

Evaluating the Issues and Challenges in Context of the Energy Crisis of Pakistan

Gussan Maaz Mufti^{1*}, Mohsin Jamil², Muddasar Nawaz¹, Mobeen-ur-Rehman¹,
Syed Zulqadar Hassan³ and Tariq Kamal⁴

¹Bahria University, Islamabad, Pakistan; 12gussanmufti@ces.nust.edu.pk, engrmnqureshi@hotmail.com, cmobeenrahman@gmail.com

²National University of Sciences and Technology (NUST), Islamabad, Pakistan; mohsin@smme.nust.edu.pk

³Chongqing University, Chongqing, China; syedzulqadar.hassan.pk@ieee.org

⁴Sakarya University, Serdivian, Turkey; tariq.kamal.pk@ieee.org

Abstract

The purpose of this article is to give an overview to the current energy crisis of Pakistan. Pakistan is an energy deficient country and the current power crisis of Pakistan is hampering its economic development. This article investigates the main causes that have led to the current power shortage of Pakistan. An overview is given to the major causes such as ineffective power policies, ineffective distribution system and tariff system that have led to the current power shortage in Pakistan. Additionally, the possible measures that can help to address these issues and help Pakistan overcome its power crisis are also being presented.

Keywords: Energy Crisis, Electrical Power Energy, Energy Crisis, Electricity Generation, Hydel Energy

1. Introduction

In the modern world, the industrial development plays an important role in the development of every country. The industrial development in turn depends on a reliable electricity supply. The increasing worldwide demand for energy increased the concerns of the different countries regarding their energy security. Due to this, the focus is now shifting on the diversification, generation and efficient allocation of the energy sources. These problems can be addressed by achieving optimal energy mix through changes in fuel consumption, by promoting energy efficiency and an effective integration of the renewable energy sources. For a developing economy like Pakistan, with a high population growth rate, it is important to maintain a balance between energy supply and demand as energy consumption is directly linked to the economic growth of a country. In recent years, economists have worked on finding the relationship between the two entities^{1,2}. The

studies^{3,4} noted that Gross Domestic Product (GDP) of Pakistan is directly linked to energy in the country which was found to be thirty percent. In their findings, they recommended to increase the generation capacity based on the growing needs of the industrial sector, agricultural sector and domestic sector in order to achieve sustainable economic growth.

Figure 1 shows a relationship in which it is seen that Per capita energy consumption in developed countries and their Gross National Product (GNP) is much higher than in countries with low incomes⁵. A sharp fall from fifteen to ten percent of the investment in the GDP ratio for Pakistan between 2008 and 2013 was observed as contrary to other South Asian countries. All these reports and figures further strengthen the notion that the energy crisis of Pakistan is the main cause in the declination of the exports as well as hampering the economic development of the country. A deep investigation into its root causes and practical implementation of their solutions both for

*Author for correspondence

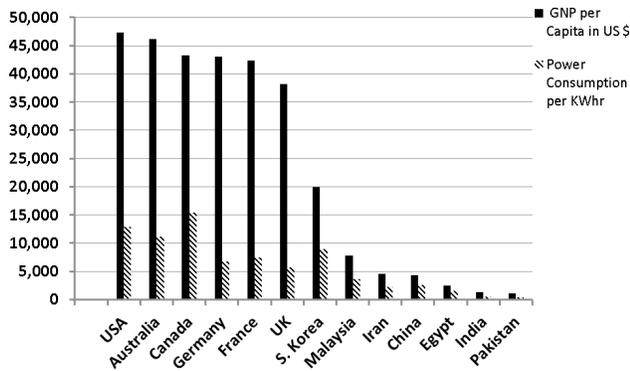


Figure 1. Per capita energy consumption and gross national product of different countries.

small as well as large scale is essential for the economic growth of Pakistan.

2. Issues and Challenges for the Energy Sector of Pakistan

Figure 2 shows the power hierarchy of Pakistan. The current power crisis of Pakistan is not only due to the mismanagement and negligence in the past ten to fifteen years only. In fact, it is the lack of foresightedness, short term solutions and non-coherent power policies which extend along over a quarter of a century. It is likely that power shortage will increase to 8000 MW by 2017 and rise to over 13,000 MW in 2020⁶.

3. Short Sighted Power Policies

A policy decision was made in 1987 that banned Water and Power Development Authority (WAPDA) from investing in thermal generation plants. The policy, though novel in its approach resulted in the shortages of power. Thus, this change in policy was reflected in the form of power deficiency that had already begun to create serious problems in the early 90s, when the power shortages were experienced. WAPDA and Karachi Electric Supply Corporation (KESCO) were responsible for the power supply of the whole country and they were suffering from large losses due to corruption, inefficiency and bad governance of these entities. On the other hand, the government was not able to invest in new projects in its capacity building due to the financial constraints. Even the up gradation and modernization of existing plants was not possible. Therefore, in order to reform the energy sector, the gov-

ernment turned to the private entities. It was the fore seed that a competition from the introduction of the private firms would result in the better performance of the public sector energy entities. The power policy of 1994 provided generous incentives for Independent Power Plants (IPP) that resulted in the attraction of investments and increasing the production capacity of the system⁷. However, the power policy in 1994 was based on a more expensive generation mix mostly from oil. The oil based generated power was more costly and the increase in tariffs were not the true reflection of the cost that WAPDA had to bear. This resulted in adversely affecting the WAPDA's finances. The energy policy of 2002 like that of 1994 continued these policies without any preference given to the source used for energy production. This resulted in the private sector happily relying on the thermal power plants that used exported and expensive furnace oil along with natural gas.

A major flaw in both the energy policies was that in spite of the incentives given to the IPPs there was no concern shown by the government about the efficiency at which they were operating. It was the major factor that the power plants continued to run without having any check or balance on the efficiency under which they were operational. In short, the energy policies formulated and followed during the last two decades have led to the current crisis, because of the high costs and an unsustainable energy production, resulting from a thermal based generation fuel mix.

4. Inefficient Distribution System

WAPDA was disintegrated into eight distribution companies (DISCOs) under the reforms of 1992 policy to improve distribution services and to improve the recovery of their debts to strengthen its financial position. It was expected that independently operating generation companies having professionally qualified executives will guarantee better results and lower losses than bureaucratically run WAPDA. Unfortunately, these targets were not met. In Pakistan the values for the transmission and distribution losses are higher as compared to other countries as shown in Table 1⁸. Electricity theft commonly called as administrative losses, has reached new heights in the recent times⁹. Many of the DISCOs as shown in Table 2 continue to show distribution losses from 20% to 40%, which are very high as compared to other well performing DISCOs¹⁰.

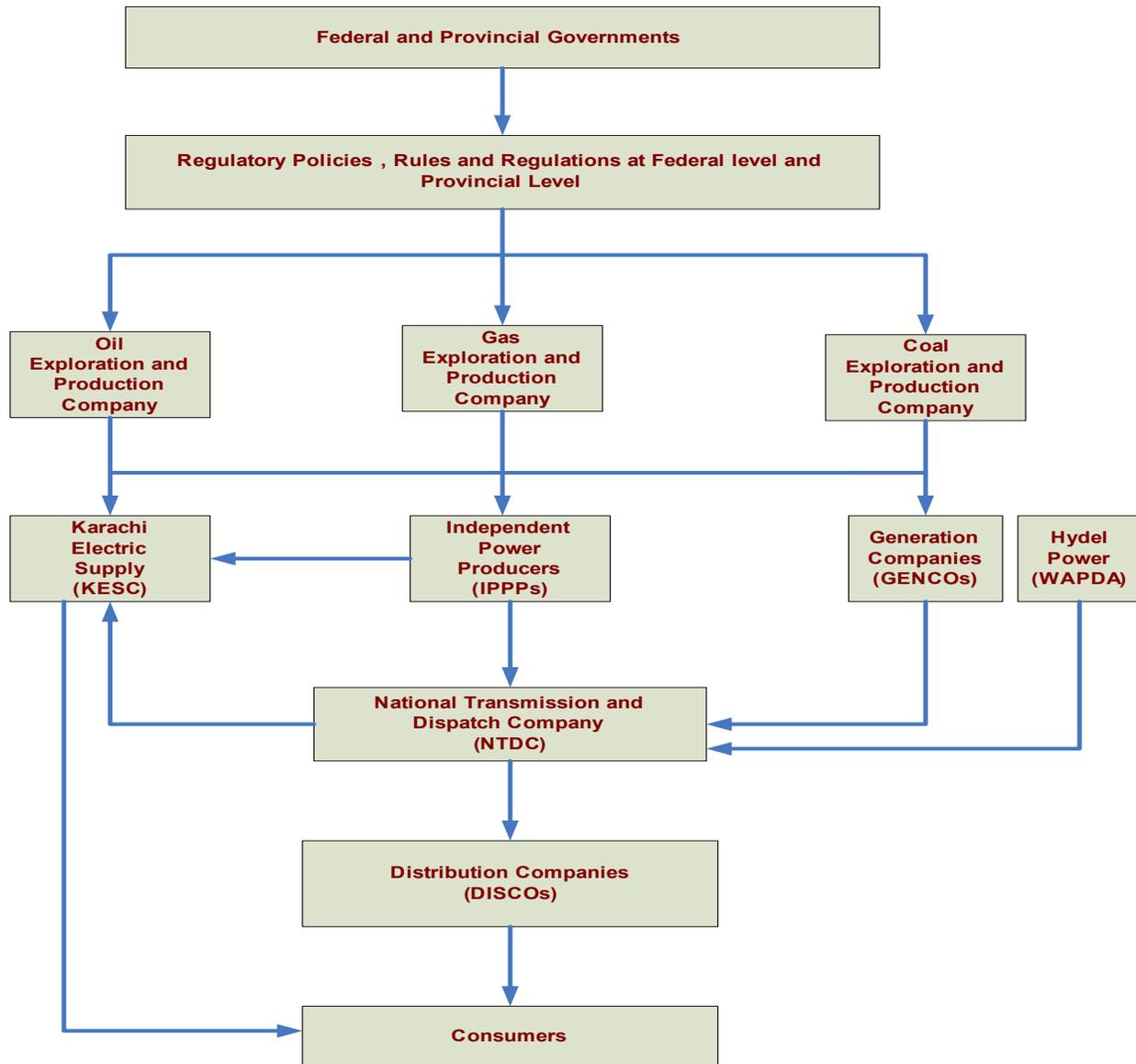


Figure 2. Power structure of Pakistan.

5. Tariffs

The National Electric Power Regulatory Authority (NEPRA) is the regulatory body that determines the tariffs of each DISCO, which is forwarded to the government that notifies a unified tariff. Due to a high generation cost and losses there is a difference between the tariffs determined by the NEPRA and the tariffs that are announced by the government to be charged from consumers. This difference is paid by the government in the form of the subsidy. Despite substantial tariff increases over the last four years, this gap continues to increase. The inability of

the government to pay the differential cost to the DISCOs results in the form of the circular debt.

Over the past few years, the government has given millions of dollars in order to reduce this circular debt, but it continues to grow with the passage of time¹¹. This circular debt has resulted in a number of the negative effects such as underutilization of the generation capacity, a higher cost of the electricity generation due to the low plant capacity factors and a lack of trust for the future foreign investments in the power and energy sector of Pakistan. There is no short cut to reduce this circular debt. The consumer end tariff rationalization that truly reflects

Table 1. Transmission and distribution losses of different countries

Sl. NO.	Heading Number Two Country Name	Transmission and Distribution Losses as Percentages of the Total Output Power
1.	Germany	4.3 Percent
2.	Australia	5.3 Percent
3.	United States	6 Percent
4.	Malaysia	6.4 Percent
5.	United Kingdom	7.6 Percent
6.	Saudi Arabia	9.4 Percent
7.	Russia Federation	10 Percent
8.	Bangladesh	10.3 Percent
9.	Iran	14.6 Percent
10.	Pakistan	16.9 Percent
11.	India	21.1 Percent
12.	Developing Countries (UN Classification)	16.1 Percent
13.	Average Value of the World	8.1 Percent

Table 2. Transmission and distribution losses of distribution companies (DISCO's) of Pakistan

Sl. No.	Name of the Distribution Company	Year 2011-2012		Year 2012-2013
		Target for the Percentage Transmission and distribution losses set by NEPRA	Actual Percentage of Transmission and Distribution Losses incurred in DISCO's	Transmission and distribution losses set by NEPRA
1.	Islamabad Electric Supply Company Limited (IESCO)	9.50	9.52	9.50
2.	Lahore Electric Supply Company Limited (LESCO)	12	13.5	12
3.	Gujranwala Electric Power Company Limited (GEPCO)	10.50	11.22	10.50
4.	Faisalabad Electric Supply Company Limited (FESCO)	10.83	10.90	10.83
5.	Multan Electric Power Company Limited (MEPCO)	15	17.91	15
6.	Peshawar Electric Supply Company Limited (PESCO)	28	35.98	28
7.	Hyderabad Electric Supply Company Limited (HESCO)	22	27.73	22
8.	Quetta Electric Supply Company Limited (QESCO)	18	20.56	18
9.	Sukkur Electric Power Company Limited (SEPCO)	28	39.14	28

the cost of the energy production and measures taken in order to reduce the theft of electricity can help to reduce this debt.

6. Solutions

Energy is essential to economic and social development and improved quality of life. The current energy situation in Pakistan is due to the reasons explained in the foregoing section. The complexity and serious consequences due to the energy crisis in Pakistan, requires that swift and serious actions are taken that would result in an uninterrupted supply of electricity to our industrial, agricultural and domestic consumers. The following measures could be taken in an effort to resolve the current crisis.

7. Altering the Generation Mix

There is a need to change the current and expensive energy mix of Pakistan^{12,13-19} and energy production from fossil fuels is also resulting in high greenhouse gas emissions. This can be achieved by placing a ban on future generation plants that are based on oil. Priority should be given to power plants that are based on a cheaper source of energy such as hydro power plants²⁰. In this regard, several measures have already been taken by the government by installing hydro power plants that could help in

reducing the gap between demand and supply. A list of the future hydro power plants is given in Table 3²¹.

8. Power Theft and Tariff Rationalization

In addition to an expensive energy mix, another important reason for the rising cost of electricity has been excessive transmission and distribution losses. Stringent measures to check theft of electricity, with strict regulations and their practical implementation with the help of law enforcement agencies will be necessary in order to reduce these losses.

Another problem is that consumers of effectively functioning DISCOs have to pay for the corruption, theft and inefficiency of poorly functioning DISCOs. Its major cause is the unified tariff system. The real purpose for the establishment of DISCOs was that NEPRA would determine different tariffs for each DISCO that would have been based on its performance. Unfortunately, this aim was never met. The current system of uniform prices with subsidies provided by the government provides no incentives for these DISCOs to improve their performance. It is imperative to introduce a performance based pricing system for each DISCO as determined by NEPRA. The poor performance should be addressed immediately and must be resolved in a given time frame otherwise penalized in the form of a higher tariff.

Table 3. Upcoming independent power producer's hydro power projects

Sl. No.	Project	Location	Capacity (MW)	Projected Completion Year
1.	Patrind Hydropower Project	Kunhar River, Khyber Pakhtunkha/Azad Jammu and Kashmir	147	2017
2.	Gulpur Hydropower Project	Poonch River, Gulpur, Azad Jammu and Kashmir	100	2018
3.	Sehra Hydropower Project	Poonch River, Azad Jammu and Kashmir	130	2018
4.	Suki kinari Hydropower project	Kunhar River, Mansehra, Khyber Pakhtunkha	870	2020
5.	Karot Hydropower Project	Jehlum River, District Rawalpindi, Punjab	720	2020
6.	Azad Pattan Hydropower Project	Jehlum River, Sudhnoti, Azad Jammu and Kashmir	640	2020
7.	Chakothi-Hattian Hydropower Project	Muzaffarabad, Azad Jammu and Kashmir	500	2020
8.	Kohala Hydropower Project	Jehlum River/Kohala, Azad Jammu and Kashmir	1100	2020

9. Capacity Building of Public Sector Plants

The power plants run by the government urgently need investment in order to restore their productivity. Improving the efficiency of these power plants can help to decrease the gap between demand and supply. This investment would not only increase the generation capacity of these power plants, but would also help to improve the plant capacity factor thus reducing the cost of the unit of the electricity that is produced and sold to the consumers. Theft of oil is another issue that needs to be resolved in these publicly operating generating units. A strict control and audit by a neutral party can help to check this pilferage but would also ensure that the oil provided to these entities meets the required standards.

10. Energy Conservation and Demand Side Management

Figure 3 shows the energy consumption pattern for the last five years which shows that the major sector for the energy consumption in Pakistan is domestic sector²². The gap between the demand and supply of electrical power can also be reduced by improving the consumption of electricity, especially during peak hours with the help of time metering method^{23,24}. Similarly, the energy consumption can also be reduced on the demand side by adopting energy efficient measures such as use of energy efficient devices and appliances in households and industry. An awareness campaign should be started on a national level that creates awareness among the masses to avoid wastage of electricity.

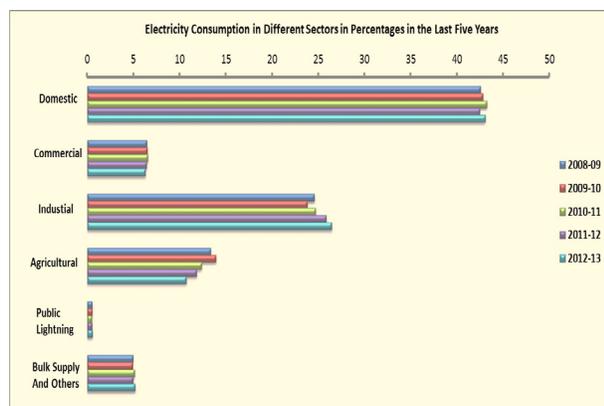


Figure 3. Energy consumption by different sectors of Pakistan.

11. Conclusion

This article highlights the major issues for the power crises of Pakistan. It is the need of the hour that coherent and foresighted national level policies are formulated that have national consent to set up future power generating plants by employing local resources, such as water, coal, nuclear and renewable energy sources to solve the present energy crises of Pakistan. Additionally, by improving the infrastructure and improving the managerial issues of the power distribution hierarchy, the power crises of Pakistan can be reduced by a significant amount.

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