International Journal of Business and Management Review

Vol.2,No.5,pp.31-39, October 2014

Published by European Centre for Research Training and Development UK (www.eajournals.org)

REVIEW OF TARIFF FOR PAKISTAN COAL POWER PROJECT

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ABSTRACT: *This paper finds that NEPRA has approved 65% expensive tariff for new coal fired power plants in Pakistan. For the 6,600 MW power plants that will be installed in Punjab province, Pakistani people will pay extra USD 2.2 Billion in a year and USD 66.88 Billion over the next 30 years period of contract. Government should cancel this tariff and manage the tariff on case to case basis by following International Competitive Bidding process and keeping in mind the international standards and industrial prudent practices.*

KEYWORDS: Efficiency, Freight for Coal Transportation, Coal Price, Punjab Coal Power Plants, NEPRA, Tariff

INTRODUCTION

Energy Prices is increasing rapidly that is why whole world is finding cheaper sources of electricity. It's a great cause of concern that in Pakistan with presence of cheaper sources of energy, we are using expensive energy options. The power, oil and gas sector are the main sufferers of this giant dilemma to deal and manage this issue in an appropriate and suitable way. During the last five years, Pakistan government has tried to show that the load shedding is due to the less installed capacity but in actual it's due to the increasing circular debt.

Earlier in 2014 government of Pakistan has announced to install 6,600 Mega Watt (MW) coal fired power projects in Punjab at almost 800~1,200 kilo meters away from sea port. As per country's existing power policy that is known as power policy 2002, international competitive bidding is compulsory for the installation of new power plants. In February 2014, Ministry of Water & Power filed a petition in the court of National Electric Power Regulatory Authority (NEPRA) for the determination of an upfront tariff for the new coal power plants for 220 MW, 350 MW, 660 MW and 1,100 MW. Based on this an upfront tariff was approved by the NEPRA in June 2014. Here in this research, we will discuss the upfront tariff and compare it with the international pricing and previous country's practices.

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

We will discuss following three types of tariff:

- Tariff As approved by NEPRA
- Tariff that will be paid by the customers
- Tariff as per the international standards and prudent industrial practices

LITERATURE REVIEW

Biggest reason of energy crisis in Pakistan is the expensive generation of electricity and the second one is electricity theft. (Ali & Badar, 2010). Author supports the second point with the data of Energy year book that WAPDA has suffered a transmission and distribution loss of 330 billion rupees during FY 2011-12. The fossils fuels reserves are fading and putting strain on present reserves. There is also need to shift from fossil fuel to renewable fuel or indigenous fuel. He also discussed the switch over from fossil fuel to renewable resources in Pakistan (Muneer, 2007). The energy resources will be the biggest challenge for the next century. Country's should focus on the cheap sources of electricity. (Khan et al, 1008). The major reasons of energy crisis in Pakistan is 1994 energy policy, circular debt, increasing fuel prices, generation and energy mix. CNG sector also had a bad effect on the energy crisis. The electricity price would be much cheaper on coal as compared to oil. The installation of new coal plants can make a significant impact on electricity prices. These plants should be installed near to port and reasonable should be given to investor. Circular debt is the biggest issue of the country and there is a theft of almost PKR 1 Billion daily (Amjad el at., 2014). The share of conventional energy is much higher in Pakistan as compared to the renewable energy. The share of renewable energy is fractional in the country. The higher cost of electricity is due to oil based generation. There is need to shift from oil to coal, wind and hydel (Sheikh,2010).

TARIFF APPROVED BY NEPRA

Here the tariff approved by NEPRA for 660 MW coal fired power project on imported coal and foreign financing will be discussed.

Following is the upfront tariff approved by NEPRA:

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

Table-1

Tariff as Approved by NEPRA	
Generator Load (MW)	660.00
Aux Load (% of Generator Load)	8.00
Net Load	607.20
Efficiency of Plant	39.00
Net Heat Rate (Btu/kWh)	8,749
Total Project Cost	956.06
Loan Processing Fee (%)	7.00
Interest Rate % (US$ based Loan)	4.95
Interest Rate % (PKR based Loan)	11.91
Return on Equity (%)	27.00
Capacity Factor (%)	85.00
Coal Price (US$/Ton)	129.06
Coal Local Freight & Loss (US$/Ton)	-
Exchange Rate	97.10
Fuel Cost Component (PKR/kWh)	4.29
Ash Disposal Charges (PKR/kWh)	0.22
Lime Stone Usage (PKR/kWh)	0.09
Variable O&M (PKR/kWh)	0.11
Energy Price (PKR/kWh)	**4.72**
Fixed O&M (PKR/kWh)	0.29
Cost of Working Capital	0.23
Insurance (PKR/kWh)	0.10
Return on Equity (PKR/kWh)	1.19
Loan Repayment (PKR/kWh)	1.09
Capacity Payment @ 100% CF	**2.89**
Capacity Payment @ 85% CF (PKR/kWh)	3.40
Electricity Cost (PKR/kWh) (Energy + Capacity)	8.12
Electricity Cost (US Cents/kWh)	8.36

Discussion on NEPRA's Approved Upfront Tariff:

This will be discussed in two steps:

- In first step, the mistakes made by NEPRA either intentionally or unintentionally to show a reduced tariff to public will be discussed.
- In second step, we will discuss the tariff that could be achieved by following international technology standards.

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

FIRST STEP: ASSESSMENTS OF MISTAKES IN TARIFF:

Capacity Factor:
NEPRA used plant's capacity factor as 85% for these plants. Previously 60% capacity factor was used for all tariffs approved by NEPRA. This was checked by tariff of following IPPs operating in Pakistan Northern Power Generation Company (NPGCL), Hub Power Limited, LalPir Power Limited and PakGen Power Limited.Technically this cannot be achieved; IPPs operating in Pakistan have the 720 hours annual outage, 500 hours maintenance allowance annually to attend unplanned shutdowns and an additional 720 hours outage after every four years. This tells us that a plant has to be available for 7,360 hours a year that means 84.02% availability. Then, how come a plant run for 85% in a year while its required availability is 84.02%. As the capacity payment is fixed and capacity payment per kWh is calculated on an assumed number of kWh export in a year. So, it looks like that to reduce the tariff to show to public, NEPRA has used 85% Capacity factor contrary to its previous practice.
This change in assumption of capacity factor from 60% to 85% has reduced the tariff by 41%.

Freight for Local Coal Transportation:
NEPRA did not consider the local freight cost while approving the tariff. They mentioned that the actual cost will be added in the tariff after words. They also mentioned that the 2% coal transportation losses will also be paid to the IPPs. The cost of coal transportation and losses would be USD 108 per ton of coal. By ignoring this cost has reduced the fuel cost per kWh by 65%.

Fuel Calorific Value:
NEPRA has used an exceptionally high calorific value for coal. They used lower heating value as 25,555 Btu/Kg. While in actual the calorific value is 23,000 Btu/Kg[1]. The use of exceptional Calorific Value has reduced the Specific Coal consumption per kWh that has reduced the per kWh fuel cost by 38.7%

Additional Charges on Electricity:
Additional charges for the end user would be Neelam Jhelum surcharge, electricity duty and sales tax.

Following is the tariff that will be actually paid by the customers:

[1] From the Feasibility Study for a coal power plant in Pakistan

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

Table-2

Tariff That will be Actually paid by the Customer	
Generator Load (MW)	660.00
Aux Load (% of Generator Load)	8.00
Net Load	607.20
Efficiency of Plant	39.00
Net Heat Rate (Btu/kWh)	8,749
Total Project Cost	956.06
Loan Processing Fee (%)	7.00
Interest Rate % (US$ based Loan)	4.95
Interest Rate % (PKR based Loan)	11.91
Return on Equity (%)	27.00
Capacity Factor (%)	60
Coal Price (US$/Ton)	129.06
Coal Local Freight & Loss (US$/Ton)	107.63
Exchange Rate	97.10
Fuel Cost Component (PKR/kWh)	8.7446
Ash Disposal Charges (PKR/kWh)	0.22
Lime Stone Usage (PKR/kWh)	0.09
Variable O&M (PKR/kWh)	0.11
Energy Price (PKR/kWh)	**9.17**
Fixed O&M (PKR/kWh)	0.29
Cost of Working Capital	0.47
Insurance (PKR/kWh)	0.10
Return on Equity (PKR/kWh)	1.19
Loan Repayment (PKR/kWh)	1.09
Capacity Payment @ 100% CF	**3.13**
Capacity Payment @ 60% CF (PKR/kWh)	5.22
Electricity Cost (PKR/kWh) (Energy + Capacity)	14.39
Electricity Cost (US Cents/kWh)	14.82
Additional Charges in Consumer Bill	
N.J surcharge @ PKR 0.1/kWh	0.10
Electricity Duty (PKR/kWh)	0.22
Sales Tax @ 17%	2.48
Total Cost (PKR/kWh)	**17.19**

This shows that actual tariff approved would be 112% more than what NEPRA published on their website. This looks an attempt to putting wool in the eyes of people that the tariff would be PKR 8.12/kWh while in actual it would be PKR 17.19/kWh for customers.

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

Second Step: Comparison with International Standard:
Now we will discuss that what has make this tariff so much high as compared to same coal plants.

Efficiency:
NEPRA has approved the efficiency for supercritical boiler based power plant as 39% while across the world the efficiency of super critical PC coal plants is 42~45% based on studies carried out by IEA 2012 Technology Road Map for high Efficiency power generations, IEA clean coal tech center. More than that Jamshoro Power Plant, Sindh, Pakistan in its application for generation license filed at NEPRA on 22nd January 2014 mentioned efficiency as 42.8%. Then it's unable to understand that why NEPRA has approved the low efficiency.

Ash Disposal Charges:
Ash disposal charges were approved as PKR 0.220 per kWh. This charge is for coal containing ash of 64.25%. In actual ash content of coal is 15% that requires PKR 0.051 per kWh for ash disposal. So, the NEPRA has approved an additional PKR 0.169 per kWh for ash disposal.

Lime Usage Charges:
Similarly lime charges were approved as PKR 0.09 per kWh while in actual it would be PKR 0.014 per kWh. The excess approved in this case is PKR 0.076 per kWh.

NEPRA has approved an additional PKR 0.245 per kWh in these two items that is equivalent to favoring the IPPs with a margin of 1.2 % in efficiency.

Loan Processing Fee:
NEPRA has approved a loan processing fee as 7% of debt amount. While in history NEPRA has approved 2~3% loan process fee for other plants. This can be reduced by negotiation with banks

Return on Equity:
NEPRA has approved a Return on Equity (ROE) that is exceptionally high while in history it had approved 15~18% ROE.

Freight for Local Coal Transportation:
The coal plants should be installed near to port to avoid the local transportation charges of US$ 108 per ton. This will also reduce the transportation losses. The coal tariff for following international standards would be PKR 10.40 per kWh that is 65% less than what NEPRA is forcing on customers.

Following is the detail of the tariff by following international standards:

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

Table-3

Tariff as per International standards and prudent Industrial Practices	
Generator Load (MW)	660.00
Aux Load (% of Generator Load)	8.00
Net Load	607.20
Efficiency of Plant	42
Net Heat Rate (Btu/kWh)	8,124
Total Project Cost	924.80
Loan Processing Fee (%)	2.00
Interest Rate % (US$ based Loan)	4.95
Interest Rate % (PKR based Loan)	11.91
Return on Equity (%)	18
Capacity Factor (%)	60.00
Coal Price (US$/Ton)	129.06
Coal Local Freight & Loss (US$/Ton)	0
Exchange Rate	97.10
Fuel Cost Component (PKR/kWh)	4.4276
Ash Disposal Charges (PKR/kWh)	0.051
Lime Stone Usage (PKR/kWh)	0.014
Variable O&M (PKR/kWh)	0.11
Energy Price (PKR/kWh)	**4.61**
Fixed O&M (PKR/kWh)	0.29
Cost of Working Capital	0.2369
Insurance (PKR/kWh)	0.10
Return on Equity (PKR/kWh)	0.765
Loan Repayment (PKR/kWh)	1.0513
Capacity Payment @ 100% CF	2.44
Capacity Payment @ 60% CF (PKR/kWh)	4.07
Electricity Cost (PKR/kWh) (Energy + Capacity)	8.68
Electricity Cost (US Cents/kWh)	8.94
Additional Charges in Consumer Bill	
N.J surcharge @ PKR 0.1/kWh	0.10
Electricity Duty (PKR/kWh)	0.13
Sales Tax @ 17%	1.50
Total Cost (PKR/kWh)	10.40

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

CONCLUSION

It is clear that NEPRA has approved tariff of US cents 8.36 per kWh while in actual the tariff would be US cents 17.70 per kWh for the customers. The NEPRA should not try to conceal the facts from the end user or customers. These plants can be installed at a tariff of US cents 10.72 per kWh based on international standards and prudent industrial practices. The difference between the tariff to customers and that can be achieved based on international standards is US cents 6.98.

Pakistani people have to pay USD 2.2 Billion (PKR 216.4 Billion) as an extra cost per year for 6,600 MW coal plants. Total extra payment would be USD 66.88 Billion over the next 30 years of contract period.

Following table is showing the Loss to Pakistani Nation by installing the plants at higher load.

Table-4

Electricity Generation per Year at 60% CF (kWh)[2]	31,914,432,000
Difference in Tariff (US$/kWh)	0.0699
Annual Loss (USD Billion)	2.23
Annual Loss (PKR Billion)	216.48

RECOMMENDATION

- The Pakistani government should have to cancel this tariff and make new tariff based on international standards to avoid this loss to the country.
- Coal power plants should be installed near sea port to avoid transportation cost and losses.
- Transmission and distribution Losses and electricity theft should be reduced to overcome the issue of circular debt.

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[2] 6,600 MW is gross generation capacity while export is 6,072 MW. The kWh calculated in this table is based on export. Export = Gross Generation – Auxiliary consumption

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

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ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)