gap: it attempts to re-shape consumer behavior by using the matrix applicable in one system while operating within another.

The historical trajectory of Pakistan's energy sector deepens this tension. The expansion of captive power was imposed, enabled and, at various points, actively supported by the state policy. Gas allocations to captive power plants and permission for buyback arrangements effectively institutionalized self-generation as part of the energy system. In retrospect, these policy measures have led to investments and structural dependencies that cannot be easily reversed through pricing mechanisms alone.

This situation explains why the imposition of the levy has distributional consequences that extend beyond energy pricing. For one, it is forcing the industries to reconfigure their long-established operational systems in response to a changing policy environment without eliminating the risks that originally led to the development of those systems. As a result, the adjustment is uneven, with some industries having partially migrated to the grid, others retaining captive capacity as insurance and many increasingly diversifying their electricity supply by deploying alternative sources such as solar power. If anything, this will further fragment the energy landscape.

This fragmentation reflects a broader characteristic of Pakistan's energy governance: reforms tend to be sequential and reactive, rather than being integrated. Each intervention targets a specific imbalance after it has arisen without fully internalizing the feedback effects across sectors. The imposition of the captive power levy is consistent with this pattern.

The deeper issue, therefore, is not whether captive power is efficient or inefficient or whether the levy is justified or unjustified. The more fundamental question is whether the energy sector's overall design can support coherent system-wide optimization at all. The evidence presented throughout this study suggests that it cannot. The reason is obvious: Electricity and gas operate under separate planning logics, industrial behavior responds to risks rather than price alone and institutional capacity remains fragmented across entities with overlapping mandates.

Captive power levy occupies a paradoxical position within this structure. It is a rational policy within the logic of the power sector but it is a destabilizing force within the logic of the gas sector. It reveals not only the limits of captive power generation but also exposes the limits of the institutional framework attempting to replace it. Until all those limits are addressed through integrated planning across electricity, gas and industrial policy spheres, the overall energy sector is likely to continue oscillating between partial corrections rather than achieving a stable equilibrium.

Conclusion

Captive power levy was introduced to address a genuine and long-standing problem in Pakistan's power sector: chronically underutilized grid-based power generation capacity and the power sector's financial stress caused by the rising capacity payments. In this respect, the levy appears to have achieved some measure of success. Industrial electricity sales have increased by approximately 1.4 billion units in Fiscal Year 2025-26 after declining for two consecutive years. This suggests that the levy has at least partially reversed the trend of falling grid demand and contributed to improved utilization of the national grid's power generation capacity.

Yet this increase remains far below the estimated sale of 9 billion additional units that would be expected if the entire captive industrial demand shifted to the grid. The gap reveals a critical situation: the levy has altered incentives but has failed to alter industrial perceptions of the grid. Interviews conducted for this study consistently identified affordability and reliability as the principal barriers for the industries to make a full transition to the grid. Even firms that have partially shifted to the grid are simultaneously exploring and exploiting alternative energy strategies, particularly solar power, as a means to reduce dependence on both captive power generation and the national electricity grid.

The persistence of captive power generation, thus, highlights a broader limitation of the levy's imposition. It is premised on the assumption that industrial migration to the grid can be achieved through price signals alone but captive power plants emerged not simply because they were producing cheap electricity. They came about because they protected industrial units against operational risks associated with unreliable electricity supply. The levy's effects also extend beyond the power sector. While increased industrial electricity demand will strengthen the electricity sector's finances, it simultaneously weakens the gas sector by reducing gas consumption. Industrial captive users have historically absorbed a significant portion of the imported gas and contributed disproportionately to the gas sector's revenues. As their consumption declines, surplus gas volumes will increase and the revenue losses of the gas utilities will deepen. A policy designed to alleviate financial pressure in the power sector is worsening financial stress in the gas sector -- already ridden with more than three trillion rupees of circular debt. In short, the levy attempts to correct a demand imbalance in one sector without fully accounting for its consequences elsewhere, thereby redistributing pressure rather than eliminating it.

The imposition of the levy, therefore, demonstrates that Pakistan's most important energy challenge is not an insufficient supply. It involves aligning incentives across the electricity and gas sectors, aligning industrial competitiveness with energy pricing and aligning short term fiscal reforms with long-term energy planning.

More fundamentally, the levy highlights an often-overlooked dimension of energy transition: it not merely about a technical shift from one fuel source to another; it is rather an institutional transition built upon credibility, trust and reliability. Captive power plants emerged because the industries lacked trust in the grid to provide them with affordable and dependable electricity. The levy assumes that this trust can be restored through pricing measures alone. If the grid electricity's affordability and reliability continue to improve, and if industrial tariffs move closer to regional benchmarks, the transition toward greater grid utilization may gradually stabilize. If they do not, the industries are likely to continue seeking alternatives through solar power, hybrid systems and other forms of decentralized generation. In that scenario, the number of captive power plants may decrease but they will still linger on in new configurations.

It is also important to highlight that Pakistan's energy crisis cannot be resolved through isolated interventions. During recent years, declining electricity demand has been driven not only by industry but also by residential and agricultural consumers. Expanding electrification in transport, industry and residential energy use may offer a more sustainable pathway for increasing electricity demand than relying solely on the migration of captive power users. Research by the Policy Research Institute for Equitable Development (PRIED) and Agora Energiewende estimates that electrifying even the easiest-to-electrify industrial processes could increase electricity demand by nearly 6 billion units by 2030 and generate approximately 240 billion rupees in additional power sector revenue.

Finally, the captive power is not an endpoint in the energy sector's policy changes but a reflection of the deeper contradictions that continue to shape the sector. On paper, the levy is technically defensible, fiscally rational and also partially effective. Yet it is also a reminder that decades of fragmented planning cannot be corrected through a single pricing instrument. Without integrated planning across electricity, gas, industrial and climate sectors, changes in one part of the energy system will continue to create new pressures in another.

Policy recommendations and the way forward

1. Make integrated cross-sector planning a precondition, not an afterthought for all energy sector policy changes: Captive power levy was designed within the logic of one sector (electricity) without accounting for its consequences in another (gas). The energy sector needs a unified planning mechanism that jointly governs electricity capacity, gas contracts and industrial energy policies. Decisions made in one part of the sector should be assessed for their cross-sector effects before their implementation. These effects should not be discovered through cascading financial crises after the fact.

2. Audit captive power facilities before imposing the next phase of the levy: A rigorous, data-driven audit of all captive power facilities covering their technical efficiency, grid-readiness, operational constraints, and sector-specific requirements is overdue. Evidence shows that the policy to impose the levy has been designed on the basis of incomplete data and weak assumptions. The next phase of the levy escalation should be calibrated to what an audit actually reveals -- not to IMF's conditionality timelines alone.

3. Link the levy's escalation to verifiable grid reliability milestones: System interruption data -- 613,958 unplanned interruptions at the 11kV shared level in one summer season alone -- shows that the national grid has not yet earned the industry's trust. The levy's escalation schedule should be linked to measurable improvements in SAIFI and SAIDI performance at the 11kV level which directly affects industrial consumers. The levy's escalation without improvement in the grid reliability is a cost transfer, not a transition.

4. Bring industrial tariffs closer to regional benchmarks: Pakistan's B3 industrial tariff sits at around 36 rupees per unit, roughly double the regional average of around 20 Pakistani rupees. No pricing mechanism designed to move industry to the grid can succeed at scale if the national grid is materially more expensive than its regional competitors. Tariff reform aimed at closing this gap must move alongside the levy, not after it.

5. Redirect the levy revenue toward grid reliability: The revenue collected through the levy is currently designated for reducing tariffs across all consumer categories. A portion of it should be segregated for targeted investments in distribution system reliability at the voltage levels where industrial consumers are most exposed. This will create a direct and legible link between what the industry pays and the improvements they require.

6. Design sector-specific transition pathways: When it comes to captive power, a textile exporter and a fertilizer plant face different constraints. For textiles, the issue is cost competitiveness against regional rivals. For cement industry, even a brief interruption can cause production losses, equipment damage, and extended restarts. A uniform levy applied to both industries ignores this distinction. The government should develop differentiated transition timelines, supported by consultation with industrial associations and backed by compensation mechanisms for grid-caused production disruptions.

7. Renegotiate or restructure imported gas contracts to reflect the new demand reality: As captive gas consumption declines after the imposition of the levy, Pakistan will be left with long-term gas imports it cannot consume. The government's engagement with QatarGas and ENI to exercise downward flexibility clauses, defer cargoes, or restructure import volumes is no longer optional, it is necessary to prevent the acceleration of circular debt in the gas sector.

8. Create a clean energy pathway for captive power plants rather than simply eliminating them: Countries like Germany and Denmark have addressed distributed industrial power generation (that includes captive power plants) not by penalizing it but by progressively decarbonizing it through industrial rooftop solar, combined heat and power systems, battery storage, and micro-grid models. Pakistan's policy currently offers industries only a binary choice: pay the levy or shift to the grid. A third option to replace fossil-fuel captive power generation with renewables-based self-generation with partial grid-connectivity should be formally incentivized and regulated. This is consistent with the just energy transition principles and is likely to achieve durable decarbonization than a forced return to a centralized grid that runs largely on imported fossil fuels.

9. Pursue industrial electrification as a demand growth strategy in parallel: Research by PRIED and Agora Energiewende shows that electrifying even the most accessible industrial processes could add nearly 6 billion units to electricity demand by 2030 and generate approximately 240 billion rupees in additional power sector revenue. This is a structurally sustainable way to spread the fixed costs to larger consumer base than relying only on the captive power's migration to the grid because it grows the demand base through productive activity rather than penalizing the adaptation strategies of the existing consumers.

10. Introduce structured buyback tariffs for captive power plants willing to supply electricity to the grid: Rather than treating all captive generation as an obstacle to be removed, captive power plants could play a constructive role, particularly in meeting evening peak demand as solar power expands and daytime grid reliance declines. The government should develop a buyback tariff framework that incentivizes captive power plant operators to feed their surplus generation into the grid at peak demand hours, thus converting a policy problem into a grid management mechanism.

11. Acknowledge the state's historical responsibility: Captive power was not a market distortion but a state-sanctioned response to the state-acknowledged failures, formalized through the 1994 Power Policy, reinforced through gas allocation decisions in 2005, and institutionalized through buyback arrangements in 2007. The levy is forcing the industries to bear the cost of reversing all those state policies without any accountability of the state's own institutions. The costs of changes in the policy must be distributed across the state and the private sector equitably.

12. Treat changes in the energy sector policies as a unified institutional task, not as a series of sector-by-sector fixes: Pakistan's recurring energy crises are not the product of one bad decision but of a governance model in which electricity, gas and industrial policy are planned and managed by institutions with separate mandates and conflicting optimization logics. The levy is the latest in a long line of policy changes that addressed one imbalance while generating another. Without a structural change in energy governance, the cycle of partial corrections and redistributed pressures is likely to continue.

PRIED
Policy Research Institute
for Equitable Development

Plot no: 5-N, (Second Floor), Sitara Market, G-7/2, Islamabad.
T: +92 51 8440512 | E: Info@priedpk.org

www.priedpk.org