The Pakistan Development Review
37 : 4 Part II (Winter 1998) pp. 37:4, 811–823

IPPs: The Real Issues

ANJUM SIDDIQUI

INTRODUCTION

Since May 1998, an important issue facing Pakistan policy-makers has been whether independent power producers (IPPs) produce expensive electricity. It is contended that IPPs' expensive power has rendered the state utility, Water and Power Development Authority (WAPDA), bankrupt. It is also alleged that IPPs indulged in corruption and colluded with WAPDA officials to get their signatures on contracts which allowed procurement of expensive power by WAPDA and which it can ill afford now.

This paper shifts through the rhetoric surrounding IPPs and focuses on the central issue of whether IPPs produce expensive power. If it can be established that IPPs produce cheaper power than WAPDA, then the second part of the argument that WAPDA became financially weak because of IPPs' expensive power is destroyed. The alleged corruption issues are not discussed as they are beyond the scope of the paper.

Section 1 provides a background to the establishment of the private power sector in Pakistan. Section 2 discusses various project risks faced by shareholders and lenders. Section 3 outlines the components of the electricity tariff. Section 4 traces the reasons for increase in electricity tariffs since 1994 when the Power Purchase Agreements (PPA) were signed. Section 5 shows the comparative costs of production of IPPs and WAPDA.

1. BACKGROUND

In 1985, the Government of Pakistan (GOP) with the assistance of the World Bank formulated its long term strategy for development of the power sector in

Anjum Siddiqui is Senior Adviser on Financial and Risk Management at the Hub Power Company, Pakistan.

Author's Note: The views expressed in the paper are the author's own and not of the Company. Data provided by the Hub Power Company and useful comments from S. Khurshid Husain, S. Ahmad Atif, and Afaq Mufti are thankfully acknowledged.

Pakistan. At that time it was correctly assessed that the provision of assured and reliable power would spur economic growth. With energy demand growing at 12 percent and supply at 7 percent per annum. Load shedding was rampant with consequential output losses for industry and agriculture. It was estimated that the annual gap of 2000 MW of electricity cost the country approximately $1 billion per year in lost GDP. Electricity was available to only 40 percent of the population and per capita consumption of 404 kWh was only 4 percent of that in the United States and 24 percent of consumption in Malaysia.

Pakistan had to catch up fast and the development of new capacity became the top priority, but the Government of Pakistan (GOP) lacked the funds for infrastructure development. Consequently, the private sector was invited to develop new generating capacity. It was rationalised that the private sector would not only supplement public sector generation, it would also mobilise additional equity and debt resources and improve the efficiency in the energy sector.

The new energy policy was implemented in a period of high political volatility in the early 1990s. The first Benazir Bhutto government (elected in 1988) was dismissed by President Ghulam Ishaq Khan in 1992. She was succeeded by Nawaz Sharif who initiated a number of free market reforms and also signed Pakistan's first IPP contract for the largest power sector project with the Hub Power Company in 1992. Disagreements with the President led to the dismissal of this government also, and an interim government was installed which held fresh elections in which the second Bhutto government was elected in November 1993. During its tenure, the Bhutto government signed a number of IPP contracts under the 1994 Power Policy and in June 1996, Pakistan's first private sector power plant, the Hub Power Company (Hubco) came into operation. In February, 1997, the Muslim League government of Nawaz Sharif won the elections by a landslide and in 1998 the government started its investigations into IPP contracts signed under the previous government. As of the writing of this paper, the IPP crisis continues unabated with serious repercussions for international investor confidence. To-date almost $4.8 billion of private investment in the power sector has taken place with IPPs accounting for almost 17 percent of the country's total electricity generation.

2. PROJECT RISKS

When the Government of Pakistan started its initial search for investors as early as 1985, it became quite apparent that there was no appetite for Pakistan risk in the international banking market.

Project sponsors were facing a number of risks which the sponsor was not willing to take without a risk premium. The IPP investments were only undertaken once the risks were insured, transferred or guaranteed. Most costs were controlled

through contractor incentives and penalties, and guarantees or warranties.

The risks faced by IPPs are:

(i) *Economic Risk:* Any changes in exchange rates, inflation or costs of finance are considered economic risk factors.

(ii) *Market Risk:* As per the PPA, IPPs can sell power only to one single customer, WAPDA. This contractual arrangement exposes IPPs to the single customer risk. While the Government of Pakistan has given a guarantee to compensate the IPPs for WAPDA's defaults on its contractual payments,[1] the recent IPP crisis has shown that the Government of Pakistan is not willing to honour such guarantees on the plea that WAPDA just cannot afford to pay the exorbitant IPP dues. The economics of Government of Pakistan guarantees was specifically designed to shield the IPPs from the single customer default. The failure of the Government of Pakistan to honour such guarantees puts the IPPs under risk of insolvency and their own defaults towards lenders and shareholders.

(iii) *Political and Country Risk:* Political risk refers to any default by the Government of Pakistan on any of its contractual obligations.[2] These largely refer to the governments guarantees to IPPs through the Implementation Agreement. Due to wars, nationalisations and prolonged military rule foreign investors were reluctant to invest without adequate sovereign and World Bank guarantees which were duly provided.

(iv) *Currency and Financial Risk:* Between 1982 and 1994 the rupee depreciated 67.6 percent cumulatively against the US dollar. Foreign investors are aware of the capital loss that could result due to depreciation. Clearly, foreign exchange risk management was required for 27–30 year IPP projects. Such risks were hedged through purchase of appropriate insurance which is built into the tariff.

(v) *Completion and Cost Overrun Risk:* The greatest period of risk in a power plant project occurs during the construction phase with the financial providers putting up most of the capital before construction starts and supporting this exposure till the plant is complete.

(vi) *Performance Risk:* The IPP should ensure that its Power Plant generates electricity according to technical specifications and deliver the required

[1]An individual, apparently unconnected with WAPDA, first went to Lahore High Court and secured an order which stated that Hubco's CPP be capped at Rs 845 million per month of billing, WAPDA, then went ahead and unilaterally reduced payments to 730 million for Hubco.

[2]The Government of Pakistan has guaranteed obligations of WAPDA under the PPA, Pakistan State Oil (PSO) under the Fuel Supply Agreement and State Bank of Pakistan (SBP) under the Foreign Exchange Risk Insurance (FERI) scheme as well as the Government of Pakistan's own future behaviour on taxes, duties etc.

power[3] to WAPDA. This risk is borne by the Project Company and the lenders financing the project. To ensure performance, the company incurs maintenance expenses which are passed through in the tariff.

3. THE IPP ELECTRICITY TARIFF

The tariff charged to WAPDA by IPPs is not a number, rather it is computed from a formula. The formula includes in it the components of the Fixed and Variable Costs.

The total tariff is the sum of the Capacity Purchase Price (CPP) which is the fixed component and the Energy Purchase Price (EPP) which is the variable cost.

The CPP[4] comprises:

(i) Project Debt payments (inclusive of interest and principal).
(ii) Return on Equity which was agreed at 18 percent IRR over the project life.
(iii) Fixed element of the Operating and Maintenance Cost.
(iv) Insurance Cost for the plant.
(v) Foreign Exchange Risk Insurance Cost (FERI) which is the cost of hedging the loans against foreign exchange risk.[5]

The EPP comprises:

(i) Fuel Cost which is set by the Government of Pakistan and is above the world oil prices by an amount of a surcharge.
(ii) Variable element of the operating and maintenance cost.

The tariff paid by WAPDA also depends on the total hours purchased or the installed capacity utilised. While total CPP payments remain constant (in rupee terms) with a larger purchase of hours, the per kilowatt CPP cost to WAPDA falls. This is so because the fixed costs are now spread over more units of purchased power. In fact, WAPDA has not been buying enough power to reduce its average costs. In 1998, WAPDA utilised only 55 percent of the available plant capacity of Hubco, 42 percent from Kohinoor Electric and 45 percent from Kot Addu Power Company (KAPCO).[6]

[3]If the company does not install and/or deliver the guaranteed capacity, the company is liable to pay "Liquidated Damages" to WAPDA.

[4]The term "Capacity Purchase Price" conveys a misleading impression that the said charge is only for capacity usage by WAPDA. In fact the CPP comprises all of the listed costs under this category.

[5]The FERI coverage in the CPP is available only to Hubco and not other IPPs because such policy was discontinued by the SBP. The FERI is charged by Hubco to WAPDA each 6 months in January and July which significantly affects the tariff for these months. Hubco pays the FERI payments received from WAPDA to the SBP who has provided this coverage. Other IPPs foreign exchange risk is self insured by WAPDA. Due to constant devaluation WAPDA's self insurance is much more expensive than the FERI rate of Hubco. Thus, compared to Hubco, WAPDA pays more to other IPPs for their uncovered foreign exchange positions.

[6] Source: *Pakistan Energy Yearbook* (1998).

The actual tariffs charged by all IPPs, other than Hubco, are governed by the 1994 Power Policy. The policy stipulates a bulk power tariff of 6.5 US Cents per kWh. The tariff paid by WAPDA to Hubco is based on the Reference Tariff (RT). How was the RT arrived at? When the project was set up the project sponsors were offered an 18 percent rate of return (IRR) over the project life.[7] This return was considered "fair" and "correct" economic return. To achieve this return and also to cover all project costs a revenue stream was calculated. This revenue stream or profile of the RT (for each year of the project life) was agreed between WAPDA and IPPs at the time that the Power Purchase Agreements were signed.

The RT profile was calculated on the following assumptions:

(i) WAPDA would be the sole purchaser of electricity from IPPs[8] and it would purchase atleast 60 percent load of the installed capacity.
(ii) An 18 percent Real Rate of Return (IRR) in US Dollars would be earned by the project investors.
(iii) Fuel Price was deemed to be a pass through item. The RT profile was calculated using the fuel price of 1994. However, being a pass through item, actual tariffs are allowed to be adjusted for the prevailing fuel prices.
(iv) The SBP was to make available the foreign exchange for the project. The RT profile for the life of the project was calculated by using the exchange rate for 1993.
(v) The Project Cost was fixed as of the signing of the PPA.

The RT is a base tariff profile. It is not the actual tariff that is paid by WAPDA to IPPs. The actual tariff accounts for actual inflation, exchange rates, fuel prices and interest rates as well as actual Additional Costs. Since these economic variables have been rising between 1994–99, the actual tariffs for the same period are higher than the computed reference Tariffs.

4. CAUSES OF RISING ELECTRICITY TARIFFS

Electricity tariffs have indeed risen since 1994. The increase in current tariff over the agreed 1994 tariff is given below:

Reference Tariff : Rs 1.758/kWh[9]
Current Tariff : Rs 3.265/kWh[10]
Increase in Tariff : Rs 1.507kWh

[7]The 18 percent return is Hubco specific. Other IPPs returns are governed by the 1994 PPA.

[8]Except Tapal Engergy which sells power to Karachi Electric Supply Corporation (KESC), other IPPs can only sell to WAPDA.

[9]This number represents the average Reference Tariff charged over the 2–12 year period of the project life. The average has been taken of the Reference Tariff profile given in the PPA.

[10]The reported Current Tariff number is also an average number. It is the average of the actual tariffs billed till 1999 and the expected tariffs till the 12th year of the 2–12 year period.

Table 1

Increase in Tariff Components

Factors	Rs/kWh	% Increase	Parities Involved
Fuel Price	0.731	48%	PSO/GOP
Rupee Devaluation	0.467	31%	GOP
Consumer Price Inflation	0.155	10%	GOP
Supplemental Charges[11]	0.040	3%	GOP
Additional Costs[12]	0.046	3%	GOP
Interest Rates	0.014	1%	Int. Markets
Others	0.055	4%	Others
Total	1.508	100%	

The component wise breakdown of the tariff increase is:

Table 1 shows that between 1994 and 1998, 95 percent of the tariff increase of Hubco, has been due to factors which can be related to the Government of Pakistan. The Government of Pakistan's role can be seen from the fact that 48 percent of the tariff increase has been due to escalation in fuel prices, 31 percent due to rupee devaluation, 10 percent due to inflation and 6 percent due to increase in costs which are attributable to Government of Pakistan levies. All of these factors are completely outside the control of IPPs as well as WAPDA, therefore, neither IPPs nor the state utility, WAPDA, can be blamed for tariff escalation due to these factors.

5. COST OF PRODUCTION OF IPPs, VS. WAPDA AND KESC

The above section has enumerated the reasons for tariff increase between the period spanning 1994–99. It has still not answered the central question: Do IPPs produce expensive electricity? The answer is based on the microeconomics of a power plant which translates itself into marginal and average costs of production per kilowatt of electricity.[13]

[11]Supplemental Charges are billed to WAPDA in respect of "Start up Costs" and "Passs Through Items" such as Octroi, various Taxes and Duties.

[12]Additional Costs are specific and agreed expenses which were met by the project Company at the time of construction. These costs are gradually recovered through the tariff over the life of the project.

[13]Data source is "Energy Data on Thermal Power Stations" from *Pakistan Energy Yearbook*, 1998. Sceptics can always criticise the use of the government statistics, but this is the best data set available todate. Whatever, the shortcomings of this data, atleast it would not be biased towards IPPs and the author cannot be accused of using a data set which suits him.

The average cost of production of an electric utility includes fuel costs, depreciation charges, interest costs on debt, maintenance costs, administrative costs etc. Unfortunately, the *Pakistan Energy Yearbook* only reports the overall average cost of production for WAPDA but not for IPPs. Hence, a comparative analysis is not possible. But fuel costs are reported for IPPs as well as WAPDA and KESC. Thus, I am constrained to restrict my analysis to comparative *fuel costs* only. This is, however, substantial, as 95 percent of the variable costs (EPP) of generating a unit of electricity are fuel costs, and variable costs are approximately 40 percent of the total costs.

Even when we compare fuel costs we have to be careful to compare IPPs oil fired plants with WAPDA's oil fired plants only. But this is not directly possible as almost all of WAPDA's plants are multifuel i.e. they run on oil, gas, diesel etc. Diesel is more expensive than oil and gas is the cheapest of the three fuels. Due to the usage of gas, the average fuel cost for WAPDA's plants should be much lower than IPPs oil fired plants. However, inspite of this fuel cost advantage, WAPDA's and KESC's fuel costs are on average greater than IPPs. The evidence in the following Table 2 makes a point, it debunks the common misperception that IPPs produce expensive electricity.

Table 2

Cost of Fuel of IPPs vs. WAPDA and KESC

Power Station	Installed Capacity (MW)	Fuel Used	Average Fuel Cost (Rs/kWh
WAPDA			
Faisalabad	132	Gas and Oil	1.87
Multan	260	Gas and Oil	1.79
Muzzafar Garh	1350	Gas, Oil and Diesel	1.53
Guddu	640	Gas and Oil	1.22
Jamshoro	850	Gas and Oil	1.65
KESC			
Korangi	250	Gas and Oil	1.43
Korangi Town	100	Gas and Diesel	2.11
Pipri	1260	Oil and Diesel	1.51
IPPs			
AES Pak Gen. M. Garth	365	Oil	1.43
Hubco. Hub	1292	Fuel Oil	1.37
Tapal Energy, Karachi	126	Fuel Oil	1.37

The Table also shows that each and every IPP is cheaper than WAPDA and KESC, WAPDA's Guddu plant is cheaper than IPPs but this is only to be expected as it generates electricity largely from the cheaper gas. Hubco's costs are 11 percent cheaper than WAPDA's most modern Muzzafargarh plant. 15 percent cheaper than Jamshoro plant.[14] 23 percent cheaper than Multan plant and 30 percent cheaper than the Faisalabad plant.

While the above analysis is instructive, it suffers from one shortcoming i.e. it compares WAPDA's average *multi-fuel* cost with IPPs *single-fuel* cost of furnace oil. The above table shows that WAPDA does not separately report the cost of the various fuels used on its power plants. Instead, WAPDA lumps together the costs of the various fuels and reports one number, i.e., the average cost of *all* the fuels. This lumped average per unit cost is not comparable to IPPs' single fuel, furnace oil costs. A comparative analysis is still possible if we calculate WAPDA's cost of production from furnace oil *only* which is possible once we separate the per kWh cost of oil from the per kWh cost of gas (and/or diesel) contained in the lumped average fuel cost for WAPDA's plants.

Not all of WAPDA's power plants are considered for fuel cost comparison with IPPs' (Hubco) power plants. Only larger power plants are considered to match Hubco's 1292 MW installed capacity. The WAPDA power plants used for comparative analysis are located at Muzzafargarh (1350 MW), Guddu (640 MW) and Jamshoro (850 MW). All of these power stations a re multi-fuel.

It was assumed that the cost of gas used at Muzzafargarh Plant is the same as the cost of gas at WAPDA's Guddu Plant 2, which runs only on gas and whose gas costs are 0.97/kWh of generated electricity. Similarly, it was assumed that the cost of diesel contained in the average fuel cost of Muzzafargarh plant would be the same as the cost of diesel of WAPDA's Pasni plant which runs only on diesel. The cost of diesel at Pasni plant is reported at Rs 2.6/kWh of generated electricity. All other numbers, i.e. generated capacity in kWh, and fuel costs in Rs/GWh are published.[15] Therefore, it is a matter of simple arithmetic to calculate the cost of furnace oil for the Muzafargarh plant which is Rs 1.63.

A shortcoming of the calculations needs mention. The individual fuel costs of oil and gas do not add up to the average fuel cost. This is because of the reason mentioned above, that the breakdown costs of various fuels used at WAPDA's individual plants was not available and substituted prices from other WAPDA plants were only an approximation. A better methodology to infer individual fuel costs at WAPDA's plants is to calculate the fuel cost in terms of input-out ratio of energy.

[14]The 15 percent cost advantage to Hubco accrues inspite of the fact that WAPDA's Jamshoro plant generates almost 60 percent of its total generation from gas.

[15]See the "Energy Data of Thermal Power Stations" (Table 5.11) in the *Pakistan Energy Yearbook*, 1998.

Table 3

WAPDA's Fuel Costs of Generation

WAPDA's Power Plants	Units Generated From Gas	Oil	Diesel	
Muzaffar Garh Plant				
Units Generated (kWh)	645,900	3,637,250	190	=4,283,340
Average Fuel Cost (Rs/kWh)	0.9774	1.6349*	2,6496	1.5358
Total Cost (Rs)	631,302.6	5,946,547.4	503.424	=6,578,353.5
Guddu (Units 1–4) Plant				
Units Generated (kWh)	1,600,700	214,020	–	=1.814.730
Average Fuel Cost (Rs/kWh)	0.9774	3.11167*		1.2291
Total Cost (Rs)	1.564.524.1	665,960.4	–	=2.230.484.6
Jamshoro Plant				
Units Generated (kWh)	1.233,930	848,320	–	=2.082.250
Average Fuel Cost (Rs/kWh)	0.9774	2.64895*	–	1.6584
Total Cost (Rs.)	1.206,043.1	2,247,160.2	–	=3.453.203.4

* These are all derived values from the rest of the information in Table 5.11 of *Pakistan Energy Yearbook* and reproduced in Table 3.

Now that we have derived the cost of furnace oil contained in WAPDA's average fuel costs, we can compare WAPDA's furnace oil costs with IPPs furnace oil costs (See Table 4). The conclusion derived in Table 1, that , WAPDA's costs of production with furnace oil for each plant are far greater than IPP fuel costs is strengthened in Table 4. Hubco's furnace oil costs per kWh of electricity are cheaper than all of WAPDA's plants.

Table 4

Comparative Cost of Furnace Oil

Power Station	Installed Capacity (MW)	Average Cost of Furnace Oil (Rs/kWh)
WAPDA		
Muzzafar Garh	1350	1.63*
Guddu	640	3.11*
Jamshoro	850	2.64*
UPPs		
AES Lalpir, M. Garh	362	1.74
ASFS Pak Gen., M. Garh	365	1.43
Hubco. Hub	1292	1.37
Tapal Energy, Karachi	126	1.37

Source: Table 5.11, *Pakistan Energy Yearbook*, 1998.

* Derived numbers from Table 5.11, *Pakistan Energy Yearbook*, 1998.

Savings by IPPs

Having established that Hubco generates cheaper power than WAPDA, we now calculate how much the country could have saved had Hubco produced the same mega watts of electricity being currently generated at WAPDA's plants.

The following simple arithmetic exercise was carried out.

(i) We first took the capacity of a WAPDA plant (in kilo watt hours) and multiplied it with the WAPDA fuel cost of oil in Rs per kWh. This gave us the total expenditure that WAPDA would incur were it to produce the total capacity of its multi-fuel power plants by *only* using oil.

(ii) We again took the capacity of a WAPDA plant but multiplied it with the cost of Hubco's fuel oil cost. This gave us the total fuel oil expenditure that Hubco would incur were it to produce equivalent power as being currently generated by WAPDA.

Note that while a tonne of oil costs the same to Hubco and WAPDA, the more efficient of the two utility companies would use lesser fuel and consequently its cost of producing one unit of electricity from oil (alone) would be cheaper.

The total expenditure on electricity by Hubco and WAPDA and the savings achieved by Hubco are presented below alongwith all calculations. (See Table 5)

Table 5

Cost Savings

Power Plants	Units Generated from Fuel Oil kWh	Average Fuel Oil Cost Rs/kWh	Total Cost Rs
Muzzafargarh	3,637,250.000	1,6349*	5,946,540.025
	3,637,250,000	1,3796**	5,017,950,100
		Savings	928,589,925
Guddu	214,020,000	3,11167*	665,959,613.4
	214,020,000	1,3796	295,261,992
		Savings	370697621.4
Jamshoro	848,320,000	2,64895*	2,247,157,264
	848,320,000	1,3796	1,170,342,272
		Savings	1,076,814,992

Source: All data is from Table 5.11 "Energy Data of Thermal Power Stations (1997-98)".

* WAPDA's derived per kWh fuel oil costs.

** Hubco's published per kWh fuel oil costs.

The unambiguous conclusion of this exercise is that because Hubco's per unit cost of production is cheaper, therefore, if Hubco had produced the same electricity instead of WAPDA, the total combined savings would have been $4.65 billion for the year 1997-98.

CONCLUSION

The paper uses cost data of IPPs and WAPDA/KESC to inquire whether IPPs produce expensive electricity. The findings are:

(i) IPPs produce cheaper electricity than both WAPDA and KESC.
(ii) The country would have saved atleast $4.65 billion had the same power been produced by IPPs (Hubco).

The Findings should not be surprising as IPPs are more efficient than the state utility WAPDA. The evidence puts a great dent in the logic of the IPP bashers who allege that IPPs produce expensive power because their project costs were high due to kickbacks to the Government of Pakistan. While public debate may still continue on whether IPPs indulged in kickbacks and corruption, there is no empirical evidence to show that IPPs produce expensive electricity.

REFERENCES

Hub Power (1994) An Innovative Approach to Project Financing. Euromoney Publications.

Pakistan Energy Yearbook (1998) Hydrocarbon Development Institute of Pakistan.

Pakistan, Government of (1994) Policy Framework and Package of Incentives for Private Sector Power Generation Projects in Pakistan.

Project and Infrastructure Finance. (1996) Asia Law and Practice Publishing Ltd.

Siddiqui, Anjum (1999) Power Projects Misunderstood. February 10, *Dawn*.