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THE POLITICAL ECONOMY OF ENERGY DEVELOPMENT IN PAKISTAN*

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Recently the energy sector and the Government energy policies have become one of the more controversial and hotly debated issue of Pakistan's socio-economic scene. The paper presents a picture of the historical growth in power seetor, of both demand and supply. The controversial 1994 power policy is then critically discussed. The related problems and policy options available to the government, under the current economic and political constraints, are also outlined. While the lack distribution capacity would suggest that Pakistan has long had a "hidden demand" (the bulk of the country's geographic area is still not connected to the National power grid), power shortages only became a major issue of public debatc during the early Eighties when the urban areas of the country first began suffering regularly from "load-shedding" by the public sector utilities. This not only affected the business and industrial sector but was also severely affected the daily routine of housholds (thus gathering the potential of becoming a major political issue). The controversy reached its height in 1995 when the then Pakistan People's Party (PPP) government announced its private power policy, which envisaged not only the set up of new power units in private sector but also the privatization of state owned power generation units under private sector (mostly foreign) management. While all due credit must be given to the Government for attending to a potentially crippling shortcoming in the economic infrastructure, one must nonetheless also look at the political aspects of the power policy in order to appreciate its various elements. The paper does this in the end.

I. Introduction[1]

The energy sector and the government's energy policies in recent past have become one of the most controversial and hotly debated issues of Pakistan's socio-economic scene. The theme of the paper is to quickly sketch a picture of historical growth in the power sector of both, demand and supply, before moving onto the controversial 1994 power policy and thence to the possible problems and policy options available, given the current economic and political constraints.

* Views expressed in the article are the authors' own and do not necessarily represents the opinions of the respective institutions with which they are associated.

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[1] This article was originally presented at the AERC conferenee in Mareh 1998. Many of the recommendations put forward in the article have already been recognized and in some cases partially

The lack of distribution capacity suggests that Pakistan has long had a "hidden demand" and the bulk of the country's geographic area is still not connected to the National Power Grid. However, power shortages only became a major issue of public debate during the early Eighties when the urban areas of the country first began suffering regularly from "load-shedding" by the public sector utilities. This not only adversely affected the business and industrial sector but also severely disturbed the daily routines of households (thus gathering the potential of becoming a major political issue).

The controversy reached its height in 1995 when the then Pakistan People's Party (PPP) government announced its private power policy, which envisaged not only the setting up of new power units in private sector but also the privatization of state owned power generation units to private (mostly foreign) sector management. While due credit must be given for attending to a potentially crippling shortcoming in our economic infrastructure, one must nonetheless also look at the political aspects of the power policy in order to appreciate its various elements.

II. History

When Pakistan become an independent state in 1947, it had virtually no industrial base and just three hydel power stations. Power supplies in all major towns were owned and distributed by private producers, with diverse voltage and fre-

implemented. Some of them are as follows: Reversal of the cross-subsidy provided to the domestic sector at the expense of industry, removal of the subsidy to power consumption in the Federally Administered Trial Areas (FATA) and of flat rate tariffs, improvements in the power transmission and distribution system, introducing amarket-based mechanism for the pricing of fuel (particularly furnance oil, a key input for thermal electricity), linking the power tariffs to inputs costs. The government realized that the IPP's assertions also held some merit and thus, prodded by the multilateral donors, it initiated a restructuring exercise to improve efficiency at WAPDA, with a view to its eventual privitaziation. As a first step, the government has already transferred its shareholding in WAPDA to a holding company responsible for restructuring and corporatisation, known as Pakistan Electric Power Company (PEPCO). Its mandate includes management of the restructuring process, assistance with the commercialization and efficiency improvement programs, and preparing for WAPDA's eventual privitization. To this end, PEPCO will assist in reorganizing the Power Wing of WAPDA into three thermal generation companies, one national transmission and dispatch company, and eight distribution companies, the induction of new management into these companies, and development of management and other systems to support their operation along commercial lines. In the meantime WAPDA has gone through a Manpower Transition Plan (MTP), which will ensure that the corporate entities would be left with their desired, trained, technical and efficient staff strength and the federal government will take care of surplus staff. Furthermore, the government is attempting to create a competitive market-based pricing structure for the energy sector. In this regard, the government has made traemendous progress, abolishment of flat bill rates, reversal of domestic - industrial cross subsidy, removing FATAs subsidy, improve transmission and distribution efficiency, etc. Moreover, the energy sector as well as the investment climate in Pakistan has undergone tremendous changes, which are obviously not accounted for in this paper. Nevertheless, the authors feel that the essence of the recommendations remain unchanged, i.e., the problem with the IPPs are merely a symptom of weaknesses in Pakistan's energy sector, particularly the public sector utility WAPDA.

quencies in each town. The Water and Power Development Authority commonly known as WAPDA was established in 1958 to implement the Indus Basin Treaty.

The initial emphasis on hydel generation was a consequence of the economy's heavy dependence on agriculture sector, and the consequent need to improve the water management system. Hydroelectric projects, it was hoped, would provide considerable synergies in terms of increasing acreage under cultivation and simultaneously increasing the country's electricity generation potential to power the subsequent (planned) industrial growth.

Figure 1, summarizing Pakistan's installed generating capacity, clearly depicts this emphasis on hydel generation. With the passage of time, however, thermal generation has increasingly captured a larger share in total generation.[2]

On the demand side the increase in electricity demand was due to following factors:

i) Since 1950's upto the 1990s Pakistan's GNP was growing at an average rate of around 5 per cent, which led to an increase in per capita income and consumption.

ii) The change in structure of the economy from a pure agriculture base to industrial base, not only generated its own demand, but also resulted in increased urbanization, increasing power requirements of urban domestic consumers.

iii) The increase in domestic electricity consumption, especially after mid-Seventies, was due to two factors: (a) the subsidized tariff rates, which between 1975-85 declined by 24 per cent in real terms [Pasha, Ghaus and Malik, (1989)]; (b) the phenomenal increase in usage of electrical appliances. This was again due to two factors: (i) increase in income, and decrease in price; (ii) migration to the Middle East, which increased the income of low and middle classes, especially in far-flung areas of rural Punjab and NWFP.

Figure 2 shows the change in demand among four main sectors of the economy. It shows that the domestic consumption rose from a mere 13 per cent in 1960 to 28 per cent in 1985 and by 1995 it even surpassed industrial consumption at 40 per cent against just 30 per cent for industry.

Although electricity consumption in the agriculture sector increased by over 100 per cent between 1960-65 (from 11 per cent to 25 per cent), possibly due to the impact of Green Revolution, after that it stagnated. In 1990's a decline in consumption was visible. In 1995 agricultural consumption reached all time low since 1962, with only 17 per cent share in national power consumption. The industrial sector's share in total power consumption has nearly halved in the last 35 years i.e., to the present 30 per cent as compared to 65 per cent in 1960. Interestingly, this is not only a reflection of slowing industrial demand, but more importantly, of very strong de-

[2] Complete detail of installed generation capacity of each unit is annexed as Appendix-I, Table A1.

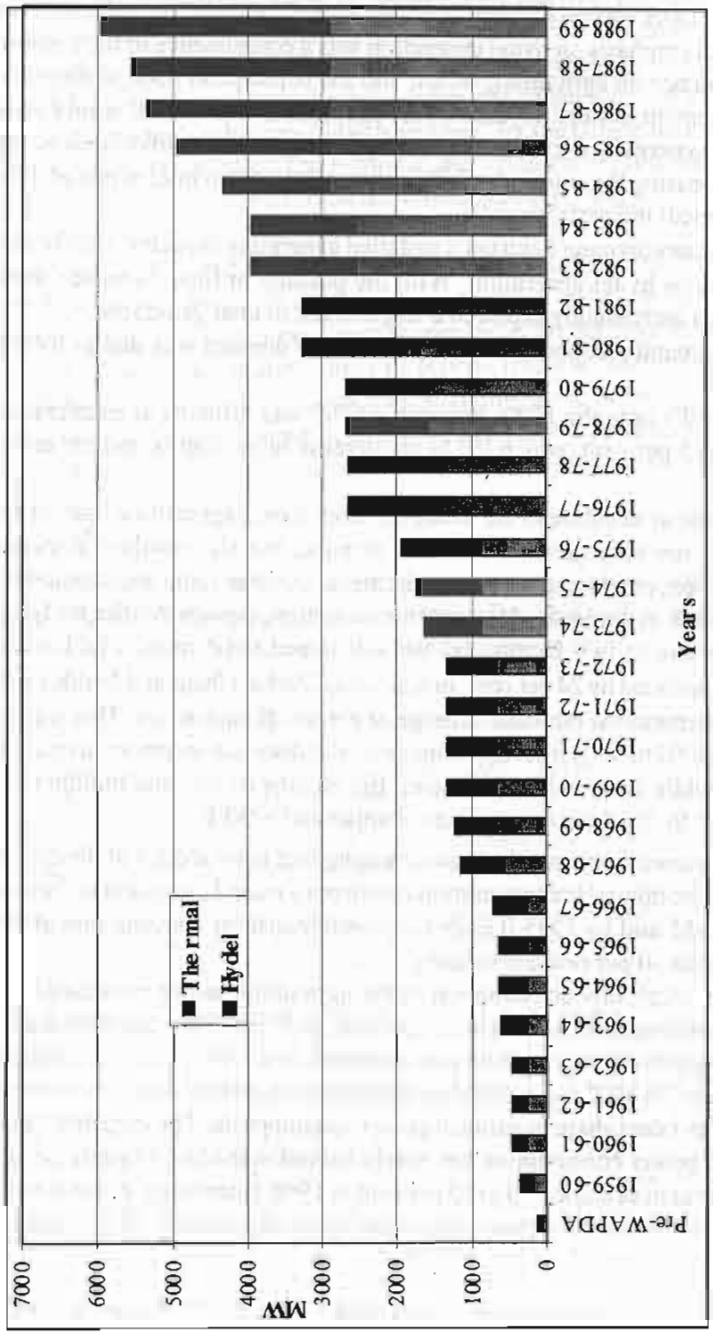

Figure 1

Progress of Installed Generating Capacity

Source: WAPDA Statistical Yearbook

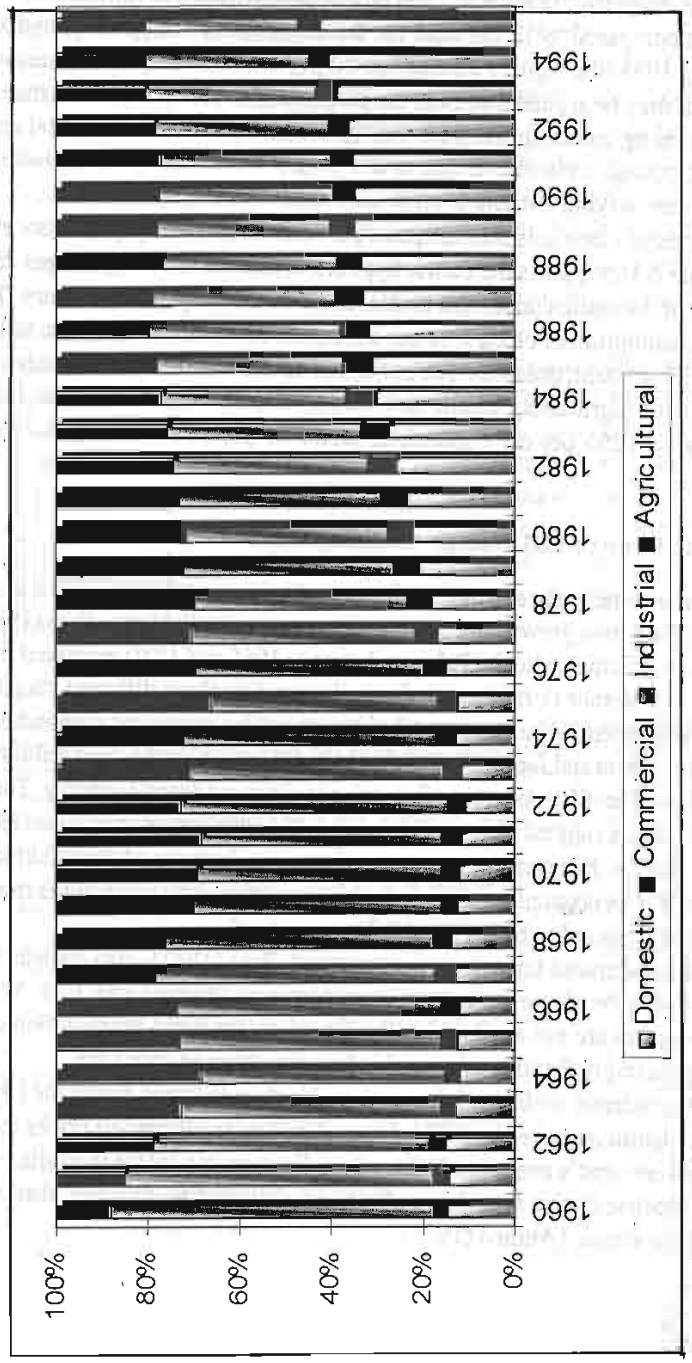

Figure 2

Sector-wise Changes in Demand (Major Sectors of the Economy)

Source: WAPDA Statistical Yearbook

mand from the domestic sector – in 1960 power demand growth for industry was 65 per cent as compared to 13 per cent for the domestic sector (see Appendix-I, Table A2). By 1995, the figures changed to 30 per cent and 39 per cent, respectively. While it may be argued that even the purported "domestic" demand may be camouflaging rising consumption from the "informal" small scale industrial units (the so-called cottage industries), this is not very probable since these undocumented units were paying nothing at all to start with.

The analysis of electricity consumption per consumer over the years (see Appendix-I, Table A3), supports the earlier hypothesis that the consumption per consumer in case of domestic consumers increased more than any other category. The increase in consumption of electricity per consumer between 1972-95 was as follows: overall 29 per cent, domestic 365 per cent, commercial 102 per cent, agriculture 101 per cent (agriculture public declined by 5 per cent between 1981-95), agriculture private 205 per cent, industrial sector 88 per cent, and others 13 per cent.

III. Economic Growth and Energy Consumption

Studies on income, price and output elasticities throw some light on the relationship between economic growth and energy consumption, in Pakistan. Riaz (1987), found that energy output ratio for Pakistan between 1965 and 1980 increased from 1.05 to 1.45. As Poisner (1980) pointed out, these ratios show different stages of economic development and an increase in the ratio can be associated with industrialization, urbanization and fuel substitution in initial stages. A decline and stability in the ratio reflects efficiency and a transformation to a service based economy. Therefore, the above ratios suggest structural changes in Pakistan's economy. Riaz (1987) also showed that for Pakistan the commercial energy elasticity of manufacturing output was 0.40. The elasticities of manufacturing employment and manufacturing capital stock were found to be 0.41 and 0.38 respectively.

As far as the demand for energy is concerned, Riaz (1987), also showed that the income elasticity of energy consumption between 1960-80 was 1.23. While more recent figures are not available in the literature, the rapid urbanization over the 1980s would imply that this relationship has strengthened over time.

Published academic studies, relating to the subject, in Pakistan during the 1990's are scarce. A controversial report "The Future Consumer Electricity Prices in Pakistan" on government's energy policies, allegedly prepared by the then chairman of National Electric Power Regulatory Authority (NEPRA),[3] indicated that electricity was price elastic [Ahmed (1997)].

[3] In Pakistan as we have witnessed approximately a 100 per cent inerease in energy tariffs in the last two and a half years. With prevailing economic conditions (high inflation rates, in which the

Correlation between commercial energy consumption and GNP was found to be high at 0.99, [Riaz (1984)]. Similarly, income elasticity for GDP was estimated to be very high at 0.80, with again very high correlation of 0.99. This supports the hypothesis that economic growth and energy consumption are closely related and economic development process is highly energy-intensive. On the basis of these elasticities the projected energy consumption for next two decades (1985-2005),[4] showed an average growth of 5.5 per cent. The consumption of commercial fuels increased (7.0 per cent) at a greater rate compared to non-commercial energy (1.98 per cent) which is a clear indication that future industrialization, urbanization will be energy-intensive and there will be substitution of commercial fuels for non-commercial fuels.

Another study by Ashraf and Sabih (1992), calculated the electricity demand functions for different sectors in Pakistan by using log-liner and partial adjustment models for the period 1959-60 to 1981-82. The results indicated that the price elasticity of demand for residential sector in Pakistan was 0.15, and the income elasticity 2.5. For industrial sector the price elasticity was found to be 0.47,[5] and the output elasticity was 1.01.[6] These numbers are in consonance with the actual growth trends witnessed in the late 1980's, when domestic consumption grew sharply amidst strong average GDP growth. For the commercial sector the price elasticity was estimated at 0.32,[7] and the output elasticity[8] at 2.53.[9] For the agriculture sector the

consumers' real income is either constant or decreasing), it is feared that instead of an increase in demand one might witness a decrease in demand. In fact, the recent figures on energy demand provide some support to this theory. In Pakistan the capacity demand growth on an average increases at the rate of 8 per cent per annum over the past few years, but due to recent surge in energy prices this declined to 2.3 per cent in 1994-95 and hit the lowest level of only 0.4 per cent in 1995-96.

[4] The trend growth rates for energy forecast were taken as GNP=6.3 per cent; industrial output=7.5 per cent; agriculture output=2.9 per cent and population output=2.5 to 2.9 per cent.

[5] In fact when the nominal and real price elasticities were calculated, the real price elasticity was found out to be either insignificant or with the wrong sign. This suggests that nominal prices have a much greater influence on demand than real prices. Also short-run price elasticity (0.21) was less than long-run price elasticity (0.38). Again suggesting that in the long run the demand for electricity is more price elastic than in the short-run.

[6] GNP was used as the proxy for output in the industrial sector.

[7] The low price elasticity was due to the lack of opportunities for conservation of elasticity and also due to lack and high cost of alternatives. Although, the use of small power generators is prevalent in the commercial sector but it is only used as the last resort when there is a complete power shut down, due to its high initial and running cost.

[8] Because of absence of data for commercial sector, GNP was used as the proxy for output, on the assumption that the level of commercial activity is highly correlated with the level of national output.

[9] The output elasticity of commercial sector was quite high as compared to other sectors. It suggests that the higher tariffs applied to the sector are justifiable by the implied high marginal benefits.

price elasticity was 0.66, and the output elasticity[10] was 3.10. The above results are evidence of a strong correlation between energy consumption and GDP growth and are supported by Figure 3 for the period 1972-95.

IV. The Cost of Electricity Outages

Pasha, Ghaus, and Malik, (1989), calculated the cost of electricity outage[11] for Pakistan's industrial sector. The estimated costs of unplanned outages was Rs11.73 per kWh and planned outages was Rs6.67 per kWh. The cost of outages for the fiscal year 1984-85, was 1.8 per cent of GDP or Rs6.2 billion. However this was higher than the Rs4 billions estimated by Investment Advisory Center of Pakistan (1986) for the same period. As far as the components of outage costs were concerned it was found that, spoilage costs attributed 55 per cent, net idle factor 33 per cent and adjustments 12 per cent, to total losses.

According to another study [Lahore Chamber of Commerce and Industry (1986)], it was shown that in Punjab, between October 1984 and May 1985, the average loss due to loadshedding was 25.6 per cent of output, with a maximum of around 30 per cent in the bicycle, steel and electrical goods industry to a minimum of around 14 per cent in ceramics. The total production loss for the fiscal year 1984-85 in Punjab was estimated at Rs6.8 billion, or 15 per cent of the value added in the industrial sector of Punjab. Another study [World Bank, E.I.U., (1994)] estimated a loss of $950m of loadshedding on Pakistan's economy for 1993.

One final aspect that needs attention is of frequent and/or extended power outages stemming from a consequent drop in investment. Unfortunately no assessment of such impacts on Pakistan's economy are available.

V. Tariffs, Energy Consumption and Economic Growth

The paper has already presented evidence indicating that energy consumption and economic growth are highly correlated. Intuition and elementary demand theory also suggests an inverse relationship of these variables with tariffs. Any increase in cost of power, *cetris paribus,* decreases its consumption, increases production costs and lowers production. The production loss could be partially offset, in the presence of weak policing, by a shift from purchase to theft of power. This is a common phenomenon in Pakistan as in many other developing countries.

A study by Hisnanick and Kymn, (1992), which focused on slowdown of the US growth rate between 1958-85, suggested that one of the major factor which

[10] With GNP as the proxy for index of production.

[11] The highest incidence of outage was found to be in the province of Punjab with an average of 307 hours per annum, in NWFP 298 hours, Sindh 67 hours and Baluchistan 29 hours.

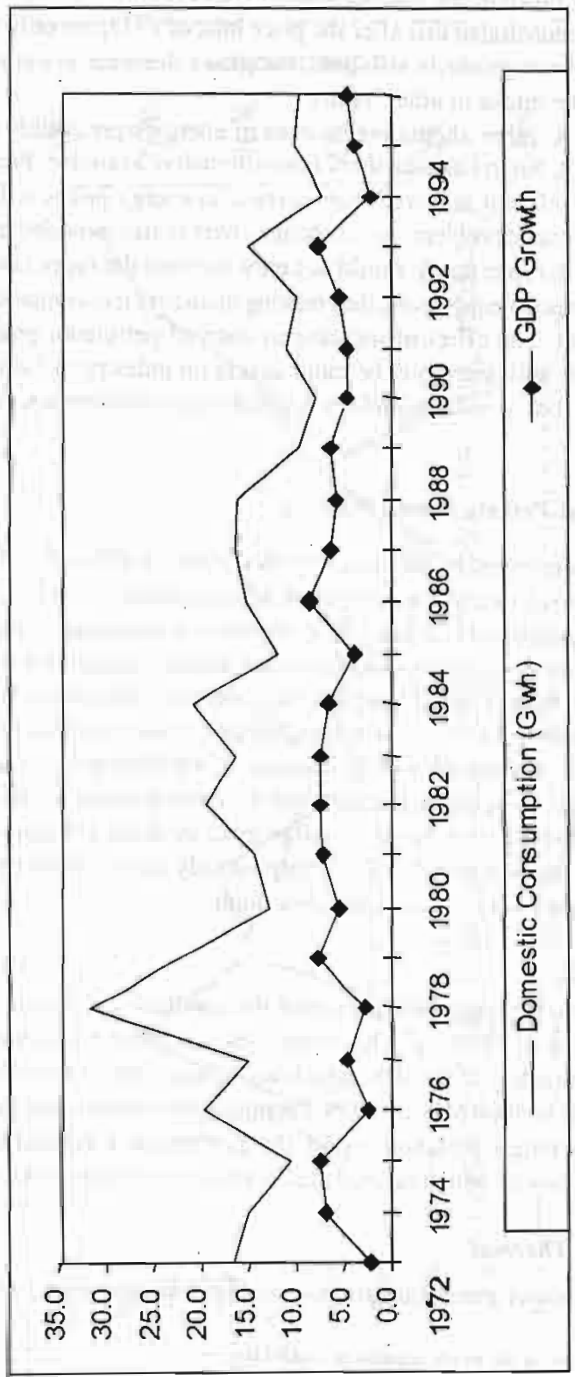

Figure 3

Energy Consumption and GDP growth

resulted in the slow down of the growth rates of US economy was the increase in energy prices. It demonstrated that after the price hike of 1973, not only was there a decrease in petroleum products as inputs, but also a decrease in output, which further decreased the intake of other inputs.

In case of U.S.A. other alternative sources of energy were readily available (nuclear energy etc.), but in Pakistan there is no alternative available. Petroleum is the main input, therefore it is feared that increase in energy prices will create a fiscal balance of payment problem. An exchange cover is also provided to all IPPs, therefore a change in rupee parity would not only increase the rupee cost of electricity but also other petroleum inputs, thus making industries less competitive in the international market. The effect of increase in costs of petroleum products and consequently power will, therefore, be more severe on industry in Pakistan. The figure for Pakistan show a correlation between industrial consumption growth and tariff.[12]

VI. Background of Private Power Policy

Since the announcement of the Private Power Policy in 1994 a lot of criticism has been levied from all quarters regarding the adverse consequences of the policy on the economy in general and the individual consumer in particular. Unfortunately, much of the criticism appears to be based on vague assumptions gained from media reports rather than on a detailed study of the contracts. Moreover, there is no discussion of the consequence of a contractual default. Even if one accepts that the contracts are biased in favour of the IPPs it is also true that the policy was promulgated by a sovereign elected government, and the consequences of repudiating a contractual agreement may be severe. A will to try to work out a strategy mutually beneficial to all parties concerned, is also conspicuously absent. In the next section the policy is evaluated from an economic view point.

a) The Backdrop

First of all, it is necessary to understand the conditions prevalent when the Private Power Policy of 1994 was announced. The government was facing a peak shortage of approximately 2500 MW, which according to *conservative estimates* was expected to rise to 5000 MW by 1999. Facing such a situation and the fact that hydel plants have a longer gestation period, the government was forced to opt for expensive thermal power, which offered highly attractive returns to the investors.

b) Hydel versus Thermal

The prevalent power generation process used in Pakistan is hydel (51 per cent

[12] This is clearly visible in the trends depicted in Figures 4 to 6.

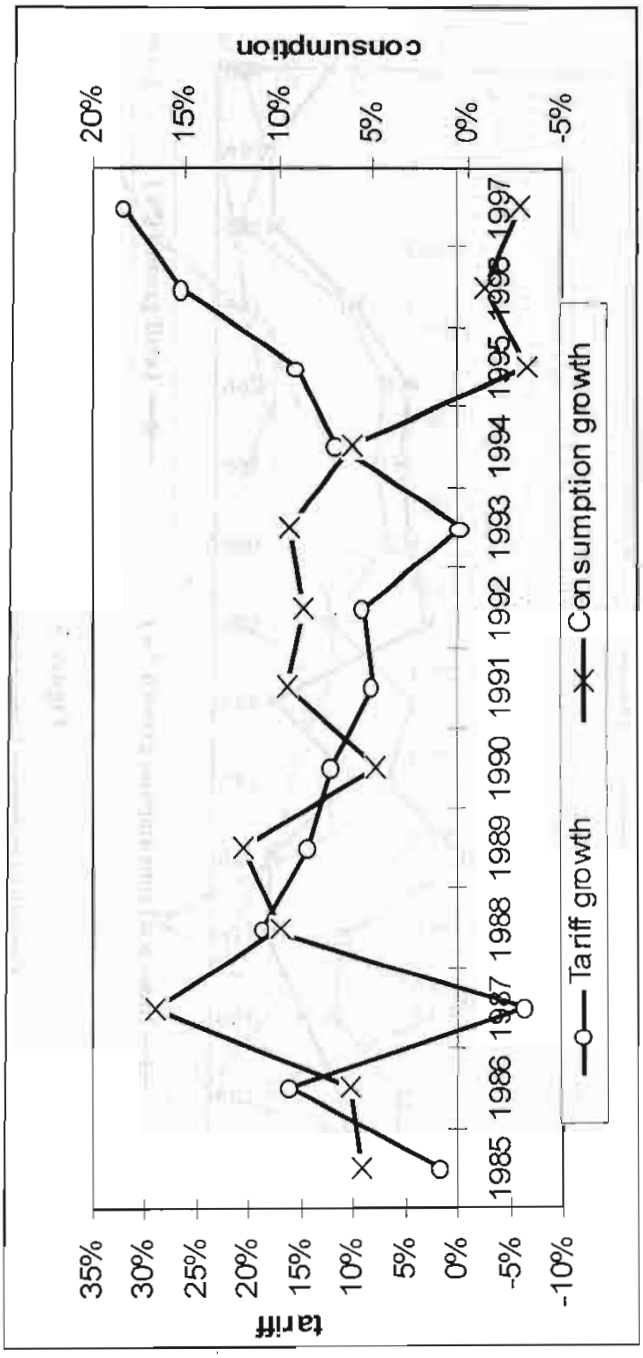

Figure 4

Growth of Industrial Consumption and Tariffs

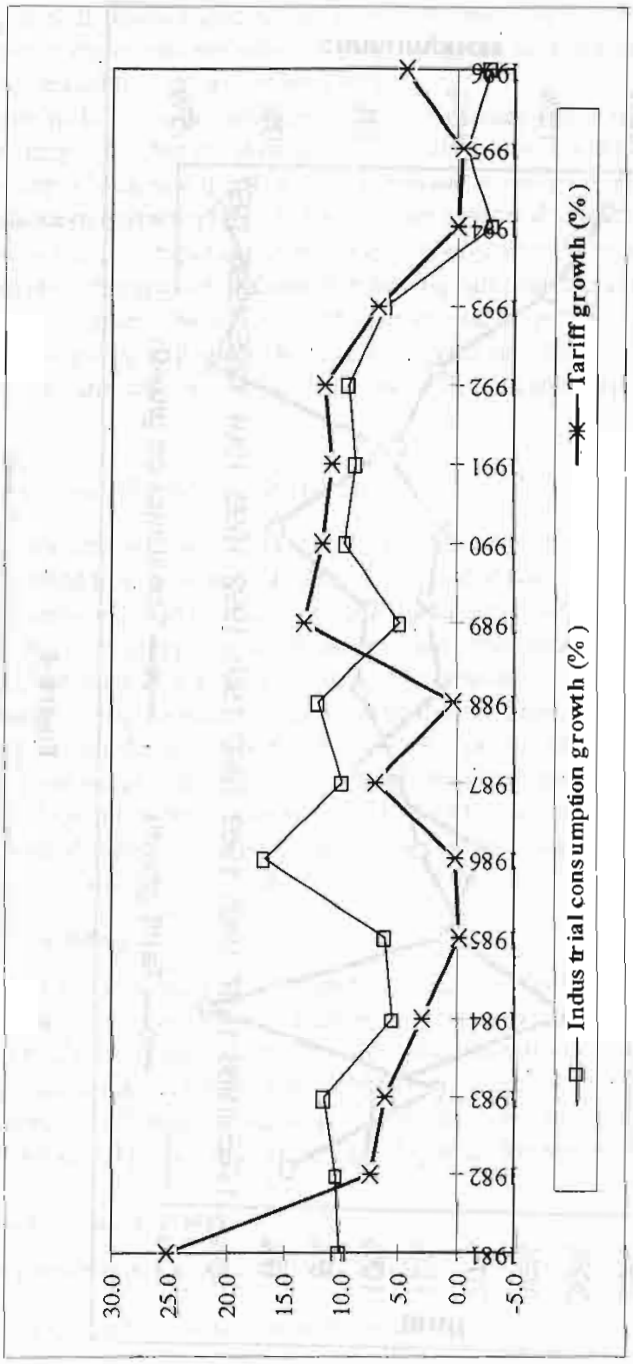

Figure 5

Growth in Industrial Consumption and Lagged Tariffs

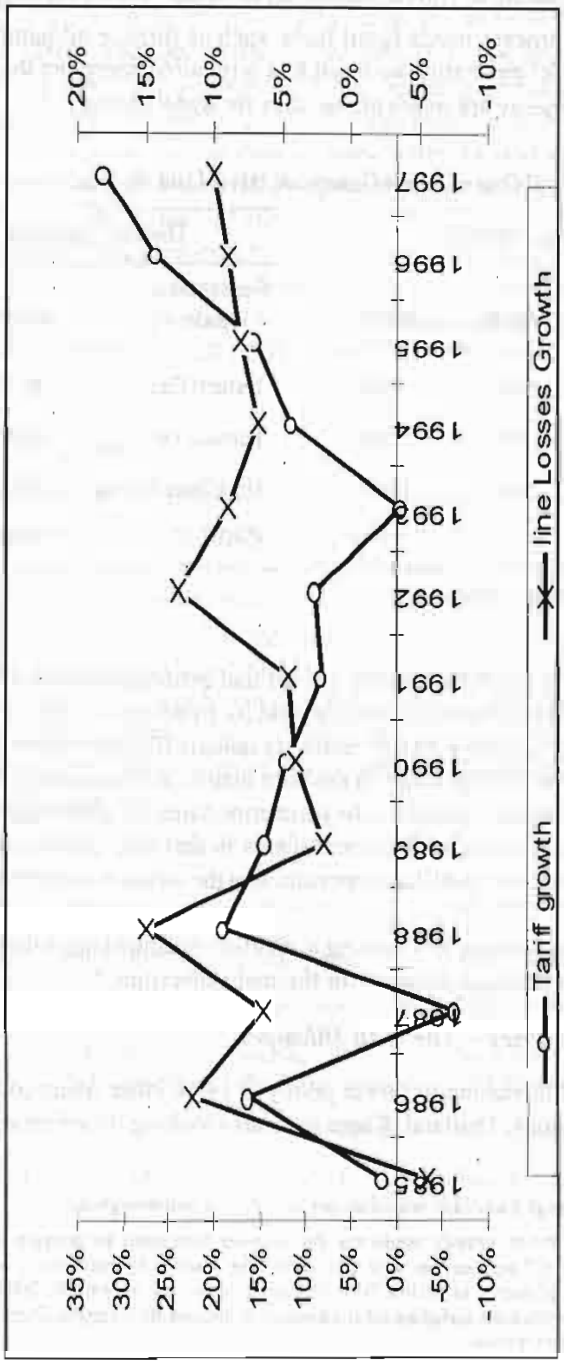

Figure 6
Growth in Line Losses and Tariffs

of total installed capacity in 1993 as compared to 49 per cent for thermal). Thermal power generation process needs fossil fuels, such as furnace oil/natural gas/coal etc., whereas in hydel generation no fossil fuel is required, therefore the generation costs for thermal energy are much higher than for hydel energy.

Total Cost of Power Generation (Hydel and Thermal)

Hydel (paisas / KWh)			Thermal (paisas / KWh)		
Generation Mode	1992-93	1993-94	Generation Mode	1992-93	1993-94
Tarbala Dam	10.00	12.58	Natural Gas	50.40	59.21
Mangla Dam	4.35	3.64	Furnace Oil	62.39	76.45
Warsak Dam	8.47	9.28	High Speed Diesel	213.17	253.46
			Coal	156.82	157.78

Source: ABN-Amro Bank (1996).

One can clearly see from the above chart that generation cost for the thermal power is at least 5 to 20 times higher than that for hydel power. But fresh thermal generation capacity can come on line relatively quickly (the generation time may be less than one year in case of small to medium plants, as compared to 5 to 7 years for a typical hydel plant). Moreover, the generation capacity of thermal plants is not seasonal. Another advantage of thermal plants is that they can be set up at any location. Finally, there is rarely local opposition to the location of the thermal power projects.[13]

As the then government was looking at short-to-medium term solution because of a critical power shortage, it opted for thermal generation.[14]

c) Are the IPP's Pricy – The Wait Dilemma

At the time of launching of power policy in 1994, other Asian countries like, Indonesia, Philippines, Thailand, Korea were also looking for investors in the pri-

[13] In Pakistan, Kalabagh Dam case is an example of delay for hydel projects.

[14] According to an E.I.U. (1994), report the Government forecasted an increase in commercial energy demand of 6.7 per cent per year until 2008. The share of hydroelectricity as a proportion of total supply is projected to decline from 15.3 per cent to 12.2 per cent by 2003. Whereas the share of petroleum products including oil is estimated to increase from current 32 per ecnt to 44 per cent during the same period.

vate sector. For competing in the global market Pakistan had to make an attractive package to lure investors. The package offered by the Government at that time appeared attractive and appropriate to investors. *However, the policy should have been revised annually to accommodate the changing global scenario. A fall in the prices of power generation plant and equipment was being anticipated in the early Nineties, as the equipment manufacturers had expanded their capacity by that time, and demand for power plants was not expected to rise proportionately due to lack of funds.*

The prices of power generation plants have declined significantly in the last couple of years lowering project development costs. Delaying power projects to take advantage of lower project costs would themselves have been expensive. The country would have faced acute power shortfalls resulting in production losses and lower GDP growth.[15]

d) Is the Tariff High?

The attraction of the 1994 energy policy was that a sponsor would receive a monthly payment for making a particular amount of capacity available to WAPDA/ KESC. The regular payment was to enable investor to repay debt, cover insurance and fixed operation and maintenance expenses and earn a return on the equity. The expenses relating to supply of energy (such as fuel cost and variable operation and maintenance expenses) were to be paid on actual dispatch of energy, which could vary between zero to 100 per cent of the dependable capacity of the plant. The main components of the tariff were: (1) Capacity Price (non-escalable component and escalable component (2) Energy Price (fuel costs, variable operation and maintenance component.

The details are given below:

Cost component	To cover	Indexed to	Reference/Base Rates
Non-escalable	debt repayment	Exchange rate	To be fixed at the time of financial
(Rs./$)	close (after making an adjustment		from the base rate of Rs.30.03/$).
Escalable	RoE, fixed O&M, Insurance	Exchange rate (Rs./$), US inflation	Rs.30.03/1$, US CPI as on January 1, 1994.
Fuel Cost	Fuel	Changes in fuel price	RFO @ Rs2,843.5/tonne
Variable O & M	variable expenses of generation	Exchange rate (Rs./$), US inflation	Rs.30.03/1$, US CPI as on January 1, 1994.

[15] According to an estimate, Pakistan lost approximately one billion US Dollars, due to loadshedding.

Although the yearly tariff (breakup of tariff components) differs from project to project depending upon the debt to equity ratio, the sponsors were expected to make around 17-18 per cent return on Equity (RoE) in dollar terms. The purpose of indexation was to provide a cover against devaluation of rupee to ensure a consistent return in dollars, because the tariff was set in Rupees.[16] Moreover, the cost to WAPDA also changed depending on the off-take levels. Figure 7 shows the change in cost/Kwh to WAPDA with different utilization levels. It is evident from the graph that it made economic sense for WAPDA to buy power from IPPs at higher utilization levels.

A typical breakup of tariff, set for thermal power plants, for the first year can be calculated as below:

	Reference Tariff (Rs/Kwh)	Indexed Tariff* (Rs/Kwh)
Non-escalable component	0.8710	0.9979
Escalable component	0.2930	0.4234
Fuel Cost	0.6490	1.1777
Variable Operation & Maintenance Component	0.1000	0.1445

*Tariff has been indexed and adjustment made on basis of rates in 2nd half of 1996

The generation costs of what the utilities would have to pay to the IPPs, the generation cost for KESC, (that operates only thermal power generation plants) are computed. Some of KESC's capacity is on combined cycle, which lowers generation costs considerably. The generation costs for KESC are presented in the following table:

	1996 (Rs/Kwh)	1997H1 (Rs/Kwh)
Fuel costs	0.9175	1.3110
Variable Generation costs	0.0525	0.0674*
Total	0.9700	1.3784

* Estimated

16 The tariff was cascading i.e., it declined progressively over the years as debts were paid. In the first year, beginning at around US Cents 6.1/Kwh (at 60 per cent plant factor) it declined progressively to around US Cents 4.0/Kwh in the 20th year of operation.

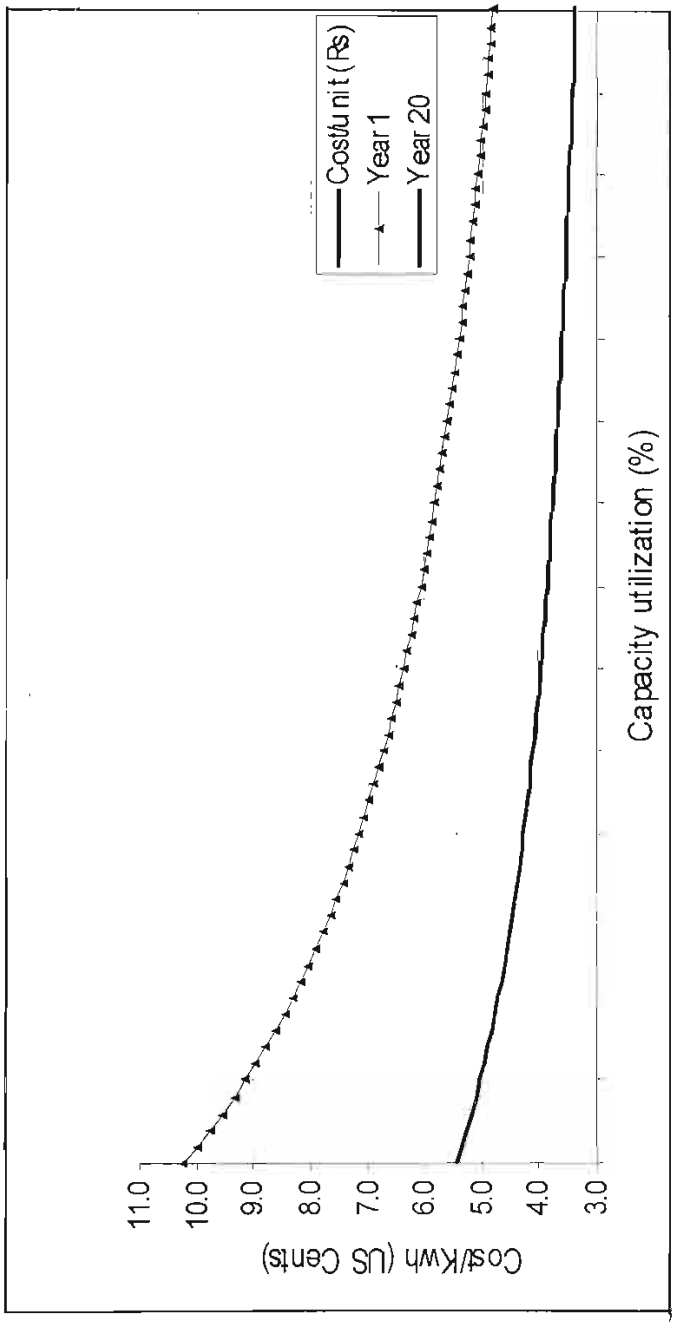

Figure 7
Cost/Kwh and Utilization Levels

The table shows, that despite having an advantage of combined cycle plants using gas (17 per cent cheaper than furnace oil), the fuel cost of state run utility is higher than the indexed tariff for an IPP. The difference is large, as fuel consumption is 11 per cent higher than the performance standards set for IPPs.[17]

Secondly, Pakistan's power infrastructure was in no position to generate power through its own resources as line losses and operational inefficiencies were eating away a substantial portion of WAPDA's capacity.[18] Keeping these factors in view attracting 3,000 MW of capacity would have been almost impossible considering Pakistan's high sovereign risk.

e) Demand and Supply Scenario

One of the major fears being voiced by many was that an oversupply situation was likely to develop in the near future. This fear may have been unfounded as the supply side assumptions were highly optimistic. The demand and supply situation is separately discussed below in order to arrive at a clearer picture.

The sectoral growth in consumption patterns over 1992-96 reveals that the domestic sector was instrumental in leading the growth in power consumption.

	Five Year CAGR (1992-96) (Percentage)
Domestic	8.36
Commercial	6.69
Industrial	–0.17
Agricultural	2.75

The year 1993 saw a disturbing trend emerge, as industrial consumption of electricity witnessed a sharp fall. Apart from this, the share of industrial consumption of electricity, as a per cent of the total power generated, was also declining steadily over the years. The negative growth was due to the following reasons:

i) Cannibalization of energy consumption by captive power units (approximately 347 Mw of installed capacity were added from 1994 to 1996).
ii) The textile sector – a major electricity consumer experienced a major crop failure in 1993-94 after which it has never fully recovered.

[17] If IPPs are not able to deliver energy at lower costs, they themselves bear the additional costs. On the other hand, if public sector utilities are run inefficiently, the cost is ultimately borne by the consumers.

[18] For instance, WAPDA's average plant factor is 51 per cent while line and auxiliary losses stand at 24.05 per cent, this means that for every 1 MW of installed capacity only 0.37 MW is actually supplied to the consumer.

iii) Structural adjustment in the 1990's adversely affected industrial growth as inefficient industrial consumers were forced to shut down.

Historical evidence indicates that industrial consumption is highly price elastic and therefore it was expected that growth in industrial consumption would show a reversal in 1998-99 due to the announced freeze on tariffs. Also, the announced increase in duties for captive power plants would discourage further units to come on line thereby reducing cannibalization.

A strong suppressed demand of electricity exists in the domestic sector, as the bulk of the 860 MW decrease in industrial consumption over the last three years was absorbed by the domestic sector. Domestic consumption of power is positively correlated to per capita income, population growth, rate of urbanization and negatively to tariffs. A slight drop in domestic consumption growth may result as tariffs rise, industrial consumption increases and rate of urbanization slows down.[19]

f) Viability of the Policy: Can the government pay the IPPs?

It is estimated that the government of Pakistan will be expected to service the following annual forex outflows resulting from energy and capacity payments to the IPPs and Hubco.

	1997	1998	1999	2000	2001	2002
Annual Forex Outflow in mln of US$	896	1,122	1,342	1,378	1,522	1,567

Considering that the Government of Pakistan also faces an annual trade deficit of over US$3.2 billion and approximately US$1.5 billion is paid in debt servicing, it will require a strong political will by the government and some exceptional management skills by WAPDA to bail the country out of the current situation. Some of the related issues are discussed below in detail:

1) Renegotiations of Power Tariff

Even during the tenure of the PPP Government, its liberal Private Power Policy was heavily criticized by the then Opposition party. Under Nawaz's Government concerns were raised over the future of the projects initiated under this policy. The Government's repeated assertions on the need to re-negotiate the contracted power

[19] It was expected that over a 4 year horizon, domestic consumption growth will be almost 6.5 to 7 per cent. It is estimated that the dependable capacity, both in the private and public sectors, should surpass peak demand in 1998, but if no progress is made there will again be a shortage of electricity after the year 2000.

tariffs worried project sponsors as well as investors. A unilateral cut in the tariffs promised to the IPPs would mean that:

i) power projects already in the pipeline would be jeopardized,
ii) foreign and local investment in all areas (those involving sovereign guarantees) would be negatively affected,
iii) given the *strong contractual guarantees* provided to the IPPs, by the Government of Pakistan, a unilateral reduction in the promised tariff rates would only result in lawsuits with subsequent penalties (likely to exceed the prospective savings).

Most of the IPPs are based on proven technology, being supplied by world renowned manufacturers, and defaults by either the fuel supplier and/or the utility purchasing the power produced by an IPP, are covered under Sovereign Guarantees. As a result, the IPPs are likely to face penalties only in the unlikely event of them being unable to produce electricity as per agreed terms and conditions.

2) Financial Position of WAPDA and KESC: Can it improve?

The Government's persistent decision of delaying increases in power tariffs will have grave consequences for Karachi Electric Supply Corporation and Water and Power Development Authority. Since the last major revision of the power tariff by the Government (15 per cent in July 1995), the (supply) price of furnace oil (a key input) has increased by over 100 per cent, while that of gas has gone up by 32 per cent. As a result, WAPDA's financial position, which had been quite comfortable until the end of 1994-95, worsened considerably by 1997. Similarly, KESC has also been under financial distress. After reporting net loss of Rs551 million for 1995-96, a net loss of Rs2,324 millions was announced for 6 months of 1997, and a loss of over Rs6 billions for the full year was estimated (see, footnote 1 for a more recent picture).

Even after current rise in electricity tariffs, a loss on the sale of power purchased from the IPPs is estimated and expected to rise with time. These losses would have to be met through adequate tariff increases, to keep WAPDA viable. In addition, to accommodate the rise in furnace oil and gas prices, some cushion would also be required to cover losses (increased theft) due to the required stiff hike in charges.[20]

The increasing share of private power generation requires a strong regulatory framework. Not only that, the linking of the prices of primary energy sources (gas and oil) to international prices and the rupee-dollar parity should have been followed by fixation of electricity tariff depending upon raw material prices.

20 Had the government increased tariffs in 1996-97 by around 25 per cent, the increases now required would have been significantly lower, and WAPDA's position would also have been much better.

3). Options for the Government to bail-out WAPDA and KESC

WAPDA is coping with the financial crunch by delaying payments to fuel suppliers (PSO, SNGPL and SSGC). The continuous rise in the amount of trade debts for these corporations indicates payment delays by WAPDA. In addition, it is resorting to short-term bank borrowings to ease the pressure on cash flows. The payments to IPPs are guaranteed through Letters of Credit in their favour, securing them from any delays in payment.

The only solution to WAPDA's precarious financial situation is an increase in tariffs, along with a drive to reduce distribution losses. In addition, a number of austerity measures would be required to make the corporation efficient. However, implementing such a program would require a significant amount of time as well as considerable political will. Remedial measures are *only short-term, solution lie in raising tariffs.*

g) The Dilemma

The government has two options (a) freeze industrial tariffs and boost industrial production, (b) bail out WAPDA by increasing tariffs across the board or reduce fuel costs (passing the burden onto the exchequer instead). The former would lead to higher export growth and increased forex inflows which would in turn ease pressure on the government's forex obligations. On the other hand, the government could increase tariffs across the board and improve WAPDA's capability to service its rupee obligations to the IPPs.

Textile, cement and sugar together constitute over 70 per cent of industrial consumption of electricity. Unfortunately, no gowth in demand emanating from cement is expected due to weak industry fundamentals. This means that in order for industrial consumption to witness a boost the textile and sugar sectors will have to lead the way. A strong correlation also exists between industrial consumption of electricity and exports, therefore in order to boost exports it is essential that industrial tariffs remain frozen at least in the short run.

According to estimates WAPDA's expected cash deficit by the year end June 1997 was likely to be approximately Rs10 bullion. To make thing worse WAPDA already had arrears of about 10 months. Under such circumstances the question was whether WAPDA would be able to honor its agreement with the 15 IPPs. WAPDA and KESC both were lobbying for a 20-25 per cent increase in tariffs which is merely a symptomatic cure. If the tariff increase was implemented it might have brought WAPDA out of troubled waters but it would simultaneously have retarded industrial growth which is essential to generate forex. Following alternative measures are being suggested to deal with the problem:

1) Reverse Domestic – Industrial Cross Subsidy

At present domestic consumption accounts for 38.3 per cent of total power consumption but contributes only 28.9 per cent to total revenue billed. On the other hand, industrial consumption has a 30.2 per cent share but contributes 40.9 per cent to revenue.[21] This trend should be reversed as industrial growth is stagnating due to high tariffs. Although raising domestic tariff may be politically difficult to implement, the subsidy reversal is an essential ingredient if the government intends to pursue its supply side policy. However, there is a strong possibility that a sharp increase in domestic tariffs may result in an increase in theft. Strong measures need to be taken simultaneously to curb the theft of power.

2) Remove Subsidy to FATA

Consumers residing in FATA pay a fixed household bill of 212 rupees. According to estimates this subsidy is costing WAPDA about 5 billion rupees annually. Although, removing the subsidy outright is improbable it is suggested that the flat rate be revised.

3) Improve Transmission and Distribution Efficiency

WAPDA's line losses have been hovering around the 24 per cent mark for the past three years, whereas the average is 15 per cent in other parts of the world. It is estimated that a one per cent reduction in line losses would translate into additional revenue of one billion rupees for WAPDA. Since a strong correlation exists between growth in industrial consumption and line losses, it is believed that the bulk of theft occurs in the industrial sector and more specifically in the informal manufacturing sector.

4) Rationalize furnace oil prices

According to the Power Policy the fuel component in the energy price is essentially a pass through item. That means that any increase in furnace oil prices is borne by WAPDA and ultimately passed on to the consumer. It is suggested that the government exempts WAPDA and IPPs from paying development surcharge. This would put downward pressure on tariffs. Consequently, electricity consumption would go up and WAPDA would also be better able to service its monthly energy payments.

[21] Pakistan has one of the highest industrial tariffs amongsts developing countries.

VII. Conclusions and Recommendations

According to estimates based on WAPDA's figures, over 50 per cent of population does not have access to electricity, on the other hand, WAPDA currently has installed capacity of 4425MW in excess of peer demand [daily Dawn (1998)]. WAPDA has also to pay on average 60 per cent of installed capacity to independent power projects at a fixed rate. If nothing is done to address this, WAPDA's financial crisis may not only persist but will become worse.

Why is that when WAPDA has power surplus there is so much unmet demand? This is due to "poor governance." When the last PPP government announced its power policy on the backdrop of long and persisting outage of power it resulted in production losses worth billions of rupees (Rs4-6 billion, according to different estimates). Because of the financial crunch the government was facing, it had to rely on private investors and with unstable economic and political conditions prevailing in the country, the then government had to offer very lucrative incentives to attract private investors. Although the contacts were signed for power generation but no public investment was made in complementary transmission system nor any contract was singed with private investors. The government ignored the fact that the transmission lines at that time were not sufficient to carry the load of electricity produced by WAPDA.

The need of the hour is therefore to invest or encourage private investors in transmission system, other wise WAPDA may be forced to close down most of its power generation units, or will have to pay to IPP's for 60 per cent of their installed capacity without even utilizing it! One of the short run options for dealing with the problem is to sell excessive power to India.

As mentioned earlier the Government of Pakistan forecasted an average 6.7 per cent increase in commercial energy demand per year, until 2008. It has also been projected that the share of hydroelectricity as a proportion of total electricity will decline to 12 per cent in 2003, from current share of 15 per cent, and consequently the share of petroleum products and oil will increase to 44 per cent from current 32 per cent. As mostly imported oil is being used, the reliance on thermal energy will not be sustainable, not only because of balance of payment problem, but also due to change of future rupee-dollar parity which will subsequently increase the cost of imported oil and production. Therefore, the options available are:

i) Development of domestic resources, to reduce heavy reliance on imported oil, especially for thermal production.
ii) Shifting to gas, either by developing new gas fields, or importing gas from Iran or Central Asian countries.

Due to auxiliary and line losses WAPDA's revenue from sale of electricity

averages only 74 per cent of long-run marginal cost of supplies [E.I.U. (1994)]. It is therefore importance to control auxiliary and line losses.

At present the FATA areas are consuming a total of 288 MW electricity in peak load season one third of the total number of consumers, 157368 are illegally connected. The tribesmen pay a mere Rs47 million per annum against estimated assessment of approximately Rs345 millions. On top of that, none of the consumers have meters and a flat rate of Rs220 per month is charged from domestic consumers, Rs428 from commercial, and Rs1777 and Rs5784 from industrial B-I and B-II category, respectively. These rates need to be revised upward.

It was observed that except in 1960's domestic and agricultural consumers were subsidized at the expense of industrial and commercial consumers, thus increasing the energy costs of both industrial as well as services sector. This is one of the main reasons for increased domestic consumption over the years. Such subsidization on the one hand leads to unproductive use of energy, and on the other, has adverse effect on both commercial and industrial sector due to high costs. Therefore, to encourage industrialization and services sectors, domestic tariff rates have to be increased.[22]

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[22] See, footnote 1.

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APPENDIX-I

TABLE A1

Installed Generating Capacity

	Major Hydel	Installed Capacity	Average Age	Effective Capabilities Max.	Effective Capabilities Min.	Avg. Plant Factor (%)	Dependable Capacity
	Tarbela	3478	13.5	3768	1260	58.30	2027.7
	Mangla	1000	19.7	1170	544	78.96	789.6
	Warsak	240	32	235	100	47.78	114.7
	Total	***4718***		***5173***	***1904***		***2931.9***
	Low Hydel						
	Dargai	20	45			76.1	15.2
	Malakand	20	57			78.5	15.7
	Rasdul	22	45			46.4	10.2
	Chichoki Malian	13	38	80	32	33.2	4.3
	Shadiwal	14	36			35.2	4.9
	Nandipur	14	34			43.1	6.0
	Kurram Garhi	4	37			67.2	2.7
	Ranala	1	72			49.6	0.5
	Total	***108***		***80***	***32***		***59.6***
	Net Hydel	**4826**		**5253**	**1936**		**2991.5**
Thermal	**Type of Power Station**						
Multan	Steam	260	35.5	200	200	53.6	139
Faisalabad	Steam	132	30	100	100	59.4	78
Faisalabad	Gas turbine	244	22	190	170	29.7	7
Shahdara	Gas Turbine	85	29	64	54	19.61	17

(continued)

TABLE A1 (continued)

Guddu	Steam	640	19	1400	1348	51.2	327
Guddu	Gas Turbine	600	12			74.3	446
Guddu	Combined Cycle	270	4			74.3	201
Guddu	Combined Cycle	145	3			74.3	108
Sukkur	Steam	50	31	36	36	52.1	26
Kotri	Gas Turbine	174	16	140	127	43.5	76
Quetta	Gas Turbine	83	20	72	55	51.8	43
Kot Addu (1 - 4)	Gas	600	10	1286	1159	33.3	200
Kot Addu (9 - 12)	Combined Cycle	224	5			40	90
Kot Addu (5 - 8)	Gas Turbine	400	9			45	180
Kot Addu (13 - 14)	Gas Turbine	264	2			45	119
Jamshoro	Steam	880	7	710	710	57	502
Pasni	Diesel	17	6	15	15	15	3
Muzaffargah	Steam	1370	3	830	830	60	822
Lakhra	Steam	150	3	100	100	50	75
Mesco	Steam	20	16	16	16	55	11
Total		***6608***		***5159***	***4920***		***3534***

	Installed	**Effective Capabilities**		**Dependable**
Total	**Capacity**	**Max.**	**Min.**	**Capacity**
Major Hydel	4718	5173	1904	2931.9
Low Hydel	108	80	32	50.6
Net Hydel	4826	5253	1936	2991.5
Thermal	6608	5159	4920	3534
Net Capacity	**11434**	**10412**	**6856**	**6526**

Source: Power System Statistics - 14th issue, Planning Department Power Wing, Oct. 1989, WAPDA.

TABLE A2

Pattern of Consumption (percentage)

Year	Domestic	Commercial	Industrial	Agricultural	Others
1960	13.43	2.99	64.67	11.11	7.80
1961	12.87	3.08	60.46	13.67	9.92
1962	13.56	3.01	54.36	19.16	9.91
1963	11.68	2.94	51.80	25.08	8.50
1964	10.63	3.01	48.12	28.76	9.48
1965	10.76	3.02	49.56	23.27	13.39
1966	10.20	3.40	49.88	22.68	13.84
1967	11.06	3.43	52.23	18.55	14.73
1968	11.58	3.58	49.96	20.15	14.73
1969	10.48	3.16	46.31	25.59	14.46
1970	10.19	3.44	45.72	26.56	14.09
1971	9.78	3.68	44.28	27.03	15.23
1972	9.48	3.43	3.68	44.28	27.03
1973	9.87	3.46	48.31	25.44	12.92
1974	10.88	3.69	47.47	23.8	14.11
1075	10.86	3.53	43.06	29.37	13.18
1976	12.76	4.18	42.54	26.08	14.44
1977	14.31	4.51	42.09	25.68	13.41
1978	15.47	4.70	40.00	26.46	13.37
1979	17.76	4.82	39.68	23.86	13.88
1980	19.17	4.77	38.65	2.20	12.21
1981	20.49	4.91	38.40	23.44	12.76
1982	23.27	5.58	38.63	22.91	9.61
1983	24.57	5.47	38.28	21.98	9.70
1984	27.19	5.79	36.89	20.87	9.26
1985	28.26	5.79	36.89	20.87	9.26
1986	29.11	5.65	38.02	18.58	8.64
1987	30.19	5.58	36.27	19.54	8.42
1988	30.38	5.09	34.59	21.23	8.71
1989	31.57	4.86	34.47	19.82	9.28
1990	31.71	4.58	34.65	20.75	8.31
1991	32.41	4.33	34.28	21.05	7.92
1992	33.11	4.07	34.90	19.90	8.02
1993	35.88	4.17	34.90	17.89	7.16
1994	37.24	4.10	32.78	17.87	8.01
1995	38.39	4.25	30.27	17.75	9.34

TABLE A3

Electricity Consumption by Sector

Year	Domestic	Commercial	Industrial	Agricultural	Total
1972	635	378	2855	997	4865
1973	740	416	3017	1170	5343
1974	752	459	3121	1131	5563
1975	943	503	3094	1631	6171
1976	1128	563	3113	1395	6199
1977	1296	636	3091	1399	6422
1978	1706	733	3402	1761	7602
1979	2091	675	3573	1805	8144
1980	2357	883	4108	2066	9414
1981	2696	954	4526	2135	10311
1982	3223	1047	5002	2369	11641
1983	3752	1049	5572	2559	12932
1984	4535	1287	5884	2673	14379
1985	5076	1413	6249	2798	15536
1986	5845	1526	7288	2900	17559
1987	6806	1713	8012	3471	20002
1988	7900	1868	8973	4415	23156
1989	8660	1921	9416	4379	24376
1990	9360	1963	10324	5027	26674
1991	10409	2072	11229	5620	29330
1992	11458	2143	12289	5847	31737
1993	13170	2333	13043	5635	34181
1994	14133	2547	12637	5772	35089
1995	15584	2623	12528	6251	36086
1996	17116	2962	12193	6696	38957

TABLE A4

Domestic Consumption and GDP Growth

Year	Domestic Consumption (Gwh)	GDP Growth
1972	16.5	2.21
1973	15.1	6.92
1974	10.7	7.45
1975	19.6	2.48
1976	14.9	4.66
1977	31.6	2.84
1978	22.6	7.73
1979	12.7	5.53
1980	14.4	7.33
1981	19.5	7.40
1982	16.4	7.56
1983	20.9	6.79
1984	11.9	3.97
1985	15.1	8.71
1986	16.4	6.36
1987	16.1	5.81
1988	9.6	6.44
1989	8.1	4.81
1990	11.2	4.59
1991	10.1	5.57
1992	14.9	7.71
1993	7.3	2.27
1994	10.3	3.80
1995	9.8	4.70

TABLE A5

Capacity and Domestic Demand

Year	Dependable Capacity	Peak Demand
1984	2929	3295
1985	3268	3791
1986	3652	3933
1987	3874	4325
1988	3994	5031
1989	4234	5440
1990	4636	5680
1991	5266	6090
1992	5339	6532
1993	5934	7522
1994	6851	8067
1995	7555	8252
1996 (F)	7884	8788
1997 (F)	8983	9360
1998 (F)	9856	9968
1999 (F)	11331	10616
2000 (F)	11331	11306
2001 (F)	11331	12041

(F) = Financial year.

APPENDIX-II

Estimated Changes in Key Heads of WAPDA's Profit and Loss Account

Year to June 30	1994A	1995A	1994-95	1996E	1995-96	1997E	1996-97
Sales (Rs. m)	45,701	57,861	12,159	73,512	14,590	83,554	10,042
Fuel Cost	16,539	18,323	1,784	23,885	5,562	33,912	10,027
Purchases from IPPs (m Kwh)	–	–	–	–	–	10,500	–
Average purchasing rate IPPs (Rs./Kwh)	–	–	–	–	–	4.36	–
Average selling rate WAPDA (Rs./Kwh)	1.42	1.65	–	1.93	–	2.26	–
Net loss per unit (Rs./Kwh)	–	–	–	–	–	2.10	–
Total loss from sale of electricity from IPPs	–	–	–	–	–	22,050	22,050
Distribution costs	5,904	7,312	1,408	9,140	1,828	11,425	2,285
Net Profit/(Loss) (Rs. m)	6,035	9,913	–	–	–	–	–
Weighted Average cost of furnace oil (Rs./ton)	2,808	2,850	–	3,334	–	5,739	–
Weighted Average cost of gas (Rs./000 cft)	61.6	66.3	–	84.7	–	102.1	–