

TAMIL NADU ELECTRICITY REGULATORY COMMISSION

Consultative Paper for issue of Tariff order for Wind energy and related issues

(Comments/Suggestions are invited on or before 23.3.2018)

1.0 Overview

1.1 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 seventeen 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, its promotional aspects and banking of energy depending on the source of renewable power.

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

1.3 The total capacity of renewable power in the state is 10745.12 MW of which wind power constitutes 7957 MW, the highest in the country. The capacities installed stand testimony to the fact that renewable energy has adequately been promoted. The last of the generic tariff orders of the Commission in the case of Wind power was issued on 31.3.2016 vide Order No.3 of 2016. The

control period of this Order No.3 of 2016 on wind energy expires on 31.3.2018.

1.4 Many developments have taken place since the date of issue of the tariff order on wind energy on 31.3.2016. The wind power sector is gradually transitioning from a preferential tariff regime to tariff based competitive auctions. There is a steep fall in the tariffs of wind power in the recently concluded auctions conducted by state governments and Solar Energy Corporation of India(SECI). The decline in tariffs are to such an extent that they are lesser than the average price of power generated from projects using coal as fuel. Slash in prices of equipments, cheap interest rates, advanced technologies have changed the market dynamics. In this changing scenario, determination of preferential tariff for a further control period requires contemplation. This consultative paper discusses the regulatory framework, the need for a preferential tariff and the setting of a new tariff in the emerging circumstances. Comments are invited from stakeholders on the issues discussed herein.

2.0 Need for a feed in tariff/preferential tariff:

2.1. The installed capacity of wind power in the state as on 31.12.2017 is 7957.22 MW. Wind power penetration is high in Tamil Nadu. The National Institute of Wind Energy has assessed the wind potential in the State at 100 m hub height as 33.8 GW. Many Developers have chosen this state as the

destination for investment in wind generation in the competitive bidding conducted by Solar Energy Corporation of India.

2.2 Commission has so far issued four tariff orders for procurement of power from wind energy viz. Order No.3 of 2006 dt.15.5.2006, Order No.1 of 2009 dt.20.3.2009, Order No.6 of 2012 dt.31.7.2012 and Order No.3 of 2016 dt.31.3.2016, keeping in view the mandate of the Electricity Act,2003 to promote power from renewable energy sources, provisions in National Electricity Policy, Tariff Policy, the Central Commission's Regulations and the Commission's Power Procurement Regulations from New and Renewable Sources of energy.

2.3 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 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.

(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.”

2.4 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.”

2.5 In the last tariff order issued for wind energy vide Order No.3 of 2016 dt.31.3.2016, in the context of deciding preferential tariff for wind energy vs competitive bidding, Commission observed that the ‘Government of India has not issued any bidding guidelines for power procurement from wind energy as on date as specified in section 63 of the Electricity Act, 2003. Further, Hon’ble

APTEL's order in Appeal No. 129 of 2005 on the subject of competitive bidding for procurement of power from Non Conventional Energy Sources(NCES) issued on 14-05-2007 has been stayed by the Hon'ble Supreme Court by its order dated 26-11-2011 passed in Civil Appeal No. D 26531 of 2007', and therefore in line with the Tariff Policy, 2016 that provided for procurement of power from renewable energy source projects under section 62 until a notification is issued by the Central Government, the Commission decided to fix the tariff as per the provisions under section 62 of the Electricity Act,2003.

2.6 Since the time of issue of the last tariff order on wind energy on 31st March 2016, the wind energy sector has also moved towards sale through competitive bidding. Government of India issued draft guidelines for procurement of wind power through competitive bidding. The task of conducting reverse auctions for wind power was entrusted to Solar Energy Corporation of India(SECI). The auctions conducted by SECI in February 2017 for wind power fetched a low tariff of Rs.3.46 per unit. Considering a ceiling price of Rs.3.46 per unit discovered in the auction for wind energy, the Distribution licensee, TANGEDCO, after obtaining approval from the Commission proceeded with reverse bidding for procurement of wind power of capacity 500 MW. A tariff of Rs.3.42 per unit was discovered in the reverse bidding conducted by the Distribution licensee. The auction for wind energy conducted by SECI in October 2017 saw the wind tariff falling as low as Rs.2.64 per unit. Every

competitive bidding of SECI is seen to set a new benchmark tariff. The state run auction by Gujarat for wind power has fetched a tariff of Rs.2.43 per unit. The Ministry of Power has issued the final guidelines for tariff based competitive bidding for wind power on 8.12.2017. The latest auction in February 2018 after issue of guidelines for competitive bidding for wind power, conducted by SECI saw a tariff rate of Rs.2.44 per unit. In a recent communication dt.12.1.2018, the Ministry of New and Renewable Energy has clarified that the States/UTs can consider procuring power from solar and wind projects of less than the defined threshold prescribed (25 MW for wind,5 MW for solar) in the competitive bidding guidelines through feed in tariff to be determined by concerned State Electricity Regulatory Commissions.

3.0 Legal framework:

3.1 Related Provisions of Electricity Act, 2003

3.1.1 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 utilisation 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:-

.....

(h) the promotion of cogeneration and generation of electricity from renewable sources of energy;

(i) the National Electricity Policy and tariff policy;

Section 62(1): The Appropriate Commission shall determine the tariff in accordance with 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): The State Commission shall 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;”

3.2. Related Provisions of National Electricity Policy

3.2.1 Relevant provisions of National Electricity Policy are reproduced below:

“Section 5.2.20 Feasible potential of non-conventional energy resources, mainly small hydro, wind and bio-mass 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.

Section 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.”

3.3. Related Provisions of Tariff Policy

3.3.1 Relevant provisions of Tariff Policy, 2016 are reproduced below:

“Para 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.

.....

(i) Within the percentage so made applicable, to start with, the SERCs shall also reserve a minimum percentage for purchase of solar energy from the date of notification of this policy which shall be such that it reaches 8% of total consumption of energy, excluding Hydro Power, by March 2022 or as notified by the Central Government from time to time.

.....

(iii) It is desirable that purchase of energy from renewable sources of energy takes place more or less in the same proportion in different States. To achieve this objective in the current scenario of large availability of such resources only in certain parts of the country, an appropriate mechanism such as Renewable Energy Certificate (REC) would need to be promoted. Through such a mechanism, the renewable energy based generation companies can sell the electricity to local distribution licensee at the rates for conventional power and can recover the balance cost by selling certificates to other

distribution companies and obligated entities enabling the latter to meet their renewable power purchase obligations. The REC mechanism should also have a solar specific REC.

(iv) Appropriate Commission may also provide for a suitable regulatory framework for encouraging such other emerging renewable energy technologies by prescribing separate technology based REC multiplier(i.e granting higher or lower number of RECs to such emerging technologies for the same level of generation).Similarly, considering the change in prices of renewable energy technologies with passage of time, the Appropriate Commission may prescribe vintage based REC multiplier(i.e granting higher or lower number of RECs for the same level of generation based on year of commissioning of plant).

(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 Licensee 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.”

3.4 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.”

3.5 The preamble of the Electricity Act,2003 seeks to promote competition in the power sector. The National Electricity Policy 2005 also promotes procurement of energy from renewable energy sources and promotes purchase of renewable energy by the distribution companies through competitive bidding process. The National Electricity Policy and the Tariff Policy 2006 reconciled to the fact that it will take some time for the non conventional energy sources to compete with conventional sources of energy and hence recommended procurement from such sources by distribution companies at preferential tariffs to be determined by the Commissions. The Tariff Policy 2016 has reckoned that to keep the tariff low, states have to endeavour to procure power from renewable energy sources, except waste to energy plants, through competitive bidding and the Distribution licensee shall procure power from renewable energy sources from projects above the notified capacity, through competitive bidding process, from the date to be notified by the Central Government.

3.6 Commission’s regulations on Power procurement from new and renewable energy sources provides for determination of tariff by generic or specific order and to adopt a tariff if the tariff has been determined by a transparent process following guidelines issued by the Central Government.

3.7 The Central Electricity Regulatory Commission in its Regulations on Tariff determination for renewable energy sources issued on 17.4.2017 has not fixed any generic tariff for wind and solar power for the reason that setting generic tariff based on norms may not provide the right price signals. However, the Central Commission has set financial and operational norms that would serve as ceiling norms for determination of project specific tariff.

3.8 Government of India has issued guidelines for tariff based competitive bidding process for procurement of power from wind power projects vide resolution No.23/54/2017 –R&R dt.8.12.2017.

3.9 The tariff determined for wind energy in the last tariff order of 2016 dt.31.3.2016 was Rs.4.16 per unit without accelerated depreciation and Rs.3.70 per unit with accelerated depreciation. Compared to the prices discovered through competitive bidding process conducted by SECI and a few other states, this tariff is off the benchmark price. Reports broadly suggest reduction in prices of wind power turbines to an extent of 20% in the last two years. The recent auctions show that the developers have adopted combination of various factors that has brought down the per unit price of wind energy.

3.10 Though the Commission desires to do away with the mechanism of setting a feed in tariff for wind energy by allowing the Distribution licensee to procure the required quantum through competitive bidding route, in view of the various factors that have brought about a steep decline in prices of wind power,

Commission feels a new benchmark price may be required for the State that may come in handy to the distribution licensee in any emergent situation such as projects that have failed to commission within the control period of 31.3.2018.

4.0 Tariff methodology

4.1 Commission adopted the methodology of cost plus, single part, levelled tariff while determining the tariff for wind energy in Order No.3 of 2016 dt.31.3.2016. Commission proposes to adopt the same methodology in this tariff order also.

5.0 Tariff components

5.1 The Commission has carried out a detailed analysis of the existing policies/procedures and commercial mechanisms in respect of wind power generation. The tariff determined in a cost plus scenario, would depend significantly on the following operating and financial parameters:

1. Capital cost
2. Capacity Utilization Factor
3. Operation and Maintenance expenses
4. Insurance cost
5. Debt-Equity ratio
6. Term of Loan and Interest
7. Life of plant and machinery
8. Return on Equity

9. Depreciation rate applicable

10. Interest and Components of Working Capital

11. Discount factor

5.2 Capital cost

5.2.1 The cost of wind turbines have considerably reduced over the years from 2010. One of the reasons widely reported for lower tariffs of Rs.3.46 per unit and Rs.2.64 per unit in the auctions conducted by SECI is the significant reduction in the price of wind turbines with advanced technologies and discounts offered by the wind turbine manufacturers. The cost of wind turbine with tall wind towers and advanced technology have reportedly come down by 20%. In the year 2017, few State Electricity Regulatory Commissions (SERCs) who have issued tariff orders for wind power have adopted capital costs as follows:

Sl.No.	Order of State ERCs	Capital Cost per MW Rs. in Crores
1.	Andhra Pradesh ERC Order dt.30.3.2017 (valid upto 31 st March 2018)	5.8637
2.	Karnataka ERC Order dt.4.9.2017(control period upto 31 st March 2018)	6.20
3.	Rajasthan ERC Order dt.10.7.2017	5.25
4.	Maharashtra ERC Order dt.28.4.2017	5.9441

5.2.2 Commission adopted a capital cost of Rs.6.2 crores per MW in the wind tariff order of 2016. With the cost of the wind turbine that makes for 70% or more for a wind power project added with other costs for installation and considering the reduced prices of machinery, a capital cost of Rs.5.25 crores per MW is proposed.

5.3 Capacity Utilisation Factor(CUF)

5.3.1 The CUF considered by other SERCs are as follows:

Sl.No.	Order of State ERCs	CUF
1.	Andhra Pradesh ERC Order dt.30.3.2017	23.5%
2.	Karnataka ERC Order dt.4.9.2017	28%
3.	Rajasthan ERC Order dt.10.7.2017	21%
4.	Maharashtra ERC Order dt.28.4.2017	30%

5.3.2 With the increased performance of wind turbines, advancements in technology, Commission proposes a CUF of 29.15%.

5.4 Operation and maintenance cost

5.4.1 The operation and maintenance cost of other Commissions' orders:

Sl.No.	Order of State ERCs	O&M cost in Rs. Lakhs/MW
1.	Andhra Pradesh ERC Order dt.30.3.2017	9.58; escalated at 5.72% p.a

2.	Karnataka ERC Order dt.4.9.2017	10; escalated at 5.72% p.a
3.	Rajasthan ERC Order dt.10.7.2017	9.33; escalated at 5.85% p.a
4.	Maharashtra ERC Order dt.28.4.2017	9.53; escalated at 4.85% p.a

5.4.2 The Commission proposes to adopt an O&M expense of 1.1% on 85% of Capital investment (plant and machinery cost) and 0.22% on 15% of the Capital investment (land and civil works) with an escalation of 5% from second year onwards as adopted in Order No.3 of 2016.

5.5 Insurance

5.5.1 Commission proposes to adopt an insurance cost of 0.75% on the plant and machinery which is 85% of the Capital Cost for the first year and to reduce by 0.5% of previous years insurance cost every year as adopted in the Wind Order issued in 2016.

5.6 Debt and Equity

5.6.1 The Tariff Policy lays down a debt equity ratio of 70: 30 for power projects. The Commission proposes to adopt this ratio as specified in its Tariff Regulations 2005 and as adopted in the earlier Orders on new and renewable power.

5.7 Term of loan and Rate of interest

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

Sl.No.	Order of State ERCs	Term and rate of interest
1.	Andhra Pradesh ERC Order dt.30.3.2017	10 years;12.3%
2.	Karnataka ERC Order dt.4.9.2017	13 years;9.23%
3.	Rajasthan ERC Order dt.10.7.2017	12 years;12.3%
4.	Maharashtra ERC Order dt.28.4.2017	12 years;11%
5.	CERC in RE tariff regulation dt. 17.4.2017	13 years, 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

5.7.2 Commission proposes term of loan of 10 years plus one year moratorium as adopted in the previous orders of wind energy. The prevalent lending rate being the marginal cost of funds based lending rate at which the bank prices all its loans, Commission proposes to adopt the latest MCLR (Marginal Cost of funds based Lending Rate) of 1 year of 7.95% notified by the State Bank of India in February 2018 plus 200 basis points which is 9.95%.

5.8 Life of Plant and Machinery

5.8.1 Commission considers a life period of 25 years as in the earlier order for wind energy issued in 2016.

5.9 Return on Equity (RoE)

5.9.1 The Return on Equity considered by other SERCs:

Sl. No.	Order of State ERCs	Return on Equity
1.	Andhra Pradesh ERC Order dt.30.3.2017	16%
2.	Karnataka ERC Order dt.4.9.2017	14%
3.	Rajasthan ERC Order dt.10.7.2017	16%
4.	Maharashtra ERC Order dt.28.4.2017	1 st 10 years -20.34%;11 th year onwards 24.47%.
5.	CERC in RE tariff regulation dt. 17.4.2017	14% grossed up with prevailing MAT(20.26%) on 1 st of April of previous year

5.9.2 Commission proposes to adopt normative return on equity of 17.56% as adopted by CERC in its RE Regulations 2017 and its RE Tariff order for 2017-18 for the same.

5.10 Depreciation

5.10.1 The Depreciation considered by other ERCs:

Sl.No.	Order of State ERCs	Depreciation
1.	Andhra Pradesh ERC Order dt.30.3.2017	1 st 10 years - 7% p.a; Balance 1.33% p.a.
2.	Karnataka ERC Order dt.4.9.2017	1 st 13 years – 5.83% p.a; Balance spread over remaining years.
3.	Rajasthan ERC Order dt.10.7.2017	1 st 12 years - 5.83% p.a; Balance 1.54% p.a.

4.	Maharashtra ERC Order dt.28.4.2017	1 st 12 years - 5.83% p.a; Balance 1.54% p.a.
5.	CERC in RE tariff regulation dt. 17.4.2017	5.28% per annum for first 13 years; Balance spread over remaining useful life.

5.10.2 The Commission in its Orders on Wind, Bio-mass and Bagasse based energy issued during the year 2012, 2016 has depreciated the value of plant and machinery to 90% of the initial value for the life period using the straight line method. This translates into a rate of 3.6% per annum. The depreciation was calculated on 85% of the capital investment. The Commission proposes to adopt the same method in this Order for the life period of 25 years.

5.11 Interest and Components of Working Capital

5.11.1 The interest and components considered by other SERCs :

Sl.No.	Order of State ERCs	Interest and Components
1.	Andhra Pradesh ERC Order dt.30.3.2017	12.8%
2.	Karnataka ERC Order dt.4.9.2017	11.5%;receivables -2 months
3.	Rajasthan ERC Order dt.10.7.2017	11.8%;O&M – 1 month, maintenance spares-15%; receivables – 1.5 months
4.	Maharashtra ERC Order dt.28.4.2017	11%;O&M – 1 month, maintenance spares- 15%;receivables – 2 months
5.	CERC in RE tariff regulation dt.	O&M – 1 month,

	17.4.2017	maintenance spares-15%; receivables – 2 months. Normative interest rate of three hundred (300) basis points above the average State Bank of India MCLR (one year tenor) prevalent during the last available six months
--	-----------	--

5.11.2 Interest on working capital is proposed at 300 basis points above the average State Bank of India MCLR(one year tenor) at 10.95% and one month Operation and Maintenance cost and two months receivables as working capital components

5.12 Discount factor

5.12.1 A discount factor of 8.75% equal to the post tax weighted average cost of the capital on the basis of normative debt: equity ratio (70:30) is adopted for the purpose of levellised tariff computation.

6.0 Tariff Determinants

6.1 . The financial and operational parameters in respect of Wind Power projects proposed in the paper are tabulated below:

Tariff Components	Values
Capital cost	Rs. 5.25 Crores/MW

CUF	29.15%
Operation and maintenance expenses	1.1% on 85% of Capital investment and 0.22% on 15% of the Capital investment with an escalation of 5%
Insurance	0.75% on 85% of the Capital Cost for the first year and to be reduced by 0.5% every year
Debt-Equity ratio	70:30
Life of plant and machinery	25 years
Return on Equity	17.56%(pre-tax)
Term of Loan	10 years with 1 year moratorium period
Interest on loan	9.95%
Depreciation	3.6% p.a
Working Capital components	one month O&M cost and two months receivables
Interest on working capital	10.95%
Discount factor	8.75%

7.0 Wind Power Tariff

7.1 Wind power tariff is computed with reference to the determinants listed above. The tariff works out to Rs. 2.86 per unit without accelerated depreciation and Rs.2.80 per unit with Accelerated Depreciation(AD). The tariff rates of other SERCs are tabulated below:

Sl. No.	Order of State ERCs	Tariff per unit
1.	Andhra Pradesh ERC Order	Rs.4.76 without A.D ;

	dt.30.3.2017	Rs.4.35 with A.D
2.	Karnataka ERC Order dt.4.9.2017	Rs.3.74
3.	Rajasthan ERC Order dt.10.7.2017	Rs.5.26 without A.D ; Rs.4.87 with A.D
4.	Maharashtra ERC Order dt.28.4.2017	Rs.3.96 without A.D ; Rs.3.61 with A.D

8.0 Issues related to power purchase by Distribution licensee:

1. Quantum of power purchase by the Distribution licensee
2. CDM benefits
3. Billing and Payments
4. Energy Purchase Agreement
5. Control Period /Tariff Review Period

8.1 Quantum of power purchase by the Distribution licensee

8.1.1 The distribution licensee can purchase wind energy at the rate determined by the Commission from the WEGs to meet the Renewable Power purchase Obligations(RPO) requirement on “first come first served basis”. It is open to the Distribution licensee to procure the same through competitive bidding route following the guidelines of Government of India if it can realize a more competitive rate than the one determined by Commission’s order. For any procurement in excess of RPO, specific approval shall be obtained from the Commission.

8.2 CDM benefits

8.2.1 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.”

8.2.2 The Commission accepted the formula recommended by the Forum of Regulators in its earlier order. The Commission proposes to adopt the same formula. The distribution licensee shall account for the CDM receipts in the next ARR filing.

8.3 Billing and Payments

8.3.1 When a wind generator sells power to the distribution licensee, the generator shall raise the bill every month for the net energy sold after deducting the charges for power drawn from distribution licensee, reactive power charges etc. The distribution licensee shall make payment to the generator in 60 days of receipt of the bill. Any delayed payment beyond 60 days is liable for interest at the rate of 1% per month.

8.4 Energy Purchase Agreement (EPA)

8.4.1. The format for Energy Purchase Agreement (EPA) shall be evolved as specified in the Commission's "Power procurement from New and Renewable sources of energy Regulations 2008" and amended from time to time. The agreement shall be valid for 25 years or life of the plant specified in the respective tariff order. The distribution licensee shall execute the Energy Purchase Agreement or convey its decision in line with this order within a month of receipt of the proposal from the generator for selling his power. The agreement fees are governed by the Commission's Fees and Fines regulation.

8.5 Control Period /Tariff Review Period

8.5.1 Regulation 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.

8.5.2 The Commission proposes control period of two years from the date of issue of the final_order and tariff period is 25 years.

9.0 Issues related to open access:

1. Banking
2. Open access charges – Transmission and Wheeling, and Line losses
3. Cross subsidy surcharge

4. Reactive power charges
5. Grid availability charges
6. Energy Accounting and Billing Procedure
7. Energy wheeling agreement and fees
8. Security Deposit
9. Power factor disincentive
10. Metering
11. Connectivity and evacuation of power
12. Harmonics

9.1 Banking :

9.1.1 The evolution of banking of wind energy generated from the captive generating plants and the losses stated to have encountered by the distribution licensee on account of banking have been discussed in all of the tariff orders of wind energy issued by the Commission so far. The distribution licensee has been objecting to the provision of banking provided to the wind power which it says is extremely infirm compared to all other sources of renewable energy.

9.1.2 The erstwhile TNEB followed its rule of banking until 15.5.2006 the date of issue of the first tariff order for wind power by this Commission. In order to promote clean form of energy, promotional measures were considered. Initially the wind energy generator was allowed to adjust in two HT industrial services. A

banking charge of 2% was levied from March 1986. This was raised to 5% in March 2002. The banking period underwent changes many times from three months to one year, then to two years, again to three months etc.

9.1.3 Banking has always remained a bone of contention between the licensee and Wind Energy Generators(WEGs). In the consultative processes undertaken by the Commission before issue of every tariff order, the Distribution licensee has always requested to remove the facility of banking provided to the wind energy generators. The wind energy generators on the other hand had raised concerns on the investments made having banking provision in mind and cited principles of promissory estoppel.

9.1.4 In the order of 2012, the banking charges were fixed as the difference between the average power purchase cost through bilateral trading on all India basis taken for a period of two years and the maximum preferential tariff specified in the order which worked out to Rs.0.94 per kWhr. This order on banking charges was challenged by stakeholders before Hon'ble APTEL vide Appeal Nos.197, 198 of 2013 etc. and APTEL remanded the issue to the Commission.

9.1.5 While disposing the remanded case in R.A No.6 of 2013 dt.31.3.2016, Commission observed that it is time that the promotional concessions are

gradually withdrawn and however fixed the banking charges at 10% in kind. In the order No. 3 of 2016, Commission fixed the banking charges at 12% in kind.

9.1.6 Appeals have been filed against the Order No. 3 of 2016 and the remanded case in R.A No.6 of 2013 by the distribution licensee as well as the wind generators and captive users before the Hon'ble Appellate Tribunal of Electricity. Appeals have also been filed against the order of APTEL in Appeal Nos. 197,198 of 2013 etc. dt.24.5.2013, by the Distribution licensee and wind energy generators before the Hon'ble Supreme Court of India. Licensee had filed petitions before the Commission praying for change in banking period from April to March to January to December to all wind generators commissioned prior to 31.10.2016 and to dispense with banking facility for all new WEGs commissioned from 01.11.2016. Before the Hon'ble APTEL, the licensee has sought to dispense with the provision of banking of wind energy for all WEGs irrespective of date of commissioning and for future projects as well. All these litigations are pending before the respective courts.

9.1.7 TANGEDCO has often stated that banking is detrimental to the finances of the utility. 70% of the installed capacity of wind is for captive consumption. In their various petitions filed before the Commission and APTEL, TANGEDCO has stated that banking has caused heavy losses due to power purchase cost in non wind season and additional expenditure in the form of integration cost in the

process of accommodating wind energy by backing down and surrendering power.

9.1.8 The wind energy developers have been contending that banking is a necessary provision to be continued and there is no financial loss to the licensee.

9.1.9 Number of developments have taken place in the recent years. The State has attained a power surplus situation. Restriction and control measures on supply of electricity have been lifted and the G.O issued by the Government of Tamil Nadu invoking section 11 of the Electricity Act,2003 with directions to all generators to supply power within the State has been rescinded. The rise in captive installations is a cause of concern with respect to the facility of banking of energy.

9.1.10 Commission proposes that the captive wind power plants shall restrict the installation capacity such that there is no excess generation beyond the annual average consumption, say taken for two or three years.

9.1.11 Banking provisions in other renewable rich States :

Name of State ERC	Banking provisions
Andhra Pradesh ERC	Banking period – 12 months from April to March; Drawal of banked energy not permitted during from 1 st April to 30 th June and from 1 st February to 31 st March. In addition, drawal of banked energy during ToD period not

	<p>permitted throughout the year.</p> <p>Energy banked between the period from 1st April and 31st January of each financial year and remains unutilized shall be purchased at 50% of pooled cost of power purchase. Energy credited during the month of February and March carried forward to April of next financial year.</p> <p>Banking charges - 2% in kind.</p>
Gujarat ERC	<p>Banking facility of one month; Excess generation shall be set off in one billing cycle in proportion to generation in peak and normal hours.</p> <p>No Banking for third party.</p> <p>Banking charges – 2% in kind.</p> <p>Surplus power after set off to be purchased by Distribution licensee at Average Pooled power Purchase Cost (APPC).</p>
Maharashtra ERC	<p>Banking - 12 months from April to March;</p> <p>Credit for banked energy not permitted during April, May, October and November.</p> <p>Energy banked during peak TOD slots may also be drawn during off-peak TOD slots, but the energy banked during off-peak TOD slots may not be drawn during peak TOD slots.</p> <p>Banking charges – 2%.</p> <p>Unutilised banked energy of 10% to be purchased at Pooled cost of power purchase.</p>
Rajasthan ERC	<p>Banking – monthly basis; RE generator has to say on the first of every month the quantum of energy it wishes to bank; Banked energy in a month shall not exceed</p>

	quantum of energy injected in the grid; If energy injected is less than that indicated, banked energy will be restricted to energy injected.10% of unutilized banked energy at the end of the month shall be entitled for payment at 60% of large industrial power tariff excluding fuel surcharge. Unutilized banked energy, in excess of 10% shall lapse.
Karnataka ERC	Banking – annual; Banking charges – 2% in kind; Unutilised banked energy purchased at 85% of generic tariff.

9.1.12 It is seen that the renewable energy rich States have all placed huge restrictions in the facility of banking of wind energy compared to the banking mechanism in this State. With a huge capacity of 7900 MW in the State and 70% of the capacity under captive generation i.e 5500 MW which is higher than the installed capacity of any other state, the distribution licensee may find it difficult to provide banking for all captive users in the State.

9.1.13 In view of the various developments as discussed, the Commission is of the view that the issue of Banking needs to be reviewed. Commission proposes the following alternatives and invites comments/suggestions substantiating reasons for the same:

- i) To dispense the facility of banking of wind energy but with deemed purchase of excess generation.

(OR)

- ii) Banking facility of one month with time block wise adjustments on implementation of DSM regulations and purchase of unutilized energy at the end of each month.

(OR)

- iii) Banking facility for 12 months from January to December with time block wise adjustments on implementation of DSM regulations and banking charges of 14% in kind and purchase of unutilized energy at the end of the year.

(OR)

- iv) Banking facility for 12 months from April to March with time block wise adjustments on implementation of DSM regulations and banking charges of 14% in kind and purchase of unutilized energy at the end of the year.

For all the four options above, the purchase of excess generation/ unutilized banked energy shall be at 75% of respective wind energy tariffs for normal wind energy captive users and 75% of Pooled cost of power purchase as notified in the orders of the Commission from time to time for captive generators under REC scheme.

9.1.14 There shall be no facility of banking of energy for third party power purchase.

9.2 Transmission, wheeling charges & scheduling and system operation charges :

9.2.1 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 2012 and 2016 fixed 40% of the charges applicable for conventional power for wind energy.

9.2.2 Wind power has adequately been promoted and the tariffs lower than that of conventional power plants. The concessions granted are being subsidized by other users of the network and ultimately borne by the consumers.

9.2.3 In the case of 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.

9.2.4 Wind energy is in a position to compete with conventional power sources and thus can be treated in the manner related to conventional power. Commission proposes the transmission, wheeling and scheduling and system

operation charges at 50% of that applicable for conventional power as notified by the Commission from time to time. In respect of the WEGs availing Renewable Energy Certificates (REC), 100% of the respective charges as specified in the relevant orders shall apply.

9.2.5 Line losses :

The generators shall bear the actual line losses in kind as specified in the respective orders of the Commission issued from time to time.

9.3 Cross subsidy surcharge

9.3.1 The Commission in its tariff orders related to different renewable power, has ordered to levy 50% of the cross subsidy surcharge for third party open access consumers. Wind energy being in a position to compete with conventional power sources, Commission proposes levy of 60% of cross subsidy surcharge of that applicable to conventional power.

9.4 Reactive Power Charges

9.4.1 Due to inherent characteristics, the induction type wind energy generators are prone to draw reactive power from the grid, if adequate power factor correction is not applied. During the wind season, wind energy generators contribute around 25% of the grid demand and in such a situation grid stability will be jeopardized, if the wind energy generators are allowed to draw considerable reactive power from the grid. Therefore, the Commission proposes

to retain the charges fixed in Order No.3 dated 31-03-2016 i.e 25 paise per kVARh will be levied on wind energy generators, who draw reactive power up to 10% of the net active energy generated. Anyone drawing in excess of 10% of the net active energy generated will be liable to pay double the charge.

9.5 Grid Availability Charges

9.5.1 Start up power

9.5.1.1 Due to its infirm nature of the wind, stoppage of wind energy generation and frequent start up of WEGs are common in the wind energy sector. Therefore the drawal of energy by the wind generators during the start up from the distribution licensee shall be adjusted against the generated energy.

9.5.2 Stand by charges

9.5.2.1 If adequate generation does not materialize or if drawal by the captive/ third party consumer exceeds generation, the energy charges and demand charges at the user end shall be regulated as per the Tamil Nadu Electricity Regulatory Commission Grid Connectivity and Intra-State Open Access Regulations,2014 and Commission's Regulation /Order/ on Deviation Settlement Mechanism(DSM) and other relevant orders as may be applicable.

9.6 Energy Accounting and Billing Procedure

9.6.1 The energy accounting shall be regulated by the Commission's Regulations / Order on open access, Deviation Settlement Mechanism(DSM). Till such time the DSM is implemented in the State, if a renewable energy generator utilizes 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 billing period for the net energy supplied. The licensee shall record the slot wise generation and consumption during the billing period. Slot-wise adjustment shall be made for the billing period. Peak hour generation can be adjusted to normal hour or off peak hour consumption of billing period. Normal hour generation can be adjusted to off peak hour consumption of the billing period. Excess consumption will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply.

9.6.2 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.

9.6.3 The excess generation/unutilized energy may be sold at the rate of 75% of respective wind energy tariffs for normal wind energy captive users and 75%

of Pooled cost of power purchase as notified in the orders of the Commission from time to time for captive generators under REC scheme.

9.7 Energy Wheeling Agreement and fees

9.7.1 The format for Energy Wheeling Agreement, application and agreement fees, procedure and terms & conditions are governed by Commission's following regulations in force.

- (1) Tamil Nadu Electricity Regulatory Commission Grid Connectivity and Intra-State Open Access Regulations, 2014.
- (2) Power procurement from New and Renewable sources of energy Regulations 2008.

9.8 Security deposit

9.8.1 As regards the security deposit to be paid by captive /third party user, the Commission proposes to retain the present arrangements i.e. charges corresponding to 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.

9.9 Power Factor disincentive

9.9.1 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.

9. 10. Metering

9.10.1 The Commission proposes that metering and communication shall be in accordance with the following regulations in force:

- (1) Central Electricity Authority (Installation and Operation of Meters) Regulations
- (2) Tamil Nadu Electricity Distribution and Supply Codes
- (3) Tamil Nadu Electricity Grid Code
- (4) Tamil Nadu Electricity Regulatory Commission Grid Connectivity and Intra-State Open Access Regulations, 2014.

9.11 Connectivity and Evacuation of power

9.11.1 The connectivity and power evacuation system shall be provided as per the Act / Codes/ Regulations/orders in force.

9.12 Harmonics

9.12.1 The WEGs 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 WEGs 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 15 days notice period shall be given for payment of compensation charges.

10.0. Applicability of the proposed order

10.1 This Order shall come into force on expiry of the control period of order No.3 of 2016 dt.31.3.2016. The tariff proposed to be fixed shall be applicable for purchase of wind energy by the Distribution Licensee from wind energy generators(WEGs) conforming to this order commissioned during the control period of the order. The open access charges and other terms and conditions specified in this order shall be applicable to all the wind energy generators, irrespective of their date of commissioning.

(By order of Tamil Nadu Electricity Regulatory Commission)

(S.Chinnarajalu)
Secretary
Tamil Nadu Electricity Regulatory Commission

Tariff Details-- Wind

2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700	2765700
1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500	1606500
318325	316733	315149	313574	312006	310446	308894	307349	305812	304283	302762	301248	299742	298243	296752
365663														
827804	869194	912654	958287	1006201	1056511	1109337	1164804	1223044	1284196	1348406	1415826	1486617	1560948	1638996
117073	111400	112583	113826	115133	116507	117951	119469	121064	122741	124503	126355	128301	130345	132494
6001065	5669528	5712586	5757886	5805540	5855664	5908381	5963821	6022120	6083420	6147871	6215629	6286860	6361737	6440442
2.350	2.220	2.237	2.255	2.274	2.293	2.314	2.336	2.358	2.382	2.408	2.434	2.462	2.491	2.522
68984	72433	76055	79857	83850	88043	92445	97067	101920	107016	112367	117986	123885	130079	136583
1000177	944921	952098	959648	967590	975944	984730	993970	1003687	1013903	1024645	1035938	1047810	1060289	1073407
1069161	1017354	1028152	1039505	1051440	1063987	1077175	1091037	1105607	1120920	1137012	1153924	1171695	1190368	1209990
117073	111400	112583	113826	115133	116507	117951	119469	121064	122741	124503	126355	128301	130345	132494
0.43	0.40	0.37	0.34	0.31	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15	0.13
1.02	0.88	0.82	0.76	0.70	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.34

11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	2.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2772000	2772000	2772000	2772000	2772000	2772000	2772000	1512000	0	0	0	0	0	0	0
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2772000	-2772000	-2772000	-2772000	-2772000	-2772000	-2772000	-1512000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-959389	-959389	-959389	-959389	-959389	-959389	-959389	-523303	0	0	0	0	0	0	0
0.43	0.40	0.37	0.34	0.31	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15	0.13
0.45	0.41	0.38	0.35	0.32	0.30	0.27	0.25	0.23	0.21	0.19	0.18	0.16	0.15	0.14
2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540	2553540
1151984.13	1059295.75	974065.06	895692.01	823624.84	757356.17	696419.47	640385.72	588860.43	541480.86	497913.43	457851.43	421012.81	387138.22	355989.16
-432811	-397987	-365965	-336520	-309444	-284546	-261651	-131236	0	0	0	0	0	0	0