

Pakistan's Power Crisis: Challenges and the Way Forward

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The power sector crisis has been engaging attention of the public and the media over the last 5 years due to continuing long power outages, ranging from 12 to 16 hours in urban areas and up to 20 hours in rural areas. Nearly one third of demand for electricity, during the last year, could not be met due to supply constraints. On an average, a supply deficit of around 5,000 Megawatt (MW) was experienced, while it touched the peak of over 7,000MW in the last July. When power demand touched the peak levels and the supply-demand gap soared, serious power riots would erupt all over the country. According to a joint report of the USAID and the Planning Commission, Pakistan has lost up to 10% of its GDP over the last 5 years due to power shortages.¹ In the year 2011-12, according to the Planning Commission of Pakistan, GDP suffered a loss of 3 to 4 % due to power and gas shortages.²

The long and often unpredictable hours of load shedding have been the cause of extreme angst, inconvenience and distress among general public, from housewives to hospital staff, factory workers to farmers and shopkeepers to students. The social upheaval so stirred had a far-reaching political impact and remained the single most important issue for the electorate in rejecting the incumbent ruling party in Islamabad in the May 2013 elections. The incompetence, misgovernance and corruption in the power sector, as manifested in unmitigated load shedding over the last five years, earned the PPP regime unprecedented ire of the judiciary, media, civil society, and public at large. Resolving the energy crisis, thus, figured prominently in the election manifestos of all the major political parties. While many of promises made in the election campaigns (like ending load shedding in 3 months) were just election slogans, still, the new PML(N) government, too, is fully conscious of the fact that it could also get the same treatment from the voters if it did not resolve the power crisis well before the next elections.

¹ The Causes and Impacts of Power sector circular debt in Pakistan: Planning Commission of Pakistan and the USAID: March, 2013.

² State of Industry Report: NEPRA, 2012

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This paper aims to bring out the relationship between electricity consumption and economic development, the socio-economic cost of the power crisis for Pakistan, genesis of the current impasse and the possible way forward.

Energy Consumption and Economic Development

The relationship between energy consumption, energy prices and economic growth is no longer a moot point amongst the energy experts. Over the last few decades, the energy economists have been debating over the exact nature of the nexus and causality between the energy consumption and economic growth.³ Various studies conducted in different developed and developing countries, using different methodologies, over the last few years have highlighted the existence of a unidirectional or bidirectional nexus between electricity consumption and economic growth.⁴ In their study “The Relationship between energy consumption and economic growth in Pakistan” Anjum Aqeel and Muhammad Sabi-u-din Butt⁵ validated the same findings for Pakistan as well and concluded that there was a direct link between electricity consumption and economic growth and employment in Pakistan. Likewise, the study conducted by Ramazan Sari and Ugur Soytaş⁶ titled “The growth of income and energy consumption in six developing countries” concluded that the consumption of energy in Pakistan has a very high impact on growth rate of GDP (up to 30%). It recommended increasing the generation capacity for a sustainable economic growth based on the rising needs of the industry, agriculture, services and domestic sectors.

The Economic Survey of Pakistan 2013⁷ has elucidated the point with the following Figure 1 which reveals “that our periods of high growth rate of energy consumption were followed by high growth rate of GDP, conversely periods of lower growth in energy consumption caused lower growth in GDP”.

³ A literature survey on energy-growth nexus” conducted by Ilhan Ozturk has brought out that there is a definite causality between electricity consumption and economic growth and that electricity is a limiting factor to economic growth and, hence, shocks to energy supply will have a negative impact on economic growth. Source: A Literature Survey on Energy-growth nexus :Ilhan Ozturk ,CAG University, Turkey: Energy Policy; Volume 38,issue 1:2010

⁴The study on “Relationship between energy consumption and development” conducted by John Asafu Adjaye⁴, based on the empirical evidence from a number of Asian developing countries concluded that “high level of economic growth leads to a high level of energy demand and the vice versa.”

⁵ The Relationship between energy consumption and economic growth in Pakistan: Anjum Aqeel and Mohammad Sabihuddin Butt: Asian-Pacific journal, Dec, 2001.

⁶ The growth of income and energy consumption in six developing countries: Ramazan Sari and Ugur Soytaş: Energy Policy-Oxford, Volume:35 ,2007

⁷ Economic Survey of Pakistan 2012-13, page 188.

**Figure
1**

Source: Economic Survey of Pakistan 2013

Table 1 below shows that the per capita consumption of power and the level of per capita income are directly correlated as the per capita consumption of power for developed countries with high GNP per capita is much higher than the one for the low-income countries. In terms of per capita consumption of electricity, Pakistan stood amongst the bottom 25 countries in the world, only better than some African countries. The per capita consumption of electricity in Pakistan, in fact, declined by 14% due to power outages between 2007-8 and 2011-12 in contrast to an increase of 16% in the 4 years preceding 2007-8⁸. At around 450 KWh, Pakistan's per capita consumption of electricity is one sixth of the world average

Table 1

Correlation between per capita income and per capita consumption of electricity

Country	2010 GNP per capita US\$	2009 Power Consumption per Capita kwhr
USA	47,340	12,914
Australia	46,200	11,113
Canada	43,250	15,471
Germany	43,070	6,779
France	42,370	7,488
UK	38,200	5,692
S. Korea	19,890	8,980
Malaysia	7,760	3,614

⁸ The State of Economy: From Survival to Revival: Sixth Annual Report: 2013. Chapter on Power Load shedding: A major impediment to Revival. Page 85. Dr. Aisha Ghaus Pasha and Dr. Hafiz A. Pasha: Institute of Public Policy, BNU.

Iran	4,520	2,238
China	4,270	2,631
Egypt	2,420	1,549
India	1,270	571
Pakistan	1,050	449

Source: World Development Indicators Report: 2012

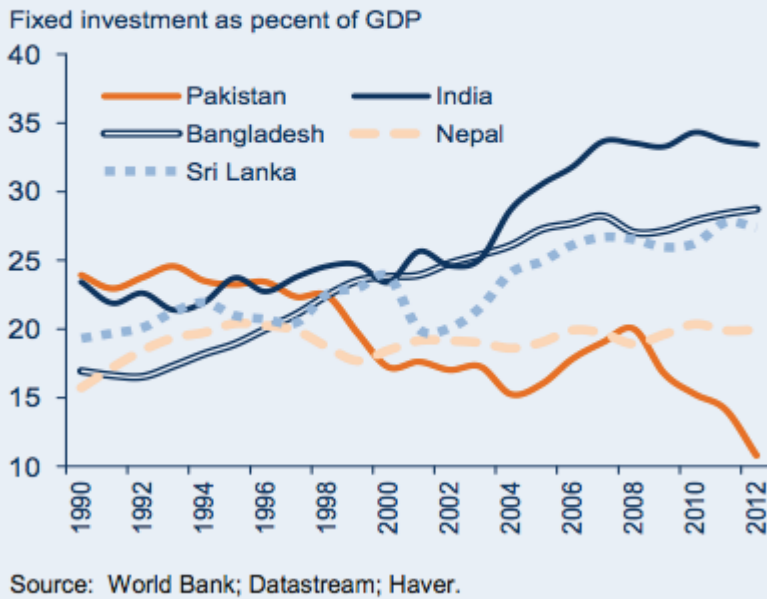
The Global Economic Prospects 2013 Report of the World Bank⁹ has highlighted that Pakistan's growth has slowed down in the recent years and gone well below the South Asia region's average due to unreliable delivery of natural gas and electricity. The electricity and gas shortages were also cited as the major reasons for slowdown in the growth for exports and higher core inflation rates in the country.

The power crisis has resulted in a declining trend in the foreign investment flows. The Figure 2 below highlights a sharp decline from over 15% to 10% in the investment to GDP ratio for Pakistan between 2008 and 2013, while most of the other South Asian countries registered significant increase during the same period. The growth projections for 2013-14 and 2014-15 place Pakistan at the bottom of the South Asian countries with the projected growth rates of 3.6% and 3.7 % respectively for the next two years.

Figure 2

⁹ Global Economic Prospects June 2013:World Bank: pages 183-197

Fig SAR.10 A sharp decline in investment-to-GDP ratio in Pakistan



Source: Global Economic Prospects Report June 2013, the World Bank

Socio-economic cost of load shedding

During the year 2008, the power load shedding had been estimated¹⁰ to have “cost the country Rs. 210 billion or over 2% of GDP, over US\$ 1 billion of export earnings and potential displacement of 400,000 workers. Costs could be higher if impact on other sectors like agriculture and services are allowed for, which account for almost the same share in power consumption as industry.” The industrial sector, which accounted for 28% of the total power consumption during that period alone suffered direct and indirect losses worth Rs. 107 billion. The cost of outages includes the lost production value and also the alternate arrangements, which had to be made for meeting the shortfall. In their recent study¹¹, however, Dr. Aisha Ghaus Pasha and Dr. Hafiz A. Pasha, after updating the earlier IPP study, and considering the findings of a 2011 PIDE study came to the conclusion that “load shedding is imposing a large cost on the economy of Rs. 1272 billion in 2011-12, equivalent to 6% of the economy.”

Though most of the units in the large scale-manufacturing sectors like textiles, chemicals and fertilizer industry have their own captive power plants, they, too, were, at least partially hit due to simultaneous load shedding of gas and electricity, particularly in the Punjab. The worst hit

¹⁰ State of the Economy: Emerging from the Crises: 2nd Annual Report; 2009 :Institute of Public Policy, BNU

¹¹ The State of the Economy: From Survival to Revival: sixth Annual Report: 2013. Chapter on Power Load shedding: A major impediment to Revival : Dr. Aisha Ghaus Pasha and Dr. Hafiz A .Pasha : Institute of Public Policy, BNU

were, however, the small and medium enterprises and the cottage industry which did not have their own alternate power generation facilities and depended totally on the power distribution companies (DISCOS). They had to cut down their production, lose export orders and were forced to lay off thousands of workforce who took to the streets and remained in the forefront violently agitating against the power breakdowns. The poor and the lower middle class households who could not afford the Uninterrupted Power Supply (UPS) apparatus or diesel generators have been at the rough end of the stick in the scorching summer months and have been venting their frustration through riotous demonstrations.¹²

Apart from the loss of production, employment and exports due to power shortages and the high cost of electricity, the additional burden that inefficiencies and corruption in the power sector impose has resulted in the colossal circular debt among the entities engaged in the energy supply chain. The volume of the circular debt in the power sector, which was Rs. 111 billion in 2006 rose to a massive Rs. 872 billion¹³ at the end of 2012. The primary causes for the circular debt were the government's inability to match the consumer end tariff with the rising cost of power generation and to pay the tariff differential subsidy to the DISCOS in a timely manner. DISCOS could not make payments to the public sector generation companies (GENCOS) and the independent power producers (IPPS), who, in turn became defaulters to the fuel suppliers. The soaring subsidies, which have to be paid by the Government to keep the power sector afloat, have adversely affected the financial health of the economy and added to the growing fiscal deficit. Nearly 18% of the total revenues in 2011-12 had to be paid as power sector subsidies.¹⁴

Looking in the Back Mirror; Genesis of the Crisis

The descent into the current chaos in the power sector has been a gradual process. It cannot be attributed to the poor governance and neglect over the last 5 or 10 years alone. In fact, it is the result of adhocism, lack of farsightedness and incoherent policies, not based on well-considered priorities, in the energy sector, spanning over a quarter of a century. The power supply deficit had already started creating serious problems in the early 90s when the shortages up to 30% of the peak demand were being experienced. The WAPDA and the KESC, which were serving the entire country, were hamstrung due to high system losses, poor recovery of revenues, corruption, inefficiency and mismanagement.¹⁵ The government could not invest in new power generation projects or even maintain and upgrade its existing plants due to financial constraints. To deregulate and restructure the power sector and to improve its efficiency and quality of services, the government invited the private sector to take the lead. It was hoped that the independent public sector entities under a corporate management, once faced with the competition from the private sector, would also improve their performance. The 1994 Power Policy offered generous

¹² The Daily Nation, Oct 3, 2011; The Guardian, June 19, 2012; The Express Tribune, June 12, 2013

¹³ The causes and impacts of Power Sector circular debt in Pakistan, March 2013: Planning Commission of Pakistan and USAID

¹⁴ Pakistan: Moving the Economy Forward: Chapter on Tackling the Energy Crisis page 133 to 162. Afia Malik

¹⁵ The New Power policy: Old Wine in New Bottle? Khalid Saeed: The Business Recorder, 26 August, 2013.

incentives to the Independent Power Plants (IPPs) and succeeded in attracting investment worth around US \$ 5.3 billion and adding a generation capacity of 4100 MW to the system.¹⁶

However, the 1994 policy brought its own set of problems. It laid the foundations for a more expensive furnace oil-based generation mix. While the investors were fully protected through guaranteed fuel supply and power off take by the government, WAPDA had to bear the brunt of unbearable financial burden arising out of heavier reliance on a more expensive oil based generation in its energy basket. With the tariff increase insufficient to match the increased cost of purchase, the front loaded and dollar indexed payments to the IPPS resulted in adversely affecting WAPDA's finances.¹⁷ Apart from corruption charges in the selection and approval of the projects, the 1994 policy inducted projects that did not meet the least cost criterion due to their inefficient technology, capacity and location of plants and selection of the most expensive fuel by almost exclusive reliance on oil and gas.¹⁸

Like the 1994 policy, the 2002 Power Policy¹⁹ maintained the incentives offered to the private sector without placing any restrictions or conditions regarding the source of fuel for power generation. Resultantly, the private sector happily took up the cherry-picking offer and went for the thermal power plants based on expensive imported furnace oil and the fast depleting indigenous gas. Despite the generous incentives received by them, IPPS did not have any motivation to improve their efficiency due to the guaranteed rate of return and off take.

The power policies followed over the last two decades, thus, sowed the seeds for the current crisis due to an excessively high and unsustainable cost of power generation resulting from a highly unfavorable generation fuel mix.

Table 2
Fuel Consumption and Cost of Thermal Generation in GENCOS

	2009-10	2010-11	2011-12
GAS:			
Generation on Gas (GWh)	9,968	7,184	7,843
Cost/kWh (Rs)	3.86	4.28	4.94
FURNACE OIL (FO):			
Generation on Furnace Oil (GWh)	9,324	6,802	5,653
Cost/kWh (Rs)	11.27	13.67	18.54

Source: State of Industry Report 2012: NEPRA

¹⁶ Lessons from Private Power Experience in Pakistan: 2005 : Julia M. Fraser

¹⁷ ibid

¹⁸ ibid

¹⁹ Policy for Power Generation Projects, 2002. Source: www.ppib.gov.pk

Notwithstanding the addition to capacity made by the IPPs, albeit at a higher cost, the other problems which had triggered unbundling of the WAPDA into separate DISCOS, the National Transmission and Dispatch Company (NTDC) and GENCOS still remain unresolved. The level of transmission and distribution losses in Pakistan is amongst the highest in the world. Likewise, the quality of services remains poor. Some of the main performance indicators of power plants include the plant load factor²⁰, the capacity factor and the auxiliary consumption²¹. The plant load factors of most of GENCOS plants ranged from 6% to 59%. For India, as a whole, during 2011-12 the plant load factor was 73%. A low plant load factor points to a lower utilization of available capacity and means a capacity loss. Most of GENCOS plants operate at an efficiency level, lower by one-fifth to one-third from the designed efficiency, due to poor maintenance and conversion from gas to oil due to reduced availability of gas for the power plants.

The supply demand gap is growing and with the estimated annual average demand growth in the electricity of about 6% over the next 10 years, it is unlikely that the country will be able to come out of the crisis completely. The projected demand for power by 2017 is placed at 25,352 MW which requires an addition of at least around 12000 MW in the next 3 years. According to the NTDC estimates, the country's power requirements at peak demand²² will be 113,695 MW in 2030 under a higher 8% growth assumption, but even with a much lower demand growth of 5-6%, we need to at least triple the existing generation capacity.

Apart from opting for an oil and gas based generation program, our failure to supplement the existing hydel power resources has badly distorted the hydel-thermal ratio in our power generation mix and resulted in significant increase in its average cost. The now seemingly abandoned Kalabagh Dam project, with 3,800MW capacity became a victim of an unfortunate controversy among the provinces. While, it had become quite evident since long that, with a staunch opposition from the Khyber Pakhtun Khwa (KPK), the project may never see the light of the day, no urgent steps were taken by the successive governments to start some other noncontroversial hydel power projects. After much delay, the work on the DiamerBhasha Dam with a capacity of 4,500 MW was started in 2011. Till to date, however, there doesn't seem to be any firm financial commitment for financing the project. Both the World Bank and the Asian Development Bank have reportedly backed out of financing the project as it was deemed controversial and asked Pakistan to obtain NOC from India. In a statement on the 20th August, 2013, however, the Finance Minister claimed to have convinced the World Bank and the ADB to withdraw the condition of the NOC and promised that the work on both the Diamer Bhasha

²⁰Plant load factor is a measure of the average capacity utilization of the thermal power station. A low plant load factor points to a lower utilization of available capacity and means a capacity loss.

²¹The auxiliary consumptions, which signifies the electricity consumed internally to run the power plant for our GENCOS plants ranged from 8.59% to 16.84%, which is much higher than the average best performing units internationally which ranges around 7.5%. Even in India the average figure for 2011-12 for auxiliary consumption was 8.57%.

²² Electricity Demand Forecast (2008-30): National Transmission and Dispatch Company. www.ntdc.com.pk

4,320 MW and the Dasu Dam with a capacity of 4,500 MW will soon begin simultaneously and will be completed in 10-12 years²³.

Over the years, failure to ensure a more power sector oriented gas allocation policy has contributed to lowering the share of gas based cheaper generation in the total power mix. This forced many plants, particularly in the public sector, either to significantly cut their generation or to switch to 4 times more expensive oil as a fuel. Between 2006-7 and 2011-12, the consumption of gas for power sector declined by 3.7%, while the transport and domestic sectors' consumption grew respectively by 16.1% and 7.1%.²⁴

A policy decision in 1987 banning any further investment by the WAPDA on adding to thermal generation²⁵ and failure to maintain the designed capacity and efficiency levels for the existing GENCO plants has been another contributing factor in exacerbating the crisis. The neglect of the existing GENCOS' plants resulted in loss of almost 1/5th of their efficiency and one third of capacity.²⁶

Notwithstanding various missteps, the existing installed capacity of 23,500 MW and the actual dependable capacity of between 14,000 to 16,000 MW clearly did not warrant the level of load shedding witnessed over the last 5 years. The problem, to a large extent, at least for now, is more that of arranging finances for purchasing fuel than the generation capacity. Between 2007 and 2012, the gap between the NEPRA determined tariff and the government notified consumer tariff increased from Rs 0.89/kwh to Rs 3.17/kwh. Earlier, the Musharraf government, with a short sighted approach, did not raise the tariffs from 2003-4 to 2006-7 out of political expediency. During the same period, the oil prices increased by 76%.²⁷

To summarize, the major issues faced by the country in getting out of this imbroglio are:

1. The expensive fuel mix for power generation and inefficient public sector generation.
2. High transmission and distribution losses and poor recovery by the distribution companies.
3. Below cost consumer end tariffs and the circular debt
4. The governance issues and corruption

Generation Mix

²³ The Daily Dawn: 21 August, 2013.

²⁴ Pakistan Energy Yearbook :2012

²⁵ Pakistan: Moving the Economy Forward: Chapter on Tackling the Energy Crisis page 138. Afia Malik

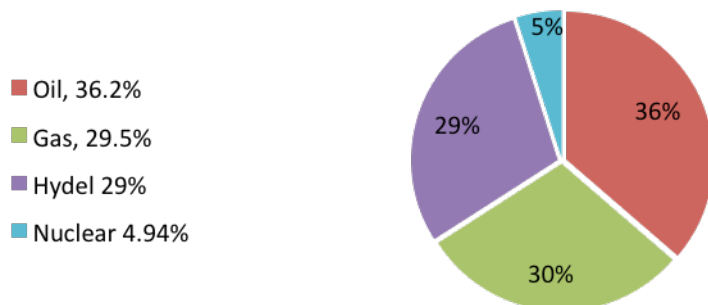
²⁶ Haigler Bailly Pakistan: Technical Audit Study of Jamshoro, Guddu and Muzaffargarh TPS in Pakistan, 2011

²⁷ Power Crisis in Pakistan: Afia Malik ;2012

Pakistan's total installed capacity for power generation stood at 23,538 MW as in June 2012. The fuel wise break up was as reflected below.

Figure 3

Electricity Generation (2011-12)



Source: NEPRA: State of Industry Report: 2012

Public sector accounts for around 56% of the total power generation and the private sector contributes 44%. The private sector is almost entirely restricted to the thermal power generation while the WAPDA almost exclusively operates the hydel power plants.

Furnace oil accounted for 36%, gas for 29.5% and the hydel generation made up 29% of the total generation in 2012. The share of hydel generation, which is the cheapest source, has drastically dropped from over 65% in the mid eighties to less than 30% last year. All over the world, coal has been a major source of power generation. Coal accounts for over 40% of the total world's production of electricity. It contributes 69% for India, 79% for China and 45% to USA's total power generation. In Pakistan, however, coal based generation was never adopted as a policy. Earlier, Pakistan, with the availability of cheaper and environment friendly gas, did not opt for coal. However, now, with the depleted gas reserves and ever-rising oil prices, there is no choice but to induct coal as an alternate cheaper fuel for power generation. During the last 15 years, when the gas shortages had already become known to the policy makers, over 5,000MW capacity based on oil was added to the system in Pakistan. Over the same period, 50% incremental generation capacity being added around the world was coal based.

Performance of Public Sector GENCOS

As brought out earlier in the paper, the public sector plants are operating far below their designed capacity and efficiency. A technical audit of the GENCOS in 2011²⁸ concluded that due to poor maintenance of the power stations, the GENCOS have lost nearly one third of their capacity. Most of the GENCOS plants operate at an efficiency level lower by one-fifth to one-third from

²⁸ Haigler Bailly Pakistan: Technical Audit Study of Jamshoro, Guddu and Muzaffargarh TPS in Pakistan, 2011

the designed efficiency due to poor maintenance, and conversion from gas to oil due to reduced availability of gas for the power plants. The report highlighted lack of preventive maintenance (due to delayed payments to the GENCOS and delay in procurement of parts), poor housekeeping (involving minor issues without any expenditure); limited financial and administrative autonomy and lack of performance evaluation as the key reasons contributing to the present dismal state of affairs at GENCOS plants.

Gas Pipelines: Pipe Dreams?

To supplement the domestic gas resources and to reduce reliance on expensive furnace oil, proposals for import of Liquefied Natural Gas (LNG) and gas through pipelines from Iran and Turkmenistan, have also been around for some time. The availability of gas to the power sector from these sources, if and when these come on line, will, however, not be cheap. The price of LNG is linked globally with the oil prices and any long-term contracts for power plants operated on LNG will be cheaper only by about 20% compared to the oil. Likewise, the cost of the gas imported from Iran, once the Iran-Pakistan gas pipeline project is completed is nowhere close to the price that the power sector pays for the domestic gas. The imported gas at around 80% of the oil prices in the international markets will be around four times costlier than the domestic gas and almost double of the cost of generation from coal. The Turkmenistan, Afghanistan, Pakistan and India (TAPI) pipe line, being promoted by the USA, as a substitute for the Iran gas, is unlikely to be feasible or probable in the current geo-political and security situation in the region. Similarly, requiring an investment of around US\$ 1.5 billion and with a strong opposition from the US on the Iran Pakistan gas deal, it too, may remain a pipe dream in the foreseeable future²⁹.

Distribution System Inefficiencies: Hefty Losses and Low Recoveries

Under the 1992 reform plan, WAPDA had been unbundled into 8 distribution companies (DISCOS) to improve the distribution services, to control the losses, and improve recoveries of their dues in an effort to strengthen their financial position. It was hoped that as independent corporate entities, with empowered Board of Directors and professionally competent Chief Executives, these companies would ensure better results than the bureaucratically run WAPDA. These goals, however, have remained elusive even after 25 years. Theft of electricity, euphemistically called the administrative losses, has now attained new heights, and in some areas has been institutionalized as "*kunda culture*". Unless the rot in the distribution companies is stemmed, any efforts at alleviating the situation by augmenting supplies and other measures will be neutralized. Many of the distribution companies (HESCO, SEPCO, PESCO and QESCO) still show distribution losses ranging from 20% to 40%. Not only are these DISCOS incurring huge losses, mainly due to theft of electricity, they have been showing extremely poor recovery (36 % for the QESCO to 69% for the HESCO) of the billed amounts. The table below indicates the level of losses and percentage of dues being recovered by various DISCOS.

²⁹ "Pakistan-Iran Gas pipeline: Pakistan plans to seek waiver from US curbs". The Nation, August 30, 2013. www.nation.com.pk

Table 3

System Losses and Revenue Recoveries

DISCO	Distribution Losses (2011-12)	Recovery (2011-2012)
PESCO	35%	68%
HESCO	28%	69%
SEPCO	49%	53%
QESCO	21%	36%
IESCO, JEPCO, FESCO, LESCO (average)	9.5%-13.5%	95%-98%

Source: NEPRA: State of Industry Report: 2012

The system losses, which at a national level stand at an unsustainable level of 23-25%³⁰, compare quite unfavorably with the transmission and distribution losses incurred globally.

Table 4

Distribution Losses in Different Countries

Country	%age of output Transmission & Distribution Losses
Australia	7%
USA	6%
Canada	8%
Germany	4%
France	6%
UK	7%
S. Korea	4%
Malaysia	4%
Iran	17%
China	5%
Egypt	11%
India	24%

³⁰ National Power Policy, 2013. Government of Pakistan.

Pakistan	20%
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Source: World Development Indicators Report: 2012

Tariffs

The expensive fuel generation mix coupled with a mismanaged distribution network results in an unaffordable cost of electricity for the consumers. While the National Electric power Regulatory Authority (NEPRA), based on their revenue requirements, determines tariffs for each DISCO separately, the government notifies a uniform tariff for all the DISCOS. In view of the high generation cost and the losses beyond the ones allowed by the NEPRA, the tariffs notified by the government and charged from the consumers are far below the ones determined by the regulator. The differential between the NEPRA approved tariffs and the government notified tariffs is picked up by the government³¹ The gap between the NEPRA determined tariff and the government notified tariff has been increasing and stood at Rs 3.17 per unit for 2011/12, when the average NEPRA determined tariff was Rs. 11.89 as against the government notified tariff of Rs. 8.72 per unit.

Despite substantial tariff increases over the last 3 years³², the gap still persists.

Circular Debt

The inability of the DISCOS to recover their costs either through their own revenues or through timely reimbursement of the subsidy from the government and their inability to meet their financial obligations results in the power sector inter-corporate circular debt. Over the last 4 years, the government has pumped in over Rs 1.8 trillion in bailing out the power sector entities but the ugly monster of the circular debt keeps raising its head ever again. There is no shortcut to getting out of this disastrous mess unless the cost of the power generation and distribution is controlled through drastic measures to plug the leakages caused through electricity theft, the fuel pilferage and nonpayment of dues. Simultaneously the consumer end tariff has to be rationalized by bringing it closer to the cost of service delivery.

The non-payment of circular debt over a long period of time has been resulting in the closure of public and private sector generation facilities due to non-supply of fuel. The IPPs, in fact, every now and then, threaten to invoke the sovereign guarantees given to them for payment of their capacity charges and have been approaching the Supreme Court in this regard as well. The existence of the circular debt thus, not only results in underutilization of the existing generation

³¹ This is the tariff differential subsidy, which has to be paid to the DISCOS by the government to meet their power purchase costs and the operational expenditure.

³² From March, 2010 to September, 2011, a 125% increase was made. (Tackling the energy Crisis: Afia Malik).

A 30 % to 200% increase for domestic consumers was again announced from October 1, 2013. Substantial increase of up to 74% also enforced for the commercial and industrial sectors. This is in addition to the monthly fuel adjustment charges notified by the NEPRA. (The Dawn, 6th Aug, 2013). www.dawn.com

capacity, but also in higher per unit cost for the balance electricity due to extremely low plant factors.

Governance Issues

Apart from the policy engendered problems of expensive generation mix or the politically oriented decisions to notify tariffs at below cost level, the governance and corruption issues are at the heart of the power sector crisis. WAPDA, prior to its unbundling, was responsible for the overall planning and projection of demand and supply and through its vertically integrated setup, engaged in the generation, transmission and distribution of power. It could take a holistic approach to the issue. However, with the breakup of WAPDA into different entities handling the generation, transmission and distribution activities separately as independent companies, there was no single entity focusing on the planning side to work out the future demand and supply projections which could be held responsible and accountable for executing the schemes to meet the future demand.

The GENCOS performance over the years has remained far below par. Governed by the ineffective Board of Directors and inept CEOs, centrally controlled by the Pakistan Electric Power Company (PEPCO), they were left with little autonomy or financial resources to handle even the day-to-day problems, let alone making any major investments for up gradation of the existing capacity.

The repair, renovation, replacement and proper maintenance of public sector GENCOS, however, is not going to offer lasting solutions unless the governance issues are tackled upfront. GENCOS' poor financial health, coupled with over-staffing, political interference in the postings and transfers, micro-management by the PEPCO, ineptitude of the CEOs, lack-luster performance and indifferent attitude of the Board of Directors and lack of financial autonomy have contributed to the current mess that these entities find themselves in. Corruption, like other public sector entities, has also compounded the problems faced by the GENCOS. Similarly, mired with corruption, inefficiency and mismanagement, the distribution companies, too, became happy hunting grounds for the political bosses to plant their favorites. Recruitment of thousands of unnecessary employees in the DISCOS further landed them in serious financial trouble

The pilferage of furnace oil in the public sector GENCOS, for example, is an issue, which has been plaguing the public sector power generation for a long time. According to an enquiry conducted by the NEPRA in 2012, around Rs 25 billion worth of fuel was being siphoned off yearly by public sector GENCOS in collusion with the transporters. The Haigler Bailly technical audit report (2011) also confirmed that “no credible measurement system exists for RFO received from the suppliers as well as fed to the installed units from the storage facilities of the plant. The same applies to natural gas supplied and consumed at Guddu power station”. Likewise, “the testing quality and procedures of plants laboratories lacked transparency” and sample of RFO, apart from having lower than minimum required standards of calorific values,

also contained higher water and ash contents. This scandalous leakage will have to be plugged through enforcing a strict 3rd party monitoring mechanism to ensure quality control and reliable measurement mechanisms for fuel received and consumed.

The Way Forward

The current situation is the inevitable outcome of a myriad of reasons as discussed in detail in the foregoing paragraphs. To recapitulate, our policy makers and planners' failure to arrange for adequate power supply that needed to complement the high growth rates of the economy for the period 2001-2007³³; short sighted and ad hoc quick fixes in the choice of fuel and technology for the power generation irrespective of its likely financial burden: lack of a national outlook on utilization of our resources for hydel generation³⁴; irrational gas allocation and pricing policies³⁵; operational mismanagement, inefficiency and corruption in the public sector power supply chain; fiscal mismanagement and political expediencies in not allowing tariff to keep pace with the cost of generation; governance and institutional issues have all contributed to the present bleak power scenario. The public sector entities were neither run according to the 1992 power sector reform plans on corporate lines, nor did they remain under the strict control of the WAPDA. Keeping in view the complexity and serious ramifications of the power crisis, a number of measures have to be taken to ensure that a reliable power supply is available at affordable prices to our industry, agriculture, commercial enterprises and domestic consumers. The following specific measures could be the focal areas for any serious effort at solving the current crisis.

Altering the Generation Fuel Mix

The unfavorable generation mix has to be altered by placing a complete ban on any future oil based generation in the public and private sectors. The cost of generation should be brought down to get out of the vicious circle of the circular debt, which keeps recurring due to the difference between the high cost of generation and the consumer-end tariff. This is only possible if we reduce our reliance on the most expensive fuel i.e. furnace oil by switching over to alternate cheaper sources of generation

To cut down the huge cost which is being paid on the import of furnace oil³⁶, the existing oil based plants need to be urgently converted to coal to reduce the average cost of power

³³ Their complacency, following the temporary power surplus of late 90s, was to result in a severe supply shortfall beyond 2006.

³⁴ Kalabagh is a well-known case; likewise the Sind Government opposed and successfully thwarted the Chashma Jhelum link canal based hydel project.

³⁵ The indiscriminate extension of domestic gas supply net work, promoting CNG as a transport fuel and offering hefty profit margins in CNG business mostly doled out to political favorites all contributed to a long term crisis which is now visible in the form of miles' long queues outside the CNG stations.

³⁶ The increase in electricity tariff due to rising oil prices and the Pakrupee devaluation act as a double burden for the hapless consumer.

generation. The cost of coal-based generation has been estimated to be around Rs. 8-9 per KWH, depending on the location of the plants. Transportation of coal from coal mines for domestic coal and from port for imported coal adds substantially to the cost for plants based up country. But even the higher cost of Rs. 9 per KWH is less than half the cost currently being incurred on most expensive oil based generation projects of GENCOS. Recently, NEPRA has given upfront tariff³⁷ for coal based generation wherein for local coal (other than Thar), an upfront levelised tariff for 30 years ranges from Rs. 7.27 per KWH to Rs. 9.32 per KWH (depending on the size of the plant), while for the imported coal, the same ranges between Rs. 7.27/KWH to Rs. 9.36 per KWH.

The reported plans of switching of some existing oil based power plants to coal is a step in the right direction. While the private sector's plans for the conversion are still not firm, the proposed conversion of some public sector generation plants, along with the addition of new coal based generation with the ADB assistance will be a welcome measure³⁸. The recent announcement to set up a 6,600 MW corridor in Baluchistan for setting up new coal based power plants³⁹ needs to be followed up with concrete projects in an expeditious way. There is, however need to be careful about the technology to ensure that we are again not left with the obsolete technology or plants as in the case of Lakhra.⁴⁰ While adopting coal as a new fuel, both public and private sectors also need to prepare technical expertise in coal-based generation. Due to the absence of any worthwhile existing coal based plants in the country, the relevant expertise in our power sector is totally lacking. We may, however, attract overseas Pakistanis with relevant background and experience to run and manage these plants.

Once sufficient coal based power is added, the average cost of thermal power generation will come down and reduce the difference between the cost of generation and the consumer end tariff, thereby cutting down the amount of subsidy required to be paid by the Government.

Gas supplies and efficient utilization

While the current gas resources are reportedly fast depleting⁴¹, all out efforts are needed to remove bottlenecks in the way of exploring new gas reserves to increase the supply of indigenous natural gas. Simultaneously, notwithstanding the reservations expressed earlier, we still cannot abandon our efforts to supplement the domestic gas with the LNG and the imported

³⁷ NEPRA Tariff Determination for Coal :www.NEPRA.org.pk

³⁸ In his budget speech for 2013-14, the Finance Minister has announced converting of Muzaffargarh with 1350MW generation capacity with 1350 MW and Jamshoro (450MW capacity) Thermal Power Stations from oil to coal. ADB, apart from providing Rs 77.6 billion for these projects has also indicated willingness to provide Rs. 124 billion for setting up 2 new coal based projects of 660MW.

³⁹ The News, 26th Sep, 2013.

⁴⁰ Lakhra, the only coal based project of 150MW, built with the Chinese assistance in 2005 has been a total failure and has never operated on its capacity due to unfeasible and doubtful technology. (www.pakistantoday.com.pk) Pakistan Today, 29, May, 2013.

⁴¹ The Dawn, Jan13, 2013. www.dawn.com

gas. We should revisit the gas allocation policy and, due to the critical importance of energy for all sectors of the economy, prioritize the power sector. Failure to allocate adequate gas to the power sector results in huge idle and unutilized gas-based capacity which further adds to the cost of power. Even the gas available for the power sector is not being currently utilized in a most efficient manner. Thus, while some of the far less efficient gas based GENCOS plants receive gas, the, more efficient private sector plants, capable of generating more electricity with the same volume of gas are deprived of it. The scarce gas and limited financial resources for purchase of the oil should be allotted on the criterion of fuel efficiency alone.

Restoring Public Sector Plants Capacity

The GENCO plants have lost more than 20% of their efficiency and are currently working at one-third reduced capacity. The degraded public sector plants are in dire need of investment to upgrade and restore their efficiency and capacity. Rehabilitation of public sector power plants and improving their efficiency on a war footing is a must and should be an important element of our strategy to restore the ailing health of the public sector plants.⁴² Repair, renovation and replacement of obsolete and inefficient units with modern and cost efficient units are an investment long overdue. The up gradation of public sector power plants will ensure increased generation due to higher efficiency and a reduction in the cost of power generation. Pilferage of the oil in the public sector generation companies must be immediately checked and a third party audit and strict control on the logistical network should be enforced to ensure not only that no oil or gas is pilfered on its way to the GENCOS plants, but also, that the quality of oil provided meets the required specifications as per the contracts.

Improving Governance in Public Sector Power Supply Chain

Converting the existing oil based plants to coal, setting up of new coal based projects or rehabilitation programme for restoring the lost capacity in the public sector GENCOS will, however, deliver sustainable and meaningful results only if it is not beset by similar governance issues as currently faced by the GENCOS. Accordingly, the governance reforms will have to be an essential component of any comprehensive solution.

We could consider two options to resolve the governance related issues:

(a) To outsource the management to some competent private sector companies who could be given long term (say) 10 to 12 years contracts. They could be allowed to operate for 6 to 9 months at the current efficiency levels determined through tests at the time of handing over before they complete their investment in replacement, up gradation and repair of the existing facilities. After that, they will be contractually bound to improve the efficiency levels

⁴² USAID is currently assisting Pakistan in the up gradation and rehabilitation of some GENCO plants. The Nation,27 September,2013.www.nation.com.pk

comparable to the IPPs, duly discounted for age and technology of the machinery, and subject to guaranteed minimum investments in plant.

(b) If, however, for administrative reasons and political expediency, outsourcing is not considered as a practicable option, then a professional management for these GENCOS may be inducted on merit with clear goals and time-bound specific targets to be monitored on a regular basis at the highest level. Government, being the sole owner of these GENCOS, has to invest in upgrading the infrastructure and for that purpose, necessary funds will have to be allocated immediately. With the IPPs offering much better salaries and perks, public sector will find it difficult to attract and retain the competent people unless their pay structures are market-based.

Likewise the NTDC and the DISCOS will also need to be manned by motivated, professionally competent and efficient managers and engineers. They will require the operational and financial autonomy under the empowered CEOs and the Board of Directors to achieve the desired results without any political interference.

No improvement in the public sector operations can be expected unless drastic improvements are made in the governance and institutional setup of these entities.

Focus on Renewable and Indigenous Sources

Hydel generation which used to form over 65% of our total power generation till mid 80s has now been brought down to less than 30%. Pakistan is endowed with rich hydro power resources with the potential of round 50,000 MW which is still untapped. While the Kalabagh Dam does not seem to be on the cards, we have to speed up the work on the Diamer Bhasha Dam and other big projects like Dasu. The hydel projects currently under construction, like the Neelum Jhelum (969 MW) and some smaller projects, with a total capacity of around 625 MW, are at various stages of construction and should be put on the fast track to ensure that some additional power supply could be brought on the national grid from the cheaper sources. The private sector must also be persuaded to come and invest in the hydel projects. Though the Alternate Energy Development Board (AEDB) has been around for many years now, the progress in adding power through renewable energy sources has been very limited. Keeping in view the rich wind corridors that we have in the Sindh and Baluchistan, we should exploit the wind resources and plan to add at least 1,500 to 2,000 MW through the wind power over next three year. We have been endowed with the sunshine for most of the year. Pakistan should keep itself abreast of the latest developments in the solar power technology and ensure that a right mix of the renewable energy based projects on wind, solar and bio thermal are also a part of our energy mix. Similarly, the nuclear energy which currently contributes less than 5% to our power supply should be gradually ramped up.

The previous Power Policies have been paying lip service to encouraging the indigenous resources for power generation, but in terms of actual implementation, there has not been much effort in this respect. It is important that any future incentive for the investment in the power sector should be restricted to schemes based on such indigenous resources which are available in abundant supply like coal, wind, water and solar resources.

Controlling Power Theft and Tariff Rationalization

Apart from the expensive generation mix, another major reason for the soaring electricity cost has been the excessive losses in the transmission and distribution system. Strict measures to control the electricity theft with a stringent legal framework and a ruthless implementation carried out with the support of the provincial governments and the law enforcement agencies, will be a prerequisite to check the electricity theft. Recent efforts by some of the provincial governments to catch big time electricity and gas thieves have produced salutary results and this campaign must be carried on.

Power sector cannot remain sustainable unless the cost of service is fully recovered. There is no way that a poor country can afford to keep on providing hefty subsidies to the consumers in the long run. It is, therefore, imperative that the tariff structure reflects the actual cost of generation and service delivery. However, it is also unfair to burden the consumer with the cost escalations⁴³ due to unpragmatic policies, poor operational efficiency, theft and losses.

Another dilemma is that currently the law abiding consumers residing in the jurisdictions of more efficient DISCOs end up paying for the corruption, theft, losses and poor recoveries of the worst performing DISCOs like HESCO, SEPCO, QESCO and PESCO. This is due to the uniform tariff system⁴⁴ currently followed in the country. The very purpose of setting up of independent distribution companies for which the NEPRA determines separate tariffs, based on their performance and requirements, has failed. The current system of uniform tariffs, with the government paying subsidy for the poor performers leaves no incentives for them to improve. We may introduce different tariffs for different DISCOs according to the determination of NEPRA. The poor performing DISCOs may be given a strict time frame to improve their performance and come at par with the better performers. Efforts should be made to keep the tariff in line with the cost of generation and not to allow the ugly head of circular debt to resurrect itself time and again.

Energy Conservation and Demand Side Management

⁴³ The most recent tariff enforced from 1st October, 2013, raising household's tariffs from 30 % to 200 %.(The News 1st, October, 2013).the raise was later withdrawn on the intervention of the Supreme Court but is likely to be re-notified later to meet our commitments to the IMF.

⁴⁴ NEPRA determines different tariffs for all DISCOs but the government notifies and applies a uniform tariff all over the country

Apart from the supply side management there is a need to mainstream the demand side management to control electricity prices. During the peak demand hours consumption could be discouraged by enforcing time of use metering, which is already being implemented gradually. Similarly, various other measures like ensuring the energy efficient use of machinery, equipment and appliances in households and industry, subsidizing and promoting the use of energy savers and placing of sensors and motivating the people to avoid the wastage of electricity need to be a part of a national energy conservation campaign.

National Consensus for Energy Security

The recent past experience whereby the provincial government have been seeking stay orders from the courts⁴⁵ against the tariff adjustments have badly damaged the financial health of many distribution companies. The methods of tariff adjustments and priorities in the power generation need to be agreed to in the Council of Common Interest (CCI) and all the provincial governments should strictly adhere to these decisions in the larger national interest

The issue of energy security needs to be mainstreamed in the national narrative. We have already suffered irreparable loss over the last many years for our failure to develop a national consensus on this critical issue. All the provinces and the federal Governments will be well advised to agree on the most efficient allocation of the natural resources. Unless we can agree among ourselves about the proper utilisation of the available hydel, coal and gas resources in the larger national interest, we will not be able to overcome the energy shortage which has already become a drag on the economy and an impediment in the revival of our economy.

⁴⁵ The Express Tribune, 22 nd October, 2010.www.tribune.com.pk.