TAMIL NADU ELECTRICITY REGULATORY COMMISSION

Consultative Paper on "Comprehensive Tariff Order for Bagasse based Co-generation plants"

*(Comments/Suggestions are invited on or before **27-10 -2014**)*

DRAFT CONSULTATIVE PAPER ON POWER PROCUREMENT BY DISTRIBUTION LICENSEE FROM BAGASSE BASED CO-GENERATION PLANTS AND ALLIED ISSUES RELATING TO CAPTIVE USE AND THIRD PARTY SALE

1.0 PREAMBLE

1.1 Power Scenario in Tamil Nadu

The generating capacity connected to TANGEDCO's grid including the allocation from Central Generating Station is 12909.10 MW as on 31-05-2014 comprising 4660 MW from TANGEDCO's four thermal stations, 516 MW from four gas turbine stations, 2284 MW from hydro stations, 1154 MW from private Power Producers, 68 MW as contribution to Tamil Nadu grid by sale of electricity from captive generating and biomass plants, 4177.10 MW as Tamil Nadu's share from central generating stations and 50 MW as external assistance.

1.1.1. Generating capacity from privately owned wind farms is 7262 MW as on 31-05-2014. The installed capacity of cogeneration plants is 659.4 MW and biomass power project is 215.4 MW. The installed capacity of Solar PV power project is 104.77 MW.

1.2 Importance of Non-Conventional Energy Sources:

Non-Conventional Energy Sources are pollution free. Global concern over pollution problems caused by the increase in greenhouse gasses emission and consequent climate changes have resulted in paradigm shift in the approach towards development of energy sector in all the countries. The need for adoption of clean

technology, improving end use efficiency and diversifying energy bases, etc. have all been seriously considered by the Government of India since Sixth Five Year Plan. Renewable energy sources such as wind, solar, mini hydro power project , biomass and bagasse based co-generation are abundant and they not only augment the energy generation, but also contribute to improvement in the environment, drought control, energy conservation, employment generation, upgradation of health and hygiene, social welfare, security of drinking water increased agricultural yield and production of bio-fertilizers. The phase of development has been accelerated through fiscal and tax incentives.

Electricity Act 2003, National Electricity Policy, Tariff Policy have all addressed the necessity for promotion of the co-generation and generation of electricity from renewable sources of energy.

2. Commission's Regulation on New and Renewable Energy Sources

The Commission notified the "Power Procurement from New and Renewable Sources of Energy Regulations 2008" on 08-02-2008 in accordance with the powers vested under Section 61 of the Electricity Act 2003 (Central Act 36 of 2003) which stipulates that the State Electricity Regulatory Commissions shall specify the terms and conditions for the determination of tariff.

Amongst other important provisions listed in the Regulations, it is also specified that the tariff determined by the Commission shall be applicable for a period of twenty years and the control period may ordinarily be two years.

3. Commission's order on NCES based generation and allied issues.

The Commission issued Order No.3 dated 15-05-2006 on "Power purchase and allied issues in respect of Non-Conventional Energy Sources based Generating Plants and Non-Conventional Energy Sources based Co-generation Plants". The said Order stipulated tariff rates for power procurement by the Distribution Licensee from Wind Energy Generators (WEGs), Biomass based generators and Bagasse based generators. This was the first Order issued by the Commission on NCES based power plants.

The Commission issued Order No.3 of 2009 dated 06-05-2009 on

"**Comprehensive Tariff Order for Bagasse based Co-generation Plants".** This Order covered tariff rates for power procurement by the Distribution Licensee from Bagasse based co-generators. In the said Order, the Commission fixed the validity of the Order upto 31-03-2011. By Tariff Order No.3 of 2011, the said Order was extended upto 31-12-2011 and it was further extended upto 30-06-2012 by Tariff Order No.6 of 2011 dated 21-12-2011. This Order was again extended upto 31-07-2012 in Tariff Order No. 4 of 2012 dated 30-06-2012.

The Commission issued Order No.7 of 2012 dated 31-07-2012 on **"Comprehensive Tariff Order for Bagasse based Co-generation plants"**. This Order covered tariff rates for power procurement by the Distribution Licensee from Bagasse based co-generators. In the said Order, the Commission fixed the validity of the Order upto 31-07-2014.

4. Floating of Consultative paper:

As the control period of 2 years has expired on 31-07-2014, the Commission is issuing this concept paper to seek the views / suggestions from the stakeholders for the tariff for the next control period.

5. Bagasse based Co-generation Power Scenario in Tamil Nadu:

Tamil Nadu is blessed with conducive meteorological and topographical settings for electricity generation through Non-conventional energy sources. As on 31-03-2014, the installed capacity of Bagasse based Co-generation plants in Tamil Nadu is 659.4 MW. The year wise capacity addition in Tamil Nadu is furnished below:

Year	Capacity Addition in MW
Upto 2009-10	559.90
2010-11	52.50
2011-12	25.00

2012-13	22.00
2013-14	Nil
Total (upto 31-03-2014)	**659.40 MW**

6. Legal Provisions:

6.1 Related Provisions of the Electricity Act, 2003:

The Commission is guided by the following provisions of Section 61 of the Electricity Act 2003 which are relevant to this Order:

Section 61 – *"The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff and in doing so, shall be guided by the following namely:-*

(a) The principles and methodologies specified by the Central Commission for determination of the tariff applicable to generating companies and transmission licensees;

(b) The generation, transmission, distribution and supply of electricity are conducted on commercial principles;

(c) The factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;

(d) Safeguarding of consumers' interest and at the same time, recovery of the cost of electricity in a reasonable manner;

(e) The principles rewarding efficiency in performance;

(f) Multiyear tariff principles;

(g) That the tariff progressively reflects the cost of supply of electricity and also, reduces cross-subsidies in the manner specified by the Appropriate Commission;

(h) The promotion of co-generation and generation of electricity from renewable sources of energy;

(i) The National Electricity Policy and tariff policy:"

Section 86 stipulates the following among other functions of the State Commission.

Section 86(1)(e): "Promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee;"

6.2 Related Provisions of the National Electricity Policy:

The guidelines stipulated in the National Electricity Policy on NCES, which are relevant, are reproduced below:

"(1) Clause 5.2.20: *Feasible potential of non-conventional energy resources, mainly small hydro, wind and biomass would also need to be exploited fully to create additional power generation capacity. With a view to increase the overall share of non-conventional energy sources in the electricity mix, efforts will be made to encourage private sector participation through suitable promotional measures.*

(2) **Clause 5.12.1:** Non-conventional sources of energy being the most environment friendly, there is an urgent need to promote generation of electricity based on such sources of energy. For this purpose, efforts need to be made to reduce the capital cost of projects based on non-conventional and renewable sources of energy. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources.

(3) Clause 5.12.2: The Electricity Act 2003 provides that co-generation and generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from non-conventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commissions. Such purchase by distribution companies shall be through

competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies. "

6.3 Related Provisions in the Tariff Policy

The Commission is also guided by the following specific provisions of the Tariff Policy of Government of India (Ministry of Power) relating to NCES:

*" **(1) Clause 5(3) (i):** Tariff fixation for all electricity projects (generation, transmission and distribution) that result in lower Green House Gas (GHG) emissions than the relevant base line should take into account the benefits obtained from the Clean Development Mechanism (CDM) into consideration, in a manner so as to provide adequate incentive to the project developers.*

***(2) Clause 6.0:** Accelerated growth of the generation capacity sector is essential to meet the estimated growth in demand. Adequacy of generation is also essential for efficient functioning of power markets. At the same time, it is to be ensured that new capacity addition should deliver electricity at most efficient rates to protect the interests of consumers. This policy stipulates the following for meeting these objectives.*

***(3) Clause 6.4(1):** Pursuant to provisions of section 86(1)(e) of the Act, the appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006.*

It will take some time before non-conventional technologies can compete with Conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the appropriate Commission.

***(4) Clause 6.4(2):** Such procurement by distribution licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-*

conventional sources. In the long term, these technologies would need to compete with other sources in terms of full costs."

7.0 Promotion of New and Renewable sources of Energy:

In order to promote new and renewable sources of energy, the Commission has prescribed the minimum percentage of electrical energy which each obligated entity shall purchase from new and renewable sources generators. The obligated entity shall comply with the provisions as stipulated in the Commission's Renewable Purchase Obligations Regulations, 2010, as amended from time to time. "Obligated entity" is a subject matter of a Writ Petition in Hon'ble High Court of Madras.

8.0 Applicability of the proposed Order:

The Order shall come into force from the date of its issue. The tariff fixed in this Order shall be applicable to all Bagasse based Co-generation Plants commissioned during the control period of this Order. The tariff is applicable for purchase of bagasse based co-gen power by Distribution Licensee from Bagasse based Co-generators conforming to this Order. The open access charges and other terms and conditions specified in this Order shall be applicable to all the Bagasse based co-generators, irrespective of their date of commissioning.

9.0 Tariff Determination Process:

The Commission has issued the Regulations on Power Procurement from New and Renewable Sources of Energy Regulation, 2008. Important provisions of the Regulation 4 which emphasize on promotion of NCES is reproduced below for reference:

" (1) The Commission shall follow the process mentioned below for the determination of tariff for the power from new and renewable sources based generators, namely:-

a) *initiating the process of fixing the tariff either suo motu or on an application filed by the distribution licensee or by the generator.*

b) *inviting public response on the suo motu proceedings or on the application filed by the distribution licensee or by the generator.*

c) *Omitted*

d) *issuing general / specific tariff order for purchase of power from new and renewable sources based generators. "*

10. Tariff / Pricing Methodology

Regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008 also details the basic guidelines on the Tariff / Pricing Methodology. Important provisions in the Regulations are reproduced below:

" (2) While deciding the tariff for power purchase by distribution licensee from new and renewable sources based generators, the Commission shall, as far as possible, be guided by the principles and methodologies specified by:

(a) Central Commission
(b) National Electricity Policy
(c) Tariff Policy
(d) Rural Electrification Policy
(e) Forum of Regulators (FOR)
(f) Central and State Governments

(3) The Commission shall, by a general or specific order, determine the tariff for the purchase of power from each kind of new and renewable sources based generators by the distribution licensee.

Provided where the tariff has been determined by following transparent process of bidding in accordance with the guidelines issued by the Central Government, as provided under section 63 of the Act, the Commission shall adopt such tariff.

(4) *While determining the tariff, the Commission may, to the extent possible consider to 'permit an allowance / disincentive based on technology, fuel, market risk, environmental benefits and social impact etc., of each type of new and renewable source.*

(5) While determining the tariff, the Commission shall adopt appropriate financial and operational parameters.

(6) While determining the tariff, the Commission may adopt appropriate tariff

methodology. "

11.1 Market Determined Pricing

In a market, where there is adequate competition among various players, the price for long term, medium term and short term could be determined by the market mechanism. However, the current market is not developed as demand for power always outstrips the supply due to which no competitive price can be discovered.

In view of this, the Commission continues with the Cost Plus Tariff determination in this Order.

11.2 Cost-Plus Tariff Determination

Cost-plus tariff determination is a more practicable method but it discourages competition and efficiency. However, to encourage the setting up of new co-gen plants and till the competitive bidding is introduced, Cost plus Tariff method is followed. As it can be easily designed to provide adequate return to the investor as assured return will lead to larger investment in renewable power. Accordingly, the Commission adopts the Cost plus Tariff approach in this Order.

11.3 Single Part vs. Two Part Tariff

In the Commission's Order No. 7 of 2012, dated 31-07-2012, the Commission adopted the **"Cost plus two part tariff".** Generally, the two part tariff is adopted when the fuel cost varies from time to time and the fuel cost is considered as pass through. The variable component of tariff would take care of such price escalation. The stake holders expressed the view that the two part tariff is convenient to accommodate the fuel cost escalations appropriately. Hence, a two part tariff is proposed to be adopted in this Order also.

12.0 Issues Relating to Tariff and allied matters:

12.1 Tariff Components

The Power Procurement from New and Renewable Sources of Energy Regulation, 2008 specifies that while determining the tariff, the Commission shall adopt appropriate financial and operational parameters for the tariff determined in a cost-plus scenario. The Commission has carried out a detailed analysis of the existing policies/procedures and commercial mechanisms in respect of Bagasse based co-generation.

The following important factors have been considered to arrive at the tariff and other related issues for bagasse based co-generation.

1. Capital cost per MW
2. Plant Load Factor (PLF)
3. Debt – Equity ratio
4. Term of loan
5. Interest rate for the loan
6. Return on Equity
7. Life of plant and machinery
8. Depreciation
9. O & M Expenses
10. Station Heat rate
11. Gross calorific value of the fuel
12. Specific fuel consumption
13. Fuel cost
14. Components of working capital
15. Interest on working capital
16. Auxiliary consumption

The issue-wise proposal of the Commission and orders of other Commissions' are discussed below:

12.1.1 Capital cost per MW:

12.1.1.1. The Commission assumed Rs.4.20 Crores / MW as the Capital Cost for Order No.7 of 2012 dated 31-07-2012.

The capital cost adopted in the Orders of other Commissions are as follows:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
Rs.4.40708 Cr/MW	Rs.4.30 Cr/MW	Rs.4.7537 Cr./MW	Rs.4.57 Cr./MW	Rs.3.25 Cr/MW	Rs.4.36 Cr./MW

In the Commission's Order No.7 of 2012 dated 31-07-2012, the Commission adopted the Capital Cost specified by CERC. The Commission proposes to adopt a capital cost of Rs.4.41 Crores. The capital cost includes evacuation cost up to inter-connection point. The Commission apportions the capital cost on machineries, land and civil works at 85% and 15% respectively.

12.1.1.2. In Order No.7 of 2012, dated 31-07-2012, it was stated that the Commission sought clarification as to how the cost allocation is done for power generation and other uses since steam is used in power generation as well as sugar production. When the steam is extracted from the turbine for use in sugar mill, it is also not clear whether the steam after use in sugar mill is condensed and brought back *to* the steam cycle or it is wasted. The energy content of the steam extracted as well as the makeup water requirement is not made available. If these details were available, the Commission could have worked out the allocation of cost for use of steam in power generation viz-a'-vis sugar manufacture. In the absence of such a detailed analysis, the Commission would like to use thumb rule method for giving benefit to the power segment for the steam used for sugar manufacture which is not a regulated business. In case these details are made available by the bagasse based co-generation plants, a detailed analysis can be carried out in future, atleast for the next tariff order. In the absence of any explanation by the generators and in the absence of any details in this regard, the Commission deducted 10% of the fixed capacity charges towards steam extracted and used in sugar manufacture. So far these details were not furnished by the Co-generators.

12.1.1.3. Hence, the Commission proposes to continue the same methodology in the

absence of information as discussed above. Now the Commission proposes to deduct 20% of the fixed capacity charges towards steam extracted and used in sugar manufacture. The steam used for sugar mills may be around 40% to 60%.

12.1.2. Plant Load Factor:

The plant load factor of a Bagasse based power generation depends on number of factors like availability of fuel, vintage of the plant, etc. Since the fuel price is being revised from time to time, the Commission retained the existing PLF of 55 % in Order No. 7 of 2012, dated 31-07-2012.

The PLF adopted in the Orders of other Commissions:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
60% for Tamil Nadu	60%	60%	60%	55%	53%

12.1.2.1 Some of the sugar mills also use fossil fuel during off seasons. Even during the crushing season if the sugarcane is not available supplementary fuel is used therefore the Commission would like to continue with the ***PLF of 55% on annual basis***. The PLF is an annual phenomenon for the purpose of cost recovery.

12.1.2.2 In some cases, generation may go beyond 55% PLF. Once the annual fixed charges or the capital cost recovery is achieved at the normative PLF of 55%, for any generation beyond the normative PLF of 55%, an incentive would be adequate for the additional efforts and to meet the wear and tear of the plant and equipment. Therefore, Commission allows an incentive which is already in practice in respect of the Conventional Power Stations.

12.1.2.3. As in the Commission's Order No.7 of 2012, dated 31-07-2012, 10% of the fixed cost applicable for that year is proposed to be continued as incentive for extra generation beyond normative PLF of 55% .The variable cost as provided in this Order would be applicable if bagasse is used as fuel. If any other fuel is used, the total tariff

shall be in accordance with Order No.4 of 2006, dated 15-05-2006, as amended or revised from time to time.

12.1.3. Debt – Equity Ratio:

A Debt-equity ratio of 70:30 is prescribed by the Tariff Policy for power projects. In the Commission's Order No.7 of 2012, dated 31-07-2012, the Commission had also adopted the Debt: Equity ratio of 70:30. In the present proposal also the Commission proposes to retain the same ***Debt-Equity ratio of 70:30***.

12.1.4 Term of Loan:

The Commission in its Order No.7, dated 31-07-2012 had adopted the term of the loan as 10 years with a moratorium of one year. The Commission proposes to adopt the ***term of loan as 10 years with a moratorium of one year*** for this Order also.

12.1.5 Interest rate for loan:

12.1.5.1 In Commission's Order No.7 dated 31-07-2012, the Commission considered the interest rate of IREDA and adopted an interest rate of 12.25% p.a. The CERC in its Order dated 15-05-2014, adopted the average State Bank of India (SBI) Base rate prevalent during the first six months of the previous year plus 300 basis points. The rate of interest considered by CERC is 12.70 %(9.70% plus 300 basis points).

12.1.5.2. The present rate of interest from 12-06-2014 onwards available in the IREDA website in respect of Co-generation plants is 12% to 12.65%.

The rate of interest adopted in the Orders of other Commissions:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated	Order dt.11-	Draft Order	Order dated	Order dated	Order dated

15-05-2014	12-2009 and 29-03-2012	dated. 06-05-2014	08-08-2013	12-09-2011 & ATE Order dated 20-12-2012	01-04-2013
12.70%	11.75%	12.78%	12.86%	12%	13%

12.1.5.3. It is now proposed to adopt ***12.70% as rate of interest*** for the term loan.

12.1.6 Return on Equity:

12.1.6.1 In the Commission's Order No. 7 of 2012, dated 31-07-2012, the Commission adopted 19.85% (pre-tax) as Return on Equity without linking to Minimum Alternate TAX (MAT) or Income Tax.

12.1.6.2. The Return on Equity adopted by the other Commissions are as follows:

Return on Equity considered in the Orders of other Commissions:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
20 % for 1st 10 years 24% from 11th year onwards	16%	At 19% for 1st 10 years At 24% after first 10 years	14% (MAT 20.008% for 1st 10 years and Corporate tax 32.445% for next 10 years)	16% with MAT/IT as pass through	At 20% pre-tax

12.1.6.3.While CERC proposes an RoE of 20% p.a. for the first 10 years with an increase to 24% from the 11th year onwards, majority of the Commissions are retaining the RoE at 16%.

12.1.6.4. The Tariff Regulations of the Commission stipulates 14% (post tax) RoE for conventional fuel based generating stations. With the objective of promoting renewable energy, Commission in its New and Renewable Energy Tariff Orders issued during 2009 considered 19.85% (pre-tax) RoE, wherein the RoE was adopted linking it to Minimum Alternate Tax and Income Tax(IT). Since these factors are changing frequently, the Commission in its Orders issued in 2012 relating to determination of tariff for NCES power (including the Bagasse based Co-gen plants Order No.7 of 2012, dated 31-07-2012), adopted a RoE of 19.85% (pre-tax) without linking to MAT and IT.

12.1.6.5. The Commission now proposes to adopt a ***RoE of 20% (pre-tax) per annum*** for Bagasse based Cogenerating Plants without linking it to MAT and Income Tax.

12.1.7.Life of plant and machinery:

Generally the project life of a plant is considered as 20 years for tariff determination process, therefore the useful life of the plant proposed to be considered by the Commission is ***20 years*** for this Order.

12.1.8 Depreciation:

12.1.8.1 The rate of Depreciation adopted by the Commission in Order No.7 of 2012, dated 31-07-2012 is 4.5% p.a. Straight Line Method on plant and machinery by reckoning 85% of the capital cost as the cost of plant and machinery. The accumulated depreciation shall however be limited to 90% of the cost of plant and machinery. The rate of depreciation adopted by other Commissions' is as follows:

Depreciation considered in the Orders of other Commissions':

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
5.83% for 1st 12 years and 2.51% from 13th year onwards	7% Straight Line Method	7% for 1st 10 years and 2% thereafter for remaining useful life of 10 years	6% for 1st 10 years and 3% from 11th year to 20th year	7.84% for 1st 8 years, 7.28% for the 9th year and further depreciation of 20% spread over evenly in the balance 11 years	7% p.a. for 1st 10 years and balance 20% to be depreciated in next 10 years as for the 1st 10 years in order to pay loan the rate of depreciation of 7% was allowed

12.1.8.2. The Commission proposes to continue the existing methodology of depreciation as in its earlier Order dated 31-07-2012 which is ***4.5% p.a. Straight Line Method on plant and machinery by reckoning 85% of the capital cost as the cost of plant and machinery***. The accumulated depreciation shall however be limited to 90% of the cost of plant and machinery.

12.1.9 Operation and Maintenance (O & M) Expenses:

12.1.9.1 The rate of O & M expenses approved by the Commission in Order No.7 of 2012, dated 31-07-2012 is 3% with annual escalation of 5% from second year as O & M expenses on 100% of capital cost.

O & M Expenses adopted in the Orders of other Commissions':

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
Rs.17.89 Lakh/MW with an escalation at 5.72%	3.0% of Capital Cost including insurance with an escalation of 5%	Rs.17.63 Lakh/MW with an escalation at 5.72%	3% of Capital Cost with an escalation at 5.72%	4% of Capital Cost with an escalation at 6.69%	3% of Capital Cost with an escalation at 5.00%

12.1.9.2. The Commission now proposes to continue with the O & M expenses including insurance at 3% of the capital cost with an annual escalation of 5.72% from the second year onwards.

12.1.10. Station Heat Rate:

In Order No.7 of 2012, dated 31-07-2012, the Commission adopted a Station Heat Rate of 3700 kCal/kWhr. Co-gen plants are generally of higher size unlike biomass plants and therefore, they enjoy economies of scale, Co-gen plants also undertake works using advanced technological developments. Therefore, considering the technological development in the co-gen plants and the economies of scale, the Commission decides to propose the Station Heat Rate of 3600 kCal/kWhr.

The Station Heat Rate adopted in the Orders of other Commissions is as follows:

Station Heat Rate adopted by other Commissions:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
3600 kCal/kWhr	3600 kCal/kWhr	3600 kCal/kWhr	3600 kCal/kWhr	3600 kCal/kWhr	3600 kCal/kWhr

12.1.11 Gross Calorific value of the fuel:

12.1.11.1 In Order No.7 of 2012, dated 31-07-2012, the Commission adopted a Gross Calorific Value (GCV) of 2300 kCal/kg. It can be seen that the GCV of 2250 kCal/kg is being adopted by the other Commissions including CERC. Hence, the Commission proposes to adopt a GCV of 2250 kCal/kg in the present order.

The GCV adopted by other Commissions in their respective Orders is as follows:

GCV considered by other Commissions:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
2250 kCal/kg	2250 kCal/kg	2250 kCal/kg	2250 kCal/kg	2250 kCal/kg	2250 kCal/kg

12.1.12 Specific fuel consumption (SFC) :

12.1.12.1. Specific fuel consumption is the resultant of Station Heat Rate and Gross Calorific Value of fuel. As proposed above, the Commission desires to adopt the Station Heat Rate of 3600 kCal/kWhr and fuel calorific value of 2250 kCal/kg which corresponds to a fuel consumption of 1.60 kg/kWhr.

The Specific fuel consumption adopted by other Commissions in their respective Orders is as follows:

Specific fuel consumption considered by other Commissions':

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
1.60 kg/kWhr	1.60 kg/kWhr	1.60 kg/kWhr	1.60 kg/kWhr	1.60 kg/kWhr	1.60 kg/kWhr

12.1.13 Fuel Cost:

12.1.13.1 In the Commission's Order No.7 of 2012, dated 31-07-2012, the cane price with transport cost was considered and 50% of this cost was adopted as fuel cost for determining the variable cost at Rs.1050/- PMT.

12.1.13.2 The fuel cost considered by the other Commissions' in their respective order is as follows:

Fuel cost and escalation considered by other Commissions:

Parameter	CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
	Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 16-05-2014	Order dated 01-04-2013

		2012				
Fuel Cost	Rs.1673.30/ PMT (As per Fuel price indexation mechanism)	Rs.1025/ PMT	Rs.2061.15/ PMT	Rs.1804/PMT for bagasse and Rs.2912/PMT for coal	Rs.1551/PMT(as per CERC's draft Order dated 7-1-2014)	Rs.1583/PMT
Price Escalation	5.00%	5.00%	5.00%	5.00%	Cost of fuel will be indicated before start of next financial year	5.00%

12.1.13.4 It is proposed to adopt ***Rs.1673.30/ MT with an escalation of 5% p.a***.

12.1.14. Components of working capital:

12.1.14.1 The Commission in its Order No.7 of 2012, dated 31-07-2012, fixed the components of working capital on the following norms:

a. Fuel stock of one month

b. O & M Expenses for one month

c. Receivables equivalent to one month

The Commission now proposes ***to adopt the same working capital components*** for this Order also.

12.1.15. Interest on Working Capital:

12.1.15.1 The rate of interest adopted by the Commission in Order No.7 of 2012, dated 31-07-2012 was 12.5% p.a. This rate was the upper limit of the interest rate charged by IREDA.

12.1.15.2 The rate of interest adopted by other Commission for calculating the Interest on Working Capital is as follows:

Rate of Interest for calculating Interest on Working Capital considered by other Commissions:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 12-09-2011 & ATE Order dated 20-12-2012	Order dated 01-04-2013
13.20%	13.25%	13.28%	12.86%	12%	13.50%

12.1.15.3. The rate of interest now proposed by the Commission is ***13.20% p.a.***

12.1.16.Auxiliary Consumption:

12.1.16.1. The Commission in Order No.7 of 2012, dated 31-07-2012 adopted an auxiliary consumption of 9%.

12.1.16.2 Auxiliary consumption adopted by other Commissions in their respective orders is as follows:

Auxiliary Consumption adopted in the Orders of other Commissions:

CERC	Karnataka	Maharashtra	Gujarat	Andhra Pradesh	Madhya Pradesh
Order dated 15-05-2014	Order dt.11-12-2009 and 29-03-2012	Draft Order dated. 06-05-2014	Order dated 08-08-2013	Order dated 16-05-2014	Order dated 01-04-2013
8.50%	8%	8.50%	8.50%	9%	8.50%

12.1.16.3. Auxiliary consumption adopted by other Commissions is generally at 8.5%. The Commission proposes to adopt auxiliary consumption at 8.50%.

12.2. Related issues

The following are the related issues for energy generation from bagasse based co-generation plants:

1. Transmission and wheeling charges & Scheduling and system operation charges
2. Cross Subsidy Surcharge
3. CDM Benefits
4. Reactive power charges
5. Grid availability charges
6. Adjustment of energy generated
7. Application fees and agreement fees
8. Billing and payments
9. Payment security and Security deposit
10. Power factor
11. Metering
12. Connectivity and Evacuation of energy
13. Energy Purchase and Wheeling Agreement
14. Scheduling of power generation
15. Tariff review period / Control period

The above charges / terms are applicable to all bagasse based co-gen plants irrespective of their year of installation. These are discussed in detail in the following paragraphs.

12.2.1 Transmission and wheeling charges & Scheduling and system operation charges:

12.2.1.1The Commission in its present Order No. 7 of 2012, dated 31-07-2012 as a promotional measure under section 86 (1)(e) of the Electricity Act, 2003, has adopted 60% of the transmission charges and 60% of the wheeling charges of conventional power to bagasse based Co-gen projects. It is proposed to ***continue the existing norms*** for this control period also.

12.2.1.2 With regard to scheduling and system operation charges, the Commission ***now proposes to adopt 60% of the applicable conventional power charges***. Apart from these charges, actual line losses in kind as specified in the respective Order of the Commission and as amended from time to time are also payable for the captive use and third party sale. For generators who are availing Renewable Energy Certificate (REC), normal transmission charges, wheeling charges, Scheduling and System operation charges and line losses will apply. Apart from these charges, the Bagasse based Co-generators shall have to bear the actual line losses in kind as specified in the respective orders of the Commission issued from time to time.

12.2.2.Cross subsidy surcharge:

12.2.2.1.The Commission in its Order No.7 of 2012, dated 31-07-2012 as a promotional measure for renewable energy, adopted 50% of the applicable Cross Subsidy Surcharge for Bagasse based cogeneration projects.

12.2.2.2. It is proposed to continue the existing ***Cross Subsidy Surcharge rate of 50%*** during this control period also.

12.2.3. CDM Benefits:

12.2.3.1. The Commission in its present Order No. 7 of 2012, dated 31-07-2012 had stated that as recommended by the Forum of Regulators (FOR), the CDM

benefits should be shared on gross basis starting from 100% to developers in the first year and thereafter reducing by 10% every year till the sharing becomes equal (50:50) between the developer and the consumer in the sixth year. Thereafter, the sharing of CDM benefits will remain equal till such time the benefits accrue.

12.2.3.2. The Commission now proposes to adopt the ***same formula*** for this Order also. The Distribution Licensee shall account for the CDM receipts in the next ARR filing.

12.2.4. Reactive Power Charges:

Commission decides ***to adopt the reactive power charges*** for bagasse based co-generating plants as specified in its Order on Open Access charges issued from time to time.

12.2.5. Grid availability charges:

The charges for startup power of generators shall be as per Commission's Grid Connectivity and Intra-State Open Access Regulations, 2014 in force.

Similarly, if adequate generation does not materialize or if drawal by the captive / third party consumer exceeds generation, ***the energy charges and demand charges shall be regulated as specified in the Commission's Grid Connectivity and Intra-State Open Access Regulations, 2014 in force.***

12.2.6. Adjustment of energy generated:

12.2.6.1. The Commission in Order No.7 of 2012, dated 31-07-2012, decided that the adjustment of energy shall be as per the Commission's Open Access Regulations in force.

The Commission proposes ***to continue*** with the existing procedure.

12.2.7 Application Fees and Agreement Fees:

12.2.7.1.The Commission in its Order No.7 of 2012, dated 31-07-2012 had stated that the Intra State Open Access Regulations 2005 of the Commission was amended in 2008 to provide for concession in application fees and agreement fees for generators of non-conventional and renewable sources of energy.

12.2.7.2 The application fees and agreement fees for the Energy Purchase Agreement (EPA) and Energy Wheeling Agreement (EWA) shall be as specified in the Commission's Intra State Open Access Regulations, 2005 and Fees and Fines Regulations, 2004 in force. The fees of EPA shall be collected by the licensee and passed on to the Commission. Whenever the Commission revises the above fees, the revised fees shall be payable by the Bagasse based co-generators.

12.2.7.3. Whenever there is a change in the usage of energy from bagasse based co-gen or a change in the drawl point, etc., there will be extra work to the licensee. Therefore, an additional fees equivalent to the application fees and agreement fees shall be leviable by the licensee on the generator.

12.2.7.4. In the present order also, the Commission proposes to continue the same as in the Commission's Order No.7 of 2012, dated 31-07-2012.

12.2.8.Billing and payments:

12.2.8.1. The Commission in its Order No.7 of 2012, dated 31-07-2012 had specified that when a renewable energy generator sells power to the distribution licensee, the generator will raise a bill every month for the net energy sold after deducting the charges for startup power and reactive power.

As the interest at the rate of 13.20% has already been allowed for one month receivables in the working capital, the bill amount is due only after one month. ***If the distribution licensee makes the payment within a period of one month of presentation of bills by a generating company, a rebate of 1% shall be allowed***. ***Any delayed payment beyond 30 days is liable for interest at the rate of 1% per month.***

12.2.8.2. The Commission decides that a bagasse based co-generator utilizes the power for captive use or if he sells it to a third party, the distribution licensee shall raise the bill at the end of the month for the net energy supplied. The licensee should record the generation and consumption on the same day as far as possible. While preparing the bill, peak hour generation shall be adjusted against peak hour consumption. Off-peak hour generation shall be adjusted against off-peak hour consumption. Normal hour generation shall be adjusted against normal hour consumption. Excess consumption will be charged at the tariff applicable to the consumer as per the Regulations / Orders of the Commission in force. Appropriate transmission and wheeling charges, scheduling and system operation charges and cross subsidy surcharge, wherever applicable, shall be recovered from the open access consumers. The

net amount recoverable from the consumer shall be raised in the bill as per their normal billing schedule.

12.2.8.3. Peak, Off-peak and normal hours shall be as defined in Terms & Conditions for Determination of Tariff Regulations, 2005 as amended from time to time. Presently, as per Clause 11 (2) of the Terms and Conditions for determination of Tariff Regulations, 2005 – defines Peak hour as " *the time between 06.00 hrs and 09.00 hrs and between 18.00 hrs and 21.00 hours". Clause 11(3) of the Terms and Conditions for determination of Tariff Regulations, 2005 defines off-peak hour as "the duration between 22.00 hours and 05.00 hours.* Balance hours are normal hours.

12.2.8.4. The Commission proposes ***to continue the same*** in the present Order also.

12.2.9 Payment security and Security deposit:

12.2.9.1. In Commission's Order No.7 of 2012, dated 31-07-2012, the Commission had stated that the Tariff Policy calls for adequate and bankable security arrangement to the generating companies. This mechanism has been found impractical, as there are more number of generators and the monolith distribution licensee is unable to offer security for such numbers. In the said Order, it had been stated that the interest for delayed payment by the licensee at 1% per month would serve the ends of justice.

12.2.9.2. With respect to the security deposit of the consumer, it was decided that two times the maximum net energy supplied by the

distribution licensee in any month in the preceding financial year shall be taken as the basis for the payment of security deposit by the consumers.

12.2.9.3. The Commission now proposes ***to continue the existing system in respect of the payment security and security deposit***.

12.2.10. Power factor:

12.2.10.1. Power factor disincentive may be regulated for the power factor recorded in the meter at the user end as specified in the relevant regulations/orders in force.

12.2.11. Metering:

12.2.11.1 The Commission in its Order No.7 of 2012, dated 31-07-2012 had decided to adopt the metering and communication in accordance with the following Regulations/ Codes, as amended from time to time:

(a) Central Electricity Authority (Installation and Operation of Meters) Regulations 2006

(b) Tamil Nadu Electricity Distribution Code 2004

(c))Tamil Nadu Grid Code 2004

(d) Tamil Nadu Electricity Regulatory Commission - Intra State Open Access Regulations, 2005.

12.2.11.2. The Commission in its present Order, proposes ***to continue*** the same.

12.2.12.Connectivity and Evacuation of energy:

12.2.12.1. The Commission in its Order No.7 of 2012, dated 31-07-2012 had ruled that the connectivity and power evacuation system shall be provided as per the Act, Codes, Regulations and Orders in force.

12.2.12.2. The Commission now proposes ***to continue*** the same as in the previous Order.

12.2.13. Energy Purchase and Wheeling Agreement:

12.2.13.1. The Commission in its Order No.7 of 2012, dated 31-07-2012 had decided that the format of the Energy Purchase Agreement (EPA) shall be evolved as specified in the Commission's Regulations in force. The agreement shall be valid for a minimum period of twenty years. The distribution licensee shall execute the Energy Purchase Agreement within a month of receipt of application from the generator. The parties to the agreement may be given the option of exiting in case of violation with three months' notice to the other party.

12.2.13.2. The format of Energy Wheeling Agreement (EWA) shall be evolved as specified in the Commission's Regulations in force. The ***period and other terms of agreement shall be as per the terms of Open Access Regulations*** issued by the Commission.

12.2.14. Scheduling of power generation:

12.2.14.1 The Commission in its Order No.7 of 2012, dated 31-07-2012 had reiterated that the generator shall follow the scheduling procedure as specified in Indian Electricity Grid Code and Tamil Nadu Electricity Grid Code and other Regulations,

Codes and Orders of the Commission. Depending upon the availability of Bagasse, the generators should be in a position to declare the availability on a day-ahead basis.

12.2.14.2. The Commission, now in its present order also proposes ***to adopt the same***.

12.2.15. Tariff review period / Control period:

Clause 6 of the Power Procurement from New and Renewable Sources of Energy Regulations, 2008 of the Commission specifies that the tariff as determined by the Commission shall remain in force for such period as specified by the Commission in such tariff orders and the control period may ordinarily be two years. Hence, the Commission decides that the ***control period of this Order shall be for two years from the date of issue of the Order and the tariff period is twenty years***.

13. Tariff:

With the adoption of above financial and operational parameters the tariff rate for the new plants works out as follows:

13.1. Fixed Cost:

(Rs./unit)

Year	FCC	Year	FCC
1	**2.26**	11	**1.72**
2	**2.29**	12	**1.67**
3	**2.22**	13	**1.71**
4	**2.15**	14	**1.75**
5	**2.09**	15	**1.79**
6	**2.02**	16	**1.84**
7	**1.96**	17	**1.88**

8	**1.90**	18	**1.93**
9	**1.84**	19	**1.99**
10	**1.78**	20	**2.04**

13.1.1 Further, there would be a reduction of 20% in the fixed costs as discussed in Para 12.1.1. (i.e. Capital Cost) for apportioning the FCC between co-gen and sugar mills as the steam used is in the range of 40% to 60% in sugar mills. Hence, it is proposed to reduce the fixed cost by 20%. Consequently, the tariff rates for the new plants are worked out as follows:

(Rs./unit)

Year	FCC	Year	FCC
1	**1.81**	11	**1.38**
2	**1.83**	12	**1.34**
3	**1.77**	13	**1.37**
4	**1.72**	14	**1.40**
5	**1.67**	15	**1.43**
6	**1.62**	16	**1.47**
7	**1.57**	17	**1.51**
8	**1.52**	18	**1.55**
9	**1.47**	19	**1.59**
10	**1.42**	20	**1.63**

13.2. Variable Cost:

13.2.1. The variable cost for the ***financial year 2014-15 will be Rs.2.93/- per unit*** and for the ***financial year 2015-16, the rate will be Rs. 3.07/- per unit*** as discussed in Clause 12.1.13.

13.2.2. The fixed capacity charges specified in this Order will be applicable with reference to the date of commissioning of the plant and the variable cost will be applicable with reference to the financial year. The fixed capacity charges specified above will continue to be applicable to the plants commissioned on or after the date of the proposed order and the variable cost will apply for all plants commissioned on or after 15-05-2006.

14. Tariff for the plants commissioned before 15-05-2006:

14.1 The Commission in its Order No.7 of 2012, dated 31-07-2012 had stated that determination of tariff for the plants commissioned prior to 15-05-2006 will be dealt with while disposing the Petition No. PPAP No. 8 of 2011 filed by TANGEDCO. In the above case, the arguments were concluded and the Order is reserved on 21-04-2014.

15. Tariff for Co-generation plants tied up with other Industries:

15.1. The Commission in its Order No.7 of 2012, dated 31-07-2012 already discussed with respect to the tariff for Co-generation plants tied up with other Industries and stated that PPPAP No.1 of 2011 was filed by M/s. Sakthi Sugars Ltd.,Chennai and M/s. Tamil Nadu News Print and Paper Ltd. In the said petition, M/s. Sakthi Sugars and M/s. TNPL pleaded for creation of new tariff category in respect of these plants. The Commission issued an interim Order on 02-03-2011 fixing an interim tariff of Rs.3.01/unit for the power supplied by M/s. Sakthi Sugars to TANGEDCO using coal as fuel. The Commission further issued an interim Order on 22-01-2013 in which it sought information to enable the Commission to pass suitable orders. As the Commission is seized of this matter, orders on determination of tariff in respect of the above plants will be issued separately in case of Petition No. PPAP No.1 of 2011.

(By order of the Commission)

Secretary
Tamil Nadu Electricity
Regulatory Commission.

ANNEXURE

WORKING SHEET FOR TARIFF COMPUTATION FOR BAGASSE BASED CO-GENERATION PLANTS

Year	O & M charges (Rs)	Interest on loan (Rs)	Depreciation (Rs)	Fuel cost (Rs)	Working capital (Rs)					Return on Equity (Rs)	Total Fixed Cost (Rs)	Units generated Less Auxilliary	Fixed Cost (Rs / unit)	**Variable Cost (Rs / unit)**	Total Cost per unit (Rs / unit)	Fixed Cost 20% discount due to apprortionment	**Total Cost per unit with discount**
					O & M expenses	Fuel	Receivables	Total Working Capital	Interest on Working Capital								
1	1323000	3920490	1686825	12899135	110250	1074928	1906968	3092146	408163	2646000	9984478	4408470	2.26	**2.93**	5.19	1.81	**4.74**
2	1398676	3920490	1686825	13544092	116556	1128674	1968356	3213587	424193	2646000	10076184	4408470	2.29	**3.07**	5.36	1.83	**4.90**
3	1478680	3528441	1686825	14221296	123223	1185108	1999827	3308158	436677	2646000	9776623	4408470	2.22		2.22	1.77	
4	1563260	3136392	1686825	14932361	130272	1244363	2034571	3409206	450015	2646000	9482493	4408470	2.15		2.15	1.72	
5	1652679	2744343	1686825	15678979	137723	1306582	2072757	3517061	464252	2646000	9194099	4408470	2.09		2.09	1.67	
6	1747212	2352294	1686825	16462928	145601	1371911	2114558	3632069	479433	2646000	8911764	4408470	2.02		2.02	1.62	
7	1847153	1960245	1686825	17286075	153929	1440506	2160159	3754594	495606	2646000	8635829	4408470	1.96		1.96	1.57	
8	1952810	1568196	1686825	18150378	162734	1512532	2209753	3885018	512822	2646000	8366653	4408470	1.90		1.90	1.52	
9	2064510	1176147	1686825	19057897	172043	1588158	2263543	4023743	531134	2646000	8104617	4408470	1.84		1.84	1.47	
10	2182600	784098	1686825	20010792	181883	1667566	2321743	4171192	550597	2646000	7850121	4408470	1.78		1.78	1.42	
11	2307445	392049	1686825	21011332	192287	1750944	2384577	4327808	571271	2646000	7603590	4408470	1.72		1.72	1.38	
12	2439431		1686825	22061898	203286	1838492	2452281	4494058	593216	2646000	7365472	4408470	1.67		1.67	1.34	
13	2578966		1686825	23164993	214914	1930416	2558137	4703467	620858	2646000	7532649	4408470	1.71		1.71	1.37	
14	2726483		1686825	24323243	227207	2026937	2669371	4923515	649904	2646000	7709212	4408470	1.75		1.75	1.40	
15	2882438		1686825	25539405	240203	2128284	2786258	5154745	680426	2646000	7895690	4408470	1.79		1.79	1.43	
16	3047314		1686825	26816375	253943	2234698	2909084	5397725	712500	2646000	8092638	4408470	1.84		1.84	1.47	
17	3221620		1686825	28157194	268468	2346433	3038154	5653055	746203	2646000	8300648	4408470	1.88		1.88	1.51	
18	3405897		1686825	29565054	283825	2463754	3173783	5921362	781620	2646000	8520341	4408470	1.93		1.93	1.55	
19	3600714		1686825	31043306	300059	2586942	3316307	6203309	818837	2646000	8752376	4408470	1.99		1.99	1.59	
20	3806675		1686825	32595472	317223	2716289	3466076	6499589	857946	2646000	8997446	4408470	2.04		2.04	1.63	

Note : Fuel cost is escalated at the rate of 5% for arriving at the receivables in connection with determination of interest on working capital