TAMIL NADU ELECTRICITY REGULATORY COMMISSION

(Constituted under section 82 (1) of the Electricity Act, 2003)
(Central Act 36 of 2003)

PRESENT:-

Thiru.S.Nagalsamy …. Member

and

Thiru.G.Rajagopal …. Member

D.R.P.No.3 of 2011

JSW Steel Ltd
POTTANERI, MECHERI
SALEM DIST. – 636 453
Represented by J.M.SATHAYE
Executive Director (Works)

… Petitioner
Thiru. Karthik Seshadri
(Advocate for Petitioner)

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Vs

The Chairman cum Managing Director
Tamil Nadu Generation and Distribution
Corporation Limited
144, Anna Salai, Chennai – 600 002.

….Respondent
Thiru Yasod Vardhan
(Senior Advocate for Standing Counsel,
TANGEDCO)

Dates of hearing : 02-03-2011; 12-07-2011; 11-10-2011; 28-11-2012; 24-01-2013; 05-02-2014; and 25-03-2014

Date of order : 01-07-2015

The above D.R.P. No.3 of 2011 came up for final hearing before the Commission on 25-03-2014. The Commission upon perusing the above petition and the connected records and after hearing both sides passes the following order:-

ORDER

1. Prayer of the Petitioner:-

The prayer of the petitioner is –

Since it is practically not possible for demand to be utilized 100% load factor and this is implicit in the normal tariff charge, the Commission may give a ruling on the following:-

(a) How much the utilization should be practically allowed? We feel that in integrated steel plant, where the load is fluctuating, the utilization may be set at 50% i.e. Deemed Demand = Units Purchased / (No. of hours x 0.5). In case this is not permissible, then the units purchased by us but utilized by TNEB may be charged to TNEB at a rate equal to the infirm power purchase price as has been set by the Commission vide the Order No.4 dated 15-05-2006 and subsequent order amendments.

(b) When interstate power is purchased, then no charge should be made for deemed demand as long as the deemed demand is within the contracted demand.

2. Facts of the case:-

The Petitioner is a consumer of electricity from TANGEDCO, Mettur Circle with HTSC No.143. The Petitioner was also purchasing reliability power from TANGEDCO and further purchased inter-state power under Open Access. Since the Petitioner is aggrieved by the method adopted by the TANGEDCO in the matter of calculation of deemed demand, the present D.R.P. is filed with the above prayer.

3. Contentions of the Petitioner:-

3.1. The Petitioner is owning and operating an integrated Steel Plant located at Pottaneri, Mettur Taluk, Salem District, Tamil Nadu, with crude steel production capacity of 1.0 million MTPA.

3.2. The Petitioner is a consumer having a contracted demand of 38 MVA from TNEB. While the contract demand is 38 MVA, the actual permitted demand at present, in the conditions of power cut, is 25 MVA. Out of this 25 MVA, the average utilization is 12% eventhough the peak demand is 22.4 MVA. This is the normal situation for the Petitioner's plant operation.

3.3. The Petitioner has been purchasing reliability power with higher tariff from TNEB for use during peak hours between 18.00 to 22.00 hrs, of any day. The calculation of Deemed Demand is made by the following method as insisted by TNEB:

Deemed Demand = Purchased Units / (No. of hours x 0.9)

This method implies full utilization of units assuming 0.9 power factor. In fact, the utilization of energy is close to zero and they are paying only for demand requirement.

3.4. Similarly when TNEB was unable to provide power the Petitioner has purchased power from other States under the permitted Interstate Open Access policy. In this case also, TNEB is insisting the above method for calculating the Deemed Demand. TNEB also insist that extra charge be made on this demand during peak hours eventhough it is unable to satisfy the contract demand.

3.5. As in the case of reliability charges and in the case of interstate purchase, the Petitioner finds that their actual utilization of energy very close to zero and that they are actually paying only for demand. Their purchased energy without being utilized is disappearing into the TNEB grid free of any charge to TNEB.

3.6. The Petitioner undertakes that it will not raise any claim on TANGEDCO retrospectively.

4. Contention of the Respondent in the Counter Affidavit dated 18-04-2011:-

4.1. Due to increase in demand of power and lack in generation, the Government of Tamil Nadu has implemented Restriction and Control (R & C) measures on the consumption of power under clause 38 of Tamil Nadu Electricity Distribution Code, 2004. All industrial and commercial consumers in the State were requested to comply with the imposition of power cut based on the order of the Government. A circular notice dated 01-11-2008 was communicated in this regard. The Commission was also pleased to approve the R & C measures and issued an order in this regard.

4.2. The TNEB has filed a petition M.P.No.21 of 2009 on 14th December 2009 and I.A. No.19 of 2009 on 16th December 2009, proposing to supply additional power to the willing consumer over and above the TNEB portion of quota and for reliability charge of not exceeding Rs.7/- per unit for such of those HT consumers who opt for it during the period from January 2010 to May 2010. TNEB was directed to publish the abridged version of the above proposal at least in two Tamil and two English dailies on 17th December 2009. The advertisement specified that objection and suggestions would be received by the Commission upto 24th December 2009.

4.3. The proposal was placed before the State Advisory Committee on 23rd December 2009 in accordance with section 88 of the Electricity Act, 2003. A view was expressed in the Advisory Committee that public hearing could be dispensed with in view of the fact that the tariff hike applies only to selected number of consumers on voluntary basis. The broad consensus in the Advisory Committee was that all HT consumers should be given the option of availing the additional power and that the additional power should be equitably shared among all willing consumers.

4.4. The proposal of the TNEB was discussed in the public hearing on 30th December 2009. A total of 41 persons participated in the public hearing. The points that emerged in the public hearing particularly centered around the equitable distribution of additional power amongst all willing HT consumers. Further, a plea was made for distribution of the additional power amongst all categories of consumers at the current level of tariff.

4.5. After taking into account the suggestions and objections that emerged from various representations, from the State Advisory Committee and from the public hearing, the Commission in exercise of the powers conferred by sections 62 and 64 of the Electricity Act, 2003, directed inter-alia, as follows in M.P. No.21 of 2009 dated 05-01-2010:-

(a) the enhanced tariff applies only to such of those HT consumers who opt for it ; there is no legal impediment in prescribing different charges.

xxx xxx xxx

(d) If the additional power procured by the TNEB is less than the total requirement as consented by the HT Industrial Consumers, the

additional power shall be distributed amongst all the consenting consumers proportionate to the requisitioned additional power.

xxx xxx xxx

(k) the TNEB should ascertain from each consumer the additional demand and energy requirement for every month limited to the base demand and base energy; the TNEB should confirm to the indenting consumer one week prior to the commencement of the month the additional available demand and energy; both for the 6.00 p.m. to 10.00 p.m. slot as well as the remaining hours; having confirmed the additional demand and energy the TNEB is bound by the promise; the consumer is entitled to consume the additional demand at the normal rate and additional energy at the higher rate; penal charges should not be levied for that committed quantity; similarly, if the consumer does not off take the committed demand and energy, he is liable to pay higher charge for the committed quantum of energy.

(l) the energy supplied to a consumer shall be separated into two parts; the first part would be the additional energy supplied on the basis of the requisition of the consumer; and the second part would be the balance; the first part will be billed at the higher rate and the second part will be billed at the normal rate.

4.6. The TNEB addressed all HT Industrial consumers, who were currently subjected to R & C measures to ascertain their willingness for supply of additional power at a total energy cost not exceeding Rs.7/- per unit; the consumers indicated their requirement of additional power between 6.00 p.m. and 10.00 p.m. as well as the remaining hours and necessary agreement incorporating the Commission's order had been executed by the willing HT consumer for the proposal of reliability power. As such, the Petitioner had executed necessary agreement as per their committed willingness under the scheme of reliability power.

4.7. In the Supply Code, it has been explained that where the rating is in terms of KVA, it shall be converted to KW by multiplying it by a power factor of 0.9. In this case, the Petitioner purchased the energy in KWHR, it shall be converted to KVA by dividing it by a power factor by 0.9 and the Petitioner has been allowed to utilize the demand and energy as per the aforesaid method of calculation.

4.8. The Petitioner contends that the utilization of power is close to zero and they will pay only for demand requirement and requested for refund of reliability charges for their under-utilization of energy against the energy intended and committed entire quantum of energy by the Petitioner. In this connection, the Commission in its order dated 05-01-2010 made in M.P.No.21 of 2009 and order dated 19-10-2010 in M.P.No.16 of 2010 clearly ordered to the effect that the TNEB is bound by the promise; the consumer is entitled to consume the additional demand at the normal rate and additional energy at the higher rate; penal charges should not be levied for that committed quantity; similarly, if the consumer does not off take the committed demand and energy, he is liable to pay the higher charges for the committed quantum of energy. Hence, the request of the Petitioner is not maintainable. The Petitioner has to pay for their total intended and committed quantum of energy as per the agreement entered into for availing of additional power. Besides, in clause 6 (iv) of the agreement, it is clearly mentioned that if the HT consumer consumes less power than the additional power scheduled in a particular month, the HT consumer shall make payment for the entire quantum of such scheduled additional power by TANGEDCO during that month. Further, it is Petitioner's responsibility to monitor their consumption with their committed and intended power.

4.9. Under Interstate Open Access Regulation, some consumers purchase IEX power in a month, for fraction of days such as 10 days, 20 days etc., some consumers purchase even for single day in a month during peak hour. In the above cases, the excess demand charges has been arrived on daily basis based on downloaded CMRI data (i.e.) the equivalent demand arrived based on the units allotted by the State Load Despatch Centre in a day and compared with recorded demand on that day. If any excess demand availed, the excess demand charges are levied. The Petitioner is attempting to mislead and misinterpret the working procedure of excess energy charges and excess demand charges.

4.10. As per the willingness of the Petitioner, the reliable power has been allotted and the TNEB is bound by the promise, the Petitioner is entitled to consume the additional demand at normal rate and additional energy at higher rate, the excess charges should not be levied for that committed and intended quantity, similarly, if the consumer does not take the committed demand and energy, TNEB is not responsible, the Petitioner purchased power under Interstate Open Access Regulation based on their utilization of the power on daily basis, if the Petitioner consumed less than their purchased power, TANGEDCO cannot be made responsible. As such, this is Petitioner's responsibility to run their industry based on their purchased power under Open Access.

4.11. The reliability power proposal was mooted by the Confederation of Indian Industries (CII) and South Indian Spinning Mills Association (SISMA). At the initial stage of discussions, TNEB intimated CII that Open Access was permitted both for the generator and consumers and there was no need for TNEB to intervene between the generator and the consumer. Consumers can directly source power from outside

for their use. However, CII expressed practical difficulties and wanted TNEB to help them out. It was at this stage, TNEB has filed the petition seeking approval to supply power to those who were interested to utilize power between 6 p.m. to 10 p.m. at a rate not exceeding Rs.7/- per unit. This scheme was open to all HT consumers and it was not a compulsion. The demand and supply gap was around 2000 MW and may go up by 18 to 20%. The net deficit to the industries was around 1200 MW per day. They have no immediate solution to meet this shortage. In such a context, the suggestion mooted by CII and SIMA agreeing to pay higher rate than the tariff was welcome. The selection of 255 HT consumers was only a proposal to the Commission as of then. Once the process was finalized other HT consumers would be taken care of. The 255 HT consumers were only intending consumers and this number might go up or down. Hence, TNEB obtained firm commitment from 255 HT consumers, to make a start. The price of Rs.7/- per unit was only an indicated price and TNEB does not want to make any profit out of that. It is basically a revenue neutral proposal. This additional power would be supplied on acceptance by both the Commission and the public.

4.12. The Petitioner is misinterpreting the Commission's Order No.2 dated 15-05-2006 in connection with computation of equivalent demand and power factor applicable to Open Access Consumers. It is clearly mentioned that while equivalent demand arrived, power factor shall be taken as maintained at the consumption point in the billing month. Hence, the request of the consumer is not in order.

5. Concept Paper dated 04-10-2011 submitted by the Respondent:-

5.1. On 18-04-2011, the Commission directed the Respondent to submit a Concept Paper in respect of "calculation of deemed demand for power purchased on

reliability charges or purchased under interstate open access rules" and the Respondent filed the Concept Paper on 04-10-2011.

5.2. Although load factor is to be taken into account for calculation of equivalent demand, wide variations in the values of load would cause unpredictable instantaneous demand, which could be detrimental to the stability of the grid. If all consumers were to operate based on their individual load factor there is every possibility of the grid being thrown out of stability. The demand if arrived based on the load factor of each industry would be disadvantageous to the Board in terms of billing also. It would also be difficult to arrive at the demand for each service since their operations and functioning are subject to seasonal and many other related functional parameters.

5.3. In order to give the benefits of calculation of demand based on usage and to ensure grid stability, a value of load factor equal to 0.95 may be adopted. For all the HT industries which are working under a wide range of load factors, the value of 0.95 may be adopted uniformly to avoid ambiguity.

6. Rejoinder to Concept Paper dated 24-11-2012 filed on behalf of the Petitioner:-

6.1. The submissions in the concept paper are denied. The variations in load are natural arising of the activities of various consumers, this is why all consumers are connected to grid, so loads are balanced. The Tamil Nadu Grid historically has been quite stable and effectively controlled by State Load Dispatch Centre and grid collapses are very rare. Hence, it is surely possible that the load factor of each industry can be considered for calculation of deemed demand. Even in the

TANGEDCO tariff, minimum chargeable demand is set at 90% of contract demand i.e. a load factor of 0.9.

6.2. The Petitioner believes that in other States, it is as low as 0.5 (eg. Maharashtra). It is for this reason that tariff has been charged on two factors one is being demand and another being energy. This is a clear indication that energy, which is dependent on load factor (i.e. dependent on cost of generation), is charged separately from demand which is dependent on interest and depreciation i.e. cost of having a grid.

7. Concept Paper on Impact of Load Factor on fixation of demand filed by the Respondent:-

7.1. On any HT industrial and commercial consumer's utility bill, the quantity of energy used is measured in kilowatt-hours (KWH) and is referred to as energy charges. The capacity of energy usage or power is measured in Kilovolt Ampere (KVA) or in kilowatts (KW) and is referred to as demand charges or fixed charges. These charges are typically separated on utility bill.

7.2. The Energy Meter of Open Access consumers records both the demand and energy usage. This meter records highest peak energy usage over a 15 minute interval. If a consumer's peak energy usage period occurs during the day time, reducing his lighting load at night will have no impact on reducing his MW/MVA peak demand. It will, however, reduce his overall kWh usage and therefore, lower that portion of electric bill. To better understand this, the difference between MW/MVA and kilowatt-hours (KWH) needs to be understood. Briefly, kWh is the quantity of

energy consumed, and MW/MVA relates to the rate at which that quantity is consumed.

7.3. The factors, which determine the system requirements and economy of utility and consumers are-

Demand factor = Maximum demand of a system / Total connected load on the system.

Demand factor is always less than one.

HT consumers get their service connection based on their maximum demand requirement and the same is termed as sanctioned demand.

Example : If a HT consumer having 10000 watts equipment connected has a maximum demand of 6000 W, then the demand factor is = 6000W / 10000W =60%.

The lower the demand factor, the lesser the system capacity required to serve the connected load.

7.4. Feeder-circuit conductors of the TANGEDCO should have an ampere sufficient to carry the load; the ampere of the feeder-circuit need not always be equal to the total of all loads on all branch-circuits connected to it. The demand charges are collected to maintain the infrastructures to serve the connected load (i.e.) the rationale and relevance of demand charges is well established in the electricity industry. It is to be recognized that when a consumer is connected to a system, the utility has to provide or keep in readiness certain capacity of the system to serve the consumer. Machine capacity, transmission system, certain work force and supervisory staff is kept on the job of monitoring the system, attending to emergency, restoring the supply in the event of outage, routine and periodic maintenance, meter reading, billing, bill delivery, defraying administrative expenses not directly related to

the consumption of energy. This element of the fixed charges, as an accepted practice, is recovered through the mechanism of demand charges. These charges reflect the cost of generation and transmission requirement of consumer and are well justified.

7.5. A factory utilizes energy at a broadly constant level. On certain occasions, on account of breakdowns, strikes or shut downs or for other reasons, the factory may not utilize energy at the requisite level over certain periods, but there are exceptions. Every factory expects to work normally. The utilities expect and accordingly produce energy required by the factory and keeps it in readiness for that factory keeping it ready on tap. The electricity once generated cannot be stored for future use. This is the reason and the justification for the demand charges and the manner of charging for it.

7.6. The demand charges and consumption charges are intended to defray different items. While demand charges are meant to recover the capital costs, energy charges are supposed to meet the running / variable charges. Every utility requires machinery, plant, equipment, sub-stations, transmission lines and so on, all of which require a huge capital outlay. The TANGEDCO like any other Corporation has to raise funds for the purpose which means it has to obtain loans. The loans have to be repaid, and with interest. Provision has to be made for depreciation of machinery, equipment and buildings. Plants, machines, stations and transmission lines have to be maintained, all of which require a huge staff. In order to meet the capital outlay, the demand charges (i.e. fixed charges) are levied and collected whereas the consumption charges are levied and collected to meet the running / variable charges.

7.7. The maximum demand of a given plant / factory determines the type of lines to be laid and the power of transformers and other equipment to be installed for the purpose. A factory having a maximum demand of say 1000 KVA and a factory having a maximum demand of 10,000 KVA requires different type of lines and other equipments for providing supply to them. In the case of latter, lines have to be of a more load-bearing variety. Transformers of more capacity have to be installed. Sometimes in the case of bulk consumers even a sub-station may have to be established exclusively for such factory / plant. Mostly, these industries are situated away from power stations and main transmission lines. Hence, special power lines over considerable distances to give the supply connection have to be laid. As a matter of fact, the significance of the maximum demand would be evident from the fact that the agreement between the TANGEDCO and HT consumers specifies only the maximum demand and not the total units allowed to be consumed. (Units consumed are limited when R & C measures in force for the power supplied by the TANGEDCO).

7.8. Another factor which depends on Demand is known as Diversity Factor.

Diversity Factor = Sum of Individual Max. Demand / Max.Demand on Power Station.

Diversity Factor = Installed load / running load

Diversity factor is usually more than one. (since the sum of individual maximum demands > Maximum Demand)

7.9. The load is time dependent as well as being dependent upon equipment characteristics. The diversity factor recognizes that the whole load does not equal the sum of its parts due to this time Interdependence (i.e. diverseness). When the

maximum demand of a supply is being assessed, it is not sufficient to simply add together the ratings of all electrical equipment that could be connected to that supply. If this is done, a figure somewhat higher than the true maximum demand will be produced. This is because it is unlikely that all the electrical equipment on a supply will be used simultaneously. The concept of being able to de-rate a potential maximum load to an actual maximum demand is known as the application of a diversity factor. If everything (all electrical equipment) was running at full load at the same time the diversity factor is equal to one.

Greater the diversity factor, lesser is the cost of generation of power but TANGEDCO adopts DF of 1 only for all HT consumers since the demand is opted by the consumers.

7.10. Diversity factor in a distribution network is the ratio of the sum of the peak demands of the individual customers to the peak demand of the network. This will be determined by the type of service i.e. residential, commercial, industrial and combinations of such. Diversity is the relationship between the rated full loads of the equipment downstream of a connection point, and the rated load of the connection point. Many designers prefer to use unity as the diversity factor in calculations for planning conservatism because of plant load growth uncertainties. Local experience can justify using a diversity factor larger than unity, and smaller service entrance conductors and transformer requirements chosen accordingly.

7.11. Diversity factor is mostly used for distribution feeder size and transformer as well as to determine the maximum peak load and diversity factor is always based on knowing the process. The diversity factor of a feeder would be the sum of the maximum demands of the individual consumers divided by the maximum demand of

the feeder. In the same manner, it is possible to compute the diversity factor on a substation, a transmission line or a whole utility system. The residential load has the highest diversity factor. Industrial loads have low diversity factors usually of 1.1 street light practically unity and other loads vary between these limits.

Designing size of infrastructure requirements for a HT consumer is done by use of demand factor and diversity factor.

7.12. There is a yet another factor which is linked to demand and is known as Load Factor, the ratio between the average load demand and the maximum demand during a certain period. Load Factor = Average load/Maximum load during a given period. It can be calculated for a single day, for a month or for a year. Its value is always less than one because maximum demand is always more than average demand.

> Load Factor = Load that a piece of equipment actually draws / load it could draw (full load).

Example: Motor of 200 hp drives a constant 150 hp load whenever it is on. The motor load factor is then 150/200 = 75%.

Load Factor is term that does not appear on utility bill, but does affect electricity costs. Load factor indicates how efficiently the customer is using peak demand.

> Load Factor = (Energy (kWh per month) / (Maximum demand (kW) x hours / month).

A high load factor means power usage is relatively constant. Low load factor shows that occasionally a high demand is set. To service that peak, capacity is sitting idle for long periods, thereby imposing higher costs on the system for establishment running expenditure input fuel.

For example:-

Customer A High Load Factor
82% load factor = (3000 kWh per month x 100%) /5 kW x 730 hours / month.
Customer B – Low Load Factor
41% load factor = (3000 kWh per monthx100%) / 10 kW x 730 hours / month.

To encourage the efficient use of installed capacity, electricity rates are structured so the price per kWh above a certain load factor is lower. The actual structure of the price blocks varies by rate though this not been practiced by TANGEDCO.

7.13. "Load Factor" is an indicator of how steady an electrical load is over a period of time. If electric billing rate includes both an Energy (KWH) and Demand (KW) charge, consumer's load factor can be calculated by the following formula:

L.F.(percent)= [(Total kWh) / # Days in Bill Cycle x 24 hrs. / day)] / [peak kW Demand].

If consumer's load factor is low, he should look for ways to even out his electrical usage (i.e. shift energy intensive processes to periods of otherwise low usage). By increasing load factor, consumer will reduce the impact of monthly demand (kW) charges on his bill. This was the reason why TANGEDCO demands demand charges, which will be levied on maximum KVA demand recorded in that month or 90% of the sanctioned demand whichever is higher. The consumers are liable to pay only this amount irrespective of whether the power is used by them or not.

7.14. To understand demand charges and load factor, the following analogy may be considered:-

Two cars both travel 30 miles. One travels at 30 mph (rate of speed) and covers the 30 miles (distance) in one hour. The second care travels at 60 mph for 20 minutes and then travels the remaining 10 miles at 15 mph. Both cars cover the 30 miles in an hour, but the second car is defined by the high rate of power used during the 60 mph session of the 30 mile trip. If someone compare the car's engine and an electric company, they both have the same

requirement. The consumer requires adequate power for performance of their machine(s) for maximum level.

Consider the electrical load of a hypothetical moulding facility. It would have a constant base load of 200 KW. If this was the only load on the electrical service, it would be billed a demand charge equal to 200 KW, since this load was maintained for a period of atleast 15 minutes. At 10:00 AM this facility started MACHINE # 1; A 50 KW load. This motor will run for 45 minutes and shut off. The new demand charge would now increase to 250 KW, resulting in around 4% decrease in demand charges. This is a simple example and it represents the basic principles of energy management.

7.15. Customer load profiles are always more complicated than the moulding facility example described above. Motors may be started at only certain time of the day, electrical heaters and air conditioning equipment operate in cycles, the full array of lights may be used only at certain times. Because of these different patterns of usage, there are peaks in the electrical demand (just like the high velocity of the 60 mph car). Therefore, the utility charges, a sanctioned demand charge to these customers to cover the cost of supplying these large blocks of energy, eventhough it may only be for a relatively brief period of time. The concept of a “demand charge” apart from what stated earlier was also introduced to treat consumers more equitably, meaning that those who require excessive peaks of power during certain hours, and very little power during other hours, contribute their fair share toward the utility’s installed capacity. Due to air conditioning loads, most commercial customers’ maximum peak demand occurs during the summer months i.e. May to September. The monthly billed demand charge is based on the actual demand recorded or 90%

of the highest demand recorded from March to September of the previous 12 month period, whichever is higher.

7.16. The thrust of the scheme for charging excess demand and excess energy consumption when R & C measures are in force is that the consumer should be discouraged from drawing power from the grid when licensee is facing huge demand supply gap. The Commission also concurred with the above statement and directed that excess demand shall be charged at a rate thrice the normal rate and excess energy consumption be charged at thrice the normal rate for both HT industrial and commercial consumers.

7.17. Since the infrastructure facilities has already been created based on the sanctioned demand by TANGEDCO, it is but logical to allow purchase of power from third parties upto the sanctioned demand instead of restricting the same to the base demand. The TANGEDCO had allowed procurement of power upto the sanctioned demand. The equivalent demand brought in by the consumer from captive and third party sources should be subtracted from the maximum demand recorded by the meter of the consumer. Balance would be the demand actually supplied by the TNEB. If this figure exceeds the quota demand of the TNEB, the consumer would be liable to pay excess demand charges at the rates stipulated in the order of the Commission in M.P.No.42 of 2008. Similarly, the energy purchased from captive and third party sources would be subtracted from the total energy consumed by the consumer. The balance would be deemed the energy actually supplied by the TNEB. If this quantum exceeds the energy quota of the TANGEDCO, the consumer would be liable to pay excess energy charges at the rates stipulated in the order of the Commission in M.P.No.42 of 2008. The calculation of deemed demand for

power purchased on reliability charges or power purchased under Interstate and Intrastate is being calculated as per the formula given below:-

$$\text{Demand supplied by third party} = \frac{\text{Energy purchased}}{\text{No. of days in a month x 24 hrs. x pf 0.95}}$$

The power factor is being taken at consumption end and deemed demand is being allowed for purchased units.

7.18. Regulators / Utilities differentiate the major components of the system according to the drivers of costs i.e. according to the functions of the system. Three broad categories of costs emerge from this approach-generation, transmission and distribution which can be separately priced as consumer understanding and administrative simplicity allow. Where the benefits of changes in usage caused by more complex rate designs are not enough to justify the added metering and billing costs to support such rates, the pricing elements are combined and aggregated into simpler energy-only or energy and demand charges. The structure of the electric industry in a state might affect the nature of partial requirements service, like that of full requirements service. If multiple competitive suppliers provide generation service, distribution utilities will provide only delivery service and regulatory interest in standby will be, accordingly, restricted to that component of service. Restructuring accelerated the movement to unbundled pricing for the various components of service (i.e. separate prices for the differentiable elements of service-generation, transmission and distribution), but nothing about vertically integrated industry structures prevents a similar unbundling of rates. Unbundling makes the nature of costs more transparent and, if done properly, greatly reduces or even eliminates the potential for the cross-subsidization of one service by another. Generation consists

of variable and fixed costs. Energy is the cost to actually produce KWH-that is, variable (or marginal) cost. Primarily this is the cost of fuel, but often there are variable operators and maintenance costs that are not incurred if the unit does not run. Fixed or capacity is the cost of the plant - or, more precisely, of the ability to generate power – for the period of the purchase (hour, day, month, year).

7.19. Capacity is typically expressed in per MW terms, but it can also be expressed in energy terms (per kWh) given assumptions about a plant's operating characteristics. The amount of generation that a system needs is a function of its overall peak demand. Only that amount necessary to meet peak (and reserves – otherwise unused capacity to maintain reliability in case of unplanned outages) should be acquired; any more would be wasteful and any less would, without remedial action, jeopardize system reliability. This means that it is a consumer's or more accurately, a consumer class's full or partial requirement, contribution to the system (or coincident) peak that determines its responsibility for the costs of the required generation capacity. Insofar as, the load-serving entity (i.e. the utility or competitive service provider) knows generally when peaks will occur, time-differentiated pricing can be designed to reflect the expected costs of peak demand, and this will go a long way towards fairly allocating the costs of capacity among users, capturing the benefits of demand response, and capturing load diversity from the different power generation sources.

7.20. Each consumer class imposes unique demands on the system, and the tariffs drawn up to reflect those different characteristics provide, in effect, different services suited to the needs of the classes. To the extent that the usage characteristics of partial requirements consumer, and the costs associated with that usage, are

demonstrably different from those of related full requirements consumer, such consumer can be seen as constituting a different class. Whether, from the perspective of captive consumers, being treated as a separate class is good or bad (that is, less or more costly) depends on, among other things, the average load factor (the ratio of average electric load to peak load) of the group and its contribution to system peak. If the load factors of captive consumers are for the most part better than those of other consumers in the relevant full requirements service class, then the non-captive consumers are benefiting from the inclusion of captive consumers in the class. Alternatively, it might be the other way around. But either way, a detailed cost of service study-using reliable data on the operational characteristics of captive generator systems-will be needed to inform the regulators' decision about how to treat these consumers.

7.21. A standard practice in the design of standby tariffs is to impose more than one type of demand charge. The first is the reservation or contract demand charge, which ostensibly covers the costs of the capacity that the utility must have access to in order to cover a call for unscheduled service, even if that call is never made. Typically, the reservation charge is applied against monthly billing demand (contract, maximum potential, or ratcheted), and therefore looks very much like an unavoidable, fixed, recurring fee that gives a consumer the right to take standby service. For partial requirements consumer, the negotiated contract demand might be accompanied by the consumer's promise not to exceed it (accompanied by special load-limiting facilities to make good the guarantee), a feature sometimes referred to as "physical assurance."

7.22. Ratchets are most painful to consumer with relatively low load factors-i.e.,low ratios of actual usage (in kWh in a period) to maximum potential usage (the product of peak demand and hours in the period). They require the consumer to pay a fee related to a significant fraction of their peak demand in periods when their demand does not approach their peak. A consumer with relatively high load factors is less affected by the ratchet the closer its periodic demands are to its peak, and so the fees it pays are not much different from those it would pay without the ratchet. Either way, of course, it is worth examining the justification for the ratchet to determine if it is related to the nature of the costs incurred and if the capacity whose costs it covers is indeed unable to be put to alternative uses. This is another way of looking at the question of diversity, the measure of the coincidence of consumer demands. The more diverse a system (or part of a system) is, the less impact the peak demand of any one consumer or set of consumer has on the overall peak of the system. Conversely, the greater the degree of coincidence in customer demands, the less diverse the system's load. A number of utilities have eliminated multi-month ratchets for distribution service. In many restructured States, transmission charges are typically included in the prices of competitive generation suppliers, not the prices of the distribution company.

7.23. There are 2880 time blocks of 15 minutes intervals in a billing month. It is not feasible to segregate precisely the quantum of demand supplied in each time block in the billing month to the Open Access user by the generator and by the licensee distinctly. Till a mechanism is put into place to ascertain the relation between the demand generated in each of the 2880 fifteen minutes time blocks and the demand recorded at the consumer end in the related time blocks, a reasonable approximation has to be followed to arrive at the demand supplied by the generator.

7.24. In the absence of required infrastructures arriving the demand utilized by the Open Access consumers is very difficult and the formula adopted for the same is the only way out. Consideration of load factor for arriving the deemed demand may not reflect the actual cost involved. Significance of load factor was already discussed in detail and its impact can be best realized through only energy charges. The allocation between generator and user is merely bilateral. TANGEDCO and TANTRANSCO grant Open Access only to enable power transfers from injected point to delivery point.

7.25. As such, allocation to the captive users by the generator and the consumption by the users solely depends upon generator, the consumer. Maintenance of good load factor is the responsibility of the OA consumers as held by the APTEL in Bharat Alloys and Energy Limited Vs. Central Power Distribution on 29th March 2007. Equivalent citations: 2007 ELR APTEL 35.

8. Written Submission of the Petitioner dated 21-03-2013:-

8.1. The variations in load are natural arising of the activities of various consumers; this is why all consumers are connected to grid, so loads are balanced. The Tamil Nadu Grid historically has been quite stable and effectively controlled by State Load Dispatch Centre and grid collapses are very rare. Hence, it is surely possible the load factor of each industry can be considered for calculation of deemed demand. Even in the TANGEDCO tariff, minimum chargeable demand is set at 90% of contract demand i.e. a load factor of 0.9. In other States, it is as low as 0.5 (eg.Maharashtra). It is for this reason that tariff has been charged on two factors one is demand and another being energy. This is a clear indication that energy which is

dependent on the load factor (i.e. dependent on cost of generation), is charged separately from demand which is dependent on interest and depreciation i.e. cost of having a grid.

8.2. Due to restriction and control measures imposed by TANGEDCO, the Petitioner is purchasing additional power from JSW Energy, Karnataka or IEX through Inter-State Open Access scheme to operate the plant. Allocated energy is sufficient but since load factor in condition of Export-Import is low we have to buy energy in excess of requirement, only to ensure sufficiency of demand to continue operations.

Till 01-08-2012 TANGEDCO was calculating deemed demand as follows:-

Deemed Demand (DD) = (Units purchased / No. of days / Hrs.)/ Actual PF
Permissible demand = 0.6 DD + R & C Demand.

From 01-08-2012 TANGEDCO is calculating Equivalent Demand as follows:-

Equivalent Demand (ED) = (Units purchased/No. of days /Hrs.)/Actual PF
Permissible demand = ED + R & C Demand

a. TANGEDCO is billing for the entire recorded demand for the full 24 hours of the day (including R & C Demand). In this calculation, PF is taken as Actual for the relevant month. However, in peak hours, it is permitting only permissible demand i.e., (ED + R & C Demand).

b. If the demand paid for the period of 24 hours per day if allowed to be utilized in the peak demand period whilst restricting the units to the purchased energy as per ABT meter, there will be no loss to the TANGEDCO and the consumer will be allowed to use all of the purchased energy.

c. Further there is no consumer who has a load factor of 1 and even the tariff provides for a minimum chargeable demand of 0.9 of contract demand i.e. tariff provides that load factor may be less than 1 and upto 0.9.

Hence, the Petitioner suggests the following to calculate equivalent demand:

ED = (Units purchased/No. of days /Hr.)/0.9 (Load Factor)/0.9 (Power Factor)
Permissible Demand = ED + R & C Demand

9. Citation filed by the Respondent:-

9.1. The load factor cannot be brought upto 100% by any electricity consuming industry, since it is not possible to maintain the same demand throughout the month. It varies between industries depending upon the nature of the process. Exceptionally some of the industries which have very limited number of energy consuming equipments may run that particular set of equipment continuously without a single stoppage in a month and they may try to achieve closer to 100% Load Factor. But it may only be a theoretical case. Hence, in the case of calculating the equipment demand for the energy consumed, probably no industry can consume full energy in proportion to the demand (alternatively) for the reached demand, the energy cannot be reached proportion to the demand. The achievement demand concept to proportional for the energy supplied will not be valid if the Load Factor for the specific industries is taken into consideration.

9.2. It is not possible to consider the Load Factor differently for each industry or different industries and there shall be some limited factors to fix the Load Factor. The Load Factor depends on the different operating conditions of different industries. But due to non-performance of the industries, this cannot be fixed as they pray. Whereas if the industries are stopped for various reasons like many breakdowns, poor marketing etc. which leads to poor consumption. This means that they may consume the highest demand and energy for a few days in a month continuously and very less consumption in the remaining part of the month (even demand also less). Load Factor can be considered for different operating conditions of different

equipments in the plant on hour basis and not on day basis. To the extent possible, the bandwidth of variation in utilization of demand shall be shortened for the purpose of better utilization of energy and stability of the Grid. This means that the variation of utilization of demand shall not be on day basis in a month and it shall be on hour basis in a day.

9.3. But if the equivalent demand is calculated for the supplied energy, then there will be no need to consider Load Factor, since the Load Factor becomes one.

9.4. On an analysis of the details pertaining to the Petitioner regarding drawal of IEX power, its adjustment and lapsed units for the months of 04/2011 to 01/2013 and the load factor maintained during 01/2012 to 11/2012 off peak hour and evening peak hour, it is clear that even though the purchased power has lapsed, the Petitioner had not limited the purchase according to their needs in the following months too, only because of the equivalent demand had been permitted for the entire purchased units and not limited to the energy consumed by the Respondent. Hence, it is the Petitioner's responsibility to maintain good Load Factor in order to consume the purchased units.

9.5. The Respondent is not responsible for the lapsed units and the Respondent had not made any attempt for unjust enrichment in this regard. Further, if the Respondent had permitted to compute the equivalent demand for the consumed units, the Petitioner would have to compute the equivalent demand for the supplied units. In view of above, the Petitioner's request to calculate the equivalent demand by considering the Load Factor is not in order from technical point of view.

9.6. The Petitioner's request to consider the Load Factor of 0.9 in addition to power factor, number of days and number of hours to arrive the equivalent demand for the energy supplied by the IEX / Third Party generator. In this connection, it is stated that the request of the consumer is not sustainable one, as detailed below:-

Computation of Excess Demand charges by the request of the Petitioner (based on Load Factor):

	20 hours	4 hours
Recorded Demand	23760 KVA --- A	13680 KVA – A1
Equivalent demand for supplied units	2188486/31x20x0.87x0.9 = 4507.067 KVA --- B	=1088328/31X4X0.87X0.9 =11209.245 KVA - B1
TANGEDCO supplied demand	= 19252.933 KVA (A-B)	= 2470.755 KVA (A1-B1)
Quota Demand	25000 KVA	4725 KVA
Excess demand availed by the consumer	Nil	Nil

The recorded demand during the month is 13680 KVA and demand quota is 4725 KVA. Therefore, the Petitioner would have purchased 701176 units in the C2 slot and 233726 units in C3 slot, respectively, to meet the demand of 8955 KVA (13680 KVA–4725 KVA). Instead, the Petitioner had purchased 816246 and 272082 units for C2 and C3 slots, respectively, and hence the Petitioner is alone responsible for the lapsed units and not the Respondent. The Petitioner had supplied a quantum of 21,88,486 units and 10,88,328 units for 20 hours and 4 hours respectively, and accordingly the equivalent demand supplied by the IEX / Generator is only 4057.260 KVA and 10088.320 KVA for 20 hours and 4 hours, respectively, and the power factor @ 0.87. As per the consumption pattern, average load factor of the Petitioner's plant is only 24.5% (or) 25%. In such case, if TANGEDCO considers the

above load factor, then TANGEDCO have to supply 16228.04 KVA and 40353.280 KVA for 20 hours and 4 hours, respectively, which is not feasible for ever. Even if TANGEDCO considers the prayer of the Petitioner that the load factor at 0.9 for arriving the equivalent demand, then Respondent have to permit the equivalent demand or the demand supplied by the generator as 4508.067 KVA and 11209.245 KVA for 20 hours and 4 hours, respectively and the difference of 450.807 KVA and 1120.925 KVA for the above said hours has to be met by the TANGEDCO by procuring power from the outside sources in order to maintain the grid stability (for the portion of 10%) and which is not sustainable one, since the equivalent demand is calculated for the energy supplied in which Load Factor comes to 1 (one). In view of the above, the prayer of the Petitioner that Load Factor 0.9 may be considered while arriving the equivalent demand for supplied energy is not in order. The statement of the Petitioner in concept paper with regard to computation of equivalent demand is denied. The equivalent demand in respect of power purchased units under third party IEX sources is being arrived as follows:-

Equivalent Demand = [Units purchased / No. of days x No. of hrs. x Actual Recorded Power Factor]

Hence, the statement of the Petitioner that the TANGEDCO has changed the method of computation of the equivalent demand from 01-08-2012 is not correct.

10. Findings of the Commission:-

10.1. Since the prayer of the petitioner in the original petition and in the further submissions and arguments of the parties, there was no clarity, the Commission during the hearing on 11-10-2011, directed the petitioner to submit an amended petition. The petitioner submitted the amended petition on 20-10-2011 requesting the Commission for a ruling as to:

(a) How much the load factor should be practically allowed. We feel that in integrated steel plant, where the load is fluctuating, the utilization may be set at 50% i.e., deemed demand = units purchased / (No of hours X 0.5).

(b) When interstate power is purchased, then no charge should be made for deemed demand as long as the deemed demand is within the contracted demand.

10.2. Even the above amended prayer of the petitioner is not crisp and clear. During the further hearing, the petitioner requested the Commission to make a rule to fix a load factor of 0.5 for his industry for the purpose of calculation of deemed demand / equivalent demand. The petitioner also requested that no charge shall be imposed on deemed demand for interstate power purchase as long as the deemed demand is within the contracted demand. The petitioner in his subsequent written submission dated 21-03-2013 suggested a load factor of 0.9 for calculation of equivalent demand. On this basis, the proceedings was conducted.

10.3. Before going into the specific prayer of the petitioner, let us understand the concept of load factor, its effect on the equivalent demand and its impact on the consumer and as well as on the distribution licensee. In general terms "Load Factor" is a measure of the uniformity and efficiency with which electrical energy is being used. A good load factor implies a more constant rate of electrical use, because kW demand is held to a minimum relative to total overall use. In essence, the lower the established demand in relation to kilowatt hour(kWh) use, the better the load factor, the lower the relative cost for electric service." Load factor is also mathematically defined as the ratio between the average demand and the maximum demand during the given period.

10.4. From the above concept of load factor, the following points are derived.

(i) The user or the consumer is responsible for maintaining the load factor, and it is depending upon the electricity usage in his load.

(ii) Higher the load factor, the lesser the per unit cost of power to the consumer.

(iii) For the distribution licensee, higher the load factor of consumers, the better or easier the management of generation resources and hence lesser the cost of power purchase.

10.5. Let us now consider the specific prayer of the petitioner. The petitioner is initially requested a load factor of 0.5 but later revised as 0.9. This specific case is related to fixation of load factor for the calculation of equivalent demand. For calculation of equivalent demand, the general formula approved by the Commission was discussed in detail in the Commission's Order issued on 15-09-2014 on M.P.No.17 to 26 of 2013. The generalized formula is

$$\textit{Equivalent Demand} = \frac{\textit{Energy adjusted by open access consumers out of the total energy consumed at the user end during the month}}{\textit{No of days in the month x 24 hours x (P.F) 0.95}}$$

In the above formula, the load factor has been assumed as "one" and it should have appeared in the denominator. Accordingly, taking into account the load factor, the revised formula for equivalent demand is

$$\textit{Equivalent Demand} = \frac{\textit{Energy adjusted by open access consumers out of the total energy consumed at the user end during the month}}{\textit{No of days in the month x 24 hours x (P.F) 0.95 x load factor.}}$$

Let us assume the resultant equivalent demand of 1000 kVA assuming the load factor of "one" in the above formula. The resultant equivalent demand will jump to 2000 kVA in case if we consider the load factor of 0.5 as requested by the petitioner. It means the distribution licensee shall provide

the equivalent demand of 2000 kVA if the Commission permits 0.5 load factor to the petitioner's industry instead of 1000 kVA now provided by distribution licensee as per the existing rules. This may result in additional augmentation of 1000 kVA capacity by the distribution licensee. To that extent the distribution licensee shall pay the additional capacity charges. Therefore, fixing of lower load factor to the open access consumer for the purpose of calculating the equivalent demand will increase the power purchase cost to the distribution licensee and hence increased tariff to the consumers. This fact of the load factor has been optly dealt with by the Electricity Act 2003. Section 62(3) of the Act permits the Commission to differentiate the tariff to the consumers based on their load factors. Though this Commission has not considered the load factor as a criteria to fix the tariff, some of the Commissions have fixed higher tariff to the consumers who are maintaining lower load factors. Even with the present arrangement of two part tariff, the consumers who are maintaining the lower load factors have to pay more per unit electricity charges when compare to the consumers who are maintaining high load factors. Therefore, it is the responsibility of every consumer to maintain high load factor not only for his own interest but also in the interest of the licensee and other consumers. The load factor depends upon the category of consumers, nature of load, duration of running of electrical load in a day etc. Even, in the same category of industry, the load factor varies with the duration of running of electrical load in a day, percentage of electrical load running at a time and its duration in the billing cycle, breakdown of machinery in the plant etc., as rightly contented by the Respondent. Even for a same consumer, the load factor may vary month to month or billing cycle to billing cycle. Therefore, it is not possible to fix a load factor even for a particular type

of industry or consumers. The petitioner has initially requested for fixing of load factor of 0.5 but later suggested a load factor of 0.9. On the other hand, the respondent initially suggested the load factor of 0.95 for all the consumers but in subsequent submissions retracted his suggestion.

10.6. The load factor may vary for consumer to consumer and for the same consumer from time to time depending upon the criteria already discussed. Therefore, fixing a common load factor for all consumers or to a particular type of industry can be only arbitrary and will not match with the real load factor achieved by the consumer for a specific period / billing period. Reducing the load factor to 0.9 to 0.5 for the purpose of calculating the equivalent demand will increase the cost of power purchase by the distribution licensee. This will inturn increase the electricity tariff of the other consumers. Reducing the load factor to 0.9 or 0.5 as prayed by the petitioner from unity is not only arbitrary but also demotivate the consumers who are taking effort to maintain high load factor. Since reducing the load factor will go against the overall interest of consumers and distribution licensee, the Commission cannot consider the prayer of the petitioner.

10.7. Regarding the second part of the prayer that no charges shall be imposed on deemed demand for interstate power purchase as long as deemed demand is within the contracted demand, it is clarified that the demand charges are governed by Tamil Nadu Electricity Supply Code and the Tariff Order issued by the Commission from time to time. In this connection, Para 6.1.vii of SMT- Order No.9 of 2014 is reproduced below:

> *vii.* ***Billable Demand:*** *In case of HT Consumers, maximum Demand Charges for any month will be levied on the kVA demand actually recorded in that month or 90% of the contracted demand whichever is higher.*

Provided, that whenever the restriction and control measures are in force, the billable demand in case of two part tariff for any month will be the actual recorded maximum demand or 90% of demand quota, as fixed from time to time through restriction and control measures, whichever is higher.

10.8. Regarding the treatment of deemed demand / equivalent demand within the sanctioned demand or contracted demand it has already been dealt with in the Commission's Order on M.P.No.6 of 2010 and others issued on 07-09-2010. Therefore, the Commission conclude that no separate order is necessary on the treatment of equivalent demand and demand charges since the Commission has already issued regulation / orders as discussed supra on the subject matters.

11. 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.....)
(G.Rajagopal)
Member

(Sd.....)
(S.Nagalsamy)
Member

/ True Copy /

Secretary
Tamil Nadu Electricity
Regulatory Commission