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Energy Crisis of Pakistan: Analyzing Governance Issues

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ABSTRACT

Pakistan faces an energy crisis because of shortages of energy which has emerged as major risks to the economic growth and the living standards of the citizens. The objective of this study is to analyse energy shortages as well as the governance issues in the power sector of Pakistan and recommend policies to improve governance and achieve financial and technical sustainability. The analysis suggests that power shortages can be minimized significantly by improving financial management and utilizing the full existing capacity of power generation. Addressing the issue of circular debt will improve the financial management which requires payment of tariff subsidy by the government to the distribution companies on time to enable the CPPA to make timely payments to the fuel companies and the IPPs. Tariff subsidy can be reduced by reducing the cost of power generation through reduction in theft of electricity and line losses.

We recommend policies to implement the integrated and cohesive development, planning, and execution of policies across the energy sector along with improving the corporate governance. While gas and oil pricing policies should be revisited to realize the sector's full potential in the sedimentary basin, there is a need to formulate policies to provide incentives for the development of tight and shale gas. The expensive energy mix can be diversified by formulating policies to increase reliance on domestic sources particularly through exploiting substantial untapped coal potential for power generation. In addition, government need to provide incentives to realize renewable energy resources like wind and solar which can add significant generation capacity at a competitive tariff. Federal government needs to play its role in developing a consensus among provinces for construction of mega dams so as to increase country's hydel capacity.

1 Introduction

Pakistan faces an energy crisis because of shortage of energy leading to massive load-shedding which is emerging as major risk to the economy. The rising energy shortages have deteriorated the quality of life of citizens and impeded economic growth, employment generation and poverty reduction. While country has nearly sufficient installed power generation capacity to meet the demand, the increasing shortfall in electricity generation has emerged because of lack of good governance and mismanagement in the energy sector.

The energy crisis, has had its toll since 2008 on the economy in the form of an estimated 2% drop in the GDP, lost international markets for our exports and growing unemployment in the country. Pasha and Pasha (2013) estimated that the cost of load shedding on the economy was Rs 1272 billion in 2011-02 or 6% of GDP. According to another study, around 40% of factories and industrial units were closed and 7.5 % of labour force was out of job due to the load shedding. ADB (2014) assessed that

the power shortages resulted in a decline of 7.5% in the private sector investment since 2008. The power sector subsidies costing 1.8% of GDP resulted in a high fiscal deficit of 8% in 2013. The crisis, in tandem with its economic and financial adverse impact, has also become a major political issue and the fate of the incumbent government re-election is dependent upon to its ability to resolve the crisis.

Pakistan's power sector has been facing many structural, operational and financial problems for the last 15 years resulting in the power crisis as demand –supply gap touched 6000-7000MWs (around one third of the total demand) in peak demand hours. The current crisis is the cumulative outcome of a number of factors including an expensive fuel generation mix; dwindling share of cheaper hydel generation; reduced allocation of gas for the power sector; outdated and poorly maintained generation, transmission and distribution infrastructure; heavy T & D losses about 23% mainly due to theft; an unsustainable tariff regime that remains unable to recover the cost of generation along-with poor revenue recoveries (86 % in 2012) by the Distribution companies (DISCOs) .

In this context, the objective of the study is to examine energy shortages as well as the governance issues in the power sector of Pakistan and recommend policies to improve governance and achieve financial and technical sustainability in order to overcome the crisis. The paper is organized as follows: Section 2 reviews the literature on energy sector as well as the linkages between energy and economic growth. Section 3 evaluates the performance of the energy sector. Section 4 assesses financial distress in the energy sector. Section 5 analyses the governance issues in the energy sector. The final section 6 concludes and gives policy recommendations.

2 Literature Review

Pakistan has been facing an energy crisis since 2008. The crisis is deepened further because of poor governance and neglect of the sector that has impacted the economic growth and employment adversely. The section reviews the earlier work on energy sector issues as well as the links between energy and economic growth.

The power shortage has negatively affected the economy of Pakistan especially the industrial output affecting the GDP growth rate. Abbasi (2011) estimated that power shortages led to loss of about 2 percent per annum of GDP. Siddiqui, et al. (2011) reported a loss of industrial output of around 12-37 percent due to power outages. According to Asif (2011), power theft can be decreased if there is a political will, whereas technical losses can be reduced by investing resources in the sector. Malik, Afia (2012) analyzed that the power sector has inefficient generation and distribution systems, with dependence on expensive fuels, non-optimal tariffs, financial mismanagement, corruption and incompetence. These issues can be addressed by professional management. The policy-makers has biased on short term goals, and made wrong choices rather than focusing on long term strategy. Pasha and Pasha (2013) that showed that high energy consumption is connected with higher GDP growth rates, whereas reduced energy use leads to lower economic growth.

2.1 Energy and Economic Growth

A sustainable provision of energy is vital for sustained economic growth since it is a basic input to sustain industrial, commercial and domestic activities. The energy consumption is positively linked with economic growth. Research shows that increased energy consumption is closely linked with higher GDP growth rates, while reduced energy use leads to lower economic growth. Numerous studies highlight a direct connection between electricity consumption, economic expansion, and job creation in Pakistan. A study examining income growth and energy consumption in six developing nations, underlines the substantial impact of energy consumption on Pakistan's GDP growth, potentially reaching up to 30%. Consequently, expanding energy generation capacity is viewed as crucial for sustaining economic growth and meeting the growing demands of the industrial, agricultural, service, and domestic sectors.

The per capita consumption of power has a strong correlation with the per capita income level. Research indicates that developed countries with high per capita income have significantly greater per capita power consumption compared to low-income countries. Pakistan lags behind in per capita electricity consumption, ranking among the bottom 25 countries globally. Pakistan's per capita electricity consumption, at 450 KWh, is just one-sixth of the global average. Even this already low per capita electricity consumption has dropped by 14% between 2007-08 and 2011-12 due to power interruptions, in contrast to a 16% increase between 2003-04 and 2007-08. The persistent power crisis slowed down the economic growth rates and reversed the declining trends of unemployment and poverty during 2008 and 2014.

3 Performance of the Energy Sector

Pakistan's per capita energy consumption is comparable to some extent with other developing countries in the region as energy access has expanded rapidly in recent years. While access to electricity has increased from 50% of population in 1996 to 66 % in 2006 and 75% in 2011, power shortages remain a major concern.

The performance of the energy sector in Pakistan has been poor causing a series of crises related to power, gas and petroleum products since 2007. In 2011-12, the primary energy supplies were 64.7 MTOE with the highest contribution from Gas at 49.5%, followed by Oil at 30.8%, Hydro Electricity at 10.5%, Coal at 4.3% and Nuclear at 1.9%. The energy demand-supply gap is expanding, and in 2008 this gap was bridged by importing approximately 18.5 million tons of oil equivalent (MTOE) of oil and 3 MTOE of coal, costing about $10 billion. Without improvements in domestic energy sources, the deficits in primary energy (measured in equivalent oil imports) could potentially surge to 56 MTOE leading to a cost of around $38 billion. This situation would negatively affect energy security and increase economic and political instability in the country. The current crisis stems from neglecting essential institutional and governance principles in the energy sector, inadequate maintenance, and insufficient capacity expansion. At the same time Pakistan need to diversify its energy mix by reducing dependence from imported oil along with increasing domestic supplies

Table 1

Projected Summary of Annual Power Balances

Financial Year	NTDC peak Demand (MW)	Capacity Addition per Year in NTDC System (MW)	Deficit /Surplus Power (MW)
2014-15	23,242*	18,499	-4,743
2015-16	23,711	18791	-4,920
2016-17	24,471	20,304	4,567
2017-18	26,105	23,734	-2,371
2018-19	27,408	26,480	-928
2019-20	28,773	29,895	1,122

Source: State of Industry Report 2014, NEPRA, Islamabad

*Export of 650MW to K-Electric is not considered

Power sector's performance remained highly dismal over the last few years with poor governance that need to be addressed immediately. There are huge and growing shortages of power about 4,000-7,000 MW a third of peak demand for electricity. The sector is heavily dependent upon the government support with subsidies of around 2% of GDP in order to cover operating costs and the investment in the sector. The energy shortages have constrained growth of productive activities since 2008 resulting in a loss of 2% of GDP, impacting employment, exports and poverty adversely.

3.1 *Power Supply and Demand*

Pakistan faces load shedding of 5000–7000 MW depending on the season and the net hydel capacity with no electricity up to daily 18 hours in rural areas and 12 hours in urban areas. Due to poor governance and mismanagement, the generation capacity further declined to 18,499 MW in 2014-15 while peak load continued to increase to 23,242 MW in the NTDC system leaving the country with a deficit of 20% of its peak demand.

Table 1 indicates year-wise projected summary of power generation capability, NTDC peak demand and the resulting deficit or surplus of power. Based on the government capacity addition planning and NTDC projected peak demand, the power deficit will increase initially from 4,743 MW in 2014-15 to 4,920 MW in 2015-16 but will decline to 2,371 MW by 2017-18 or 9.1% of peak demand.

The peak demand is estimated to be 26,105 MW in 2018 (See **Table 1**). The projected scenario is disappointing since the power deficit will persist beyond 2018 even with conservative growth rates. To overcome the power deficit, the present government is required to increase its planned capacity from - 18,499 MW in 2015 by adding 5,235 MW in the system by 2018 in order to eliminate the power shortages which require concerted efforts by the government. Given the high prioritization by the government to the roads and highways, the future of energy sector appears to be bleak.

3.2 *Pakistan's Electricity Generation Mix*

Pakistan's electricity generation mix[1] deteriorated due to the neglect of the renewable energy between 2009 and 2021. Though the total power generation capacity increased but increase was mainly due to expansion in thermal generation. As a result, the share of thermal generation after some fluctuations increased from 65.8% in 2009 to 67.6% in 2013. The current electricity generation mix is not sustainable since it heavily relies on imported fuel oil and imported gas and coal. Imported energy remained around 50% of the total energy mix during the last few years (See Figure 1).

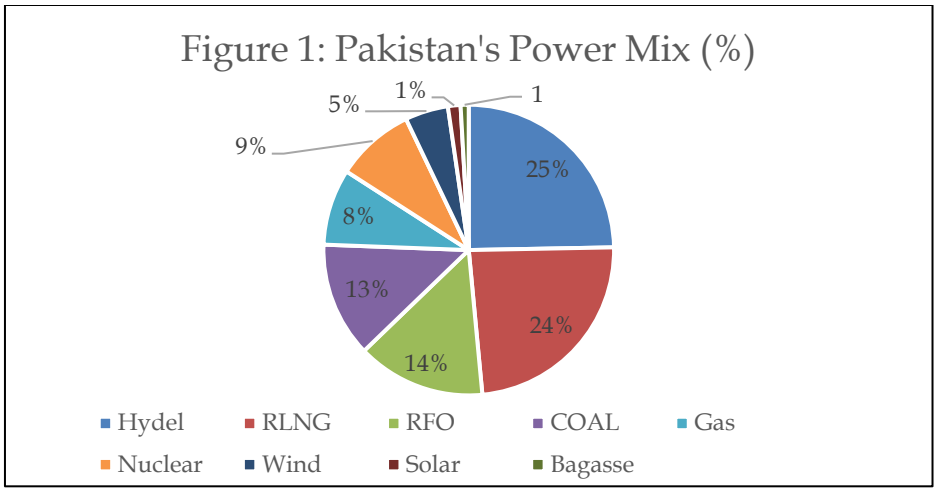

Figure 1

Pakistan's Power Mix (%)

There is a need for diversification of energy mix. The energy mix can be diversified by increasing reliance on domestic sources. Coal holds significant, yet underutilized, potential for electricity production. Pakistan possesses substantial coal reserves, with an estimated 217 million tons in Baluchistan, 235 million tons in Punjab, and 90 million tons in Khyber-Pakhtunkhwa. The province of Sindh alone boasts vast reserves of approximately 185 billion tons, ample for generating 100,000

[1] State of the Industry Report 2013, National Electric Power Regulatory Authority

MW of power. It is crucial to make deliberate efforts to elevate coal's contribution to the primary energy mix.

Moreover, Pakistan possesses significant untapped potential in renewable energy sources, including 50,000 MW from hydroelectric power and 40,000 MW from wind energy. Solar energy presents immense opportunities as well, especially in regions like Baluchistan, Sindh, and southern Punjab, where there is abundant solar irradiation, exceeding 2 megawatt hours per square meter, and over 3,000 hours of sunshine annually, ranking among the highest in the world.

4 Evaluating Financial Distress in the Energy Sector

Pakistan's energy sector is not financially sustainable since notified electricity tariffs remain below the cost recovery level. The federal government has been subsidizing tariffs by providing tariff differential subsidies which it frequently underestimates in its annual budget. The price of imported furnace oil, which was more than one third of the fuel mix for power generation, has increased significantly between 2004 and 2013. Gas prices also rose in line with fuel price. This led to significant increase in the cost of electricity generation but the government remains lagged behind in notifying increases in tariffs to cover the higher cost. High technical and commercial losses of DISCOs mainly due to theft of electricity also led to the increased cost of service. NEPRA's efforts to plug the leakages by restricting the figure of losses while determining revenue requirements and tariffs for DISCOs are negated as its owner, i.e. the Government, keeps providing subsidies to bail out these companies.

The government continued to provide a tariff differential subsidy (TDS) to distribution companies (DISCOs) to bridge the difference between the service tariff cost set by NEPRA and the standardized notified tariff. Furthermore, fiscal limitations result in the government not promptly providing the full TDS to DISCOs, exacerbating the issue of inter-company circular debt. The circular debts at the end of fiscal year 2006 that were estimated at Rs111 billion, increased rapidly to more than Rs872 billion or 4% of GDP by end of 2012 (See **Table 2**) The government soon after assuming power in 2013 cleared Rs480 billion circular debt in the last week of July 2013.

It is noteworthy that circular debts emerge when both public and private sector customers fail to completely settle their electricity bills with distribution companies, and the government doesn't fully reimburse subsidies to these companies. This, in turn, leads to distribution companies being unable to cover their power procurement expenses with the Central Power Purchasing Agency (CPPA), which acts as the single buyer. Consequently, CPPA cannot meet its commitments to power generation entities, including public sector generators (GENCOs), Karachi Electricity Supply Company (KESC), and independent power producers (IPPs). When these entities struggle to pay their fuel suppliers, itsets off a chain reaction where fuel suppliers, including refineries, gas producers, and international fuel suppliers, also face payment delays. Since major fuel suppliers like Pakistan State Oil and key gas producers are government-owned, the government bears responsibility for the circular debt.

While the government failure to pay the subsidies on time is one of the major causes of circular debt, there are other factors that also contribute to its occurrence. The circular debt represents the financial gap within the CPPA, preventing it from making payments to power supply companies. This shortfall is a consequence of two main factors: (i) the disparity between the actual cost of supplying electricity compared to the revenues collected by power distribution companies (DISCOs) from customer sales and subsidies, and (ii) DISCOs' inadequate payments to CPPA from their revenue collection, as they prioritize their own financial needs. This revenue deficiency ripples throughout the entire energy supply chain, affecting power generators, fuel suppliers, refiners, and producers, resulting in reduced fuel availability for public sector thermal generating companies (GENCOs), diminished electricity production by Independent Power Producers (IPPs), and increased power outages in the country.

Circular debt is influenced by various factors, categorized into primary and secondary causes. The primary causes, which directly contribute to circular debt, involve issues like ineffective sector governance, delays in setting and announcing tariffs, delays in notifying fuel price adjustments, inadequate revenue collection from government and private customers, and excessive transmission

Table 2

Growth in Circular Debt (Rs in Billions)

Primary Causes	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Stock of Debt_ Beginning of the Year (I)	**84.07**	**111.26**	**144.99**	**161.21**	**235.65**	**365.66**	**537.53**
NON-COLLECTION							
DISCOs Receivable From:							
Federal Government	0.22	0.35	0.08	0.15	1.79	1.57	0.19
FATA	10.87	6.36	9.43	10.24	(78.34)	4.30	13.42
Provincial Government	2.25	0.75	5.09	7.17	16.72	36.07	15.84
AJ&K Government	0.54	0.27	0.46	1.18	2	5.5	6.05
Agricultural Tube wells	0.42	1.28	1.07	3.01	3.46	(3.68)	(3.12)
Private Consumers	9.08	7.96	9.64	19.88	25.59	39.29	54.55
Sub-Total	23.38	16.97	25.77	41.63	(28.78)	83.05	86.93
CPPA Receivables from KESC	3.81	16.76	26.74	(11.87)	4.04	(1.79)	13.78
Total Non-Collection (2)	27.19	33.73	52.51	29.76	(24.74)	81.26	100.71
TARIFF AND SUBSIDY ISSUES							
Tariff Determination and Notification Delay	n.a	n.a	n.a	n.a	n.a	n.a	72.19
Fuel Price Adjustments	n.a	n.a	n.a	n.a	n.a	20.1	33.19
Difference between DISCOs							
TDS Claims vs. Actual	n.a	n.a	(36.29)	39.66	134.84	48.68	106.02
Disbursed							
Difference between DISCOs							
T&D losses Allowed by NEPRA	n.a	n.a	n.a	5.02	19.19	21.84	22.78
vs. Actual T&D losses							
Sub-Total Tariff and Subsidy Issues (3)	n.a	n.a	(36.29)	44.68	154.75	90.62	234.18

Total Circular Debt (As of Year End) (4=1+2+3)	111.26	144.99	161.21	235.65	365.66	537.54	872.42

Source: State of Industry Report 2013, NEPRA, Islamabad

and distribution (T&D) losses. The secondary causes, which indirectly contribute to circular debt, include the thermal inefficiencies of the GENCOs, inadequate subsidy budgeting, an unfavorable generation mix, the impact of court decisions on payments to the DISCOs, late payment surcharges, and the government's failure to promote demand management, energy efficiency, and renewable energy.

During 2013, Government of Pakistan injected US$ 3.8 billion as equity in the Discos to clear their outstanding losses. The Government committed to the World Bank, IMF, Asian Development Bank and other donors under Pakistan's sustainable Energy Sector Reform Program to eliminate all subsidies by 2016, except for those to low-income customers who consume up to 200 units of electricity per month but could not be achieved because of the weak performance of distribution companies in terms of controlling their losses and improving recoveries. The total amount of subsidies to the power sector by the government over the past 4 years is more than Rs 1.0 trillion which is equivalent to 1.6% of the GDP last year.

5 Analyzing Governance Issues in the Energy Sector

Many of the problems which have resulted in the energy sector crisis are the outcome of ad-hocism and lack of farsightedness in our policy framework for the energy sector. Clearly, the energy crisis owes its existence as much to poor governance as to the causes enumerated above. Many of the causes like high transmission and distribution losses, poor recoveries and highly questionable gas allocation policies are all directly linked with the management and governance issues.

5.1 Ill-advised Plans and Policies

To begin with the following *Milton Friedman quote*, it will be instructive to look at the energy policies that have been formulated and implemented over the last two decades.

"One of the great mistakes is to judge policies and programs by their intentions rather than their results" Milton Friedman

In the wake of the World Bank steered structural reform through the Strategic Plan for Power Sector Privatization (1992), that recommended the unbundling of the Water and Power Development Authority (WAPDA), a series of initiatives, especially inducting the private sector to supplement the public sector's inadequate generation capacity and improving its efficiency through competition were launched. However, these half-baked plans, without preparing the stakeholders for implementation of the reform process, laid the foundations for the intractable issues faced by country today.

5.2 Power Policy 1994

The 1994 Power policy resulted in deregulation of the power sector, promotion of IPPs and restructuring of WAPDA. It added 4,100 MWs through 16 Independent Power Projects (IPPS) bringing in an investment of US $5.3 billion in the system.[2] The policy was ill-advised as it completely ignored the affordability of the proposed power plants by relying on thermal (gas and RFO) based power generation. It failed to incentivize efficiency as well as the least cost generation. The policy was mired with serious allegations of lack of transparency leading to corruption and award of a higher than market tariff to the investors. The government assumed responsibility for ensuring both the

[2] Julia M. Fraser (2005), Lessons from Private Power Experience in Pakistan:2005:, Aized T, et al. (2018) and Sadiqa, Ayesha (2022).

availability of fuel and the purchase of electricity. The 1994 Policy presented highly attractive tariffs and favorable terms, including income tax exemptions, guaranteed payment of capacity charges, full off-take of the power generated for the 25-30 years contract period, exchange rate and inflation indexation and full repatriation of capital and dividends. In addition to creating an excess capacity, the policy placed substantial long-term financial obligations on WAPDA and significantly strained its financial stability. It completely failed to attract the IPPs to invest in renewable energy based cheaper power in the country.

5.3 Power Policy 2002

The 2002 power policy tried to bring in a more rational cost-plus formula-based tariff determination through the National Electric Power Regulatory Authority (NEPRA), unlike the higher than market upfront tariff offered under the 1994 policy. However, even this policy failed to acknowledge the key fact that Pakistan should not rely on expensive imported furnace oil and dwindling domestic gas reserves. The 2002 policy, too, failed to rectify the lop-sided power generation mix. Hence, the power sector financials were adversely affected due to the failure to induct cheaper hydel power and coal-based generation projects during the last two decades.

In the absence of a consensus among the federating units on the building of cheaper hydel based projects, like the Kalabagh dam, the cheapest fuel for power generation, gas has also not been made available to the power sector. Consequently, the share of gas-based generation in the national power generation mix dropped whereas the share of gas allocation to household and CNG sector for transport registered a substantial increase. The share of gas allocated to the power sector dropped by 3.7%, whereas the share of CNG and household sector raised by 16 % and 7 % respectively between 2006 and 2012. Resultantly, there has been a corresponding increase in the share of more expensive fuel (RFO/Diesel) for power generation. The non-availability of gas for the power sector, apart from constraints by fast depleting gas reserves, was due to a gas allocation policy of the Ministry of Petroleum and Natural Resources (MOPNR) that encouraged the CNG for transport as well as generously extended the piped gas network for domestic use. The generous allocations to the fertilizer industry, CNG sector for transport and domestic sector for cooking and heating requirements have all contributed to a smaller pie for the power sector. Therefore, the issues in the power sector can be linked[3] back to decisions regarding gas allocation.

5.4 Power Policy 2014

Another expensive policy omission, all along, has been the failure to introduce coal as a fuel for power generation. The coal based power generation was over 40% around the world the coal based generation in the USA, India and China were stood respectively at 45%, 69 % and 79%. In contrast to this, the percentage of coal based generation was less than 0.5% in Pakistan. Nevertheless, the government under 2014 power policy took a rational policy decision to convert some of the public and private sector RFO based plants to coal and induct fresh coal based plants using imported coal. The Thar Coal Project promises to offer huge indigenous coal resources, but raising the huge financial outlay required for development of the project remains a major challenge so far.

While import of gas from Iran to supplement the domestic gas resources, has been talked about for over a decade, the Iran-Pakistan gas pipeline still remains a pipe-dream at best. The efforts to supplement gas with LNG, albeit being only 20% cheaper than the RFO remained the victim of malpractices and allegations of non-transparent deals resulting in a judicial intervention causing further delays. It is, nonetheless, that the efforts to bring LNG in the system through the private sector proved to be more successful than previous such endeavors.

The 2014 Power Policy and various measures taken by then government seems to have addressed some of the issues like placing due emphasis on renewable energy (RE) sources especially solar and

[3] See State Bank of Pakistan Report :2013

wind energy, large induction of coal based projects in a major effort to change the generation fuel mix and re-entry of the public sector by investing in thermal power generation ,which almost remained suspended for at least two decades, but its implementation will remain a daunting challenge for the government.

Thus, beyond the content of various power sector policies, the broader question of the policy formulation and implementation process in the energy sector has remained a much debated subject. The divergence between the priorities and orientations of the two key ministries (Ministry of Water and Power and the Ministry of Petroleum and Natural Resources) dealing with the energy related issues remained a major stumbling block for policy formulation and implementation in the energy sector in a rational manner.

5.5 Lack of Corporate Governance

The impasse of the power sector today mainly owes to a dilemma of its existence to country's ill-advised acceptance of the World Bank sponsored structural reforms program for the power sector in 1992 that though enabled the country to get some funding to fend off the financial problems faced by the WAPDA but left the country in a sustainability crisis in the longer term. The concept of handing over the management of power distribution companies to the private sector after unbundling of WAPDA, in particular, was needed to be weighed in very carefully manner in a developing country like Pakistan. The decades' old power theft culture by individuals and businesses, the ingrained inefficiency and corruption among the WAPDA staff (who still work in the DISCOS and GENCOS after the unbundling of WAPDA) and the outdated and poor distribution and transmission infrastructure were the legacies that the newly corporatized distribution companies (DISCOs) were to inherit. To expect them to overcome their handicaps and perform significantly better than before remain an uphill and highly ambitious task.

To worsen the situation, the newly corporatized DISCOs were not structured in a truly corporate style as WAPDA and the Ministry of Water and Power still exercise strict control over them. DISCOs, though registered under the Companies Ordinance corporate laws but were never allowed to follow the code of corporate governance. The government still retains the power to hire and fire the CEOs, usually former employees of WAPDA who come with the same work ethics and culture of corruption which turned out to be the main causes of the demise of WAPDA as a vertically integrated entity for the power sector. Likewise, the National electric Power Regulatory Authority power sector regulatory authority (NEPRA), created in 1997 does not have adequate administrative control over the power sector entities to persuade them to reform. Above all, the political interference by the successive governments forced the newly constituted companies to induct thousands of unwanted employees in poor performing and cash starved DISCOs and Public Sector Generating Companies (GENCOs) that keep on adding more parasites to eat into the meager earnings of these companies. The provincial governments, out of indifference and political expediencies, were conspicuous by their absence when it came to helping the DISCOs in checking theft of electricity. In the absence of effective control to curb theft of electricity, the T & D losses in some DISCOs like KESC, HESCO and PESCO shot up to over 35 percent[4].

It is noteworthy that the country was not ready to overnight switch from a WAPDA style management to a corporate set up. To achieve the declared objectives of the Structural Plan, sufficient preparatory time was needed to develop, train and groom a new group of managers. Moreover, there was a lack of consideration for the implementation capabilities of the relevant agencies when approving the Strategic Plan. To stem the rot, new blood needed to be inducted on a competitive and transparent basis at market salaries. Once in place, the new management headed by CEOs should be given a completely free hand without any political interference.

[4] NEPRA (2022) State of Industry Report, 2022

Nevertheless, the experience elsewhere including India suggests that provision of electricity is not just an economic issue, it is rather a political issue and, thus, should not be left at the commercial whims of company executives. Consequently, the new management of DISCOs remained neither under the old formal structural control of WAPDA nor they were allowed to operate like private corporate sector companies as envisaged in the reform plan.

The Government, and Ministry of Water and Power still nominates members of the Board of Directors of these companies for short time comprising of either influential businessmen who look after their own commercial interests or disinterested bureaucrats, both lack relevant experience and expertise to turn around the newly established entities. It is hardly expected by them to have a vision or capacity to steer the management of these DISCOs to achieve miracles.

5.6 Poor Governance in Power Generation and Distribution

A related dimension of the transition was the WAPDA's reluctance to part with the power wing. For many years, WAPDA exercised full control over the newly created Pakistan Electric Power Company (PEPCO) and did not allow it to work independently. It was only after about 10 years of unbundling, that PEPCO was able to wrest some operational autonomy from WAPDA.

The governance issue is not restricted to the policy level. It is equally relevant to the pathetic performance of public sector generation, transmission and distribution companies in the power sector. On the generation side, the public sector generation companies' (Gencos) plants are poorly maintained and inefficiently run. Having outlived their useful lives, the capacities of these plants have been deteriorated. Most of these plants have already lost 20% to 30% of their efficiency due to poor maintenance. Overall, the public sector Gencos' capacity[5] had degenerated to 3580 MW in 2012 compared with the designed and installed capacity of 4664 MW.

The power generation from these plants has also suffered due to delayed payments to Gencos because of phenomenon of circular debt resulting in delayed procurement of parts, poor housekeeping and lack of financial and administrative autonomy even for routine maintenance. All these factors resulted in 32% capacity degradation[6] at TPS Jamshoro and 40% degradation each at Guddu Block I and TPS Muzzafargarh. The weak financial condition of Gencos, excessive staffing, political interference in personnel decisions for postings and transfers, excessive control by PEPCO, incompetence of CEOs, and inadequate supervision by apathetic and inefficient Boards of Directors have collectively led to the underperformance of these companies. Notably, corruption is yet another important factor contributing to the poor financial health of the Gencos and Discos. According to a NEPRA Study in 2010, the pilferage of furnace oil in the public sector Gencos' resulted in an estimated siphoning off of around Rs25billion worth of furnace oil in collusion with transporters. Haigler Bailey (2011) technical report verified that there is no reliable measurement system in place for tracking the residual fuel oil (RFO) received from suppliers and its distribution to the installed units at the plant. The situation is analogous when it comes to natural gas supplies to the Guddu power station. Moreover, the power plants operated by public sector Gencos lack an effective monitoring mechanism to guarantee the quality control of the supplied fuel, including factors such as calorific value, water content, and ash content.

The worst manifestation of maladministration resulting in colossal losses for the country's economy is visible in the operations of the distribution companies (Discos). The dismal performance of the DISCOs is reflected in the high distribution losses and poor recovery rate of their dues, mainly due to theft of electricity with the connivance of or negligence of the Discos' employees. Notwithstanding, somewhat better performance of some Discos, mainly in Punjab based (IESCO, GEPCO, FESCO, LESCO), the other poor performing Discos, particularly SEPCO, HESCO, PESCO, and QESCO

[5] NEPRA State of Industry Report:2012

[6] Haigler Bailey,(2011).Technical Audit Study of Jamshoro, Gudu and Muzaffarabad Thermal Power Stations :

continue to show unsustainably high transmission and distribution losses of 28%-37% in 2021. (See Table 3).

There is clearly a sufficient room for improvement to cut down the losses. The high technical and administrative losses, as the theft of electricity is euphemistically called, however, are not the only malady that has incapacitated the Discos. Ironically, the poorest performing Discos (in terms of showing higher distribution losses) also end up recovering only between 65%-85% of their dues as compared to 95%-98% for the better performing Discos like Iesco, Gepco ,Lesco and Fesco.

Table 3

System Losses (%)

DISCOs	Actual Distribution Losses, 2021-22 (%)	Amount of Actual Unit Lost 2021-22 (Rs. in billion)
PESCO	37.5	153.8
TESCO	9.3	3.7
IESCO	8.2	21.9
GEPCO	9.1	24.7
LESCO	11.5	72.7
FECSO	9.1	33.4
MEPCO	14.8	75.1
HESCO	32.9	45
SEPCO	35.6	43.7
QESCO	28.1	46.3
Overall Average	17.13	520.3

Sources: DISCOs, State of Industry Report, 2022

In 2021, the overall T&D losses of Pakistan's power sector stood at 17.1% amounting to Rs.520 billion. No substantial improvement in the power sector financial position is possible without controlling the unbridled T&D losses being incurred by the Discos and improving the recoveries of their dues.

6 Conclusions and Policy Recommendations

The paper analyzed the energy sector crisis of Pakistan with a particular focus on power sector's governance issues which are essential to address to achieve financial and technical sustainability. The 1994 disguised power policy was ill-advised by the IFIs that sowed the seeds of the current energy crisis stemming from the balance of payment difficulties owing to high dependency on imported oil in power generation mix. The policy awarded higher than market tariff to the investors due to lack of transparency resulting in allegations of corruption. While 2002 power policy brought a more rational cost formula, it also failed to reduce the reliance on expensive imported furnace oil to rectify power generation mix. The 2014 power policy put emphasis on renewable energy sources including large induction of coal based project to change the generation fuel mix but its implementation is still contingent on the improvement of governance in the energy sector. Not only the IFIs but also the political parties of the country are equally accountable for the current energy crisis since they failed to initiate the construction of cheaper hydel based projects on time in the wake of lack of consensus on Kalabagh dam. Based on the analysis of governance sector issues, the following policy

recommendations are important that are essential to address to end power load shedding in the next few years:

First, power load shedding can be minimized significantly by utilizing the full existing capacity of power generation, which can be made possible by improving financial management in the power sector. To improve financial management, there is a need to address the issue of circular debt fundamentally. For this purpose, the government should pay the tariff subsidy to the distribution companies on time in order to enable the CPPA to make timely payments to the fuel companies (gas companies, refineries) and the IPPs. The subsidies to domestic users should be eliminated gradually and all subsidies on gas to fertilizer industry should be removed.

Second, the government should reduce the cost of power generation by reducing theft of electricity and line losses which are very high compared with other countries. The high power tariffs are only making country's exports uncompetitive but also resulting in increased theft of electricity.

Third, energy sector's governance is fragmented since the presence of too many institutions handling different aspects like electricity, fuels, and water results in challenges for cohesive planning and budgeting in the sector. This situation hinders efficiency, integrated planning and budgeting in the sector, leading to imbalances among the subsectors. To achieve energy security, there is a need for integrated planning, cohesive development, and execution of policies across the sector. Corporate governance of energy companies can be improved by providing financial and administrative autonomy.

Fourth, the appointment of members of the Board of Directors by the government comprising of either influential businessman who look after their own commercial interests or disinterested bureaucrats, (both lack relevant experience and expertise) should be stopped. It is hardly expected to have a vision to steer the management of these DISCOs to achieve miracles.

Fifth, country's energy intensity is high as transmission and distribution losses in the system are very high compared with international standard which can be brought down by updating the system and reducing theft of electricity.

Sixth, while the successive governments have failed to undertake any serious efforts in electricity conservation measures, it is now essential to educate and incentivize the public for saving electricity.

Seventh, there is also a need to increase coordination between the Ministry of Water and Power and the Ministry of Petroleum and Natural Resources for gas allocation which should be based on price parity between competing fuels and across users and priority allocation be based on economic value, employment generation, contribution to exports.

Eighth, gas and oil pricing policies remained unsuccessful in realizing the sector's full potential of this sector in the sedimentary basin. There is also a need to formulate policies to provide incentives for the development of Tight and Shale Gas.

Ninth, there is a great need for diversification of energy mix by formulating policies to increase reliance on domestic sources, by exploiting substantial untapped coal potential for power generation. Significant endeavors are needed to boost the contribution of coal in the primary energy blend. Furthermore, government should provide incentives to realize renewable energy resources like solar and wind that can add significant generation capacity at a competitive tariff. Government should also develop consensus among provinces for construction of mega dams so as to increase country's hydel capacity.

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