KERALA STATE ELECTRICITY REGULATORY COMMISSION
THIRUVANANTHAPURAM

Present: **Shri T.M.Manoharan, Chairman**
Shri. K.Vikraman Nair, Member
Shri. S. Venugopal, Member

In the matter of 'Replacement of two faulty diesel engine generator sets with new gas based generator sets at BDPP.

Petitioner : Kerala State Electricity Board Limited
Vydhyuthi Bhavanam, Pattom
Thiruvananthapuram

<u>Order No. 02234/C. Engg/ BDPP/2014 dated 12-01-2016</u>

1. Kerala State Electricity Board Limited (KSEB Ltd) vide its application dated 20-11-2014 has submitted that,

   (i) *Brahmapuram Diesel Power Plant (BDPP) had started it's operation in 1997 and comprising of 5 x21.32 MW Pielstick diesel generator sets designed for operation either on diesel or LSHS. The plant is having a total capacity of 106 MW and completed 17 years by 2014. The plant is now experiencing limited availability of requisite fuel (LSHS with less than 1% sulphur content) and increasing cost of maintenance. The two diesel sets of BDPP have been lying faulty, i.e; DG#3 was faulty since 08.11.2011 and DG #2 was fualty since 21.04.2012. These faulty generating units were not repaired due to lack of assurance of performance guarantee from the OEM of these DG sets. The repairing cost of these units comes to about 22.37 crores.*

   (ii) *Kerala State Electricity Board Limited (KSEBL) has in principle decided to replace two numbers of faulty diesel engine generators at Brahmapuram Diesel Power Plant (BDPP) with new gas engine /Turbine generator. The work involves installation of gas based generators in the premises of BDPP after replacing the faulty units by using some of the existing infrastructure facilities. The total capacity envisaged for the new units is*

36-42 MW. RLNG is the main fuel for the proposed project . The fuel requirement of the plant is met from the LNG terminal at Kochi of M/s.Petronet LNG Ltd. The plant shall be capable of peaking operation as well as base load operation at existing site conditions. The operating pattern is taken as from 05.00 hrs to 9.00 hrs for morning peak and from 18.00 hrs to 23.00 hrs for evening to exploit the possibility of combined cycle operation. Under the above operating conditions, the plant is capable of achieving a plant load factor of 37.5%.

(iii) *The project cost is estimated at Rs. 171 Cr. for 42 MW (gas engine on combined cycle technology) and the levelised tariff worked out to be Rs.12.43/kWh (at a gas price of USD 20/mm Btu and PLF 37.5%). The project would augment the internal generation capacity to the tune of 42 MW within a short span of time and also it would facilitate domestic gas allocation from GoI.*

(iv) *KSEB Ltd requested before the Commission to grant investment approval for proceeding with the replacement of the existing two faulty Diesel Generators at BDPP with new Gas turbines, as detailed in the 'Project Report' enclosed.*

2. The Commission vide its letter dated 06-04-2015 has directed the KSEB Ltd submit the following details to the Commission:

(i) Whether the plant can be converted to a dedicated station for licensees such as Smart City, Info park etc?

(ii) What is the annual capacity charge per megawatt?

(iii) How the Generation SBU proposes to realize the capacity charges?

3. In reply to the direction of the Commission, KSEB Ltd vide its letter dated 16-12-2015 has submitted the following:

(i) <u>Conversion of plant to a dedicated station:</u> *The new plant can be utilized as a dedicated station for the Licensees like Info park, Smart City etc, in case mutual agreement is reached on the terms and conditions for such utilization . The Info park, Kinfra Export Promotion Industrial Park, and the upcoming Smart City are within a radial distance of 2 km from the plant and also the plant can be put in to operation within 5 minutes. The existing transmission facility can also be used for feeding these licensees and due to proximity of potential procurers, power cables are feasible for the bulk*

supply. The matter can be explored among the licensees under the guidance of the Hon'ble Commission.

(ii) *Annual Capacity Charge per MW:* *KSEB Limited had invited the tender for the work on 'technology independent solutions basis' and the lowest bid was offered on gas engine based solutions. Based on the lowest bid and the norms specified under regulations the annual capacity charges for the plant is about Rs.22.5842 Cr., which works out to Rs.56.66 Lakhs/MW for the first year. With the fall in capacity charges in subsequent years, the levelised capacity charges will be Rs.44.41 Lakhs/MW which is very moderate when compared to recently commissioned coal based station like Vallur ,NTPL- Tuticorin and Simhadri TPS stage-II . The present capacity charges for these plants are Rs. 117.47 Lakhs/MW, Rs.107.37 Lakhs/MW and Rs. 113.39 Lakhs/MW respectively.*

(iii) Realization of Capacity Charges: The plant will be scheduled by the Board for peaking operation as well as base load operation of the system based on the merit order consideration. Hence the annual charge of the project is proposed to be recovered through the Distribution SBU of KSEBL.

Analysis and Decision of the Commission

4. Commission has analysed the proposal of KSEB Ltd, with special reference to the following issues, duly considering the problems and prospects of the gas based power generation in our country.

   (i) Whether the State of Kerala, requires additional power on long-terms basis during next '5'years in view of the anticipated the demand supply position and also, considering the large quantum of power tied up from various sources including Central Generating Stations, traders, generators etc?.

   (ii) Whether the cost of electricity generated from the proposed project is competitive when comparing the price of electricity from other sources?.

   (iii) Whether it is prudent to invest in a gas based plant?.

5. The Commission had made a detailed appraisal on the above issues, in order to ascertain, whether investment approval can be granted to KSEB Ltd for the

replacement of two faulty generator sets of BDPP with new gas based generator sets.

6. Issue No.1 : Whether the State of Kerala, requires additional power on long-terms basis during next '5'years in view of the anticipated the demand supply position and also, considering the large quantum of power tied up from various sources including Central Generating Stations, traders, generators etc?

(i) KSEB Ltd on previous occasions, had submitted the details of the power tied up through various sources including CGS, 'power tied with the generators TATA Maithon, DVC etc', power tied through DBFOO basis, and own capacity addition by KSEB Ltd from hydel, solar etc.

(ii) The anticipated electricity demand and supply position of the State based on the 18th Electric Power Survey Report (EPS report) of the Central Electricity Authority and availability from various sources is summarized below.

Table-1.

Energy demand and availability

Year	Energy Demand (18th EPS)	Energy Availability (MU)							Shortfall	Short fall as (%) of total demand
		Hydel	CGS	DBFOO (865 MW)*	TATA Maithon (300 MW)*	DVC (150 MW)*	Case-1 bid (400 MW)*	Total		
2015-16	24915	7102	9066	0	435	0	1128	17732	7183	28.8
2016-17	26584	7232	10234	739	1801	1054	2708	23766	2818	10.6
2017-18	28080	7310	11484	4168	1953	1054	-	25969	2111	7.5
2018-19	29595	7546	11948	6119	2000	1054	-	28666	929	3.1
2019-20	31198	7585	12215	6119	2094	1054	-	29066	2132	6.8
2020-21	32895	7608	12662	6119	2094	1054	-	29537	3358	10.2
2021-22	34691	7608	13257	6119	2094	1054	-	30131	4560	13.1
2022-23	36583	7608	14228	6119	2094	1054	-	31103	5480	15.0
2023-24	38577	7608	14943	6119	2094	1054	-	31818	6759	17.5
2024-25	40677	7608	14943	6119	2094	1054	-	31818	8859	21.8
2025-26	42890	7608	14943	6119	2094	1054	-	31818	11072	25.8
2026-27	45221	7608	14943	6119	2094	1054	-	31818	13403	29.6

*Energy availability at State periphery

Table-2
Peak demand and availability

Year	Peak Demand (18th EPS)	Power Availability (MW)							Shortfall	Short fall as (%) of total demand
		Hydel	CGS	DBFOO (865 MW)	TATA Maithon (300 MW)	DVC (150 MW)	Case-1 bid (400 MW)	Total		
2015-16	4386	1675	1335	0	140	0	397	3547	839	19.1
2016-17	4669	1691	1504	299	262	142	397	4295	374	8.0
2017-18	4931	1751	1578	822	262	142		4555	376	7.6
2018-19	5198	1821	1591	822	281	142		4657	541	10.4
2019-20	5479	1821	1671	822	281	142		4737	742	13.5
2020-21	5777	1830	1751	822	281	142		4826	951	16.5
2021-22	6093	1830	1907	822	281	142		4982	1111	18.2
2022-23	6426	1830	1983	822	281	142		5058	1368	21.3
2023-24	6777	1830	1983	822	281	142		5058	1719	25.4
2024-25	7147	1830	1983	822	281	142		5058	2089	29.2
2025-26	7536	1830	1983	822	281	142		5058	2478	32.9
2026-27	7946	1830	1983	822	281	142		5058	2888	36.3

(iii) As detailed above, the energy shortages expected in the State may vary between 3% to 10% of the energy demand as per 18th EPS report during the next five years and whereas the peak shortages during the said period is about 10% only.

(iv) The Commission has noted that, the actual energy demand in the State has been less by 7% to 8% compared to the energy requirement as per the 18th EPS report and the actual peak demand has been less up to 12% compared to the peak power requirement as per the 18th EPS report. The details are given below.

Table-3

Comparison of actual electricity demand with 18th EPS report

Year	Comparison on Annual Energy Demand			Comparison on Peak demand		
	Energy demand as per 18th EPS report	Actual energy demand met	Reduction in demand over 18th EPS report	Peak demand as per 18th EPS report	Peak demand met	Reduction in demand over 18th EPS report
	(MU)	(MU)	(%)	(MU)	(MW)	(%)
2012-13	20971	19891	5.15	3683	3268	11.27
2013-14	22233	20524	7.69	3903	3558	8.84
2014-15	23554	21582	8.37	4137	3643	11.94

(v) Government of India, Bureau of Energy Efficiency, Government of Kerala, Energy Management Centre and such other institutions are implementing energy conservation programmes with a view to minimizing consumption of energy and peak load by introduction of energy efficient equipment and efficient and economic use of energy. Therefore it has to be reasonably concluded that the present trend in reduction in demand over the energy and power requirement as per the 18th EPS report will continue and it has to be taken into account, while assessing the energy and power requirements of the State. The Commission is of the considered view that, the State may have only manageable shortages in the next five to six years.

(vi) The Commission has also noted that,

(a) In our Country, the short-term market including transactions through energy exchanges has been maturing over the years. At present, about 10 to 15% of the total energy transactions are being done through short-term market, deviation settlement (formerly UI) and through short-term bi-lateral transactions etc. The energy prices derived through the short-term market including exchanges, especially during night off-peak hours is much less than the rate derived through long term contracts. The rate of power during peak hours is also around Rs.5/- per unit in the southern region, presumably due to the transmission constraints in the southern region (SR). The rate of power in the other regions where NEW grid is operational is comparatively lower. In order to avail the benefit of competitive price of short-term market for the best interest of the consumers of the State, KSEB Ltd shall have to procure about 10 to 15% of the daily demand from short-term market and balance only need be met through long-term contracts.

(b) The inter-regional transmission constraints between SR and NEW grid are expected to ease out with the commissioning of the Raigarh-

Pugalur transmission system and other inter-state transmission lines. At present there are five 400 kV sub-station in the State functioning at Thiruvananthapuram, Pallikara (Ernakulam), Madakkathara (Thrissur), Kanjikode (Palakkad) and Areacode (Malappuram). Madurai – Thiruvananthapuram 400 kV line, Udumalpet – Madakkathara 400 kV line, Udamalpet – Kanjikode 400 kV line, Madakkathra – Pallikara 400 kV line and Mysore- Areacode 400 kV line are operational. With the commissioning of the above 400 kV sub-stations and lines, the import capacity of the State has increased to about 3000 MW (72 MU/day), and the State can import cheaper power available in generation rich Eastern and Western regions. Further, Edamon-Pallikkara 400 kV line is under construction. The augmentation of the internal transmission system in tune with the increase in demand appears to be the immediate necessity. Hence, KSEB Ltd, as the State Transmission Utility should have given more thrust for augmenting the intra-state transmission system.

7. <u>Issue No.2 : Whether the cost of electricity generated from the proposed project is competitive when comparing the price of electricity from other sources ?</u>

(i) KSEBL has reported the levelised fixed cost and variable cost of the proposed gas based project with the following assumptions.

(a) Capital cost	- Rs.171.00 crore
(b) Target PLF	- 37.50%
(c) Debt: Equity ratio	- 70:30
(d) Return on equity	- 15.5%
(e) Interest	- 12.50
(f) Discounting factor	- 10%’
(g) Depreciation rate	- 6%
(h) O&M cost	- Rs 22.74 lakh/MW per year
(i) O&M escalation	- 5.85%

- Based on the above financial parameters, the levelised fixed cost of the project reported is Rs.2.90/- per unit for Gas Engines on combined cycle. The fuel used is RLNG and the variable cost reported is Rs.9.53/unit, adopting gas price @ 20 USD/ MMBTU.

- Thus the overall levelised tariff of the electricity from the proposed project is Rs.12.43 per unit.

(ii) In this matter, it is worthwhile to look into the average tariff of the CGS and other sources from KSEB Ltd has been procuring/ entering into contract , which is reported before the Commission through ARR and other statutory documents.

a) Average tariff of power from CGS at the periphery of KSEB Ltd	- Rs 3.50 per unit.
b) Tariff for TATA Maithon	- Rs 3.70 per unit
c) Mejia plant of M/s DVC	- Rs 4.00 per unit
d) Power contracted through DBFOO	- Rs 3.60 per unit to Rs 4.29/unit
e) PTC (medium term for one year)	- Rs 5.18/unit
f) Power exchanges	- average Rs 4.50 per unit
g) Deviation settlement	- Rs 2/- per unit to Rs 3/- per unit

Commission also noted that, average price of energy transacted through the exchanges in NEW GRID areas is less than Rs 3.50 per unit. The average price of peak power at present in southern region is around Rs.5/- only. In view of the fact that the transmission constraints between NEW Grid and SR would ease out in the near future when the inter-state transmission projects are commissioned, the price of power in the SR is not likely to increase considerably.

(iii) The generation capacity of the Country from conventional sources is increasing at a rate of about 12000 MW per annum. The target of renewable energy is about 175000 MW by 2022. In the proposed Amendments to the Electricity Act, 2003, there are provisions for mandatory renewable generation obligation (RGO) and spinning reserve. Therefore the price of electricity is not likely to increase due to shortages in the generation.

(iv) The Naphtha based plants namely, RGCCPP at Kayamkulam (359 MW) owned and operated by NTPC and the BKPL plant at Kochi (157MW) are being kept idle for the last few years due its high cost compared to other sources of energy. As per the details submitted by KSEB Ltd, the fixed cost of RGCCPP @85% PLF is only Rs.0.85 per unit. As per the submission made by BKPL in their letter No. BKPL/KSERC/2015-16/004 dated 29.12.2015, the average fixed cost offered is about Rs.0.40 per unit. Further, price of Naphtha at the present is about Rs.33000 / MT, including all taxes and duties. The average variable cost of these power plants is in the range of Rs.5.85/unit to Rs.6.05 per unit. Further, there is no 'take or pay' and 'ship or pay' obligation for Naphtha based plants and these plants can be operated strictly based on merit order. Hence if there is additional demand for electricity, the existing unutilized capacity of the Naphtha based power plants in the State can be utilized in combination with the hydro power capacity.

(v) Comparing the tariff of the proposed gas plant of KSEB Ltd at BDPP with the electricity tariff of various other sources as detailed above, it is seen that the tariff for the proposed gas plant at BDPP is prohibitively high.

(vi) As the main distribution licensee of the State and as a State Government owned utility, it is the responsibility of the KSEB Ltd to source electricity 'either through its own generation or through purchase' at the most competitive rates.

8. <u>Whether it is prudent to invest in a gas based plant?</u>

(i) The paragraph 3.6, 3.7 of the project reported submitted by KSEB Ltd deals with fuel and related issues, which is summarized below for ready reference.

(a) RLNG is the main fuel for the proposed project.

(b) The fuel requirement is planned to be met from the LNG terminal at Kochi of M/s Petronet LNG Ltd.

(c) For sourcing RLNG for the gas based power generation, KSEB Ltd need to enter into two contracts,

- One for the transportation of RLNG namely Gas Transportation Agreement (GTA) with GAIL and
- Another agreement for supply of RLNG namely, Gas Supply Agreement (GSA) with any of the Gas marketing companies like GAIL, BPCL or IOCL.

(d) Paragraph 3.6.1 of the project report deals with 'Take or pay' condition, which is extracted below

'The take-or-pay clause in Gas Contract requires that, gas has to be paid for whether taken or not, and specifies an obligation for the seller to make available defined volume of gas. The probable PLF of the plant has to be decided before entering into Gas agreement'.

(e) Paragraph 3.6.2 of the project report deals with 'Ship or pay' condition, which is also extracted below for ready reference.

'The ship-or pay clause in the Gas Transport Contract requires that transportation charges for the gas has to be paid wheather taken or not, and specifies an obligation for the transporter to make available the pipe line and necessary infrastructure for transporting the defined quantity of gas. As in the case of GSA, the probable quanity and time requirement of gas has to be worked out before entering into Gas Transport Agreement

(f) Vide the paragraph 3.7 of the project report, KSEB Ltd further submitted that, 'the gas price in the market is highly fluctuating.

(ii) Further, vide paragraph 3.8 of the project report, KSEB Ltd has also submitted that, they have applied for domestic gas allocation. In this regard the prospects for the availability of domestic gas for the proposed project have to be seriously assessed. In view of the acute shortage of domestic gas even for the existing gas based power plants, Government of India had issued an advisory to the State Governments to the effect that no power projects should be implemented in anticipation of availability of domestic gas, till 2015-16. The position relating to availability of domestic gas has not improved considerably. That is why the Ministry of Power, Government of India has issued office memorandum No. 4/2/2015-Th-1 dated 27th March 2015, which states as follows,-

'The present gas based capacity, commissioned as well as ready for commissioning in the Country is 27,123 MW. Of this, during the current financial year (Apr 2014 to Jan 2015), the gas grid connected plants with the capacity of 9845 MW received some limited available domestic gas operated at an average PLF of 32.50% during this period and are classified as 'Plants receiving domestic gas'. Further, 14305 MW capacity had no supply of domestic gas and is classified as 'stranded gas based plants';.

With a view to promoting generation from such plants with totally un utilized or under utilized capacities, MoP, GoI has introduced the Scheme for utilization of gas based power generation capacities, vide the vide the office memorandum No. 4/2/2015-Th-1 dated 27th March 2015. Paragraph '5'of the said office memorandum enumerates contributions from different stake holders, which include

(1) Waiver of customs duty on imported LNG.

(2) Waiver of VAT

(3) Waiver of Service Tax

(4) Reduction in pipeline tariff of GAIL

(5) Reduction in regasification charges

(6) Reduction of marketing margin

(7) Capping of fixed cost

(8) Swapping of gas and

(9) Exemption from transmission charges

Further financial support from Power System Development Fund (PSDF), is also offered. Even after offering such supports, the PLFs envisaged is only 30%. All these indicate that there is severe shortage of gas at affordable rate. Hence, there is only remote chance for getting domestic gas allocation for the proposed project even if KSEB Ltd has applied for the same. Further, it should also be noted that the States which opt for the domestic gas allocation under the scheme announced as per the office memorandum dated 27.03.2015 of Government of India, will have to sustain heavy revenue loss to the State Government exchequer by way of concessions in taxes.

(iii) The Commission has also appraised the submission of the KSEB Ltd regarding fuel cost, the 'take or pay' condition to be incorporated in the Gas Supply Agreement (GSA) and the 'ship or pay' condition to be incorporated in the Gas Transportation Agreement (GTA). The Commission has very serious concern over the 'take or pay' and 'ship or pay' conditions, which would force KSEB Ltd to bear the fuel cost including transportation charges irrespective of scheduling power from the proposed gas based plant. Further, the 'take or pay' and ship or 'pay conditions' will upset the scheduling power by KSEB Ltd based on the merit order. Ultimately, the fixed cost and the fuel cost of the plant including transportation charges will be a burden on the consumers of the State without availing any power therefrom.

9. The authorities of KSEB Ltd do not appear to have considered all the above aspects while taking decision to submit the project proposal to the Commission for its approval. As per the clause (b) of the sub-section (1) of Section 86 of the Electricity Act, 2003, the Commission is duty bound to regulate the power purchase and procurement process of the distribution licensee at the most cost effective manner for safeguarding interests of the consumers. If the Commission approves any imprudent expenditure or investment of KSEB Ltd, it will have to be passed on the consumers by way of tariff. Therefore the Commission cannot approve the prohibitively high investment in the proposed project of KSEB Ltd till a fuel supply agreement at affordable rate is put in place, so that the generation of power from the said project will find a place in merit order dispatch system. In view of the facts, circumstances and reasons as explained above, the Commission is of the considered view that, the proposed investment of KSEB Ltd to establish a gas based plant by replacing the faulty diesel engine generator sets at BDPP is prohibitively high without commensurate benefits and hence not prudent.

<u>Order of the Commission</u>

10. In view of the foregoing discussions, Commission hereby declines the investment proposal of the KSEB Ltd for replacing the two faulty diesel engine generator sets with new gas based generator sets at BDPP.

Sd/-	Sd/-	Sd/-
S. Venugopal	**K.Vikraman Nair**	**T.M.Manoharan**
Member	Member	Chairman

Approved for issue

Santhosh Kumar. K.B
Secretary