



## **TAMIL NADU ELECTRICITY REGULATORY COMMISSION**

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Comprehensive Tariff Order for Bagasse based  
Co-generation plants

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**Order No.10 of 2020, dated 16-10-2020**



**BEFORE THE TAMIL NADU ELECTRICITY REGULATORY COMMISSION  
CHENNAI**

**Present :**    **Thiru M. Chandrasekar**         -         **Chairman**  
                  **Dr. T. PrabhakaraRao**           -         **Member**  
                  **Thiru K. Venkatasamy**           -         **Member/Legal**

**Order No. 10 of 2020, dated. 16-10-2020**

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**In the matter of: Power procurement by Distribution Licensee from Bagasse based Co-generation plants and allied issues relating to captive use and third party sale.**

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In exercise of powers conferred by Section 181 read with Section 61 (h), 62 and 86(1)(e) of the Electricity Act 2003, (Central Act 36 of 2003), and after taking into account the stipulations in the National Electricity Policy and the Tariff Policy and in accordance with the Power Procurement from New and Renewable Energy Sources Regulations, 2008 of the Commission and after examining the comments received from the stakeholders, after considering the views of the State Advisory Committee meeting held on 20-03-2020 in accordance with section 88 of the Electricity Act 2003, after examining the comments received from the stakeholders as per Section 64 of Electricity Act 2003, the Tamil Nadu Electricity Regulatory Commission, hereby, passes this order to determine the tariff and other conditions for power procurement by Distribution Licensee from Bagasse based Co-generation plants and allied issues relating to captive use and third party sale.

This Order shall take effect on and from **16-10-2020.**

Sd/-  
(K.Venkatasamy)  
Member/Legal

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

Sd/-  
(M.Chandrasekar)  
Chairman

(By Order of the Commission)

Sd/-  
**Secretary**  
**Tamil Nadu Electricity Regulatory Commission**

<b>CONTENTS</b>		
<b>Para No.</b>	<b>Description</b>	<b>Page no.</b>
1.0	Overview	1
2.0	Importance of Non-Conventional Energy Sources	2
3.0	Commission's Regulations on New and Renewable Energy Sources	3
4.0	Commission's order on NCES based generation and allied issues	5
5.0	Floating of Consultative Paper	6
6.0	Legal Provisions	7
6.1	Related Provisions of the Electricity Act 2003	7
6.2	Related Provisions of the National Electricity Policy	8
6.3	Related Provisions in the Tariff Policy 2016	10
7.0	Applicability of the Order	11
8.0	Tariff Methodology	11
8.1	Cost-Plus Tariff Determination	11
8.2	Single Part vs. Two Part Tariff	12
9.0	Tariff Components	12
9.3	Capital Cost per MW	13
9.4	Plant Load Factor (PLF)	15
9.5	Debt-Equity Ratio	17
9.6	Term of Loan and Rate of Interest	17
9.7	Return on Equity (RoE)	19
9.8	Life of Plant and Machinery	20
9.9	Depreciation	20
9.10	Operation and Maintenance (O&M) Expenses	21
9.11	Interest and Components of Working Capital	22
9.12	Station Heat Rate (SHR)	24
9.13	Gross Calorific Value(GCV) of the fuel	25
9.14	Specific Fuel Consumption (SFC)	25
9.15	Fuel Cost	26
9.16	Auxiliary Consumption	28
10.	Tariff Determinants	29
11.	Tariff	30
11.2	Fixed Cost	30
11.3	Variable Cost	31
12.	Use of Fossil Fuel	31
13.	Monitoring Mechanism for the use of fossil fuel	31
14.	Related Issues	32
14.2	Transmission and Wheeling Charges & Scheduling and System Operation Charges	33
14.3	Cross Subsidy Surcharge	35
14.4	CDM Benefits	35
14.5	Reactive Power Charges	36
14.6	Grid Availability Charges	36
14.7	Adjustment of energy generated	37
14.8	Application Fees and Agreement Fees	37

14.9	Billing and Payment	38
14.10	Payment Security and Security Deposit	40
14.11	Power factor	40
14.12	Metering	41
14.13	Connectivity and Evacuation of energy	41
14.14	Energy Purchase and Wheeling Agreement	41
14.15	Parallel Operation Charges	42
14.16	Harmonics	42
14.17	Control Period / Tariff Review Period	43
14.18	Quantum of power purchase by the Distribution Licensee	43
15.	Acknowledgement	44
	<b>ANNEXURES</b>	
<b>I</b>	List of Stakeholders who submitted their written comments	45
<b>II</b>	List of SAC members who participated in the 35 <sup>th</sup> SAC Meeting held on 20-03-2020.	50
<b>III</b>	Working sheet for tariff computation for Bagasse based Co-generation Plants	51

**TAMIL NADU ELECTRICITY REGULATORY COMMISSION****“Comprehensive Tariff Order for Bagasse based Co-generation plants”****ORDER 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 Overview**

1.1 The Commission in exercise of the powers vested under the Electricity Act, 2003 and in compliance with the mandate of the Act to promote renewable energy has so far issued twenty four tariff orders in respect of various sources of renewable energy. These orders on renewable energy sources covered tariff determination for purchase of power by the Distribution licensee, issues related to open access and its promotional aspects.

1.2 The conducive policies of the Central and State Government for promotion of renewable power has helped the sector to achieve remarkable progress.

1.3 The total capacity of renewable power in the State is 14144.35 MW of which Bagasse based Co-generation power constitutes 710.9 MW (as on 25-11-2019). Last generic tariff order of the Commission in the case of Bagasse based Co-generation power was issued on 28-03-2018 vide Order No.4 of 2018. The control period of this Order No.4 of 2018 on Bagasse based co-generation power plants covers upto 31.3.2020. However it was extended vide Order no.6 of 2020 dated 31.03.2020 until issue of new order.

## **2.0 Importance of Non-Conventional Energy Sources:**

2.1 The energy which is renewable and doesn't harm to the environment and which comes from natural resources like solar energy, wind energy, bio mass and bagasse like co-generation are the best sources of Non conventional energy. Non-Conventional Energy Sources are pollution free. Moreover exporting Renewable electricity to the Grid, which displaces fossil fuel intensive electricity from the grid connected power plants and results in emission reduction. Global concern over pollution problems caused by the increase in green house 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. Among various renewable sources of energy, Bagasse based co-generation also plays as a good in-house power generation for captive usage.

2.2 Bagasse is often used as a primary fuel source for sugar mills. When burned in quantity, it produces sufficient heat energy to supply all the needs of a typical sugar mill, with energy to spare. To this end, a secondary use for this waste product is

in cogeneration, the use of a fuel source to provide both heat energy, used in the mill, and electricity, which is typically sold on to the consumer electrical grid.

2.3 The 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.

### **3.0 Commission's Regulation on New and Renewable Energy Sources**

3.1 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.

3.2 Regulation 4 (2) of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008, specifies as follows:

*"(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 Electricity Regulatory Commission*
- (b) National Electricity Policy*
- (c) Tariff Policy issued by the Government of India*
- (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. “*

3.3 Regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008 issued by the Commission specifies as follows on determination of tariff and pricing methodology:

*“4. Determination of tariff*

*(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 suomotu or on an application filed by the distribution licensee or by the generator.*

*(b) inviting public response on the suomotu 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.*

*(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 Electricity Regulatory Commission*

*(b) National Electricity Policy*

*(c) Tariff Policy issued by the Government of India*

*(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.”*

3.4 The provisions in Commission’s Power Procurement Regulations on Control period is as follows:

*“6. Agreement and Control period*

*The tariff as determined by the Commission by a general or specific order for the purchase of power from each type of renewable source by the distribution licensee as referred to in clause 4(3) shall remain in force for such period as specified by the Commission in such tariff orders. The control period may ordinarily be two years. When the Commission revisits the tariff, the revision shall be applicable only to the generator of new and renewable energy sources commissioned after the date of such revised order.”*

#### **4. Commission’s order on NCES based generation and allied issues.**

4.1 The Commission had 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.

4.2 The Commission had 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.

4.3 The Commission had 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. The Commission in its Order No. 4 of 2014, dated 28-07-2014 has extended the validity of the Order till the issue of next order.

4.4 The Commission issued Order No. 4 of 2016, dated 31-03-2016 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.

4.5 The Commission issued Order No.4 of 2018, dated 28-03-2018 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 that Order, Commission fixed its control period of two years i.e., upto 31-03-2020 and by extension Order No.6 of 2020, dated 31-03-2020 the said Order was extended until issue of next order

## **5. Floating of Consultative paper:**

5.1 The Consultative paper on Tariff for power procurement by Distribution licensee from Bagasse based plants was floated to obtain the views of stakeholders before issuing of generic tariff order and it was hosted in the Commission's website on

02-01-2020 inviting views/suggestions from the stakeholders.

5.2 The list of stakeholders and their comments who have submitted written comments is placed in Annexure-I.

5.3 The consultative paper was placed before the 35<sup>th</sup> State Advisory Committee (SAC) held on 20-03-2020 to elicit their views. The list of SAC members who participated in the meeting is given in the Annexure-II.

## **6. Legal Provisions:**

### **6.1 Related Provisions of the Electricity Act, 2003:**

#### **6.1.1. Relevant Provisions of Electricity Act, 2003 are reproduced below:**

*“Section 3(1): The Central Government shall, from time to time, prepare the National Electricity Policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy.*

**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:-*

.....

*The promotion of co-generation and generation of electricity from renewable sources of energy;*

*(a) The National Electricity Policy and tariff policy:”*

*Section 62(1): The Appropriate Commission shall, subject to the provisions of this Act for –*

*(a) Supply of electricity by a generating company to a distribution licensee:*

*Section 62(2): The Appropriate Commission may require a licensee or a generating company to furnish separate details, as may be specified in respect of generation, transmission and distribution for determination of tariff.*

*Section 62(5): The Commission may require a licensee or a generating company to comply with such procedure as may be specified for calculating the expected revenues from the tariff and charges which he or it is permitted to recover.*

*Section 63: Notwithstanding anything contained in section 62, the Appropriate Commission shall adopt the tariff if such tariff has been determined through transparent process of bidding in accordance with the guidelines issued by the Central Government.*

*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:**

6.2.1 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 2016

6.3.1. 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(11) (i):** Tariff fixation for all electricity projects (generation, transmission and distribution) that result in lower Green House Gas (GHG) emissions than the relevant baseline 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 of the total consumption of electricity in the area of a distribution licensee for purchase of energy from renewable energy sources, taking into account availability of such resources and its impact on retail tariffs. Cost of purchase of renewable energy shall be taken into account while determining tariff by SERCs. Long term growth trajectory of Renewable Purchase Obligations (RPOs) will be prescribed by the Ministry of Power in consultation with MNRE.*

*(4) **Clause 6.4(2):** States shall endeavor to procure power from renewable energy sources through competitive bidding to keep the tariff low, except from the waste to energy plants. Procurement of power by Distribution Licensees*

*from renewable energy sources from projects above the notified capacity, shall be done through competitive bidding process, from the date to be notified by the Central Government.*

*However, till such notification, any such procurement of power from renewable energy sources projects, may be done under Section 62 of the Electricity Act, 2003. While determining the tariff from such sources, the Appropriate Commission shall take into account the solar radiation and wind intensity which may differ from area to area to ensure that the benefits are passed on to the consumers.*

## **7.0. Applicability of the proposed Order:**

7.1. This Order shall come into force from the date of issue i.e., from **16-10-2020**.

The tariff fixed in this Order shall be applicable to all Bagasse based Co-generation Plants commissioned during the control period of the Order.

7.2. The tariff is applicable for purchase of bagasse based co-gen power by Distribution Licensee from Bagasse based Co-generators conforming to this Order.

7.3. The Variable cost, open access charges, Cross subsidy surcharge, Parallel operation charges, Reactive power charges, Grid availability 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.

## **8.0. Tariff Methodology**

### **8.1. Cost-Plus Tariff Determination**

Cost-plus tariff determination is a more practicable method but it discourages competition and efficiency. However, considering the Projects in pipe line in setting

up of new co-gen plants to arrive the ceiling price, the Cost plus Tariff is arrived. The Distribution Licensee shall procure Bagasse based cogen power through competitive bidding method.

## **8.2. Single Part vs. Two Part Tariff**

In the Commission's Order No. 4 of 2018, dated 28-03-2018, 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 and in order to accommodate the fuel cost escalations appropriately two part tariff is adopted in this Order also.

## **9.0 Tariff Components:**

9.1 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.

9.2 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 and Interest
5. Return on Equity (RoE)
6. Life of the plant and machinery
7. Depreciation
8. Operation& Maintenance (O & M) Expenses
9. Interest and Components of working capital
10. Station Heat rate
11. Gross calorific value (GCV) of the fuel
12. Specific fuel consumption (SFC)
13. Fuel cost
14. Auxiliary consumption

The value of every component of tariff is elaborated below.

### **9.3 Capital cost per MW:**

9.3.1. The Commission adopted Rs.5.20 Crores / MW as the Capital Cost for Order No. 4 of 2018, dated 28-03-2018. In the Consultative paper Commission proposed a Capital Cost of Rs.4.925 Crores/MW. The capital cost includes evacuation cost up to the inter-connection point.

**The capital costs considered by other Commission are as follows:**

<b>Sl. No.</b>	<b>Order of ERCs</b>	<b>Capital Cost</b>
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	Rs.4.67 Crore/MW
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	Rs.4.66 Crore/MW
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY2019-2024)	Rs.4.61 Crore/MW
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	Rs.4.36 Crore/MW
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	Rs.4.70 Crore/MW

9.3.2 TANGEDCO agreed with the proposed Capital cost rate which includes the evacuation cost upto interconnection point and ratio between the Capital cost on machineries and Land & civil works – 85% and 15% respectively.

9.3.3 In CERC's (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017, it has been stated that the normative capital cost for the non-fossil fuel based co-generation projects shall be Rs.492.5 Lakh/MW for high boiler pressure projects for the third year of Control Period (i.e. FY2019-20).

9.3.4 It is evident from the CERC's Statement of Reasons (SOR) dated 18<sup>th</sup> April 2017 for the Control Period 2017-2020, that CERC has analysed the normative capital cost for various boiler pressure (ata) and has discussed the data on the normative capital cost from Sugar Development Fund (Ministry of Consumer Affairs, Food & PD). The said data in respect of normative capital cost is Rs.442 Lakh/MT for 87 to 109 (ata) high pressure boiler and Rs.543.00 Lakh/MT for 110 (ata) and above high pressure boiler. Considering the above, by averaging the normative cost for High Boiler Pressure projects (above 87 ata) CERC has arrived

at a capital cost of Rs.492.5 Lakh/MW for FY2019-20. Further, CERC has stated that the higher capital cost of Rs.492.5 Lakh/MW is provided to encourage and ensure deployment of high pressure boilers which are more efficient in nature. Now, CERC in its Terms and Conditions for Tariff determination from Renewable Energy Sources Regulations, 2020 fixed the net Capital cost of Rs.467 lakhs for 2020-21 taking into account of the capital subsidy of Rs.25 lakh/MW. This capital cost will remain valid for the entire duration of the control period unless reviewed earlier by the Commission.

9.3.5. The capital cost fixed by the CERC is only Rs.467 Lakh/MW for the FY 2020-21 and the cost of high pressure boiler is also in declining trend in the market.

9.3.6. In view of the above, the Commission decided to retain the capital cost of Rs.5.20 Crores / MW as considered earlier but with the due deduction of capital subsidy of Rs.25 lakhs, as deducted by the CERC in its orders for 2020-21, and the Commission determines the capital cost at Rs.4.95 Crore/MW. 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.

#### **9.4. Plant Load Factor:**

9.4.1 The plant load factor of a Bagasse based power generation depends on number of factors like availability of fuel, vintage of the plant, etc. Considering the no. of operating period (Crushing & Off-season duration) during a year, CERC has fixed the PLF of 60%.

9.4.2 The TANGEDCO concurred with the PLF rate of 60% proposed by the Commission.

9.4.3 The PLF considered by other Commissions are as follows:

Sl. No.	Order of ERCs	PLF
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	60% (in respect of Tamil Nadu)
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	60%
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY 2019-2024)	50%
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	55%
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	75%

9.4.4. Sugar mills are allowed to use fossil fuel also during off seasons. Even during the crushing season if the sugarcane is not available supplementary fuel is used therefore the Commission would like to enhance the PLF from 55% to 60%. The PLF is an annual phenomenon for the purpose of fixed cost recovery. Therefore, Commission proposed to adopt a PLF of 60%. The PLF is an annual phenomenon for the purpose of fixed cost recovery.

9.4.5. Whenever the generation go beyond 60% PLF, as the annual fixed charges or the capital cost recovery is achieved at the normative PLF of 60%, for any generation beyond the normative PLF of 60%, an incentive of Re.0.25 per Unit was proposed in the Consultative paper to meet the additional wear and tear of the plant and equipment.

9.4.6. TANGEDCO accepted the Plant Load Factor proposed by the Commission, but it has requested to withdraw the incentive proposed for over and above the PLF rate. Commission has not find any merit in the request of withdrawal of incentive for PLF above 60% which has been increased from 55% in this Order.

Therefore, Commission decides to continue the incentive of Re.0.25 per unit in this Order in respect of this Green energy, at the rate applicable for the Conventional Power Stations.

9.4.7. Therefore, in this Order Commission decided to adopt a normative PLF of 60%; and any generation beyond the normative PLF of 60%, Commission allows Variable Cost and also an incentive of 25 paise per unit.

### **9.5. Debt – Equity Ratio:**

9.5.1. The Tariff Policy lays down a debt-equity ratio of 70:30 for power projects. The Commission in its previous Orders also adopted a Debt-Equity ratio of 70:30.

9.5.2. TANGEDCO accepted the Debt-Equity ratio of 70:30.

9.5.3. Therefore, the Commission decides to adopt the ratio of 70:30 as specified in the Determination of Tariff Regulations, 2005 and as adopted in the earlier Orders on the new and renewable power.

### **9.6. Term of Loan and Rate of Interest:**

9.6.1. In the consultative paper Commission has proposed a term of loan as ten years plus one year moratorium period and the rate of interest as 10.31% p.a. The Commission proposed the rate based on the MCLR of one year for the last six months period of 8.31% (prevailed as on 1<sup>st</sup> November of 2019) notified by the State Bank of India plus 200 basis points which was 10.31%.

9.6.2. TANGEDCO requested that the latest MCLR rate for one year notified by the SBI plus 100 basis points which is 9.31% may be taken for calculation of interest on loan.

9.6.3. As the rate of interest proposed in the Consultative paper of 10.31% was prevailing as on 1<sup>st</sup> November'2019 for the past six months period, the latest prevailing for the past six months prior to 1<sup>st</sup> September' 2020 has been taken for consideration which is reasonable and related to current market conditions.

9.6.4. The term of loan and rate of interest considered by other ERCs are as follows:

<b>Sl. No.</b>	<b>Order of ERCs</b>	<b>Term of Loan and rate of interest</b>
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	15 years and normative interest rate of two hundred (200) basis points above the average State Bank of India MCLR (one year tenor) prevalent during the last available six months. Interest rate for FY2020-21 is 9.67%
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	11.40%
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY 2019-2024)	11.00%
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	10.25%
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	10.50%

9.6.5. The TANGEDCO has proposed a term of repayment for 12 years with one year moratorium, but failed to justify the benefit. Therefore, Commission decides to continue with a term of loan of 10 years plus one year moratorium as adopted in the previous Orders of Bagasse based cogeneration plants. The prevalent lending rate

being the marginal cost of funds based lending rate at which the bank prices all its loans.

9.6.6. The Commission in the present orders decides to adopt the latest Marginal Cost of funds based Lending Rate (MCLR) of one year tenor of 7.28% notified by the SBI during the six months period prior to 1<sup>st</sup> September 2020 plus 200 basis points which is 9.28% p.a. as interest on Term Loan.

### 9.7. Return on Equity (RoE):

9.7.1. In the Consultative paper Commission proposed a RoE of 16.78% pre-tax.

9.7.2. TANGEDCO recommended to adopt the rate of 16.5% (pre-tax).

9.7.3. The Return on Equity considered by other ERC's are as follows:

Sl. No.	Order of ERCs	Return on Equity
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	16.96% (pre-tax)
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	ROE of 14% (plus) applicable tax payment of MAT @ 21.34% p.a. for first 10 years and Corporate tax @ 34.61% p.a. for next 15 years.
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY 2019-2024)	15.00% (pre-tax)
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	17.60% (pre-tax)
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	14.00% (income tax pass through) (decreased from 16% to 14%)

9.7.4. In the recent Regulations on Terms and conditions for determination of Tariff for Renewable Energy Sources, CERC computed the RoE as 16.96% considering the MAT rate and Corporate Tax rate. Since it is a national phenomenon, on the same rationale, Commission decides the Return on Equity at the rate of 16.96% (pre-tax) considering the normative RoE @ 14% grossing up with the recent average MAT rate of 17.47%.

### **9.8. Life of plant and machinery:**

The Commission in its all earlier Orders in 2012, 2016 and in 2018 considered the life of a plant as 20 years for tariff determination process. Therefore in this Order too, Commission decides to adopt 20 years as useful life period of plant for fixation of tariff as followed earlier.

### **9.9 Depreciation :**

9.9.1. In the Consultative Paper Commission has proposed the rate of Depreciation as adopted in the earlier orders issued during 2012, 2016 and 2018 in respect of Bagasse based Co-generation plants which is 4.50% p.a. Straight Line Method on plant and machinery. The accumulated depreciation shall however be limited to 90% of the cost of plant and machinery.

9.9.2. TANGEDCO concurred with the above proposal.

9.9.3. The rate of depreciation considered by other Commissions are as follows:

<b>Sl. No.</b>	<b>Order of ERCs</b>	<b>Depreciation</b>
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	4.67% per annum for first 15 years; From 16 <sup>th</sup> year onwards at 2%.
2.	Gujarat ERC's Order dated. 15-03-2018	7% (upto 10 years) 2% (11 to 20 years)



	(upto FY2019-20)	
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY 2019-2024)	5.83% for 1 <sup>st</sup> 12 years; and balance for remaining life period
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	5.28% for 13 years; and 3.05 for remaining life period
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	5.38% for 1 <sup>st</sup> 13 years and balance spread equally over life of the plant.

9.9.4 In respect of the rate of depreciation, in the present order also Commission decides to continue with the existing methodology of depreciation as in its earlier Orders 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.

### 9.10. Operation and Maintenance (O & M) Expenses:

9.10.1. In the Consultative paper Commission proposed to adopt the O&M expenses at the rate of 3% of Capital cost with an escalation of 5.72% from the second year onwards.

9.10.2. The O & M Expenses considered by other Commissions are as follows:

Sl. No.	Order of ERCs	O&M Expenses
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	24.52 lakhs/MW for 2020-21 and escalation of 3.84% p.a. over the tariff period
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	3% of project cost and escalation of 5.72% p.a. from 2 <sup>nd</sup> year onwards
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY 2019-2024)	17.97 lakhs/MW and escalation of 4% p.a. thereafter

4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	22.18 lakhs/MW and escalation of 5.00% p.a. thereafter.
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	3% of Cap.cost and escalation of 5.72% p.a. thereafter

9.10.3. Though the Commission has proposed the O & M expenses at 3% of capital cost in the Consultative paper, Commission decided to adopt the rate adopted by the Central Electricity Regulatory Commission in this Order. Therefore, in the present order the Commission allow the O & M expenses including insurance at Rs.24.52 lakhs per MW. The same will be escalated by 5.72% every year from 2<sup>nd</sup> year onwards.

### **9.11. Interest and Components of working capital:**

9.11.1 The Commission in its Order No. 4 of 2018, dated 28-03-2020, fixed the components of working capital with the following norms and also proposed the same in the Consultative Paper which are as follows:

- a. Fuel stock of one month
- b. O & M Expenses for one month
- c. Receivables equivalent to two months

9.11.2. TANGEDCO in its comments concurred with the components proposed by the Commission. Further, it was requested to adopt the rate of interest at 9.81% which is 150 basis points above the average SBI MCLR (1 year tenor) rate.

9.11.3 The rate of interest and components considered by other Commissions for calculating the Interest on Working Capital are as follows:

Sl. No.	Order of ERCs	Interest and components of Working Capital
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	Fuel Cost for four months equivalent to normative PLF, O & M expenses for one month, receivables equivalent to 45 days of tariff for sale of electricity calculated on the target PLF and Maintenance spare @ 15% of O & M expenses. Rate of Interest - 350 basis points above the average State Bank of India MCLR (one year tenor).
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	Components: (i) Fuel stock for 30 days, (ii) O&M expenses for one month, (iii) Receivables of 1 month for sale, (iv) Maintenance spares @ 1% of capital cost escalated @ 5% p.a. Rate of Interest – SBI rate (8.9%) plus 250 basis points
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY 2019-2024)	Components: (i) Fuel cost of 4 months (ii) O&M exp. for one month (iii) Receivable two months (iv) spares for O&M 15% Rate of Interest – 12%
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	Components: (i) O&M expenses one month (ii) 15% of O&M expenses (iii) Receivables-two months (iv) Fuel stock-one month Rate of Interest – 11.25%
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	12%

9.11.4. As Commission is consistently following the above components of working capital in its previous tariff orders, in the present order too, Commission decides to continue with the same components of working capital viz. one month fuel stock, one month O & M and two months receivables.

9.11.5. As regards the rate of interest for calculating the Interest on working capital, the same is considered as 300 basis points above the latest average State Bank of India MCLR (one year tenor) rate, during the six months period prior to 1<sup>st</sup> September 2020, i.e., 7.28% and fixes the same at 10.28% p.a.

### 9.12. Station Heat Rate:

9.12.1 In the Consultative Paper Commission has proposed a SHR of 3240 kCal/kWhr.

9.12.2. TANGEDCO concurred with the proposal of the Commission.

9.12.3. The Station Heat Rate considered by other Commissions are as follows:

Sl. No.	Order of ERCs	Station Heat Rate
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	3600 KCal/KWhr
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	3600 KCal/KWhr
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019 (FY 2019-2024)	3400 KCal/KWhr
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	3600 KCal/KWhr
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	3600 KCal/KWhr

9.12.4. M/s.South India Sugar mills Association requested the Commission to consider the Station heat rate at 3600 KCal/KWhr in line with CERC and other SERCs.

9.12.5. In R.A. No. 3 OF 2014, Order dated February 23, 2016, Commission adopted a Station Heat Rate of 3240 Kcal/kWhr. Further, in Order No. 4 of 2016, dated 31-03-2016 and Order no.4 of 2018, dated 28-03-2018 too Commission adopted the same Station Heat Rate of 3240 Kcal/kWhr. Therefore, in the present order too Commission decides to adopt the same SHR of 3240 kCal/kWhr.

### 9.13 Gross Calorific value of the fuel:

9.13.1 In the Consultative Paper Commission proposed a GCV of 2300kCal/kg.

9.13.1. The GCV considered by other Commissions are as follows:

Sl. No.	Order of ERCs	GCV for Bagasse
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	2250 KCal/Kg
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	2250 KCal/Kg
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019	2250 KCal/Kg
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	2250 KCal/Kg
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	2250 KCal/Kg

9.13.3. TANGEDCO concurred with the Gross calorific value proposed by the Commission in the consultative paper.

9.13.4. M/s.South India Sugar mills Association requested the Commission to consider the GCV rate at 2250 KCal/Kg in line with CERC.

9.13.5. Since the GCV rate has been upheld in the earlier Order, in the present Order also Commission decides to continue with the same GCV of 2300 kCal/kg.

### 9.14 Specific fuel consumption (SFC) :

9.14.1. In the Consultative paper Commission proposed a SFC of 1.41 Kg/KW hr.

9.14.2.The Specific fuel consumption considered by other Commissions are as follows:

Sl. No.	Order of ERCs	Specific fuel consumption
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	1.6 Kg/KW hr
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	1.6 Kg/KW hr
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019	1.51 Kg/KW hr
4	Telangana ERC's Order Dt.20.10.2018 (FY 2018-2020)	1.6 Kg/KW hr
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	1.6 Kg/KW hr

9.14.3. Specific fuel consumption rate of 1.41 Kg/KW hr accepted by the TANGEDCO. M/s.SISMA requested to adopt resultant SFC at 1.6 Kg/KW hr. As the Commission has decided to adopt SHR & GCV at 3240 KCal/KW hr and 2300 KCal/Kg, the resultant factor also will be the same.

9.14.4. Specific fuel consumption is the resultant of Station Heat Rate and Gross Calorific Value of the fuel. With the above Station Heat Rate at 3240 kCal/kW hr and GCV at 2300 kCal/kg the resultant consumption works out to 1.41 kg/kW hr and the Commission decides to continue with the same SFC.

### **9.15 Fuel Cost:**

9.15.1. The Commission proposed a fuel cost of Rs.1926.63/MT in the Consultative paper with an escalation of 5%.

9.15.2 The fuel cost considered by the other Commissions are as follows:

Sl. No.	Order of ERCs	Fuel cost and escalation factor
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	Rs.2023/MT with the escalation of 5%
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	Rs.2075/MT with the escalation of 5%
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019	Rs.1010/MT with the escalation of 5% (2019-20)
4	Telangana ERC's Order Dt.20.10.2018 (FY 2019-2020)	Rs.1848/MT with the escalation of 5%
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	Rs.1161.28/MT (2020-21)

9.15.3. M/s.South India Sugar Mills Association, Chennai, has stated that, under equivalent heat value method the average cost of bagasse is to be taken as Rs.2534/MT; moreover, alternative demand from the Tamil Nadu Newsprint and Papers Ltd, has the market price for bagasse at Rs.2700 to Rs.3725/MT. Therefore it has requested that Bagasse price to consider at Rs.2700/MT. In this connection, Commission views that, Bagasse, being a by-product of sugarcane, price considered for its alternative demand cannot be considered for fixation of fuel cost in respect of Co-gen power. Nowhere in the country, it is considered as a scale for fixing of fuel cost.

9.15.4. Price of Bagasse notified by the CERC for the year 2019-20 is Rs.1926.63 per ton. The Commission in the consultative paper escalated the fuel cost by 5% over the fuel cost notified in the earlier Order of the Commission no.4 of 2018, dt.28-03-2018. But Hon'ble CERC's in the recent RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020 adopted the Bagasse price of Rs.2023 / MT in respect of Tamil nadu.

Therefore, in line with the above, Commission allows the fuel cost at Rs.2023/MT for the year 2020-21, with an escalation of 5% p.a. for the subsequent year.

### 9.16. Auxiliary Consumption:

9.16.1. The Commission in its Orders during 2016 and in Order no.4 of 2018 dated 28-03-2018 adopted an Auxiliary consumption of 8.50%.

9.16.2. TANGEDCO concurred with the Auxiliary Consumption proposed by the Commission.

9.16.3 Auxiliary consumption considered by other Commissions are as follows:

Sl. No.	Order of ERCs	Auxiliary Consumption
1.	CERC's RE Generic Order (RE-Tariff-2020-21), dated 21-07-2020	8.5%
2.	Gujarat ERC's Order dated. 15-03-2018 (upto FY2019-20)	8.5%
3.	Uttar pradesh ERC's Regulations 2019, dated 25-07-2019	8.5%
4	Telangana ERC's Order Dt.20.10.2018 (FY 2019-2020)	9.00%
5	Karnataka ERC's Order, dated 14-05-2018 (FY 2018-2021)	8.5%

9.16.4. In the present order Commission decides to continue with the Auxiliary Consumption of 8.5%.



## 10. Tariff Determinants:

The financial and operational parameters in respect of Bagasse based Cogeneration Power projects considered in the present Order is tabulated below:

<b>Tariff Components</b>	<b>This Order Values</b>
Capital Cost	Rs.4.95 Crores/MW
PLF	60%
Debt Equity Ratio	70:30
Term of Loan	10 years with 1 year moratorium period
Interest on Loan	9.28%
Return on Equity	16.96%
Life of Plant and Machinery	20 years
Depreciation	4.5% per annum SLM on 85% of the Capital Cost
O & M Expenses	Rs.24.52 lakhs/MWwith an annual escalation of 5.72% from 2 <sup>nd</sup> year onwards
Components and Interest on Working Capital	Components: a) One month Fuel Stock b) One month O & M Expenses c) Two months Receivables  Rate of Interest – 10.28%
Station Heat Rate(SHR)	3240 kCal/kWh
Gross Calorific Value (GCV)	2300 kCal/kg
Specific Fuel Consumption (SFC)	1.41
Fuel Cost (Rs. PMT)	Rs. 2023/MT
Auxiliary Consumption	8.5%
Variable Cost	
2020-21	Rs.3.12 per Unit
2021-22	Rs.3.27 per Unit

Fixed Cost	
2020-21	Rs.2.22 per Unit
2021-22	Rs.2.25 per Unit
<b>Total Cost</b>	
<b>2020-21</b>	<b>Rs.5.34 per Unit</b>
<b>2021-22</b>	<b>Rs.5.52 per Unit</b>

### 11.0 Tariff:

11.1 Bagasse based Power Generation tariff is computed with reference to the determinants listed above in Para 10.

### 11.2 Fixed Cost:

11.2.1 The fixed Cost per unit for the whole project life of 20 years is as follows:

(Rs./Unit)

Year	FCC	Year	FCC
<b>1</b>	2.22	<b>11</b>	2.04
<b>2</b>	2.25	<b>12</b>	2.03
<b>3</b>	2.21	<b>13</b>	2.09
<b>4</b>	2.18	<b>14</b>	2.16
<b>5</b>	2.15	<b>15</b>	2.23
<b>6</b>	2.13	<b>16</b>	2.30
<b>7</b>	2.11	<b>17</b>	2.38
<b>8</b>	2.09	<b>18</b>	2.46
<b>9</b>	2.07	<b>19</b>	2.55
<b>10</b>	2.05	<b>20</b>	2.64

11.2.2 The fixed capacity charges specified in this Order will be applicable with reference to the plants commissioned during the control period of this order i.e., from the date of the order to 31.03.2022.

11.2.3. The fixed capacity charges payable to the existing plants, shall be the fixed charges approved by the Commission for the respective control period during which such plants commissioned.

**11.3 Variable Cost:**

11.3.1. The variable cost, from 01-04-2020 to the date of this order, shall be as per the Extension Order no.6 of 2020, dated 31-03-2020; and the variable cost of Rs.3.12/- per unit will be applicable from the date of this order and for the FY 2021-22 will be Rs.3.27/- per unit as discussed supra.

11.3.2. The variable cost will be applicable with reference to the Orders of the Commission issued from time to time. The variable cost will apply for all plants commissioned on or after 15-05-2006.

**12. Use of Fossil Fuel:**

The use of fossil fuels shall be limited to the extent of 15% of total fuel consumption on annual basis, in line with the earlier orders.

**13. Monitoring Mechanism for the use of fossil fuel:**

13.1 The Project developer shall furnish to the State Nodal Agency, a monthly fuel usage statement and monthly fuel procurement statement duly certified by Chartered Accountant to the beneficiary (with a copy to appropriate agency appointed by the Commission for the purpose of monitoring the fossil and non-fossil fuel consumption) for each month, along with the monthly energy bill. The statement shall cover details such as-

- a) Quantity of fuel (in tone) for each fuel type (bagasse and fossil fuels) consumed and procured during the month of power generation purposes,

- b) Cumulative quantity (in tonne) of each fuel type consumed and procured till the end of that month during the year,
- c) Actual (gross and net) energy generation (denominated in units) during the month,
- d) Cumulative actual (gross and net) energy generation (denominated in units) until the end of that month during the year,
- e) Opening fuel stock quantity (in tonne),
- f) Receipt of fuel quantity (in tonne) at the power plant site and
- g) Closing fuel stock quantity (in tonne) for each fuel type (bagasse and fossil fuels) available at the power plant site.

13.2 Non-compliance with the condition of fossil fuel usage by the project developer, during any financial year, shall result in withdrawal of applicability of tariff for such bagasse based power project.

13.3 The details stipulated in the Para 13.1, shall be furnished to the Commission by both the Generator and Distribution licensee every quarter duly reconciling with each other.

#### **14.0 Related issues:**

**The following are the related issues for energy generation from bagasse based cogeneration plants:**

1. Transmission Charges, Wheeling charges and Scheduling & 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. Parallel Operation Charges
15. Tariff review period / Control period
16. Quantum of power purchase by the Distribution Licensee

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

**14.2. Transmission charges, Wheeling charges and Scheduling & system operation charges:**

14.2.1. Transmission, Wheeling and Scheduling & System Operation Charges are generally regulated by the Commission's Tariff regulations, Grid Connectivity & Open Access regulations and Commission's order on open access charges issued from time to time. However, as a promotional measure, under sections 61 and 86(1)(e) of the

Act, Commission in the tariff orders of 2018 fixed 70% of the charges applicable to conventional power to the Bagasse based Cogeneration plants.

14.2.2. In the Consultative paper Commission proposed 100% of the Transmission, Wheeling and Scheduling & system operation charges as applicable for conventional power for Bagasse based co-generation plants. Though it was proposed to levy on par with conventional power plants, in view of unprecedented situation that arose due to the outbreak of the Covid 19 pandemic where several restriction were in place on the movement of public and opening of offices etc., and the gradual slowdown in economic activity, Commission decides not to disturb the current position in this Order. Therefore it is decided to retain the levy of Transmission, Wheeling and Scheduling & system operation charges at **70%** of the rate applicable for conventional power notified by the Commission from time to time, for the Bagasse plants.

14.2.3. With regard to scheduling and system operation charges, the work done by SLDC is the same as in the case of conventional power. SLDC has to monitor the grid operations effectively on real time basis. The scheduling and system operation charges have to be determined in a non-discriminatory manner with reference to the functions of SLDC and there cannot be any concession.

14.2.4. 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.

14.2.5. For generators who are availing Renewable Energy Certificate (REC), Transmission charges, wheeling charges, Scheduling and System operation charges are applicable at 100% of the normal rate applicable for conventional power plants.

### **14.3. Cross subsidy surcharge:**

14.3.1. The Commission in its other tariff orders related to different renewable power and in the orders for solar power, has ordered to levy 60% of the cross subsidy surcharge for third party and open access consumers. In the earlier its Order, Commission proposed for withdrawal of incentives in phases and decided to levy 60% of cross subsidy surcharge on the rate applicable for conventional power plants.

14.3.2. In this consultative paper, Commission proposed to levy 100% CSS on par with conventional power. Though it was proposed to levy on par with conventional power plants, in view of the unprecedented situation due to covid19 and slowdown in economic activity, Commission decides to retain levy of Cross subsidy surcharges at **60%** of that applicable to conventional power as ordered in Order no.4 of 2018, dt.28-03-2018; likewise in respect of REC generators to continue it with the 100% rate applicable for conventional power plants.

### **14.4. CDM Benefits:**

14.4.1 In the earlier orders issued on renewable energy, the Commission adopted the following formula for sharing of CDM benefits as suggested 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.”

14.4.2. The Commission accepted the formula recommended by the Forum of Regulators in its earlier order. The Commission decides to adopt the same formula. The generators shall furnish details of receipts of CDM to the distribution licensee and the distribution licensee shall account for the CDM receipts in the next ARR filing.

#### **14.5. 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.

#### **14.6. Grid availability charges:**

14.6.1 The charges for startup power of generators shall be as per Commission’s Grid Connectivity and Intra-State Open Access Regulations, 2014, Deviation Settlement Mechanism and other orders of the Commission in force.

14.6.2. 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 and Deviation Settlement Mechanism and other relevant orders.



**14.7. Adjustment of energy generated:**

14.7.1. The Commission decides that the adjustment of energy shall be as per the Commission's Grid Connectivity and Open Access Regulations, Deviation Settlement Mechanism (DSM) and other relevant orders.

**14.8. Application Fees and Agreement Fees:**

14.8.1. The Commission in its Bagasse Orders issued in 2016 and 2018 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.

14.8.2. 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.

14.8.3. 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.

14.8.4. The Commission decides to continue the same as in the Order No.4 of 2016, dated 31-03-2016 and Order no.4 of 2018, dt.28-03-2018.

14.8.5. Prior approval of the Commission shall be taken whenever any change in PPA is proposed to be made even if mutually agreed between the parties.

**14.9. Billing and payments:**

14.9.1 The Commission in its Order No.4 of 2018, dated 28-03-2018 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. 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 60 days is liable for interest at the rate of 1% per month.

14.9.2. TANGEDCO while submitting their comments has requested the Commission to consider the interest for the delayed period may be adopted @ 0.75% per month in view of the prevailing reduction in the interest rate. SISMA sought to consider the interest @ 2 % per month for delayed payment.

14.9.3 Commission in this regard views that, while TANGEDCO allowed to claim 1% rebate, without any change, for prompt payment, Interest on delayed payment cannot be increased to 2%.

14.9.4. Therefore Commission now decides to continue with the levying of interest @ 1% per month for delayed payment by the licensee as ordered earlier.

14.9.5. Energy Accounting shall be regulated by the Commission's Regulation/Orders on Open access, Deviation Settlement Mechanism and any other Orders. Till such time the DSM is implemented in the State, if 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 during the billing period. Slot wise adjustment shall be made for the billing period. However, peak hour generation can be adjusted to normal hour or off peak hour consumption of the billing period. Normal hour generation shall be adjusted against normal hour consumption. Excess consumption will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply. Any unadjusted units will get lapsed.

14.9.6. When DSM is implemented, the licensee shall record the time block-wise generation and consumption during the billing period. Time block wise adjustment shall be made for the billing period. Excess consumption will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply.

14.9.7. 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.

14.9.8. 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.

**14.10. Payment security and Security deposit:**

14.10.1. In Commission's Order No.4 of 2016, dated 31-03-2016, 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.

14.10.2. With respect to the security deposit to be paid by captive/third party user, Commission decides 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, as per TNERC's Supply Code Regulation, 2004 in force.

14.10.3. TANGEDCO accepted the S.D. clause proposed in the consultative paper.

14.10.4. As stated in the Consultative Paper, Commission now decides to continue with the existing system in respect of the payment security and security deposit.

**14.11. Power factor:**

14.11. 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.

**14.12. Metering:**

14.12.1. The Commission in its Orders No.4 of 2016, dated 31-03-2016 and Order no.4 of 2018, dt.28-03-2018 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 – Grid connectivity & Intra State Open Access Regulations, 2014.

14.12.2. In the present order also Commission decides to continue the same.

**14.13. Connectivity and Evacuation of energy:**

14.13.1. The Commission in its Order No.4 of 2018, dated 28-03-2018 had ruled that the connectivity and power evacuation system shall be provided as per the Act, Codes, Regulations and Orders in force.

14.13.2. In the present Order also Commission decides to continue the same.

**14.14. Energy Purchase and Wheeling Agreement:**

The Commission in its Order No.4 of 2016, dated 31-03-2016 had decided that 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.

#### **14.15. Parallel Operation Charges**

14.15.1. Commission proposed that in respect of Bagasse based power generators who consumes power on captive basis in the same location may opt for paralleling of their generators with the grid without actually wheeling their power. Such generators shall have to pay the applicable parallel operation charges to the respective distribution licensee as specified in the relevant regulations.

14.15.2. The Parallel Operation charges in respect of the plants under REC option may be collected on par with the conventional power plants, as already in force.

14.15.3. One of the stakeholder M/s.SISMA requested not to levy POC on cogeneration plants in the sugar mills as parallel connection has been taken only to facilitate export of surplus power to TANGEDCO. Moreover, sought to levy 50% concessional charges. But Commission doesn't find any merit in the request of the association, since the connectivity is serving the purpose for plant utility also, but decides to continue to charge as ordered in Order no.4 of 2018, dated 28-03-2018.

#### **14.16. Harmonics**

The Bagasse based co-generation plants shall follow the CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 in respect of harmonics. It is the responsibility of the generator to provide adequate filtering mechanism to limit the harmonics within the stipulated norms. It shall be

done before connecting the generator to the grid and the harmonics shall be measured by the respective distribution licensee during the commissioning. If the Cogen plants inject the harmonics beyond the stipulated limit, they shall pay a compensation of 15% of applicable generation tariff rate to the distribution licensee in whose area the plant is located till such time it is reduced within the stipulated limit. The distribution licensee is responsible for measurement of harmonics with standard meters and issue notices for payment of compensation charges if the harmonics is beyond the stipulated limit. A minimum of 30 days notice period shall be given for payment of compensation charges.

#### **14.17. Control Period / Tariff Review Period:**

14.17.1 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.

14.17.2. The Commission decides that the control period of the Order will be from the date of issue of this order to 31-03-2022 and the tariff period will be twenty years.

#### **14.18. Quantum of power purchase by the Distribution Licensee:**

The distribution licensee can purchase bagasse based cogen power at the rate determined by the Commission from the bagasse based cogen generators to meet the Renewable Power Purchase Obligations (RPO) requirement.

The Commission ordered that the licensee shall procure Bagasse based power through competitive biddings/reverse auctions under Section 63 of the Electricity Act, 2003, following the bidding guidelines of the Government of India. The preferential tariff fixed in this Order is the ceiling price for future biddings by the licensee and may also help the projects that have not been able to commission in the previous control periods. For any procurement in excess of RPO, specific approval shall be obtained from the Commission.

### **15. Acknowledgment**

The Commission would like to place on record and acknowledge with thanks, the contributions of the officers and staff of the Commission and the valuable guidance provided by the experts and members of the State Advisory Committee. The Commission also recognizes the input of TANGEDCO in finalizing this Tariff Order.

Sd/-  
(K.Venkatasamy)  
Member/Legal

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

Sd/-  
(M.Chandrasekar)  
Chairman

(By Order of the Commission)

Sd/-  
**Secretary**  
**Tamil Nadu Electricity Regulatory Commission**



## **ANNEXURE – I**

Abstract of comments received from various stakeholders on “Consultative Paper on Comprehensive Tariff Order for Bagasse based Co-generation plants”.

1. Tamil Nadu Generation and Distribution Corporation Ltd. (TANGEDCO).
2. M/s.South Indian Sugar Mills Association.
3. Thiru.S.Neelakantapillai.

\*\*\*\*

### **I. TARIFF DETERMINENTS**

#### **1. Capital Cost**

TANGEDCO concurred with the Capital Cost of Rs.4.925 Crores/MW as proposed by the Commission.

#### **2. Plant Load Factor (PLF)**

TANGEDCO concurred with the PLF of 60% proposed by the Commission. Moreover requested to withdraw the incentive of Re.0.25/unit proposed for generation beyond 60%.

M/s.SISMA requested to retain the PLF of 55%, since many of the plants could not achieve the existing 55% PLF.For any achievement over 55% PLF, to allow the incentive of Re.1.00 per unit.

Thiru.Neelakantapillai, Chennai has stated that, beyond PLF, allowing incentive is a burden to the Licensee.

#### **3. Debt Equity Ratio**

TANGEDCO concurred with the Debt Equity Ratio of 70:30 proposed by the Commission in Consultative paper.

#### **4. Term of loan**

TANGEDCO suggested to consider the ‘term of loan’ for twelve years with one year as moratorium period for repayment.

#### **5. Interest rate for the loan**

TANGEDCO suggested to adopt 9.31% for interest on loan which is 100% basis points above the SBI MCLR rate proposed by the Commission in the Consultative paper.

## **6. Return on Equity**

TANGEDCO suggested the Return on Equity of 16.5% p.a. (Pre-Tax) against the 16.78% as proposed by the Commission.

## **7. Life of Plant and Machinery**

TANGEDCO concurred to consider the Life of Plant and Machinery for 20 years.

## **8. Depreciation**

TANGEDCO concurred with the Depreciation as proposed by the Commission in the Consultative Paper of 4.5% p.a. SLM on plant and machinery by considering 85% of the capital cost as the cost of plant machinery. The accumulated depreciation would be limited to 90% of the cost of plant and machinery.

## **9. Operation and Maintenance (O & M) Expenses**

TANGEDCO concurred with the proposed rate of 3% of capital cost as O & M expenses and an annual escalation of 5.72% from the second year onwards.

## **10. Station Heat Rate (SHR)**

TANGEDCO concurred with the SHR of 3240 KCal/KW hr as proposed by the Commission.

SISMA suggested to consider at least as 3600 KCal/KW hr in line with CERC.

## **11. Gross Calorific Value (GCV) of the fuel**

TANGEDCO concurred with the GCV rate of 2300 KCal/Kg proposed by the Commission.

SISMA suggested to consider to fix at 2250 KCal/Kg.

## **12. Specific Fuel Consumption (SFC)**

TANGEDCO concurred with the SFC of 1.41 Kg/KW hr proposed by the Commission.

SISMA stated that, if SHR & GCV consider at the above rate, the SFC also become 1.6 Kg/KW hr in line with CERC.

### **13. Fuel Cost per MT**

TANGEDCO concurred with the Fuel Cost of Rs.1926.63/MT with 5% annual escalation as proposed by the Commission.

SISMA suggested to adopt at least Rs.2700/MT the rate at which the bagasse is traded in the market to Paper industries. Further stated that in no event it shall be less than Rs.2023/MT for FY 2020-21 as outlined in para 44 of CERC (Terms and conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020.

### **14. Components of Working Capital**

TANGEDCO agreed with the components of working capital considered by the Commission, which is as follows:

- a) Fuel Stock of one month
- b) O & M of one month and
- c) Receivables - two months

### **15. Interest on Working Capital**

TANGEDCO recommended for 150 basis points above the average SBI MCLR (1 year tenor) at 9.81% against 11.31% proposed in the consultative paper.

### **16. Auxiliary Consumption**

TANGEDCO accepted the 8.5% of Auxiliary consumption proposed in the consultative paper by the Commission.

### **RELATED ISSUES:**

#### **1. Open access charges and Line losses:**

TANGEDCO accepted open access charges proposed by the Commission in Consultative paper i.e., as applicable for conventional power plants notified by the commission from time to time.

## **2. Scheduling and System Operation Charges**

TANGEDCO concurred with the proposal of the Commission for 100% of the Scheduling and System Operation Charges as applicable for the conventional power.

## **3. Cross Subsidy Surcharge**

TANGEDCO accepted for the proposed 100% of the applicable Cross Subsidy Surcharges.

## **4. CDM Benefits**

TANGEDCO accepted for the CDM benefits sharing proposed in the Consultative paper by the Commission.

## **5. Reactive Power Charges**

TANGEDCO accepted the proposal of the Commission.

## **6. Billing and payment**

TANGEDCO recommended the rate of interest on delayed payment to reduce to 0.75% per month.

## **7. Incentive - Plant load factor:**

TANGEDCO recommended that the total cost per unit of power purchase from Bagasse based cogeneration plants are already over and above the average power purchase cost per unit of TANGEDCO, and hence the incentive may be withdrawn.

8. **Parallel Operation Charges**

SISMA suggested that to adopt 50% concession given in the T.O.4 of 2018.

9. **Payment security and Security Deposit**

TANGEDCO requested to adopt at 0.75% per month for any payment made beyond 60 days.

SISMA requested to fix the interest for the delayed period at 2% per month with monthly compounding.

**ANNEXURE - II**

**LIST OF THE 35<sup>th</sup> STATE ADVISORY COMMITTEE (SAC) MEETING OF  
TAMIL NADU ELECTRICITY REGULATORY COMMISSION HELD ON 20<sup>th</sup>  
MARCH 2020 AT HOTEL SAVERA, CHENNAI**

**Members Present :**

1. Thiru. M.Chandrasekar, Chairman, TNERC
2. Dr. T.Prabhakara Rao, I.A.S. (R), Member, TNERC
3. Thiru. K.Venkatasamy, Member/Legal, TNERC
4. Thiru. Vikram Kapur, I.A.S., CMD, TANGEDCO Ltd., and Chairman,  
TANTRANSCO.
5. Thiru. M.R. Krishnan, Deputy Director, Consumer Association of  
India.
6. Thiru.S.Sankaranarayanan, General Manager/TEDA.
7. Tmt.V.Geetha, Additional Secretary to Government (FAC), Energy  
Department
8. Thiru.A.Jesu Thayanand, Under Secretary to Government, Co-operation, Food  
& Consumer Protection Department.
9. Thiru. T. Vijayarangan, Secretary, Anna Labour Union.

**TNERC - CONSULTATIVE PAPER - 2020**  
**COMPONENTS OF BAGASSE BASED CO-GENERATION TARIFF**

<b>PARAMETERS</b>	<b>Consultative paper</b>	
Capital Cost (in Rs.)		49500000
Debt - 70% (in Rs.)		34650000
Equity - 30% (in Rs.)		14850000
Interest on Debt		9.28%
Depreciation- SLM at 4.5% on 85% of Capital Cost - (in Rs.)		1893375
Interest on Working Capital		10.28%
Components of working capital		
Fuel Cost	1 month	
O & M	1 month	
Receivables	2 months	
Return on Equity (ROE as per CERC)	16.9600%	
O & M Expenses - (in Rs.)	2452000	
Gross generation @ 60% PLF (in Units)	5256000	
Auxiliary Consumption	8.50%	
Net Generation (in Units)	4809240	
Fuel Cost (Rs./MT)	2023.00	
Station Heat Rate kCal/kWh	3240	
GCV kCal/kg	2300	
SFC kg/kWh	1.41	

**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 consumption (Units)	Fixed Cost (Rs / unit)	Variable Cost (Rs / unit)	Total Cost per unit (Rs / unit)
					O & M expenses	Fuel	Receivables	Total Working Capital	Interest on Working Capital						
1	2452000	3215520	1893375	14992372	204333	1249364	4276821	5730518	589097	2518560	10668552	4809240	2.22	3.12	<b>5.336</b>
2	2592254	3215520	1893375	15741991	216021	1311833	4429011	5956865	612366	2518560	10832075	4809240	2.25	3.27	<b>5.526</b>
3	2740531	2893968	1893375	16529090	228378	1377424	4534457	6140259	631219	2518560	10677653	4809240	2.22		
4	2897290	2572416	1893375	17355545	241441	1446295	4648085	6335821	651322	2518560	10532963	4809240	2.19		
5	3063015	2250864	1893375	18223322	255251	1518610	4770313	6544174	672741	2518560	10398555	4809240	2.16		
6	3238219	1929312	1893375	19134488	269852	1594541	4901583	6765975	695542	2518560	10275008	4809240	2.14		
7	3423445	1607760	1893375	20091212	285287	1674268	5042358	7001913	719797	2518560	10162937	4809240	2.11		
8	3619266	1286208	1893375	21095773	301606	1757981	5193127	7252714	745579	2518560	10062988	4809240	2.09		
9	3826288	964656	1893375	22150562	318857	1845880	5354401	7519139	772967	2518560	9975847	4809240	2.07		
10	4045152	643104	1893375	23258090	337096	1938174	5526721	7801991	802045	2518560	9902236	4809240	2.06		
11	4276535	321552	1893375	24420994	356378	2035083	5710652	8102113	832897	2518560	9842919	4809240	2.05		
12	4521153		1893375	25642044	376763	2136837	5906791	8420391	865616	2518560	9798704	4809240	2.04		
13	4779763		1893375	26924146	398314	2243679	6170291	8812283	905903	2518560	10097600	4809240	2.10		
14	5053165		1893375	28270354	421097	2355863	6447284	9224244	948252	2518560	10413352	4809240	2.17		
15	5342206		1893375	29683871	445184	2473656	6738464	9657304	992771	2518560	10746912	4809240	2.23		
16	5647780		1893375	31168065	470648	2597339	7044558	10112545	1039570	2518560	11099285	4809240	2.31		
17	5970833		1893375	32726468	497569	2727206	7366334	10591109	1088766	2518560	11471534	4809240	2.39		
18	6312365		1893375	34362791	526030	2863566	7704596	11094192	1140483	2518560	11864783	4809240	2.47		
19	6673432		1893375	36080931	556119	3006744	8060191	11623055	1194850	2518560	12280217	4809240	2.55		
20	7055152		1893375	37884978	587929	3157081	8434011	12179022	1252003	2518560	12719091	4809240	2.64		