Comparison between Wapda tariff with diesel and gas generated power cost at a typical spinning mill

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This article presents the calculations showing current comparison of cost per kilowatt hour on the basis of WAPDA tariff and that generated by operating diesel or gas engine generators in the case of a typical spinning mill comprising of 19,200 spindles.

The gap between supply and demand for electric power has existed in Pakistan for many decades. Almost all public and private sector corporations including WAPDA resorted to load shedding and electric shut-downs long ago. As per media reports, the gap between supply and demand has crossed 1500 MW, become massive with the passage of time and load – shedding is now a chronic problem.

Ihtasham ul Haque reported in daily Down of 27th October, 2007 that the power demand during 2006 was 15000 MW. The projection for power demand based on medium growth rates is estimated to increase to about 21, 500 MW by 2010. President General Pervez Mushraff has directed the concerned authorities to finalise their new strategy to deal with the growing power problems being faced by domestic and industrial consumers.

In order to bridge the gap between supply and demand, new power generation plants have been planned based on hydel, gas, oil, coal, nuclear energy and alternative energy sources. These plants are expected to be operational by 2010. However, Load-shedding and electric shutdowns are likely to continue. Consequently installation of standby engine generator sets of adequate capacity operated by diesel or gas has become an integral part of the scene in almost all industries. Obviously the object is to keep the plants in operation during the periods of load-shedding or electric shut-downs, prevent production losses and the resultant escalation in production cost.

The important considerations in making arrangements for standby engine generators are the capital investment required, fixed cost, running cost and the cost per unit of power generated as compared to WAPDA Tariff.

1. Cost of WAPDA Power

Following calculations show the current comparison of cost per kilowatt hour on the basis of WAPDA tariff and that generated by operating diesel or gas engine generators in the case of a typical spinning mill comprising of 19,200 spindles with total connected electric load of 2500 KW. The running load has been assumed at 80% and the power factor at 85%.

B-3 Tariff of WAPDA is applicable for industrial power supply at 11KV and 33KV for sanctioned Loads above 50 KW and upto 5000 KW.

The cost per KWH is calculated as follows:

Number of units consumed by the Spinning mill per month = 2500 × 24 × 30 × 0.8 × 0.85 =1,224,000 KWHS

(i) Energy Charge @ Rs. 0.67 per unit
= Rs. 0.67 × 1,224,000 = Rs. 820,080.

(ii) Fuel Adjustment Charge @ Rs. 0.75 per unit
= Rs0.75 × 1,224,000 = Rs918,000.

(iii) Fixed Charge @ Rs290/- per MDI unit (MDI assumed at 1900 KW) = Rs. 551,000.

(iv) Supply Charge = Rs820,080 + Rs 918,000 + Rs551,000
= Rs2,289,080-

(v) Surcharge @ 10.4 % of Supply Charge =
Rs 2,289,080× 0.104 = Rs 238,064.32.

(vi) Additional Surcharge @ Rs1.44 / KWH
= Rs1.44× 1,224, 000 = Rs1,762,560.

Total Charge

Rs. 2,289,080 + Rs.238, 064.32 + Rs.1,762,560 equals to Rs. 4,289,704.32

Number of units consumed per month = 1,224, 000 KWHS.
Cost per KWH = Rs 3.505 say Rs 3.51.

The foregoing calculation was considered valid uptil 1999. Since then WAPDA tariff has been raised on ad-hoc basis by Rs. 1.51 during 2000, 2001 and 2002.

The unit cost = Rs. 3.51+ Rs1.51 = Rs 5.02.

Recently the Government of Pakistan raised the WAPDA Tariff by 10% Consequently, per KWH the WAPDA supply costs is approximately Rs. 5.522 (Rs 5.02 + Rs 0.502)

2. Cost of Diesel Generated Power Standby or Regular

As already mentioned the connected load of the Spinning Mill under reference is 2500 KW and the running load @ 80% is 2000KW. Accordingly two diesel engine generators each with a capacity of 1250 KVA or 1000 KWH would be adequate as standby source of electric power. Capital investment involved would be approximately Rs. 30 million. The cost per KWH is calculated as follows:

2.1 Running Expenses

The running expenses in terms of material, manpower, fixed expenses, etc would be incurred and the break-up cost per is given below on monthly basis.

Materials

- Cost of diesel @ 0.27 litres/ KWH, therefore @ Rs.37.8 per litre amounts to Rs 37.83×0.27×1077120 = **Rs. 1,250,2058.**
- Cost of 30 nos. of fuel filters @ Rs1500 per filter = **Rs.45000**
- Cost of 18 nos. of oil filters @ Rs 3500 per filter = **Rs 63000**
- Cost of 2 nos. of air filters @ Rs 15,000 per filter = **Rs 30000**
- Cost of 2 tubes of Caterpillar grease @ Rs 1,500 each = **Rs 3,000**
- Cost of engine oil, 1.5 drums of 205 litres required per engine every 10 days. Total requirement = 205×3×2×1.5 = 1845 litres @Rs 250/litre equals to **Rs 461,250.**

Sub. Total = Rs 13,104,308.

Man power

- If there are four engine operators, then each operators salary amounts to Rs 5000 per month. Rs. 5000x4=**Rs 20,000** per month.
- Three visits of the Supplier's engineer per month for routine maintenance and servicing @ Rs 15000 per visit = **Rs. 45,000**
- Major Overhaul after 6 months operation including repairs, replacements, tuning etc. costing approximately Rs 600,000, per month expenses = **Rs 100,000**

Sub. Total = Rs 165,000

Fixed Expenses

- Approximate monthly installment of Fire Insurance Policy = **Rs 45,000.**
- Depreciation of capital investment of Rs 30 million over a period of 10 years, per month allocation = **Rs 250, 000**
- Mark-up on capital in vestment @ 10% per annum, monthly = **Rs 250, 000.**

Sub. Total = Rs 545,000

Total running & fixed expenses per month = Rs 13,814,308

Number of units generate per month on regular basis @ 80% capacity utilization = 2000 × 0.90 × 24 ×30 = 1,296,000 KWHS

Cost per kwh of Diesel Generated Power = Rs 10.66

3. Cost of Gas Generated Power

The Spinning mill consumes 1,224,000 KWHS per month. At least 3 nos. of Waukesha model VHP 100G aspirated gas engine generators should be installed as standby source of power. The generator power rating is 625 KW at 100°F and 100 metre altitude. The power generation capacity per month is calculated as follows:

Power consumed in Radiator Fan Motor = 15 KW

Net available power per set = 625-15 = 610 KW.

Power generation capacity per month @ 85% load =

610 × 24 × 30 × 0.85 × 3 = 1,119,960 KWHS

The cost per KWH is calculated on the basis of following running expenses:

Materials

- Consumption of Gas @ 80% load @ 7000 SCF/Hour @ Rs 0.30/SCF = 7000 × 24 × 30 × 3 × Rs 0.3 = **Rs 4,536,000.**
- Lube oil @ Rs 70/set/hour = Rs 70×24× 30×3= **Rs 151,200.**
- Maintenance, servicing and overhauling, replacement of spare parts @ Rs 45/set/hour equals to Rs (45×24×30×3)= **Rs 97,200.**

Sub Total = Rs 4,784,400

Man Power

- Four engine operators, salary Rs 5000 operator per month = **Rs 20,000.**
- Three visits of the Supplier's Engineer for routine maintenance per month @ Rs 15000 per visit = **Rs 45,000**
- Major overhaul after 6 months involving expenditure of Rs 600,000 per month cost = **Rs 100, 000.**

Sub Total = Rs165, 000.

Fixed cost

- Approximate cost per engine generator = USD 385, 000- for 3 sets = USD 1,155,000+ Rs 61 = Rs 70.455 million.
- Monthly premium of five insurance policy = Rs 100, 000-
- Depreciation of capital investment of Rs 70.455 million over a period of 10 years, per month allocation = Rs 587,125-
- Mark-up on capital investment @10% per annum,per month = Rs 587,125.

Sub- Total = Rs1, 274,250

Total of Running Expenses = Rs 6,223,650

Number of units generated by 3 engine generator sets per month @ 85% load = 1,119,960 KWHS.

Cost of gas generated power per KWH = Rs 5.557 say Rs 5.56

4. Conclusion

It is obvious from the foregoing calculations that the cost of WAPDA power supply per KWH is the lowest and that of the diesel generated power the highest. The cost of gas generated power is almost equal to that of WAPDA per unit. However, it must be pointed out that the capital investment involved in arranging three gas engine generator sets for the Spinning Mill of 19200 spindles as standby power source is approximately Rs. 70.455 million as compared to Rs 30 million only for two diesel engine generator sets, i.e., 42.58% of that required for gas generators.

Consequently, the spinning mills in general opt for diesel generators as stand by power source. This trend is not likely to be affected by the decision of the government of Pakistan to allow Sui-Northern and Sui-Northern gas companies increase the gas tariff by 6.5% with effect from 1st January, 2008. Similarly, the planned increase in oil prices by 10 to 15% is not likely to reverse the trend.

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Corolab XF Digital Technology

According to a press release from Oerlikon Schlafhorst, "Worldwide, 95 % of all Autocoro spinning mills trust in Corolab. With Corolab XF, the established standard for digital yarn clearing was decisively improved on the Autocoro 480. The innovative Two-in-One system, Corolab XF, recognizes and records not only each individual thick and thin place but also foreign particles in the yarn. Corolab XF doesn't miss the slightest detail, thus ensuring there are no "stowaways". The setting of this digital quality control system is also just what spinning mills want. All parameters are entered centrally on the display in practically oriented units millimeters or per cent.

Further information can be obtained from Waltraud Jansen, Expert Marketing Rotor Spinning at email waltraud.jansen@schlafhorst.de or from André Wissenberg, Corporate Communications Oerlikon Textile at andre.wissenberg@oerlikon.com