

## CHAPTER 5

### COMMISSION ANALYSIS

#### 5.1 Tariff Determination

The Commission has considered the impact of data uncertainty on tariff and has assessed the authenticity of information by TVNL through, TVNL's Internal Audit Report and Statement of Accounts for the FY 2002-03. **Since, the Commission was constrained with the data availability, the Commission has attempted to arrive at the tariff both based on the normative levels as well as the historic cost levels. This has helped the Commission to identify certain inefficiencies in the TVNL's operations. The Commission has observed that TVNL's operations are way below the normative levels. The Commission hopes that TVNL will improve its operations as well as device systems for accurate data collection in the current year and come up to normative levels. In absence of correct data for normative approach Commission has *approved the tariff based on the Historic cost approach.***

#### Tariff based on normative parameters

5.2 For the calculation of **Normative Generation Tariff**, the Commission has followed JSERC (Terms and Condition for Determination of Thermal Generation Tariff) Regulation 2004, and the CERC (Terms and Conditions for Generation Tariff), Order 2000. Following components have been assessed:

#### 5.3 Project Cost

The Project cost as indicated by TVNL, is Rs.1541.76 Crores, with an equity contribution of Rs. 100 Crores and the remaining Rs. 1441.76 Crores forming a part of the debt component. The total project cost for tariff determination was calculated as Rs. 36.708 Lakhs/MW.

#### 5.4 Debt-Equity Ratio

The debt-equity ratio was computed as 93.51: 6.49, with the equity proportion being 0.06 and proportion of debt equal to 0.94. Given the project cost (per MW) and the debt-equity ratio, the absolute amount of debt and equity was calculated.

#### ***Calculation of annual capacity (fixed) charges:***

Annual Capacity charges include 5 broad components that are computed on the basis of normative parameters as set by the Commission in the following manner:

#### 5.5 Interest Rate on Loan

The Interest rate on loan is calculated, by multiplying the Capital cost of the project with the interest rate on debt (this is taken as 13%, based on the market rate of interest during 1998 i.e the first year of operation of the TVNL plant).

The assumption of 1-year moratorium period is made, i.e. the repayment of interest will begin after a 1-year lag period (since loan repayment period gets extended by a year).

### **5.6 Return on Equity**

The Commission has considered a 16% return on equity. It is based on the recommended ROE during the time of commissioning of the project.

### **5.7 Depreciation and Advance Against Capital**

Based on the life of the generating plant, the Depreciation rate has been considered as 3.29% as calculated by the petitioner since it is within the norm indicated in the JSERC (Terms and Condition for Determination of Thermal Generation Tariff) Regulation, 2004.

#### **Provisions for Advance Against Depreciation:**

Since the amount of loan repayment is much higher than the computed value of depreciation, a normative AAD is allowed.

### **5.8 Operation and Maintenance Expenses**

The Commission has considered the norms for O&M expenses as laid down by JSERC (Terms and Condition for Determination of Thermal Generation Tariff) Regulation 2004 and CERC (Terms and Condition for Generation Tariff), Order 2000. Accordingly the O&M expenses should not exceed 2.5% of the capital cost, with annual escalation of 6% per annum thereafter.

### **5.9 Interest on Working Capital**

The Commission has computed the interest on working capital on a per capita basis with the rate of interest on working capital taken to be 15% based on the short-term market interest rate prevailing in 1998-99 for the purpose of arriving at levelised tariff.

### **5.10 Plant Availability**

The Plant Availability Factor has been taken as 80% to arrive at the fixed charge.

**Based on the above normative levels of fixed charge, the levelized fixed charge (discounted over the life of the thermal plant) was computed as Rs. 0.97 per unit.**

## **Tariff Based On Historic Costs and Parameters**

### **Fixed Charges**

#### **5.11 Interest Rate on Loan**

The Commission is of the view that the rate of interest payable by TVNL for various loans is not very clear from

the petition. The fixed interest rate is indicated as 13% in the petition, which is very high as compared to the market rate of interest. Further, TVNL was unable to provide details regarding source-wise interest rate payable and the licensee plans for refinancing of loans that carry a higher rate of interest.

The Commission is concerned about the fact that TVNL is not paying their loan liability. This not only accumulates the liabilities and reduces credit worthiness but also hampers future expansion of the plant. The Commission would also like to mention that in a low interest rate regime, TVNL should explore various refinancing option to reduce the interest liability and *therefore, directs the petitioner to come up with a comprehensive plan for reducing loan and interest liability.*

For the current year only however, the Commission has approved the existing interest liability.

### 5.12 Return on Equity

The Commission has taken the rate of return on equity at a level of 14%.

### 5.13 Depreciation

The petitioner has computed the rate of depreciation at 3.29%. Since it is in line with the norms given by the Commission, not exceeding the norms the Commission approves the same amount of depreciation.

### 5.14 Operation and Maintenance Expenses

The Operation and Maintenance expenses for the last five years are summarized in the table below:

**Table 12:** O&M Expenses from FY 2001-02 to 2004-05

	2001-02	2002-03	2003-04	2004-05 (Proposed)
O&M (in Rs. Crores)	82.83	85.56	92.38	96.22
O&M Rate (%)	5.37	5.55	5.99	6.24
Yearly increase (%)		3.29	7.97	4.15

The Commission notes that the Operation and Maintenance expenses of TVNL is very high, with O&M rates as high as 5.55% of the capital cost in 2002-03 and 5.99% of the capital cost in 2003-04. Further, the yearly increase in O&M expenses have been at the rate of 7.97% during 2002-03 to 2003-04. This is very high in comparison to a prescribed norm for O&M expenses of 2.5% of capital cost with annual escalation of 6%. If we compare with these norms, the O&M expenses proposed by the TVNL is far higher then the prescribed norms.

**Table 13:** Comparison of Normative and Actual O&M Expenses

Year	CERC/ JSERC norms (in Rs. Crores)	Actual and proposed (in Rs. Crores)
2002	48.66	82.83
2003	51.58	85.56
2004	54.68	92.38
2005	57.96	96.22

As mentioned earlier that the major component in the O&M expenses is water charges, which is considered very high. *The Commission directs the TVNL, to explore various possibilities to reduce the exorbitantly high water charges. Some of possible options that the petitioner could look for are appropriate cooling tower, water storage and recycling system etc.*

The Commission strongly believes that TVNL cannot be allowed to pass on to consumer the excessive O&M expenses and therefore the Commission would like to cap the O&M expenses to Rs.57.96 Crores (as per norms).

### 5.15 Interest on Working Capital

As discussed in the section 3.4.2 of Chapter 3 the Commission approves interest rate of 12.5% on the working capital requirement. The working capital requirement is worked on the following basis:

Table 14: Computation of Working Capital for FY 2004-05

Components	JSERC norms	Amount (in Rs. Crores)
Coal	½ month inventory	7.08
Oil	1 month inventory	1.31
O&M Expenses	1 month	4.83
Maintenance & spares	1% of plant equipment cost	11.74
Receivables	2 month of fixed and variable charges	64.22
Total Working Capital		89.18
Interest on Working Capital @ 12.5%		11.15

The components that have been included in working capital are referred from Section 21 (1) (v) of the JSERC (Terms and Conditions for Determination of Thermal Generation tariff) Regulations.

### 5.16 Plant Load Factor and Auxiliary consumption

As discussed in sections 2.3.1 and 2.3.2 of chapter 2, the petitioner has mentioned the actual PLF and auxiliary consumption of the TVNL plant for the FY 2004-05 as 46.61% and 12.5% respectively. The Commission is of the view

that PLF of 46.61% for the FY 2004-05 is abysmally low and hence not approved. TVNL should achieve PLF of 80% but it may not be able to achieve it in a short time hence the Commission has decided to consider the PLF at 68.5% keeping in view also the Regulation in this regard. Further, the Commission believes that the auxiliary consumption of 12.5% is very high and hence normative value of 9% has been considered for tariff determination.

### 5.17 Additional investments

The Commission observes that there are certain investments that TVNL is required to incur, both to upgrade the efficiency of the plant and to upgrade the evacuation capacity. The Commission therefore approves Rs. 130 crore for the following investments:

- a) Computer hardware, operating systems and application software
- b) Distributed control system
- c) New-dedicated line for power evacuation.
- d) Cooling tower in the station

The Commission would like to highlight that this list is indicative in nature and therefore, TVNL should separately file a detailed investment plan along with the time frame for completion of these activities, to the Commission for scrutiny and approval. The Commission would like to emphasize on the importance of setting up an additional dedicated line to evacuate the full capacity of the TVNL plant.

For the computation of tariff, the Commission has approved Rs. 23.63 Crore towards interest and depreciation liability arising out of these additional investments. This has been calculated after considering interest rate of 11% and normative depreciation rates.

**The table below gives the proposed and approved fixed charge after incorporating various changes in the costs and parameters. For the purpose of tariff determination, the Commission has considered Plant Load Factor of 68.5% and auxiliary consumption of 9%.**

**Table 15:** Comparison of Proposed and Approved capacity charge

Components	Proposed	Approved
ROE	140,000,000	140,000,000
Interest payment	830,557,000	830,557,000
O&M	962,211,000	579,559,247
Depreciation	506,840,000	506,840,000
Interest on additional investments	-	143,000,000
Depreciation on additional investments	-	93,333,333
Interest on WC	174,422,000	111,477,376
Total expenses	2,614,030,000	2,467,711,580

PLF	46.61%	68.50%
Auxiliary consumption	12.50%	9.00%
Fixed charge	NA	1.05

## 5.18 Variable Energy Charges

### 5.18.1 Calorific Value of Coal (kCal/kg)

The weighted average Gross Calorific Value of coal (for Grade 'D') has been indicated as 4500 kCal/ Kg in TVNL's petition. The Commission has cross-examined this with the data on grade-wise calorific value of coal, as given by the Coal India Limited (CIL). The GCV of Grade 'D' coal can vary in the range of 4200-4940 kCal/kg. The Commission is of the view that a GCV of 4500 kCal/kg is permissible, only if TVNL is able to provide accurate information about the grade of coal actually procured. This is because, in the DPR of TVNL, the plant was designed to use coal having calorific value of 4200 kCal/kg. However, joint sampling reports revealed that **as against receipt of lower grade of coal, payment for higher grade of coal was made**. This resulted in excess payment of Rs. 9.99 crore in procurement of 7.5 lakh MT of coal of lower grade (*source: Commercial Audit Report for the year ended 31 March 2001, Government of Bihar*).

The Commission directs TVNL to provide accurate information about the Grade of coal used as fuel, in the thermal power plant and would **in the interim continue to use a GCV of 4500 kCal/kg**.

### 5.18.2 Heat Rate (kCal/kWh)

The Commission is of the view that the data provided on Station Heat Rate by TVNL is inconsistent and ambiguous. In the petition that was submitted by TVNL, the Station Heat Rate had been specified as 1980 kCal/ kWh. However, when this data was used to calculate the actual fuel consumption, the records of actual fuel consumption did not match with the computed fuel consumption figures. When the Commission questioned TVNL on accuracy of the data provided by them, they responded by submitting a revised Station Heat Rate of 3040.54kCal/ kWh.

As per the DPR of the Company, heat rate of turbine of generating units of power station at a boiler efficiency of 86% was ascertained at 1967 kCal/kWh and the heat rate at generator efficiency of 98% at 2325 kCal/kWh. [*Source: Report of Comptroller & Auditor General of India, for the year ended 31 March 2001 Commercial (Government of Bihar)*]

The Commission is of the view that a heat rate of 3040.54kCal/ kWh (as indicated by TVNL) is very high, especially for grade D coal, hence, the Commission directs TVNL to provide accurate information about the grade of coal used in the plant. **In the interim the Commission has decided to use normative heat rate of 2500kCal/ kg**, for calculating fuel consumption.

### 5.18.3 Consumption of Fuel (kg/kWh)

With a Gross Calorific Value of coal of 4500 kCal/kg and a normative Station Heat rate of 2500 kCal/kWh, the gross fuel consumption has been computed as 0.56 kg/kWh.

### 5.18.4 Auxiliary Consumption

The Commission is of the view that, as per the norms fixed by Central Electricity Authority (CEA) as well as the DPR of the TVNL power plant, the auxiliary consumption of energy in the power plant should not exceed 9% of power generated. The auxiliary consumption of TVNL plant, however, has ranged from 12-16% in the past five years. According to the Commission, the high auxiliary consumption is primarily because at present only one of the units of the power plant is operational. Since this is not envisaged as a long-term situation, the Commission has decided to use the normative level of auxiliary consumption (9%) for calculating fuel costs.

### 5.18.5 Consumption of Fuel (Net Generated)

After taking into account a normative auxiliary consumption of 9%, the approved consumption of fuel, as a proportion of the net generated energy has been computed as 0.61kg/kWh (taking into account the Auxiliary consumption).

### 5.18.6 Coal Price (Rs. Per tonne)

The price of coal (excluding transportation cost) as given by TVNL is Rs. 917.11 per tonne for the period November 2003 – May 2004. While post June 15.06.2004 (with an increase in coal prices), the price of coal has been indicated as Rs. 1092 per tonne. The Commission has cross-examined these prices with the price-list of grade D coal available at CCL from the CIL data (coal price = Rs. 857 per tonne and Rs. 1040 per tonne post 15 June 2004), and is of the view that the prices quoted by TVNL are slightly on the higher side. However, the CIL data gives only the base price of coal at the pithead while TVNL has quoted the coal prices inclusive of royalty and sales tax, hence, the Commission feels that the coal price (excluding transportation costs) as quoted by TVNL is acceptable.

#### (i) Coal Transportation

Coal is transported to the Tenughat Thermal power station, from the CCL mines through trucks. According to TVNL, the distance traveled by their trucks is 40kms (one way) and the transportation cost (Rs./MT) has been quoted as Rs.132 per tonne (for the FY 2003-04).

The Commission has observed that more than Rs 60 Crores has been spent on railway siding. However, the line is still not operational. After a discussion with officials of RITES and TVNL, the Commission feels that there is no sound reason for the railway line not having been commissioned even after such a long time.

The Commission is of the view that, inability of commissioning the railway line has led to time and cost over run. Hence, *the Commission directs TVNL to make the railway line operational latest by April 1, 2005 so that adequate coal is available for running both the plants of TVNL and this would also bring down the*

*transportation and fuel costs substantially.* For the current year, the Commission has computed the transportation costs on the basis of the units of coal transported through trucks. This is explained below.

### Computation of Coal Transportation costs

In absence of details for fixation of transportation charges, for the current year, the Commission has computed the transportation costs on the basis of the information obtained from M/s CCL according to which the coal transportation cost in the CCL area varies between Rs. 2.70 to Rs. 3.00 per tonne per km. The Commission approves a transportation cost of Rs.120 per tonne (Rs.3x40) after considering the rate of Rs. 3.00 per tonne per km. The cost of coal/unit amounts to Rs.0.72.

### (ii) Oil Consumption

The normative oil consumption as per the CERC norms is 2ml/ kWh. However, the oil consumption as indicated by TVNL is 8.17ml/ kWh, for the FY 2003-04. The Commission is of the view that the actual fuel consumption is too high. As a result, the Commission has decided to use the actual oil consumption data from April to July '04 and thereafter directs TVNL to follow normative oil consumption level of 2ml/ kWh. The table below gives the plant performance of TVNL for the period from April 2004- July 2004:

**Table 16:** Specific Oil Consumption from April 04 to July 04

Month and Year	Specific Oil Consumption (ml/kWh)
April – 04	5.10
May –04	7.2290
June – 04	3.80
July – 04	1.89
Average	4.325

Based on this information, the Commission has worked out the level of oil consumption permissible for the tariff purpose. The table below gives the average oil consumption for the FY 2004-05 as approved by the Commission. Based on this and given the Oil price, the per unit oil cost has been computed as Rs.0.06 per unit.

**Table 17:** Computation of per unit oil cost

Oil required (Klitre)	6,364
Oil (Rs/KL)	21,166
Oil cost	134,707,207
Oil cost/unit	0.06

### 5.18.7 Fuel Cost

Based on the Coal price and oil consumption rates, the variable charge has been approved at Rs. 0.78 per unit.

### 5.19 Approved tariff for TVNL

**5.19.1 Following the above discussions, the Commission approves tariff of Rs.1.83 per unit, inclusive of fixed charge of Rs.1.05 per unit and variable charge of Rs.0.78 per unit.**

**5.19.2** This Tariff Order, **effective from 1<sup>st</sup> April 2004**, shall unless amended or revoked, continue to be in force **up to 31st March 2005**. In the event of failure on the part of the licensee to file the tariff petition for FY 2005-06 on or before 31 December, 2004, the tariff determined by the Commission shall cease to operate, unless allowed to be continued for further period with such variations or modifications as may be ordered by the Commission.