

TAMIL NADU ELECTRICITY REGULATORY COMMISSION
(Constituted under section 82 (1) of the Electricity Act, 2003)
(Central Act 36 of 2003)

PRESENT:

Thiru S.Akshayakumar	Chairman
Thiru G.Rajagopal	Member
	and	
Dr.T.Prabhakara Rao	Member

M.P.No.11 of 2017

Tamil Nadu Generation and Distribution Corporation Ltd.
Represented by the Chief Engineer / Gas Turbine Schemes
144, Anna Salai
Chennai – 600 002.

... Petitioner
(Thiru M.Gopinathan
Standing Counsel for TANGEDCO)

Vs.

NIL ...Respondent

Dates of hearing : 02-06-2017, 29-08-2017 and 13-11-2017

Date of Order : 19-12-2017

The M.P.No.11 of 2017 came up for final hearing on 13-11-2017. The Commission upon perusal of the Petition and connected records and after hearing the submissions of the Petitioner hereby makes the following:

ORDER

1. Prayer of the Petitioner in M.P.No.11 of 2017:-

The prayer of the Petitioner in the above M.P.No.11 of 2017 is for approval and ratification for having generated real power of 11.12380 MUs at the fuel cost of Rs.16.46 Cr. in FY 2016-17 under unavoidable emergency circumstances in order to

avoid cascade tripping of generating units and EHT/HT feeders and blackout in the area of Chennai city area during critical situation thereby maintaining stability of Chennai network by considering BBGTPS as a part of Grid Stability Mechanism and for approval of real power generation at BBGTPS during trial run of the units / Mock drill.

2. Facts of the Case:-

The Petition has been filed seeking the approval and ratification of the Commission for having generated real power of 11.12380 MUs in FY 2016-17 under unavoidable emergency circumstances in order to avoid cascade tripping of generating units and EHT/HT feeders and blackout in the area of Chennai city by considering Basin Bridge Gas Turbine Power Station (Hereafter called “BBGTPS”) as a part of Grid Stability Mechanism and to exempt the said power station from the ambit of Merit Order Dispatch.

3. Contentions of the Petitioner:-

3.1. In the SMT Order No.9 of 2014, power generation at BBGTPS is not allowed under “Merit Order Dispatch” vide clause 4.141 of SMT order and it requires prior approval of the Commission, as per the directives of Commission vide 7.1 (h) of the SMT order. Hence, the present Miscellaneous Petition is filed before the Commission for having generated real power of 11.12380 MUs at fuel cost of Rs.16.46 Cr. in FY 2016-17 under unavoidable emergency circumstances.

3.2. 4 units of 30 MW each are available at Basin Bridge Gas Turbine Power Station and the Units have been commissioned to meet out the Grid requirements whenever network disturbances occurred. Further, Chennai city network is highly loaded in summer and any tripping of one line will lead to cascade tripping, if necessary action is not taken at appropriate time. The units generated at BBGTPS and the cost for such generation is as follows:-

Total Power generated:	11.12380 MU
Total cost of fuel:	16.46 Crore

3.3. In order to admit the expenditure, incurred towards cost of fuel, during real power generation of 11.12380 MU at BBGTPS in FY 2016-17 in the TANGEDCO's ARR when the Tariff Petition is filed before the Commission for Tariff revision, this petition is filed before the Commission, otherwise the expenditure made towards fuel for generating real power at BBGTPS could not be reflected in Tariff.

3.4. During the tripping and breakdown of vital 230 KV feeders like NCTPS-Tondairpet feeders 1 & 2, Manali-Alamathy feeders, Manali-Mylapore feeders etc, there would be disturbance in 110 KV network system causing major Grid disturbance (to the tune of about 300-400 MW) in Chennai city leading to black out of major essential services like Government Head Quarter Hospital, Railway traction system, Metro water works, High Court and Secretariat campus etc. Hence, in order to mitigate the supply failure in the important vicinity of Chennai city, it is very much essential to keep the units in BBGTPS in service to extend supply to vital substations like 230KV Mylapore, Tondiarpet, Taramani, Chindadaripet, Valluvarkottam & High Court substations. Two 110 KV generation sources i.e., BBGTPS & GMR were available prior to 14.02.2015. Consequent to expiry of PPA (Power Purchase

Agreement) with GMR on 14.02.2015, the only generating source at 110 KV in Chennai network is BBGTPS.

3.5. On restoration of station supply to the above substations, depending upon the feeder healthy conditions, 230KV feeders are gradually normalized with simultaneous restoration of relevant 110KV feeders according to the Chennai city network loading condition without affecting the stability and security of the system. The restoration process takes about 30 minutes to 2-3 hrs depending upon the severity of the disturbance. After normalizing, the generation units of BBGTPS will be taken out of bar and kept as stand by. In view of the above, the operation of the Generation units in BBGTPS during critical condition is very much required to meet the contingency situation in the Chennai city network in restoring supply to essential services and thus ensuring supply.

3.6. The very purpose of establishment of BBGTPS under open cycle is to operate the units during grid emergencies to safe guard the grid since Gas Turbine machines are quick start machines and 30 to 120 MW could be fed in to grid within the time span of 15-45 seconds.

3.7. The unit is operated only in the extraordinary circumstances in order to maintain the grid stability and it may be considered as a part of grid stability mechanism rather than a power generating station.

3.8. At present, Mylapore 230/110KV and 230/33KV Substations are radially fed through 230KV Manali-Mylapore feeder. During the failure of the above feeder,

230KV Basin Bridge –Mylapore feeder is being extended to meet out Mylapore substation loads. Hence additional 230 KV source from any one of the generating station to Basin Bridge 230/110KV substation is essential. Hence, additional source to Basin Bridge 230 KV substation has been provided in the proposal for establishment of Pulianthope 400 KV Substation and steps taken to provide additional 230 KV source to Basin Bridge 230 KV SS & Mylapore 230 KV SS are furnished below:-

i) Providing additional 230KV Source to Basin Bridge 230KV Substation:-

230 KV cable laying works from Tondiarpet 230KV Substation to Basin Bridge 230 KV Substation is nearing completion and it is expected to be commissioned by the end of May 2017 and it is being used as an additional source till establishment of the proposed Pulianthope 400 KV GIS Substation.

ii) Providing additional 230KV Source to Mylapore 230KV Substation:-

230 KV cable laying works from Mylapore 230KV Substation to Tharamani 230 KV Substation has been energized on 17.04.2017.

iii) Second source to Basin Bridge 230 KV SS:-

Second source to Basin Bridge 230 KV substation is made available after commissioning of Pulianthope 400/230KV substation. Retendering is under process for awarding of contract for Pulianthope 400/230KV substation.

3.9. After commissioning of Pulianthope 400/230KV substation, 230KV Basin Bridge -Mylapore feeder can be tied with 230 KV Manali-Mylapore feeder at 230 KV Mylapore substation thereby reducing the 230 KV Manali bus loading and providing reliable source to Mylapore. Necessary action is being taken to complete the above

works on top priority so as to avoid the operation of units at Basin Bridge Gas Turbine Power Station.

4. Contention of Petitioner in Additional Affidavit dated 13-11-2017:-

In the additional affidavit dated 13-11-2017, the Petitioner has stated the following:-

4.1. The number of storage fuel tanks available at BBGTPS along with the capacity is as below:

- | | | |
|-----|--------------------|----------------|
| a) | Naphtha Fuel Tanks | : 2 Nos, |
| | Capacity | : 1700 kl each |
| | Safe capacity | : 1600 KI each |
| (b) | HSD Fuel Tanks | : 2 Nos. |
| | Capacity | : 160 KI each. |
| | Safe capacity | : 148 KI each. |

4.2. The storage stock level of Naphtha was maintained as per the approval of the Director/Generation communicated vide Memo No. CE/GTS/SE/GTS/EMII/BBGTPS/F.Naphtha/D.305/16, dated 16.12.2016. Hitherto the minimum stock of Naphtha fuel was being maintained as 72 machine hours corresponding to 1250 KL which includes dead stock. At present, the naphtha stock is 65 machine hours corresponding to 1153.868 KL. Now it has been informed by the Chief Engineer/Grid Operation in the letter vide U.O.No.CE/GO/SE/LD&GO/EE/LD/AEE/EMS/F.16/D.No.211/17, dated 11.08.2017 to maintain 40 Machine Hours of the minimum stock of Naphtha fuel instead of 72 Machine Hours corresponding to 840 KL which includes dead stock.

4.3. The present method of calculation for arriving Variable Cost in (Rs/Kwhr) & weighted average cost at BBGTPS are furnished as below:

A) Variable Cost =

$$\frac{\left\{ \begin{array}{l} \text{(Quantity of HSD Consumed in KL x Weighted Average Cost Per KL)} \\ + \\ \text{(Quantity of Naphtha consumed in MT x Weighted Average Cost per MT)} \end{array} \right\}}{\text{Nett Generation in Kw hr}}$$

ii) Weighted average cost of fuels is as below:

B) Weighted Average Cost of Naphtha / HSD=

$$\frac{\left\{ \begin{array}{l} \text{(Cost of total amount of Naphtha/HSD + (Cost of Naphtha/HSD received} \\ \text{stock at the beginning of the month) during the month)} \end{array} \right\}}{\left\{ \begin{array}{l} \text{(Total Quantity of Naphtha/HSD stocked + (Quantity (Naphtha/HSD) received} \\ \text{at the beginning of the month) during the month)} \end{array} \right\}}$$

(i) Cost of opening stock of Naphtha/HSD stored in the tank at the beginning of month which is as same as the cost of closing stock at the end of the previous month - (a)

(ii) Cost of Naphtha/HSD received during the month = Cost is arrived based on the invoices received from IOC - (b)

(iii) Quantity of Naphtha/HSD stored at the beginning of the month which is as same as the Quantity of stored at the end of the previous month - (c) .

(iv) Quantity of Naphtha/HSD received during the month - Sum of the Quantity unloaded at BBGTPS from the tankers during the month. - (d)

Weighted Average cost in Rs./MT : (a + b) / (c + d)

Based on the above calculation the variable cost arrived at BBGTPS for the past 3 years as below:-

FY 2014-15: Rs.21.64

FY 2015-16: Rs.16.87

FY 2016-17: Rs.15.72

4.4. It is to be stated that the Variable cost of generation of M/s. PPN is found to have been arrived for the Gross Generation under Combined Cycle Mode of operation. But, the variable cost of generation of BBGTPS has been arrived for the Net Generation, under Open Cycle Mode.

To have a levelised comparison following data were considered

- (i) In case of M/s.PPN, the estimated generation of the gas turbine alone is considered, i.e., 2/3rd of total generation since the generation that could be achieved in STG is around 50% of the generation in GTG.
- (ii) The gross generation of BBGTPS is considered for comparison.
- (iii) At BBGTPS, HSD is used during start-up and shutdown sequences only without any generation of power. Hence during every start-up and shutdown 0.90 KL of HSD is being utilized without any power generation. Hence, for levelised comparison, HSD fuel consumption during the start-ups and shutdowns has not been considered.
- (iv) Station Heat Rate (SHR) for BBGTPS has been arrived $((3219/10572)*11264=3430$ Kcal/Kwhr) by adopting the norms (SHR-3219 Kcal/Kwhr) fixed by TNERC with HHV (High Heat Value of Naphtha) as calculated by M/s.PPN.

4.5. Based on the above, the variable cost for the financial years 2014-2015, 2015-2016 & 2016-2017 have been calculated for Basin Bridge Gas Turbine Power Station and M/s.PPN. The comparative statement of rate per Kwhr for BBGTPS & M/s.PPN is furnished below:

Sl. No.	Year	BBGTPS	M/s.PPN	Excess Cost
1.	FY 2014-15	19.00	17.46	1.54
2.	FY 2015-16	14.20	13.28	0.92
3.	FY 2016-17	12.62	10.87	1.75

The excess cost of Rs.1.54 per Kwhr, Rs.0.92 Kwhr and Rs.1.75 per Kwhr for the financial years 2014-2015, 2015-2016 and 2016-2017 respectively had been incurred due to the following reasons.

- Units were mostly operated in partial load as per instructions from Load Despatch Centre as shown below:

Year	Partial Load Hours (taken from Log Book)
2014-2015	28.24
2015-2016	105.14
2016-2017	212.43

- The type of Gas Turbine installed at M/s.PPN is M701F series higher capacity of (GTG-230 MW and STG-100.5 MW) which has efficiency 20% higher than the Gas Turbine (MS6001B) installed at BBGTPS which has the lesser capacity of (GTG-30 MW).

Further, it is also submitted that the design Heat rate of BBGTPS as per OEM is 3005 Kcal/Kwhr for operating the machine at base load. The actual Heal rate at BBGTPS for the past 3 years are furnished below:

Sl. No.	Year	Partial Load Hours (taken from Log Book)
1	FY 2014-2015	3258
2	FY 2015-2016	3345
3	FY 2016-2017	3474

The excess Heat Rate contributed over the designed Heat Rate for the above three years are due to the operation of the units in various loads viz., low load, partial load and full load and hence the designed Heat Rate could not be maintained.

5. Findings of the Commission:-

5.1. We have carefully considered the prayers of the Petitioner which are as follows:

For approval and ratification for having generated real power 11.12380 MUs at the fuel cost of Rs.16.46 Crore in FY2016-17 under unavoidable emergency circumstances in order to avoid cascade tripping of generating units and EHT/HT feeders and blackout in the area of Chennai city area during critical situation thereby maintaining stability of Chennai network by considering BBGTPS as part of Grid Stability Mechanism and for approval of real power generation at BBGTPS during trial run of the Units / Mock drill.

5.2. The Petitioner, TANGEDCO has submitted reasons for operating the Power Plant and explained that during the tripping and break-down of vital 230 KV feeders like NCTPS-Tondiarpet feeders 1 & 2, Manali-Alamathy feeders, Manali-Mylapore feeders, etc. there would be disturbance in 110 KV network system causing major Grid disturbance (to the tune of about 300-400MW) in Chennai city leading to black out of major essential services like Government Head Quarter Hospital, Railway traction system, Metro water works, High Court and Secretariat campus, etc.

5.3. Further, it was also stated that the very purpose of establishment of BBGTPS under open cycle is to operate the units during grid emergencies to safe guard the grid since Gas Turbine machines are quick start machines and 30 MW to 120 MW could be fed into the grid within the time span of 15-45 seconds. TANGEDCO has also stated that only in the extraordinary conditions which require running of BBGTPS, the plant was operated.

5.4. The reasons submitted by TANGEDCO for operating the power station is hereby accepted and the Commission in earlier occasions while approving the purchase of power outside Merit Order Despatch, has approved only up to the Average Rate of Realization of the Petitioner for the purpose of Annual Revenue Requirement (ARR). In view of the same Commission, hereby approves the total power generated i.e. 11.12380 MUS for the FY2016-17 at the Average Rate of Realization for the year FY2016-17.

5.5. Commission permits TANGEDCO to generate real power at BBGTPS during trial run of units/Mock drill.

5.6. Further, as per the 'Directive' (g) and (h), issued in the Order in T.P. No. 1 of 2017, dated 11-08-2017, TANGEDCO shall take prior approval from the Commission for purchasing energy from unapproved sources. To submit the MoD stack of actual power purchased from various sources during the month, on a monthly basis. In case of any variation from the MoD stack approved by the Commission, TANGEDCO should file quarterly Petitions for ratification of such

power purchase with proper justification, in the same manner as being done presently for purchase from IPPs outside the MoD stack.

5.7. With the above Orders, the M.P.No.11 of 2017 is disposed of.

6. Appeal

An appeal against this Order shall lie before the Appellate Tribunal for Electricity under section 111 of the Electricity Act 2003, within a period of 45 days from the date of receipt of a copy of this order by the aggrieved person.

(Sd)
(Dr.T.Prabhakara Rao)
Member

(Sd.....)
(G.Rajagopal)
Member

(Sd.....)
(S.Akshayakumar)
Chairman

/ True Copy /

Secretary
Tamil Nadu Electricity
Regulatory Commission