TAMIL NADU ELECTRICITY REGULATORY COMMISSION

Comprehensive Tariff Order on WIND ENERGY

Order No 3 of 2016 dated 31 -03- 2016

BEFORE THE TAMIL NADU ELECTRICITY REGULATORY COMMISSION

PRESENT: **Thiru.S. Akshaya Kumar - Chairman**
Thiru. G.Rajagopal - Member
Dr.T.Prabhakara Rao - Member

Order No. 3 /2016, dated 31-03-2016

In the matter of : a comprehensive tariff order on wind energy

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In exercise of the powers conferred by Sections 181, 61 (h), 62 and 86 (1) (e) of the Electricity Act 2003, (Act 36 of 2003), read with the National Electricity Policy, the Tariff Policy and Commission's Power Procurement from New and Renewable Energy Sources Regulations, 2008, the Commission, after issuing a consultative paper for public view on "Comprehensive Tariff Order on Wind Energy" inviting comments from stakeholders and after examining the comments of all stakeholders, after consulting the State Advisory Committee (SAC) on 17/3/2016 and on consideration of the views of the stakeholders and the SAC Members on the Consultative Paper, passes this suo motu Comprehensive Tariff Order on Wind Energy.

This order shall take effect on and from the 1st of April, 2016.

Sd./-	Sd./-	Sd./-
(T.Prabhakara Rao)	(G.Rajagopal)	(S.Akshaya Kumar)
Member	Member	Chairman

(By Order of the Commission)

Sd./-
(S.Chinnarajalu)
Secretary

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TAMIL NADU ELECTRICITY REGULATORY COMMISSION

"Comprehensive Tariff Order on Wind Energy"

1. Introduction

1.1 Wind power in the State of Tamil Nadu is one of the largest sources of renewable energy, the State being bestowed with rich wind resource. Contribution from Wind energy to the State has grown over the years from 1996. The Commission issued various tariff orders on wind energy in accordance with section 61 and 86(1)(e) of the Electricity Act,2003 from the year 2006. The Commission's "Comprehensive tariff order on wind energy" was last issued on 31.7.2012.

1.2. Commission's regulation on Power Procurement from New and Renewable Energy Sources

1.2.1 In exercise of the powers under section 61 of the Electricity Act,2003 (Central Act 36 of 2003) which stipulate that the State Electricity Regulatory Commission shall specify the terms and conditions for the determination of tariff, the Commission notified the "Power Procurement from New and Renewable Sources of Energy Regulations 2008" on 08-02-2008. The regulations specify that the tariff determined by the Commission shall be applicable for a period as specified by the Commission in the tariff order and that the control period shall ordinarily be two years.

1.3. Commission's earlier orders on wind energy

1.3.1 The Commission issued Order No. 3 of 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" on 15-05-2006. The said Order stipulated tariff rates for power procurement by

Distribution Licensees from Wind Energy Generators, Biomass based generators and Bagasse based co-generators. This was the first Order issued by the Commission on NCES based power plants.

1.3.2 The Commission issued its first composite tariff order on wind energy vide Order No.1 of 2009 dated 20-03-2009. This was the second order issued by the Commission for wind energy generators. The third tariff order on wind energy was issued by the Commission vide Order No.6 of 2012 dated 31.7.2012.

1.4. Commission's initiative on issue of the next tariff order for wind energy

1.4.1 The Commission's "comprehensive tariff order on wind energy" issued on 31.7.2012 adopted a control period of two years. The Commission's order dt.31.7.2012 was challenged by a few stakeholders before the Hon'ble Appellate Tribunal for Electricity(ATE) vide Appeal Nos.197 of 2012 and others. The ATE in the order dt.24.5.2013 in the said Appeal remanded specific issues, viz. annual maintenance contract charges and insurance charges, plant load factor/capacity utilization factor, time value of money, abnormal rise of banking charges, deemed demand charges, encashment of lapsed units by REC captive users, to the State Commission with directions to hear the parties and pass orders.

1.4.2 The remanded issues were taken on file of the Commission for hearing of the cases. Meanwhile, against the order dt.24.5.2013 of ATE in Appeal Nos.197 of 2012 etc., TANGEDCO filed an appeal before the Supreme Court of India. Another stakeholder, M/s. Tamil Nadu Spinning Mills Association also filed an appeal before the Apex Court, against the order dt.24.5.2013 of ATE.

1.4.3 The validity of the order No.6 of 2012, dt.31.7.2012 was extended upto the date of issue of the next 'comprehensive tariff order on wind energy'.

1.4.4 Regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008 says,

"(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."

1.4.5 The Commission initiated the process for issue of the next tariff order by floating a consultative paper on issue of "comprehensive tariff order on wind energy" on 25.9.2014, inviting comments/suggestions from stakeholders, on various parameters related to determination of wind energy tariff and on other issues related to power purchase by the distribution licensee and open access. While issuing the consultative paper the Commission intended to issue the order as an independent order. Many of the stakeholders expressed views that the remanded matters by ATE be resolved before issue of the next tariff order. Few stakeholders pointed out that some of the matters remanded by ATE are under review before the Hon'ble Supreme Court of India and the matter is sub judice. The Civil appeals filed before the Supreme Court of India have been heard and no stay order has been granted by the Apex court on the orders of the ATE. The remanded issues have since been heard and orders issued by the Commission which are subject to the outcome of the appeals before the Apex Court.

1.4.6 The Electricity Act, 2003, National Electricity Policy and Tariff Policy encourages generation from renewable energy sources that are sustainable than conventional sources. In order to converge on the tariff determination process and connected issues, a meeting of the State Advisory Committee was held on 17.3.2016 and the issues discussed.

1.4.7 The abstract of the comments received from the stakeholders are placed at Annexure I. The views expressed by the members of the State Advisory Committee are placed at Annexure II.

1.4.8 The Commission issues this order, the fourth, on wind energy, taking into account the decisions of the Commission on the remanded issues, the views of stakeholders, views of the State Advisory Committee(SAC) and after due deliberations on all issues related to the order.

2. Legal provisions

2.1. Related Provisions of the Electricity Act, 2003

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;"

2.2. Related Provisions of National Electricity Policy

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."

2.3. Related Provisions of Tariff Policy:

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. Power position in Tamil Nadu

3.1 The generating capacity connected to the Tamil Nadu's grid including the allocation from Central Generating stations is 13883.5 MW as on 29.2.2016 comprising of 4,660 MW from TANGEDCO's four thermal stations, 516 MW from four gas turbine stations, 2288 MW from hydro stations, 852.5 MW from private generating stations, 68 MW as contribution to Tamil Nadu grid by sale of electricity from captive generating and biomass plants, 5464 MW as Tamil Nadu's share from central generating stations and 35 MW as external assistance.

3.2 Generating capacity from privately owned wind farms is 7512 MW as on 29.2.2016. The installed capacity of cogeneration plants is 659.4 MW and biomass power projects is 230 MW. The solar generation capacity is 581.26 MW.

3.3 The present demand in the State is around 13700 MW. The expected peak may vary from 14200 MW to 14800 MW. The peak power requirement is increasing at the rate of around 8% annually in the State. Therefore, any capacity addition at this time will help the State to a great extent.

4. Wind Power Scenario

4.1 Total installed capacity of power generation in the country is 2,88,664.97 MW as on 29-02-2016. The contribution of power from renewable energy sources to the country is around 38821.51 MW. As on 29-02-2016, the installed capacity of wind power in Tamil Nadu is 7,512 MW which is more than 50% of the power from other sources in the state. The installed capacity of wind power in different States as on 31-05-2015 is furnished below:

State	Installed Capacity (MW)	Percentage to the total installed capacity
Andhra Pradesh	1038.15	4.44%
Gujarat	3542.56	15.14%
Karnataka	2639.55	11.28%
Kerala	35.2	0.15%
Madhya Pradesh	876.69	3.75%
Maharashtra	4437.9	18.97%
Rajasthan	3308.22	14.14%
Tamil Nadu	*7512	32.11%
Others	4.3	0.02%
TOTAL	**23394.57**	100%

Source: *NIWE data available as on 31.5.2015*

** The wind energy installed capacity in Tamil Nadu as furnished by TANGEDCO.*

5. Applicability of this order

5.1 This Order shall come into force from 01-04-2016. The tariff as approved in this order is applicable for purchase of wind energy by the Distribution Licensee from wind energy generators(WEGs) conforming to this order commissioned during the control period. 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.

6. Tariff / Pricing Methodology

6.1 Tariff / Pricing Methodology specified in Regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008, which the Commission has followed, is reproduced below:

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

(a) Central 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."

6.2. Project specific or Generalized Tariff

6.2.1. A generalized tariff mechanism would provide incentive to the investors for use of most efficient equipment to maximize returns and for selecting the suitable site while a project-specific tariff would provide each investor, irrespective of the machine type, the stipulated return on equity which, in effect, would shield the

investor from the uncertainties involved. This order mainly provides for power purchase by distribution licensees for their Renewable Purchase Obligation (RPO) compliance as specified in the Commission's Regulations. The wind mills in the State have mostly adopted similar technology with minor modifications. Hence, the Commission decides to issue a generalized tariff order for wind energy projects.

6.3. Preferential Tariff vs. Bidding

6.3.1 The Tariff Policy, 2016 stipulates as follows:

"Para 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 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"

6.3.2 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 on appeal No. 129 of 2005 on the subject of competitive bidding for procurement of power from 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.

6.3.3 In line with the Tariff Policy, the Commission decides to fix the tariff as per the provisions under section 62 of the Electricity Act,2003.

6.4. Single Part Tariff vs. Two Part Tariff

Two-part tariff is generally adopted when the variable component is significant.

In the case of wind energy generation, wind being the motive force, variable generation cost is nil. Variations in operation, maintenance and insurance cost could be taken care of by adopting suitable parameters. Therefore, the Commission proposes to continue with the single-part tariff for wind energy generation in accordance with Clause 4.6 of Power Procurement from New and Renewable Energy Sources Regulations 2008.

6.5. Cost plus, single part, levelised tariff

6.5.1 The Commission's earlier orders have adopted "cost plus single part average tariff". Tariff order No.3 dated 15-05-2006 was challenged by Wind Power Producers Association before the Hon'ble Appellate Tribunal for Electricity (ATE). The ATE in its order dated 18-12-2007 on the appeal Nos. 205/2006 and 235/2006 directed the Commission to re-determine the tariff for wind power producers by taking into consideration the time value of money. The order of the ATE was challenged by the erstwhile TNEB and the Commission before the Hon'ble Supreme Court and the Hon'ble Supreme Court had granted stay on ATE's order in its order dated 03-03-2008.

6.5.2 The Commission issued an amendment to sub-regulation 6 of regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulations,2008 on 27.4.2009 that enabled the Commission to adopt appropriate tariff methodology for the renewable energy sources based generators. The ATE in the order dt.24.5.2013 in the Appeal Nos.197 of 2012 and others, has observed that the stay of the judgment by the Tribunal granted by the Hon'ble Supreme Court of India cannot be an impediment in the light of the amended regulations framed later for considering the time value of money for determining the tariff of wind energy generators. CERC and many of the other State Commissions have adopted the method of levelised tariff for wind energy. The Government of India has reintroduced the accelerated depreciation

benefit for wind power from 1st April,2014. The wind energy generators have the option to avail accelerated depreciation benefits. The Commission decides to adopt the methodology of cost plus, single part, levelised tariff.

7. Tariff Components

7.1 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 Investment
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

7.2. Capital Investment

7.2.1. The estimates of capital investment show wide variation. The capital cost as reported by the National Institute of Wind Energy (NIWE), Government of India, in their website ranges from Rs.4.5 crores to Rs.6.5 crores per MW, the cost depending upon the type of turbine, technology, size and location of wind electric generator. In 'reply to the investors' query in the website, Indian Renewable Energy Agency Limited(IREDA), a Government of India enterprise under the Ministry of New and Renewable Energy, indicated the capital cost as ranging from Rs.6.5 crores to Rs.7.5 crores per MW. The Southern India Mills

Association have suggested a capital cost of Rs.7 crores per MW. Thiru Ramesh Kymal, President, Confederation of Indian Industry, member of the SAC, has stated that the potential of present wind sites are with a CUF of 25% and to capture the wind at such potentials, technically advanced machines are required which raises the capital cost and that the entire project inclusive of land, grid connectivity etc. would cost Rs.7 crores/MW.

7.2.2 Commission, in the consultative paper proposed a cost of Rs.6.04 crores/MW. Many of the stakeholders concurred with the Commission's proposal in the consultative paper. TANGEDCO also concurred with the proposal of the Commission. The CERC in its order dated 31-03-2015 has fixed a Capital cost of Rs. 6.195 crores/MW in respect of Wind Energy Projects. The wind turbines exhibit economies of scale in terms of declining investment costs per kW with increase in turbine capacity. It is also noted that in view of the global economic slow down, prices for capital equipments are steeply falling. The Commission decides to consider a capital cost of Rs.6.2 crores per MW.

7.2.3 Based on the recommendation of MNRE, Commission in its tariff orders No.1 of 2009 and No.6 of 2012, considered 85% of the capital cost as attributable to machinery cost,10% for civil works and 5% for land cost. Commission decides to adopt the same percentage in this order also.

7.3. Capacity Utilization Factor (CUF)

7.3.1 Indian Wind Power Association has objected to the retention of CUF citing ATE's direction on the matter for augmentation of the transmission and distribution system in the Appeal No.197 of 2012 dt.24.5.2013. Other stakeholders have sought for a CUF ranging from 18.02% to 25%. TANGEDCO and TANTRANSCO have taken necessary steps to augment the transmission and distribution system. Appropriate directions in this regard have been issued to

the licensees in the R.A No.6 of 2013 wherein the remanded issues by ATE in the above said appeal were taken up and disposed on 31.3.2016. The wind power density of Tamil Nadu published by TEDA shows wind power densities higher than 250W/m^2 fairly in larger areas at 30 m height. The National Institute of Wind Energy has estimated the potential of wind energy in Tamil Nadu at 80m hub height as 14152 MW. Manufacturers have come up with high efficiency low wind speed turbine models with increased hub heights so as to achieve higher generation levels. Commission considers that it shall enable investors to select suitable unexploited sites and use the high efficiency technology and derive maximum benefits.

7.3.2 Therefore, Commission decides not to alter the CUF proposed in the consultative paper and to retain the present CUF of 27.15% for the new machines also for this control period.

7.4. Operation and Maintenance Cost (O&M Cost)

7.4.1 Commission in its order No. 1 of 2009 dated 20-03-2009 and order No.6 of 2012 dt.31.7.2012 adopted per annum O&M expenses of 1.1% on 85% of the capital investment and 0.22% on 15% of the capital investment and escalation factor of 5% from second year onwards. The 85% of the capital cost refers to the plant and machinery cost and 15% refers to the land and civil works. Commission decides to adopt the same in this order also.

7.4.2. Some stakeholders have requested to adopt the rate of CERC and a few of them have sought to consider 3% of capital cost towards O&M expenses. The CERC in its order dated 31-03-2015 has adopted a cost of Rs.10.63 Lakhs/MW with escalation of 5.72% per annum. The Commission decides to adopt an O&M expense of 1.1% on 85% of Capital investment and 0.22% on

15% of the Capital investment with an escalation of 5% from second year onwards in this order as adopted in the Wind Order issued in 2009.

7.5. Insurance cost

7.5.1 Commission in the order No.1 of 2009 dt.20.3.2009 allowed insurance charges of 0.75% of cost of plant and machinery i.e. on 85% of capital cost, for the first year to be reduced by half a per cent of previous year's insurance cost every year thereafter. In the order No.6 of 2012 dt.31.7.2012, the insurance expenditure was clubbed with O&M cost.

7.5.2 The Commission decides to adopt in this order 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 2009.

7.6. Debt - Equity ratio

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

7.7. Term of the Loan

7.7.1 The stakeholders have not disputed on the term of loan proposed in the consultative paper. The Commission decides to adopt the term as 10 years with 1 year moratorium as adopted by the Commission in its previous orders on Wind, Bagasse and Bio-mass power.

7.8. Rate of Interest

7.8.1 The Commission in the consultative paper proposed to adopt an interest rate of 12.70 % for a loan period of 10 years. The CERC adopted an interest rate of 12.7% in its order for determination of generic tariff for renewable energy, 2014-15. The Indian Wind Energy Association has suggested to adopt the interest rates as adopted by CERC. The Indian Wind Power Association has requested to consider a rate of 13% that is offered by financial institutions. The Southern India Mills Association has accepted the rates adopted by the Commission in the consultative paper. The CMD/TANGEDCO in the SAC meeting stated to consider an interest rate of 12% though the same itself is higher.

7.8.2 The CERC has adopted an interest rate of 13% per annum in the order for determination of generic tariff for renewable sources of energy for 2015-16. The Commission decides to adopt the interest rate of 13% per annum.

7.9. Life of Plant and Machinery

7.9.1 Many of the stakeholders have requested to consider a life period of 20 years. The Commission had adopted a life period of 20 years in the last tariff order. CERC, GERC, RERC and MERC have adopted a life period of 25 years for the wind power projects. The Commission considers a life period of 25 years for this order.

7.10. Return on Equity (RoE)

7.10.1 Many stakeholders have expressed views to consider return on equity in line with CERC RE tariff order. CERC in the RE tariff order dt.31.3.2015 has considered normative return on equity at 20% per annum for the first 10 years and at 24% per annum from the 11^{th} year.

7.10.2 The Tariff Regulations of the Commission stipulates 14% post tax RoE for conventional fuel based generating stations. The Commission in its orders issued in 2012 related to determination of tariff for renewable sources of energy adopted RoE of 19.85% pre tax without linking it to MAT and IT. In the order issued for determination of Solar power during 2014 and 2016, Commission has considered RoE of 20% pre tax without linking it to MAT and IT. The Commission decides to adopt a RoE of 20% (pre tax) per annum for WEGs without linking it to MAT and IT.

7.11. Depreciation

7.11.1 Some of the stakeholders have sought for a higher depreciation for the initial period of 10 to 12 years of the order of 5.83 % to 7 % and a few others have requested to follow the order of CERC.

7.11.2 The Commission in its Orders on Wind, Bio-mass and Bagasse based energy issued during the year 2012 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 decides to adopt the same method in this Order for the life period of 25 years.

7.12. Interest and Components of Working Capital

7.12.1 CERC has adopted Operation & Maintenance expenses for one month, Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF and Maintenance spare @ 15% of operation and maintenance expenses in their latest order for 2015-16 with an interest on working capital at the rate of 13.50%.

7.12.2 Some of the stakeholders have suggested to adopt rate of interest and components of working capital as that of CERC.TANGEDCO has suggested to fix an interest rate of 12.5%. Thiru Ramesh Kymal, member of the SAC committee suggested to retain the interest rate at 13.5% stating that the interest rates are really not coming down.

7.12.3 The Commission decides to consider one month Operation & Maintenance cost and two months Receivables as working capital components and an interest rate of 13.50% for the working capital.

7.13. Tariff Determinants

7.13.1 The financial and operational parameters considered in respect of Wind Power projects in this order are tabulated below:

Tariff Components	Values
Capital cost	Rs. 6.2 Crores/MW
CUF	27.15%
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
Life of plant and machinery	25 years
Term of Loan	10 years with 1 year moratorium period
Interest on loan	13.00%
Working Capital components	one month O&M cost and two months receivables
Interest on working capital	13.50%
Return on equity	20% (pre-tax) per annum without linking it to MAT and IT

Debt-equity ratio	70:30
Depreciation rate	3.60% per annum
Discount factor	10.21%

8. Wind Power Tariff

8.1 Wind power tariff is computed adopting the values of the determinants above. The levelised tariff works out to Rs.4.16 per unit without Accelerated Depreciation(A.D) benefit. The accelerated depreciation component of the tariff is Rs.0.46 per unit. The tariff for the WEGs availing AD benefit will be the tariff arrived at after deduction of AD benefit from the tariff as determined above. The working sheet is enclosed as ANNEXURE III.

9. Other issues related to power purchase by distribution licensee from WEGs.

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

9.1. Quantum of wind energy purchase by the distribution licensee

9.1.1 The distribution licensee can purchase wind power at the rate determined by the Commission from WEGs for their RPO requirement. For any procurement in excess of RPO, specific approval shall be obtained from the Commission.

9.2. CDM Benefits

9.2.1 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."

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

9.3. Billing and payment

9.3.1 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.

9.4. Energy Purchase Agreement (EPA)

9.4.1 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 as 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 power. The agreement fees are governed by the Commission's Fees and Fines regulation.

9.5. Control Period / Tariff Review Period

9.5.1 Regulation 6 of the Power Procurement from New and Renewable Sources of Energy Regulations, 2008 of the Commission specifies the following:

"The tariff as determined by the Commission shall remain in force for such period as specified by the Commission in such tariff orders and the control period may ordinarily be two years."

Hence, the Commission decides that the control period of this order shall be for two years from the date of issue of this order and tariff period shall be 25 years.

10. Issues related to open access

1. Open Access charges and Line Losses
2. Cross subsidy surcharge
3. Reactive power charges
4. Grid availability charges
5. Energy Accounting and Billing Procedure
6. Energy Wheeling Agreement and Fees
7. Security Deposit
8. Power Factor Disincentive
9. Metering
10. Connectivity and power evacuation.
11. Banking period and Charges
12. Deemed demand charges
13. Lapsed energy by REC captive users
14. Harmonics

10.1. Open Access charges and Line Losses

10.1.1 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, the Commission decides to adopt 40% in each of the transmission, wheeling and scheduling and system operation charges as applicable to the conventional power to the wind power. Apart from these charges, the WEGs shall have to bear the actual line losses in kind as specified in the respective orders of the Commission issued from time to time.

10.2. Cross subsidy surcharge

10.2.1 The Commission in its other tariff orders related to different renewable sources of energy, has ordered to levy 50% of the cross subsidy surcharge for third party open access consumers. The Commission decides to adopt the same for wind energy generators also.

10.3. Reactive Power Charges

10.3.1 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 decides to retain the charges proposed in Order No.6 dated 31-07-2012. Thus, 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.

10.4. Grid Availability Charges

10.4.1 Start up power

10.4.1.1 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.

10.4.2 Stand by charges

10.4.2.1. 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 Order on ABT and other relevant orders.

10.5. Energy Accounting and Billing Procedure

10.5.1 The energy accounting shall be regulated by the Commission's Regulations / Order on open access, Order on ABT. Till such time the ABT is implemented in the State, if a wind 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 should 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 and normal hour generation can be adjusted to off peak hour consumption. Adjustment of off peak hour generation to normal/peak hours and normal hour

generation to peak hour is not permissible. Excess consumption will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply. After the banking period, the balance energy may be sold at the rate of 75% of the respective applicable wind energy tariff rate fixed by the Commission.

10.6. Energy Wheeling Agreement and Fees

10.6.1 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.

10.7. Security Deposit

10.7.1 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.

10.8. Power Factor Disincentive

10.8.1 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.

10.9. Metering

10.9.1 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.

10.10. Connectivity and Evacuation of power

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

10.11. Banking period and Charges

10.11.1 The concept of banking of energy that evolved from 1983 and its transformations over a period was discussed elaborately in the tariff order for wind energy issued in 2012. The distribution licensee had requested to dispense with the facility of banking citing losses incurred. The banking period that was initially fixed as nine months in 1983 underwent frequent changes from one to two months and then to two years and subsequently to 1 year during the period from 1983 to 2006. In the three tariff orders issued by the Commission in 2006, 2009 and 2012 for wind energy, banking was permitted for a period of 12 months. Banking charges were fixed at 5% in kind in the wind tariff orders of 2006 and 2009. 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. The order of

2012 on wind energy was challenged in the ATE and the 'banking charges' is one of the remanded issues.

10.11.2 In response to the suggestions elicited on the consultative paper floated by the Commission on a banking period of 'one month' or for a period of '12 months with banking charges as the difference between the marginal cost of power purchase of TANGEDCO and the applicable wind tariff', all wind energy generators have requested to continue with the facility of banking of energy and to reduce the banking charges. The stakeholders have said that investments have been made considering the banking facility that was granted as a promotional measure and the same cannot be withdrawn all of a sudden. Many of the stakeholders have sought to comply with the directions of ATE in the order dt.24.5.2013 for reduction of banking charges. Few stakeholders have stated that TANGEDCO's claims of financial loss due to banking is not acceptable as the wind generates power during peak demand in the summer and the distribution licensee should back its claims of financial losses with adequate data. TANGEDCO, in the first instant has sought to dispense with banking and in the alternative to consider banking from 1st January to 31st December instead of 1st April to 31st March. The distribution licensee has also suggested to levy banking charges as the difference between the HT tariff of adjustment and the preferential tariff of wind energy.

10.11.3 The CMD/TANGEDCO in the SAC meeting stated that banking has to be dispensed with or allowed with certain restrictions by permitting them to draw during periods of low demand and restricted during periods of high demand like done in Andhra Pradesh. Dr.A.S.Kandasamy, member, SAC, said that the units generated in a month should be settled in the same month and recommended removal of banking. Thiru Ramesh Kymal, member of the SAC, stated that banking is a book adjustment and the grid is large enough to handle variations. The captive user cannot use the entire energy generated in the wind season. If

the power is allowed to be exported outside the state and a reasonably higher tariff given, removal of banking would not be a problem.

10.11.4 The Commission has examined the provisions related to banking of energy in the other renewable energy rich states. Gujarat has allowed banking for one month for captive users. Surplus energy is deemed to be sold to the licensee at 85% of the tariff determined by the Commission. Rajasthan ERC has allowed banking for captive consumption for a period of one month. Unutilised banked energy upto 10% is entitled for payment at 60% of energy charges applicable for large industrial power tariff excluding full surcharge and the unutilized energy in excess of 10% shall lapse. Andhra Pradesh has permitted banking of energy for 12 months from April to March but has prohibited drawal of banked energy for five months, from April to June and February to March. In addition, drawal of banked energy during peak hours, are also not permitted throughout the year. Maharashtra ERC in the draft Distribution Open Access Regulation 2015 has proposed banking for 12 months and has not permitted credit for banked energy during the months of October, November and March. It is seen that the states that have granted banking facility have imposed certain restrictions in the drawal of banked energy .

10.11.5 TANGEDCO has contended in R.A No.6 of 2013, wherein the remanded issues by ATE were taken up by the Commission, that banking is detrimental to the financés of the utility. Commission has observed in R.A No.6 of 2013 that such concessions are not to be continued forever and has to be gradually withdrawn. All stakeholders with the exception of the distribution licensee has requested to provide banking facility for a period of 12 months.

10.11.6 The Commission decides to continue with the provision of banking period in this order also. The banking period shall be for a period of twelve months commencing from the 1st of April and ending on 31st March of the following year . The energy generated during April shall be adjusted against

consumption in April and the balance if any shall be reckoned as the banked energy. The generation in May shall be first adjusted against the consumption in May. If the consumption exceeds the generation during May, the energy available in the banking shall be drawn to the required extent. If the consumption during May is less than the generation during May, the balance shall be added to the banked energy. This procedure shall be repeated every month.

10.11.7 Unutilized energy as on 31st March every year may be encashed at the rate of 75% of the respective applicable wind energy tariff rate fixed by the Commission.

10.11.8 The charges for banking specified in the order of 2012 has been set aside by the ATE in the order dt.24.5.2013 with a direction to reconsider the computation of the charges after hearing the stakeholders and in consideration of the orders in Appeal No.98 of 2010 dt.18.3.2011. In the order issued by the Commission in the remanded case taken up in R.A No.6 of 2013, banking charges has been fixed as 10 % in kind. The Commission decides to fix the banking charges in this order at 12% in kind.

10.11.9 The WEGs have requested to consider purchase of unutilised energy for the generators under REC scheme at APPC rates and to permit banking of energy. This issue has also been dealt in R.A No.6 of 2013 and Commission has passed orders to extend one year banking facility to WEGs under REC scheme and encashment of unutilized units at 75% of the applicable rate for REC users. Therefore, the Commission extends one year banking period to the WEGs under REC scheme. The unutilized energy may be encashed at 75% of the applicable rates notified by the Commission in the orders issued on pooled cost of power purchase under Renewable Energy Power Purchase Obligations,2010.

10.11.10 As and when the Commission's ABT regulations come into force, the adjustments of energy will be as per the said regulations.

10.12. Deemed demand Charges

10.12.1 Keeping in view the various factors, the Commission in Wind Order No.6 of 2012 discontinued the deemed demand concept for calculating the demand charges for the open access consumers. None of the regulations of the Commission including the Open Access Regulation recognize deemed demand concept applicability for Open Access consumers. This is an issue remanded by ATE in its order dt.24.5.2013. The Commission in its order on the remanded issue in R.A.No.6 of 2013 has ruled that the concept of deemed demand cannot be extended to the wind energy generators observing that the concept of deemed demand itself is not a well conceived one and the same introduced in one of the tariff orders in 2006 has been removed in a subsequent tariff order issued in 2012. Therefore, the issue of deemed demand charges does not arise in this order.

10.13. Harmonics

10.13.1 Some of the stakeholders have sought for reduction of compensation charges from 15% to 5%. Few other stakeholders have requested to grant a period of 12 to 24 months for installation of harmonic filters. Harmonics being detrimental to the network and to other consumer installations, a compensation charge of 15% of applicable generation tariff is reasonable.

10.13.2 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.

10.13.3 In case of existing WEGs, an initial notice shall be issued to the wind generators by the distribution licensee for implementing harmonic norms within three months. The harmonics shall be measured by the Distribution Licensee after the three month notice period. The enforcement mechanism will come into force after the three month notice period and after such measurement.

11. Wind energy tariff

11.1 Wind energy tariff is computed with reference to the determinants listed in para (8) of this order. The tariff works out to Rs.4.16 per unit without accelerated depreciation benefit and Rs.3.70 per unit with accelerated depreciation benefit. The wind mills commissioned on or after 01-04-2016 and upto 31-03-2018 shall be eligible for this tariff. The wind mills commissioned prior to 15-5-2006 shall be eligible for a tariff of Rs.2.75 per unit. The wind mills commissioned from 15-5-2006 to 18-9-2008 shall be eligible for a tariff of Rs.2.90 per unit. The wind mills commissioned from 19-09-2008 to 31-7-2012 shall be eligible for a tariff of Rs.3.39 per unit. The tariff applicable to wind mills commissioned from 01-08-2012 to 31-03-2016 shall be as per the tariff re-determined in the order issued in R.A No.6 of 2013 dt. 31-03-2016 i.e. Rs.3.96 per unit without accelerated depreciation and Rs.3.53 per unit with accelerated depreciation benefit.

11.2 Other related charges and terms and conditions specified in the order shall be applicable to all the wind energy generators, irrespective of the date of commissioning.

12. Directions

12.1 TANGEDCO/TANTRANSCO shall furnish monthly report of generation of wind energy and units banked, unutilised units by WEGs under REC scheme, the quantum of energy wheeled from the WEGs for captive consumption and third party sale and the quantum of energy purchased from the WEGs every month to the Commission.

13. Acknowledgment

The Commission acknowledges with gratitude the contribution of the officers and staff of the Commission, the valuable comments offered by the stakeholders, the active participation and advice of the Members of the State Advisory Committee. The Commission is indebted to the valuable inputs offered by the Tamil Nadu Generation and Distribution Corporation Ltd..

Sd./-	Sd./-	Sd./-
(T.Prabhakara Rao)	(G.Rajagopal)	(S.Akshaya Kumar)
Member	Member	Chairman

(By Order of the Commission)

Sd/-
(S.Chinnarajalu)
Secretary

ANNEXURE I

Abstract of comments received from various stakeholders on "Consultative Paper on Comprehensive Tariff Order for Wind energy"

1. Capital Cost / MW in Crores

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Rs.7 crores / MW may be considered.

M/s.Inox Wind Limited

Rs.6.39 crores/ MW may be considered.

Thiru.S.Narayanaswamy,Member Generation (Retd.)/TNEB

IDC collected by TANGEDCO at the rate of Rs.35 lakhs / MW may be added to the capital cost.

The capital cost does not include the transmission line cost as energy is metered at the wind mill end.

Indian Wind Power Association

Rs.7 crores / MW may be considered

M/s.Orient Green Power Company Limited

Rs.7 crores / MW may be considered.

2. <u>Capacity Utilization Factor</u>

Indian Wind Power Association

PLF in low wind zones are low. Hence, CUF of 25% may be considered when generation is evacuated in full.

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Suggestion by APTEL in the order dt.24.5.2013 may be considered.

M/s.Inox Wind Limited

CUF may be revised to 24.20%.

M/s.Vaayu (India) Power Corporation Pvt. Ltd

Commission may consider the CUF of 22% for wind zone 2 and 25% for wind zone 3 as considered by CERC.

M/s.ReNew Power Ventures Private Limited

In case, Commission adopts higher CUF, deemed generation from the WEGs may be allowed during such period of non-availability of grid. Commission may consider to provide wind zone wise tariff as followed by CERC.

Indian Wind Energy Association

Considering lower CUF of newer sites and issues of grid back down, a CUF of 25% may be considered.

Thiru.S.Narayanaswamy, Member Generation(Retd.)/TNEB

A separate grid availability factor shall be introduced or CUF shall be multiplied by a factor to compensate for switching off.

M/s.Orient Green Power Company Limited

PLF of 24% may be considered when the generation is evacuated in full.

M/s. Naga Limited

Without any preventive measures for grid backdown or improving the evacuation, considering the 27% PLF is neither reasonable nor fair.

Indian Wind Turbine Manufacturers Association

CUF of 25% may be adopted or alternatively the tariff may be linked to CUF on the basis of wind power density of the regions in the State.

Tamilnadu Spinning Mills Association

PLF of 18.02% may be considered.

M/s.Mytrah Energy (India) Limited

Commission may consider CUF at 24%.

3. <u>De-rating of wind machine</u>

Thiru.S.Narayanaswamy,Member Generation (Retd.)/TNEB

A degradation factor of 0.20 may be provided.

Indian Wind Energy Association

De-ration factor of 1% per year after 10 years may be considered**.**

M/s.Mytrah Energy (India) Limited

De-rating of WEG may be considered.

4. <u>O&M expenses per annum</u>

TANGEDCO

Proposal of the Commission concurred with. The O&M charges is only for

O&M of WEG by the promoter. It does not include O&M charges to be paid to TANGEDCO for maintaining the evacuation facility by TANGEDCO.

The Southern India Mills' Association

O&M expenses may be increased to 3% on 85% of capital cost and 1% on 15% of capital investment.

M/s.Inox Wind Limited

O&M expenses should be revised to 1.66% on 85% of capital investment and 0.50% on 15% of the capital investment with an escalation of 5.72% from 2nd year onwards.

Indian Wind Power Association

O&M expenses shall be enhanced to 3% on 85% of capital cost and 1% on 15% of capital investment with escalation of 5% from second year onwards.

Indian Wind Energy Association

O&M cost at Rs.10.05 lakhs per MW with 5.72% escalation as specified by CERC may be considered**.**

Thiru.S.Narayanaswamy,Member Generation(Retd.)/TNEB

O&M charge of Rs.10 lakhs / MW collected by TANGEDCO may be included.

Indian Wind Turbine Manufacturers Association

O&M charges of Rs.9 lakhs per MW with suitable indexing mechanism as prescribed by CERC may be considered.

M/s.Orient Green Power Company Limited

O&M expenses of 3% on 85% of capital investment and 1% on 15% with escalation of 5% may be considered.

5. Insurance expenditure per annum

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Views of the Commission accepted.

Thiru.S.Narayanaswamy,Member Generation (Retd.),TNEB

Insurance may be considered for working out working capital interest, as insurance is paid yearly in advance.

6. Term of Loan

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Views of the Commission accepted.

Indian Wind Energy Association

Term of loan as specified by CERC may be considered.

M/s. Naga Limited

The term of loan at 10 years with 1 year moratorium is rare. In fact, all the loans are around 5 years or maximum 7years.

7. <u>Interest on Loan</u>

TANGEDCO

The revised rate of interest offered by IREDA is between 11.90% to grade I and 12.50% to grade IV. Hence, it is more appropriate to fix at 12%.

The Southern India Mills' Association

Views of the Commission accepted.

Indian Wind Power Association

Rate of 13% offered by financial institutions may be considered.

M/s.Orient Green Power Company Limited

Rate of 13% offered by financial institutions may be considered.

Indian Wind Energy Association

Rate of interest as specified by CERC may be considered.

8. <u>Life of Plant and Machinery</u>

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

20 years is suggested.

M/s.Orient Green Power Company Limited

Life of plant and machinery should be retained as 20 years.

M/s. Naga Limited

The Commission may retain the life of 20 years.

Indian Wind Power Association

The life of plant and machinery may be retained at 20 years.

9. <u>Return on Equity (RoE)</u>

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Views of the Commission accepted.

M/s.Vaayu (India) Power Corporation Pvt. Ltd

MAT and IT rate may be considered while determining RoE in line with CERC RE tariff order so that wind energy generators can have admissible RoE of 16% post tax.

Thiru.S.Narayanaswamy,Member Generation(Retd.)/TNEB

Return on equity of 16% may be assumed and income tax may be made a pass through or CERC order dated 15.05.2014 allowing 20% for the first 10 years and 24% for the rest may be followed.

Indian Wind Energy Association

20% RoE(pre tax) in Tamil Nadu is on the lower side in comparison with RoE provided by CERC and other SERCs for RE generators. A minimum of 16% RoE

post tax may be ensured over the useful life of a generating station. On a pre tax regime, the same works out to 20% pre tax for first 10 years and 23.68% or 24% for the rest of the 15 years.

10. Debt-Equity ratio

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Views of the Commission accepted.

11. Depreciation

TANGEDCO

Proposal of the Commission concurred with.

M/s.Vaayu (India) Power Corporation Pvt. Ltd

Commission may consider depreciation rate of 7% by SLM which is in line with debt repayment requirement of the project.

M/s.ReNew Power Ventures Private Limited

Depreciation rate shall be 5.83% per annum for initial period of 12 years and 1.54% from 13th year onwards in line with CERC order.

Thiru.S.Narayanaswamy, Member Generation (Retd.)/TNEB

CERC order dated 15.05.2015 may be followed. Even though this will not alter the average tariff, it is required when levelised tariff is adopted.

M/s.Orient Green Power Company Limited

Considering the life period of 20 years, depreciation of 4.5% should be adopted.

The Southern India Mills' Association

Depreciation rate of 4.5% per annum may be adopted.

Indian Wind Power Association

Considering life period of 20 years, 4.5% per annum may be adopted.

Indian Wind Energy Association

Depreciation rate of 6.36% for first 11 years and 1.43% for remaining useful life may be adopted. Further,as specified in the TNERC Terms and Conditions for Determination of Tariff Regulations,2005, depreciation for leased land component at a rate of 3.34% may be specified for wind energy generators.

12. <u>Components and interest on Working capital</u>

TANGEDCO

Interest on working capital would normally be 0.5% more than that of term loan. Hence, it may be fixed at 12.5%.

The Southern India Mills' Association

Views of the Commission accepted.

Thiru.S.Narayanaswamy, Member Generation(Retd.)/TNEB

O&M charges shall be provided for 3 months and receivables for 2 months to calculate the interest on working capital.

Indian Wind Power Association

Interest on working capital may be considered at 13.5%.

Indian Wind Energy Association

O&M expenses for one month, Spares(15% of O&M expenses),receivables -2 to 6 months in line with CERC regulations may be considered.

M/s. Orient Green Power Company Limited

13.5% should be considered.

Indian Wind Turbine Manufacturers Association

Guidelines of CERC may be followed.

13. <u>Auxiliary Consumption</u>

Thiru.S.Narayanaswamy, Member Generation,(Retd.),TNEB

As payment is made on net generation, a figure of 1% towards internal consumption of wind mills may be assumed.

M/s.Mytrah Energy (India) Limited

Auxiliary consumption may be included.

14. <u>Tariff</u>

Thiru.Ganga Prasada Rao

Two part tariff by adopting a formula may be considered.

TANGEDCO

With regard to preferential tariff, two part tariff and cost plus, single part average tariff, the TANGEDCO concurs with the proposal of the Commission.

Wind tariff may be arrived after taking into account the suggestion by TANGEDCO on rate of interest and interest on working capital. Wind tariff has been arrived considering the capital cost of WEG to be commissioned after the date of issue of the order and the tariff is applicable for the WEGs commissioned on or after the date of this order. However, the wind mills commissioned prior to this Order shall be eligible for a tariff applicable for the control period in which the wind mills were commissioned.

The Southern India Mills' Association

Tariff of Rs.3.96 per unit may be considered.

Indian Wind Power Association

Levelised method may be adopted for 20 years for fixation of tariff. A tariff of Rs.4.50 may be considered.

Thiru.S.Narayanaswamy, Member Generation (Retd.),TNEB

Levelised tariff is preferable against average tariff considering time value of money.

M/s. Orient Green Power Company Limited

Levelised method shall be adopted for 20 years for fixation of tariff. In line with the Judgment of APTEL, time value of money shall be considered.

M/s. Naga Limited

Tariff of Rs.4.23 per unit, which is the lowest compared to other State Electricity Regulatory Commissions, may be considered.

Tamil Nadu Spinning Mills Association

The tariff should be fixed atleast at Rs.5.41 per unit.

M/s.Mytrah Energy (India) Limited

Based on the outcome of Supreme court, liberty shall be taken before the Commission to comment / review the methodology for determination of wind tariff.

Indian Wind Energy Association

Levelised tariff approach as directed by APTEL and followed by Central Commission and various other State Regulatory Commissions may be followed. A tariff of Rs.5.28 may be specified.

15. <u>CDM benefits</u>

TANGEDCO

CDM benefit for the new REC projects may be shared 80% to TANGEDCO and 20% to the generator since for the single project there are two benefits under environmental components. There is no incentive to TANGEDCO in the REC scheme even though RPO has been achieved by TANGEDCO. Before claiming the CDM benefit, clearance has to be obtained from the TANGEDCO so that there is a track record to claim the eligible CDM benefit from the generator. TANGEDCO's CDM benefits may be adjusted in the power purchase bill amount to be settled to the generators.

The Southern India Mills' Association

Sharing of 50:50 shall be dropped and it shall rest with the developer alone.

M/s. Vaayu (India) Power Corporation Pvt. Ltd

CDM revenue should remain with the generator only.

M/s. Orient Green Power Company Limited

CDM benefits need not be shared with the distribution licensee. All expenses incurred for registration of CDM are borne by the generators.

M/s. Naga Limited

The Commission may waive the revenue sharing.

Tamil Nadu Spinning Mills Association

Due to European melt down, no CERs are being traded and even if it is traded, it is being traded at a much lower price that does not match the cost on projects and hence no entity is now interested to register any CDM project from India from 2009 onwards. Hence, the question of sharing the CDM benefits does not arise.

M/s. Mytrah Energy (India) Limited

Commission may allow 100% benefit to the generators. Otherwise, sharing pattern may be imposed with reference to the CER trading price over and above 10 Euros / CER.

16. <u>Transmission,wheeling charges and line loss</u>

TANGEDCO

50% instead of 40% in each of the transmission charges, wheeling charges as applicable to the conventional power may be adopted for wind power.

The Southern India Mills' Association

Transmission and Wheeling charges must be limited to the units.

M/s. Orient Green Power Company Limited

20% of normative charges instead of 40% may be adopted for non REC generators. This recovery should be based on units injected into the grid for both

non REC and REC generators considering the backing down of WEGs and not based on installed capacity.

M/s. Naga Limited

Charges like transmission charges, wheeling charges, system operation charges, banking charges etc. may be rationalised to one single charge payable per unit.

Tamil Nadu Spinning Mills Association

Fixing the transmission charge based on the units generated by the wind mills may be fixed. Commission should either factor the O&M charges collected by TANGEDCO separately while fixing the wheeling charges or should desist the TANGEDCO from collecting the O&M charges separately.

M/s.Mytrah Energy (India) Limited

A time frame for which the promotional charges are applicable to the generators should be declared to bring in more clarity which is a prerequisite for the bankers to fund the projects.

Indian Wind Power Association

20% of charges as that applicable to conventional power on unit basis may be considered.

Indian Wind Energy Association

Commission may determine reasonable transmission charges by way of considering transmission charges in terms of Rs./kWh.

17. <u>Scheduling and system operation charges</u>

M/s. Orient Green Power Company Limited

Commission may adopt existing system operating charges of Rs.600 for 2 MW.

Tamil Nadu Spinning Mills Association

Considering that the matter is already in dispute before the Hon'ble Supreme Court, the Commission may drop any move to increase the charges manifold.

TANGEDCO

50% instead of 40% of scheduling and system operation charges of that applicable to the conventional power may be adopted for wind power.

Indian Wind Power Association

Existing charges may be adopted.

18. <u>Cross subsidy surcharge</u>

TANGEDCO

Levy of 100% of the cross subsidy surcharge from the wind energy third party users may be considered.

As per the judgment of APTEL dated 18.02.2013 on Appeal No.33 of 2012, one who is unable to fulfil the requirements of rule-3 of electricity rules 2005 is not permitted under the law to have exemption from payment of cross subsidy surcharge.

The Southern India Mills' Association

Cross subsidy surcharge may be waived as a promotional measure to nonconventional energy.

M/s. Orient Green Power Company Limited

The cross subsidy surcharge shall be made nil for promotion of renewable energy sources.

M/s. Naga Limited

The Commission should dispense with the cross subsidy surcharge as the State Utility is not able to fulfil the power needs of the consumers of the State.

Tamil Nadu Spinning Mills Association

There could be either the cross subsidy or open access charges and there cannot be two charges on one and the same services of the open access. Hence, even the proposed 50% cross subsidy surcharge shall be dropped.

19. <u>Banking mechanism and Charges</u>

Indian Wind Power Association

The Commission shall continue with the banking period for one year from 1st April to 31st March as is being followed now. The computation of banking charges shall be done as directed by the Hon'ble APTEL in the Appeal No.197 of 2012 dated 24.05.2013, as the manifold increase in banking charges determined by TNERC in its order dated 31.07.2012 was set aside in the above judgment.

The wind energy banked is only accounted on paper but fully consumed in the area of the Distribution licensee. This usage of energy fetches revenue to the licensee at Average Realization Rate in addition to banking charges. Had this energy not banked and absorbed in the Grid, the licensee shall have to purchase high cost power. During the non-windy season which happens during the period of October to March, it could be seen from the frequency distribution monthly demand curve that the overall demand is comparatively less than that during windy season. The conclusion is that the wind generation is high during the high demand summer season and not the other way.

The proposal of the Commission in the consultative paper to dispense with one year banking will not have any merit and it is legally untenable.

The judgment of APTEL in Appeal Nos.45 & 91of 2012 may be complied with by extending one year banking to the machines commissioned under REC scheme.

M/s. KG Fabriks Ltd., M/s. Pongalur Pioneer Textiles Private Ltd., M/s. Sri Kannapiran Mills Ltd., M/s. Sri Balamurugan Textile Processing Ltd., M/s. K.G.Denim Ltd., M/s. Sri Karthikeya Spinning & Weaving Mills Pvt. Ltd., M/s. Sri Visaka Textiles Pvt. Ltd., M/s. Million Spinners Pvt. Ltd., M/s. Ruckmani Ammal Cotspin Pvt. Ltd

The present banking facility at the same cost may be maintained.

TANGEDCO

Banking provision shall be dispensed with not only to the future projects but also to the existing projects commissioned before and after 15.05.2006 irrespective of the tariff order in which the WEG is covered for which necessary amendments may be effected in the existing energy wheeling agreement.

In the alternative, the banking period may be fixed from 1st January to 31st December instead of 1st April to 31st March. The banking charges may be levied based on the difference in cost between HT tariff of adjustment to the wind energy purchase rate. Further, since all the surplus units are kept in banking for the entire banking period, the banking charges may be levied for the entire banked units instead of units drawn from the bank.

The Southern India Mills' Association

Banking provision may be retained. The banking charges of Re.0.94 per unit fixed in the last tariff order requires reconsideration and to be reduced. TANGEDCO earns when the units generated are banked by way of selling to other categories of consumers at the average cost of supply/HT tariff. The procedure of encashing in full the banked units when restriction and control measures are in force may be adopted.

M/s Inox Wind Limited

Previous provisions of monthly banking may be continued with banking charges as Re.0.70 / kWh.

M/s. Vaayu (India) Power Corporation Pvt. Ltd

Commission may continue annual banking mechanism. There is an urgent need to devise an equitable and rational mechanism for determination of banking charges.

M/s. ReNew Power Ventures Private Limited

Banking provision is required for promotion of open access in Tamil Nadu. Banking period may be changed from April – March to June – May for effective grid management. Banking charges may be fixed at 2% of the energy banked during the billing month as applicable in the neighbouring state of Karnataka.

Thiru.S.Narayanasamy, Member Generation,(Retd.)/TNEB

Banking period may be considered as one year and that shall be the financial year. When banked energy is utilised by captive consumer, TANGEDCO may be permitted to collect the difference of monthly pooled cost of power and applicable wind energy tariff.

M/s. Orient Green Power Company Limited

The principle of retaining the banked energy at the generator end shall be ordered. The judgment of APTEL may be complied with while determining the banking charges.

M/s. Naga Limited

Based on the banking facility only the investors have invested on wind mills. Therefore, the principle of promissory estoppel and the legitimate expectation come into play and the Commission cannot suddenly think of removing the same

as they are bound by the contractual rights of the investors. Further, the Commission's suggestion that banking facility can be continued with higher cost overlooks the APTEL direction. The APTEL also directed the Commission to consider allowing the banking facility for the REC captive users and the same may be considered.

Tamil Nadu Spinning Mills Association

Facility of 100% encashment of unutilised banked units when R&C measures are enforced in State may be retained. Commission should not be a party to favour the withdrawal of banking benefit or altering it in any manner. The banking charges may be increased based on the % of increase of respective tariff. The banking period may be from June to May.

M/s.Mytrah Energy (India) Limited

Even in the absence of specific provision on banking in the Act, Commission has jurisdiction to continue banking as a provision of promotion. It is more important to address the issue of financial impact of utilities on account of banking facility given to the wind power projects. In the absence of analysis, the Commission is requested to take up all banking related issues separately.

Indian Wind Energy Association

In view of the impact of the existing banking charges to the State wind energy sector, and Hon'ble APTEL's judgment, Commission may continue with 1 year banking mechanism and reconsider computation of nominal banking charges to revive the State wind energy sector.

Indian Wind Turbine Manufacturers Association

Reducing of banking period to one month will not only affect the new installations but also the existing captive users who have made huge investments. The current banking mechanism may be continued.

Levy of banking charges as a difference of between marginal cost of power purchase and applicable wind tariff will further increase the banking charges.

During R&C period, unutilised banked energy may be sold at 100% of tariff rate fixed by the Commission.

20. Reactive power charges

TANGEDCO

In view of the grid security, the reactive power charges may be fixed at Re.1 per kVARh upto 10% of the net active energy generated and Rs.2 per kVARh for more than 10% of net active energy generated.

21. Grid availability charges

TANGEDCO

For sale to TANGEDCO the start-up may be charged according to their purchase rate. For wheeling category it may be billed under HT temporary supply tariff. In the case of standby charges, proposal of the Commission concurred with.

22. Billing and payment

TANGEDCO

Considering the stringent financial condition of TANGEDCO, and the fact that

wind power is infirm, penalty clause may be waived or otherwise 60 days time limit may be extended to 90 days.

The Southern India Mills' Association

Though there is a provision of payment of interest at 12% per annum the objective is not to get benefit out of interest. Hence the present period of 30 days may be retained.

Thiru.S.Narayanaswamy, Member Generation,(Retd.)/TNEB

Delayed payment by TANGEDCO shall attract interest at 1% per month beyond 30 days instead of 60 days. Any delay beyond that interest shall be paid by TANGEDCO on accumulated principle plus interest on monthly basis which is adopted by bank.

Any surplus energy available after the banking period shall be paid at 100% tariff during R&C period.

M/s. Orient Green Power Company Limited

Payment shall be made within 30 days. For any delayed payment beyond 30 days, the distribution licensee should pay interest at the same rate charged to the consumers.

Indian Wind Power Association

The Distribution licensee shall make payment within 30 days. For any delayed payment beyond 30 days, the licensee should pay interest at the same rate charged by them from the consumers.

Tamil Nadu Spinning Mills Association

Attempting to increase the payment period from 30 days to 60 days is highly unjustifiable under any reasoning. Hence the existing period of 30 days needs to be retained. Interest rate of 1.5% per month shall be permitted as in the case of BPSC.

23. <u>Payment security and security deposit</u>

M/s. Orient Green Power Company Limited

The interest shall be payable to OA customer for the security deposit paid.

Tamil Nadu Spinning Mills Association

The provision for security deposit can be made by amendment to supply code instead of making provision in the order.

Indian Wind Power Association

Interest shall be payable to open access customer i.e the generator for the quantum of security deposit.

24. Energy Purchase and Wheeling Agreement

TANGEDCO

Proposal of the Commission with respect to energy purchase agreement in para 10.4 concurred with.

With regard to quantum of energy purchase by the distribution licensee, proposal of the Commission concurred with. However, purchase of energy from existing PPA will continue. The proposed method may be followed for the WEGs commissioned after this order. If TANGEDCO purchases any excess energy over and above RPO, TANGEDCO will get approval of the Commission.

The Southern India Mills' Association

Considering the life of the plant as 20 years, the energy purchase agreement shall be made.

The TANGEDCO shall be encouraged to purchase wind energy beyond the RPO and unnecessary restriction on getting approval need not be made.

M/s. Inox Wind Limited

Tariff is determined by the Commission under Section 62 of the Act and not under Section 63. This may be corrected in clause 10.1.1.

M/s. Orient Green Power Company Limited

The existing format of EPA should be adopted for a life period of 20 years. The existing EWA format should be continued with addition of the line, "Banking shall be done at the generator end only". The proposal to seek approval of the Commission for purchase of wind power in excess of their RPO may be dispensed with.

M/s. Naga Limited

Purchase of energy beyond the prescribed RPO with the permission of the Commission will be a significant barrier to investment in wind mill under sale to TANGEDCO.

Indian Wind Power Association

Existing format approved by the Commission for EPA may be adopted which shall be valid for 20 years or the life term of the plant.

Existing Commission approved format for EWA may be continued.

Indian Wind Energy Association

The reference to power procurement by distribution licensee 'under section 63' in para 10.1.1 may be removed. The stipulation regarding requirement of approval from the Commission for renewable power procurement by the DISCOM in excess of its RPO may be removed.

Tamil Nadu Spinning Mills Association

EPA/EWA has been dealt with in the Power Procurement from New and Renewable Sources of Energy Regulation, 2008. Extracting the same in the order or going with a modified content would make the regulation inconsistent. The consultative paper comes with an idea of providing some restriction on TANGEDCO for purchase of renewable power from wind. The matter is already

covered in TNERC RPO Regulations and the same cannot be revised or modified, since it would be an attempt to make the regulation inconsistent.

25. <u>Control period / Tariff review period</u>

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

The control period shall be 2 years from the date of issue of final order with the tariff determined by the Commission for the period of 20 years.

M/s. Orient Green Power Company Limited

Tariff revision has to be made within the stipulated time frame in consonance with the provision of the Act/Tariff Policy/Regulation/Orders in force. Commission should neither extend the control period nor postpone the determination of tariff revision.

Tamil Nadu Spinning Mills Association

The control periods shall be acted upon or the new tariff if any fixed may be ordered to be enforced from the date of expiry of the control period.

Indian Wind Power Association

The tariff revision has to be made within the stipulated time frame in consonance with the provisions of the Act/Tariff policy/Regulations/Orders in force. The Commission should neither extend the control period nor postpone the determination of tariff revision.

Indian Wind Energy Association

The Regulations of the Commission specify that 'control period may ordinarily be two years'. The next tariff order should be effective from the date of expiry of the

previous tariff order, even if the delay has been caused inadvertently. The new tariff order based on due public process of public consultation should be applicable from 1.8.2014.

26. <u>Scheduling of wind energy / UI mechanism</u>

M/s.Orient Green Power Company Limited

The additional cost of approximately Rs.2 lakhs / MW incurred for forecasting and scheduling of wind energy shall be considered while determining the tariff.

Indian Wind Power Association

The cost of forecasting which is approximately Rs.2 Lakhs per MW may be considered while determining tariff.

27. <u>Deemed Demand Charges</u>

M/s. Orient Green Power Company Limited, Indian Wind Power Association

Withdrawal of deemed demand concept, introduced by Order Nos.2 & 4 dt. 15.05.2006 incorporating the objectives, reasons and basis of the determination methodology, ignoring the directions of APTEL, in the consultative paper is neither legally tenable nor factually correct.

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

As per the order of the APTEL, the deemed demand concept and its charges may be restored retrospectively.

M/s.Orient Green Power Company Limited

Withdrawal of deemed demand concept introduced by Order No.2 and 4 of 2006, ignoring the directions of the APTEL is neither legally tenable nor factually correct.

M/s. Naga Limited

The matter was already remanded back to the State Commission for reconsideration and therefore, Commission may consider allowing deemed demand charges to the investors.

Tamil Nadu Spinning Mills Association

Considering the APTEL's Order dated 24.05.2013, the proposal to withdraw the deemed demand benefit needs to be dispensed with.

Indian Wind Power Association

Withdrawal of deemed demand concept, introduced in Order Nos.2 & 4 dt.15.5.2006 incorporating the objectives, reasons and basis of the determination methodology, ignoring the directions of APTEL, in the consultative paper is neither legally tenable nor factually correct.

28. Encashment of lapsed Units by REC Captive users

M/s.Mytrah Energy (India) Limited

The Commission may consider purchase of unutilised energy under REC mechanism at APPC or 85% of the preferential tariff.

M/s.INOX wind Ltd.

Surplus power from wind power projects for captive use/third party sale and opting for REC, may be purchased at APPC.

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

REC benefits may be extended for captive users.

M/s.Orient Green Power Company Limited

The judgment of APTEL may be complied with by extending one year banking to machines commissioned under REC scheme. The unutilised banked energy at the end of financial year in respect of machines commissioned under REC should be paid at APPC rates as applicable for sale to utility.

Indian Wind Power Association

Unutilised banked energy at the end of the financial year in respect of machines commissioned under REC schemes may be paid at APPC rates.

Tamil Nadu Spinning Mills Association

Banking facility for REC captive mills should be allowed in pursuance of the APTEL's order.

29. <u>Harmonics</u>

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Compensation of 5% as against the proposed 15% may be considered at the initial stage.

Indian Wind Power Association

As more number of existing smaller capacity WEGs are to be provided with harmonic filters, instead of 3 months time, atleast 24 months may be allowed.

M/s. Orient Green Power Company Limited

The compensation charges may be reduced to 5%. It is required to be complied only by those who have to install filters as per CEA regulations.

Tamil Nadu Spinning Mills Association

Minimum one year time limit should be given from the date of notice. Also, compensation should be reduced to a reasonable level.

30. <u>Energy accounting and Billing procedure</u>

TANGEDCO

Proposal of the Commission concurred with.

The Southern India Mills' Association

Due to scheduled and unscheduled load shedding, captive power consumers are not in a position to consume 51% of their generation. Therefore, to the extent of non providing of supply, a provision for deemed consumption may be made. Captive wind adjustments may be made by providing priority based on commissioning dates of WEGs.

M/s.Orient Green Power Company Limited

On account of R&C measures, for captive consumers unable to consume 51% of generation, deemed consumption may be taken into account and there shall not be any restriction for consumption of banked units.

Indian Wind Power Association

Slotwise adjustment shall be adopted to the categories having differential rates in the slots. When uniform rate is specified for the categories of consumers, the monthly consumption shall be adjusted against monthly generation.

Tamil Nadu Spinning Mills Association

TANGEDCO shall factor the hours of load shedding and also the demand to buy outside power. Without such things being factored, minimum consumption of 51% alone cannot be enforced on the principles of equity.

With regard to adjustment priority for captive consumers who consume from multiple wind mills, Commission may order to provide priority of adjustment for first commissioned wind mills first and second commissioned wind mills second and so on.

31. Security Deposit

TANGEDCO

Proposal of the Commission concurred with.

32. Power factor disincentive

TANGEDCO

Proposal of the Commission concurred with.

Tamil Nadu Spinning Mills Association

The order being one for generation, insertion of clauses on power factor disincentive may be avoided.

33. Metering

TANGEDCO

Proposal of the Commission concurred with.

34. Connectivity and evacuation of power

TANGEDCO

Proposal of the Commission concurred with.

Indian Wind Power Association

The directions of the ATE in its order dt.24.5.2013 shall be complied with.

35. Other issues

Indian Wind Power Association

The APTEL in judgment dated 25-05-2013 has remanded some issues related to the 2012 Wind Order to the Commission. The Commission needs to first comply with the directions issued in the above judgment since the tariff terms and conditions which had been decided by the Hon'ble Commission have been set aside with specific directions to the Hon'ble Commission.

TANGEDCO may be directed not to recover O&M charges as it has not been approved by the Commission.

In the last tariff order, TANGEDCO has been directed to publish wind energy generation details in the website on monthly basis and the same has not been complied with. Commission may give directions on the same.

TANGEDCO

Second sentence in clause 5.1 may be deleted. The following may be added as clause 5.2:

‘5.2. For the existing Energy Purchase Agreements (EPA) signed before the effective date of this order between the wind energy generators and the distribution licensee, the respective tariff rates agreed in the respective EPA shall be continued to be valid. However, all other terms of this order will become applicable to all the WEGs irrespective of the date of commissioning. The agreements between the WEGs and the distribution licensee in relation to all wind machines commissioned on or after the effective date of this order shall be in conformity with this order’.

Like harmonics compensation charges, the WEGs may be instructed to provide low voltage ride through (LVRT) protection arrangement to avoid pull out of wind generation due to sustained low voltage problem. If the WEGs fail to provide the LVRT, they shall pay a compensation of 15% of applicable generation tariff rate to the distribution licensee.

M/s. Orient Green Power Company Limited

The directions given by APTEL in its order dated 24.05.2013 with regard to connectivity and power evacuation shall be complied with. In the event of forced backdown, deemed generation shall be compensated.

Commission should give a direction to TANGEDCO not to recover the O&M charges from WEGs.

Tamil Nadu Spinning Mills Association

Directions may be given to collect all charges at the consumption end only.Even though direction has been given to TANGEDCO in the last wind order to provide data on wind generation, the directions have not been complied with. Commission should take action in this regard.

M/s. Naga Limited

Investors under REC scheme shall be permitted to switch over to the preferential tariff scheme.

Annexure II

MINUTES OF THE 29th MEETING OF STATE ADVISORY COMMITTEE OF TAMIL NADU ELECTRICITY REGULATORY COMMISSION HELD ON

17th MARCH 2016 AT GULMOHAR HALL, HOTEL GRT GRAND, T.NAGAR, CHENNAI – 17.

Members Present:

1. Thiru S. Akshaya Kumar, Chairman, TNERC
2. Thiru G. Rajagopal, Member, TNERC
3. Dr. T. PrabhakaraRao, Member, TNERC
4. Dr. M. Saikumar, CMD, TNEB Ltd. & TANGEDCO Ltd. and Chairman, TANTRANSCO Ltd.
5. Thiru R.K. Kulshreshta, Chief Electrical Engineer, Southern Railways
6. Dr. A.S. Kandasamy, Member, SAC
7. Thiru T. Vijayarangan, Member, SAC
8. Thiru K. Alagu, Member, SAC
9. Thiru Ramesh Kymal, Member, SAC
10. Thiru C. Muthusami, Member, SAC
11. Thiru G.S. Rajamani, Member, SAC
12. Thiru K. Kathirmathiyon, Member, SAC

Chairman, TNERC welcomed the members of the State Advisory Committee. He introduced the new member of the Commission, Dr.T.Prabhakara Rao, to the members of the committee. He expressed condolence to the demise of SAC member Thiru Desikan who had actively participated in many of the meetings of the SAC and offered valuable suggestions. He further stated the purpose of the meeting convened to discuss the consultative papers issued on issue of comprehensive tariff orders on Wind,Bio-Mass, Bagasse and Solar power. These papers were hosted in the Commission's website inviting comments/suggestions from stakeholders and

now being placed before the State Advisory Committee. He requested the Director/Engineering and Director/Tariff to make the presentations on the subject.

The Director/Engineering first made the presentation on Wind power on the issues dealt in the consultative paper.

Chairman/TNERC requested the members to offer their views on the various issues on wind power. The views expressed by the members of the SAC are as follows:

Dr. A.S. Kandasamy - Electricity is a commodity that cannot be stored even for a fraction of a second. The word banking is a misnomer. When generation is idle, it develops only pressure. The utilization begins only when load is connected. The units generated in a month should be settled for payment in the same month. The energy exported to TANGEDCO should be billed as per the rates decided by the Commission. Wind power is highly infirm in nature. During the wind season, when the generation to the tune of 4000 MW all of a sudden fails, the Licensee and the consumers are made to suffer. He strongly recommended removal of banking. He raised question as to whether depreciation is linked to straight line method or sinking fund method as per the provisions of the Act. He fully agreed with the proposal of Commission and suggestion of TANGEDCO for removal of deemed demand.

Thiru Ramesh Kymal, President,CII – He has stated that banking is just a book adjustment. The grid is large enough to handle the variations. In Tamil Nadu most of the investments are for captive use and not for feed in tariff. Banking is essential as during the high wind season the captive users cannot use the entire energy generated. He further added that if a reasonably high tariff is given, the proposal of the Commission could be considered. Regarding the components for tariff, he expressed the following views:

CUF and capital cost - The World Institute of Sustainable Energy has found out that the potential for wind in Tamil Nadu is 2 Lakh MW. Only 7000 MW has been exploited so far. He suggested that problems in utilizing the entire generation in the State could be solved technically by exporting part of the generation outside the State during the windy season. The potential of present wind sites are with a CUF of 25%. To capture the wind at such potentials, technically advanced machines are required and that raises the capital cost. The capital cost ex-factory is Rs.5.5 Crores/MW and for the entire project inclusive of land, grid connectivity etc. the cost is Rs.7 Crores/MW.

Discounting factor - CERC's discounting factor of 10.87% may be considered.

Useful life - He agreed to the useful life period of 25 years adopted which could be possible due to the advancement in technology.

Return on equity – He suggested to consider a return on equity of 20% for the first 10 years and 24 % for the remaining years as adopted by CERC.

Depreciation – CERC's guidelines of 5.83% for the first 10 years and 1.54% for the remaining years may be considered.

Working capital and interest – TANGEDCO does not make payments within one month. Interests are not really coming down . He suggested that interest may be retained at 13.5 % in line with CERC.

O&M expense – Commission's rate of O&M works out to Rs.5.57 Lakhs/MW. An amount of Rs.5 Lakhs would go for manpower and the rest for insurance. This would hardly leave anything for consumables. He suggested Rs.10.63 lakh/MW with escalation of 5.72% p.a as adopted by CERC. Considering the parameters as suggested above would work out to a tariff of Rs.4.72 per kWhr. He reiterated his opinion on banking earlier stated.

Dr. A.S. Kandasamy – He has stated that though banking is a book adjustment and a scientific method of calculating the banking charges have been devised, the proposal of removal of banking should be considered.

Thiru Ramesh Kymal – Banking is said to be a problem because the entire energy generated is being tried to be utilized within the state. If the power is allowed to be sent out of the state through the national grid the problem of banking would be reduced to a large extent. The State is blessed with wind power before the monsoon sets in the North. The vast potential of energy available should be allowed to be exported outside the state.

Thiru G.S. Rajamani– He congratulated the Commission for the excellent consultative paper and the precise presentation made. He said that by convention, O&M expenses are treated as a composite rate. The idea is not to go into the details of how it is being spent. He felt that insurance charges should be a part of O&M and not to be provided as a separate charge. Insurance charges varies from company to company. He further queried as to whether reactive charges are being measured and whether SLDC has taken steps to control the reactive power.

CMD/TANGEDCO – TANGEDCO's suggestion on interest rate given was 12%. This is a regime of falling power tariff and falling interest rates. Rates of interest of 13% - 13.5% proposed by the Commission is on the higher side. Even the interest rate of 12% is slightly higher. TANGEDCO's suggestion of tariff rate is Rs.3.32 per unit assuming an interest of 12%. Regarding banking, he said that banking was a concept introduced in 1986. This was to encourage renewable energy . Now the installed capacity of wind power is 7500MW. The banked units are drawn at a time when the licensee is in trouble. During the high demand season, the banked units that are a low cost power are drawn, and TANGEDCO has to meet the demand by purchase of power at high cost and subsidise the banked units. In Andhra Pradesh, the banked units are not allowed

to be drawn during the months when the utility has to meet high demand. During January, February the utility supplied about 275 MU per day but the same could not be translated to revenue due to the drawal of banked units. Unless the banking concept is suitably modified or completely removed, the euphoria of wind power will not be there. The state is blessed with wind power. But the problem is, as Dr.Kandasamy mentioned, the power is highly infirm. Now forecasting of wind power has improved but TANGEDCO requires proper scheduling from the wind power generators. When generation is not as per schedule, the wind energy generators should store energy or buy from the market and provide to TANGEDCO. That is what western countries are doing. Indian Wind Power Association had taken people to Norway, Denmark where 100 % wind is used. After scheduling, if there is 25 to 30% shortfall, TANGEDCO has either to go for load shedding or buy power from the open market and supply, and when TANGEDCO enters the open market, the power that was selling at Rs.4 per unit becomes Rs.10 per unit. Somebody has to have storage facility. Either wind power has to be stored or the generators can have diesel generators and provide power as per schedule. California is using diesel generators. TANGEDCO had an experience of shortfall in power supply during the month of September, due to the sudden fall in wind power generation, when its thermal units were shutdown for absorbing more wind power. Inspite of having surplus power, TANGEDCO had to resort to load shedding for 5 days when the assembly session was going on. Such a thing has not happened in the history of any Board. Everybody can profit but there should not be profiteers. He stated that banking has to be dispensed with or allowed with certain restrictions by permitting them to draw during periods of low demand and restricted during high demand seasons peak like done in Andhra. A proper scheduling should be done so that TANGEDCO will know when to back down their thermal stations, and when wind power is not as per schedule, the onus should be on the wind power generator to provide as per schedule or some sort of penalty system should be brought in, say, through amendment of PPAs. Unless these kind of measures are taken, banking will be

redundant. The installed capacity will go up to 8000 MW and when 6000 MW is to be banked, and drawn during the months of October to April, the utility will be in trouble.

Thiru Ramesh Kymal - He said that his views presented on banking and tariff were on the investors point of view. Tariff rates coming down is actually a mirage. One cannot look at the Solar prices coming down which are not sustainable. Coal prices will not be low for a long period. The tariffs for wind are not fixed on a weekly basis. The decision being taken this day will hold for the entire control period. Therefore a balanced view has to be taken on the tariff for the renewable energy sector.

Thiru K.Kathirmathiyon: He said that while determining tariff, global warming needs to be considered and renewable energy is to be encouraged. Government of India has fixed a target of 40% renewable energy to be achieved by 2030. At the same time, licensee's problems have also to be looked into. Due to the wind potential in the State, installed capacity of wind power is high, which is 70% of TANGEDCO's installed capacity. Wind power may be a problem to TANGEDCO as power is intermittent but at the national level it has to be encouraged. He suggested that TANGEDCO may take necessary steps to evacuate the entire wind energy and sell to outsiders. CAG has pointed out that TANGEDCO has not evacuated the power. Only after complete evacuation, banking needs to be considered. For the past few days, wind energy is being evacuated completely by the licensee. Banking was introduced as an encouragement to the wind sector. The licensee actually sells the banked units and gets an average cost of power. During periods of peak demand, drop in wind power affects the licensee and licensee has to purchase power at high cost. Therefore banking could be thought of with certain restrictions. Banking could be for a period of six months. It is also noticed that during the last year only 60 MW has been installed. Renewable energy has to be encouraged. All components taken for tariff determination in the consultative paper is at the lower end. The

tariff is lower than that fixed by many other Electricity regulatory commissions like RERC. GERC, CERC, MERC. The minimum tariff was Rs.3.61 and maximum was Rs.6.34. If reasonable tariff is fixed and the entire power is evacuated, the wind mill generators could be encouraged. Regarding, banking charges, the proposed rate as a difference of marginal cost of power and the wind tariff is not viable. It could be fixed as the difference in the cost of energy supplied to the industry and the wind power tariff.

Dr. A.S.Kandasamy - He stated that he is not against revision of tariff. A remunerative price has to be given to the investor. CMD/TANGEDCO has said that the utility's financial resources have gone down. The licensee's liability is to be considered. Banking charges could be raised or tariff marginally increased.

Thiru R.K. Kulshrestha, Chief Electrical Engineer, Railways - He raised the issue of harmonics wherein 15% compensation charges are being asked to be paid for exceeding prescribed limits. The latest wind energy units installed are as per international standards which have inbuilt remedies for harmonics. This should be taken into consideration. He further said that evacuation problems still persist in the state. In respect of their 10MW plant in ICF, CUF has come down due to low evacuation. Banking is not an issue for Railways as they consume all the power. They have abandoned the idea of creating additional capacity in the state and have moved to other states like Rajasthan. He requested to consider this issue also.

Dr. A.S.Kandasamy :Harmonics not only distort the source voltage. It is high pollutant. Harmonics are produced by the loads. Harmonics passes through the transmission/distribution lines and reaches the alternator wherein the emf is generated. This modifies the entire sinusoidal wave. The machines are stated to have inbuilt harmonic filters. He expressed doubts about the functioning of the filters. He cited a case where the measurements showed that the harmonic filtering units were not functioning well. When voltage is distorted, other

consumers get affected. Current harmonic affects the utility. It is for TANGEDCO to measure and take effective steps.

Thiru R.K.Kulshrestha, Railways – He suggested that harmonics may be verified at the time of installation itself. Voltage harmonics only are of relevance and current harmonics should not be taken into consideration. Only the state of Tamil Nadu levies charges for harmonics. No other state has enforced penal charges. If the licensee has invested in suppressing of harmonics, levy of penal charge may be relevant. Similar is the case of power factor. For leading P.F, Kerala gives incentives. In Andhra also it is the same. A comparison may be made with other states and then levy of penalty proceeded with.

Dr. A.S.Kandasamy– The utility does not require leading power factor. It affects the grid. He said that he does not agree with payment of incentives for lead power factor. He said that harmonics should also be measured and penalty levied.

Chairman/TNERC requested Director/Engineering to make the presentation on the issues dealt in the 'Consultative paper for issue of comprehensive tariff order on Solar power'.

Director/Engineering gave the presentation on the 'comprehensive tariff order on solar power'

The views of the members of the SAC are as below:

Dr. A.S.Kandasamy– Many of the educational institutions want to install solar power. Educational institutions may be allowed to install rooftop solar power. Net metering may be permitted and they may be allowed to export power at the rates fixed for the solar power by the Commission. Solar power needs to be encouraged. The State does not have coal reserves. Solar power is more firm than wind power. Regarding the auxiliary consumption, he stated that invertor will

consume some power. The details of current consumption by the invertor are available in the nameplates. He requested the Commission to look into this aspect.

Thiru R.K.Kulshrestha, Railways – Railways has lot of scope for rooftop solar. There is availability of land too. Allowing export of power through net metering may be considered. The life of plant specified as 25 years needs to be reconsidered. Even if one follows the MNRE specification, it is difficult that the plant achieves a life period of 25 years.

Thiru Ramesh Kymal– Net Metering is the only way to have Distributed generation in the factories. When it comes to quality standards solar has no quality standard unlike wind where the price difference band is less than 10%. In the case of Solar, the price difference is over 70% and the reduced price of solar panels is not sustainable as it is a supply demand mismatch and is not due to technological breakthrough and so fixing of tariff should be carefully done. Here again the tariff is not fixed weekly and it is for a period of time. This may be taken into account while fixing the feed in tariff.

CMD/TANGEDCO – He said that TANGEDCO suggests an interest rate of 12% on capital and 12% on working capital and keeping the above rates in view the tariff works out to Rs.4.66. Rajasthan's tariff rate is Rs 4.23. He pointed out that on 16.3.2015, the highest quantum of solar power of 450MW of 600 MW was evacuated. Solar is a firm power compared with wind so TANGEDCO could evacuate it. There was a mention about non evacuation of wind**.** If there is 6000 to 7000 MW of solar power, it can be certain that between 12 to 1 PM, there will be a generation of 4000 MW. To that extent, TANGEDCO can switch off the thermal stations and evacuate**.** But inthe case of wind, unless there is an assurance on the quantum of supply by way of alternate supply from other sources, evacuation will be a problem. Grid is not a problem. Banking is a problem. It is a vicious cycle. Evacuation is a problem because of unreliability of

wind power. Solar power is reliable when compared to wind. TANGEDCO suggests Rs 4.66 per unit for Solar power.

Member I – He has stated that there are two ways of fixing the tariff. One is preferential tariff fixed by the Commission u/s 86(1)(e) and the other is adopting the tariff obtained in the tender floated by the licensee through competitive bidding process. By going for competitive bidding, in different states lower tariffs have been discovered due to severe competition and aggressive bidding. Rajasthan has got around Rs.4.34 per unit and Andhra has got Rs.4.63 per unit. So, TANGEDCO also may consider the same.

Chairman/TNERC - He said that not only for Solar, but in all other cases, the feed in tariff which is fixed by the Commission is the benchmark rate and the utility is free to go for competitive bidding if they are finding a price which is lesser. It is only that the ceiling is fixed. It is only the RPO which is actually to be met. To meet the RPO, like in any other conventional power the utility can go for merit order and fill the gap, till the RPO limit is reached.

CMD/TANGEDCO - TANGEDCO already has PPAs with feed in tariffs, for about 1500 MW, out of which till March it is assumed that only 600 or 650 MW will be commissioned and not more than 700 MW. So this will be relevant only for those who fail to commission before 31stMarch. They will have to go by the new tariff. That is why TANGEDCO has suggested to fix the cost at Rs 4.66. Further, as per State Solar Policy the utility requires at least 3000 MW. For another 1500 MW, TANGEDCO has to go for a tender. This has to be taken up after the elections when the model code of conduct is lifted. CMD stated that TANGEDCO will take up the tender process considering the ceiling fixed by the Commission and hopes to get a further reduction in price.

Thiru Ramesh Kymal - He stated that wind during high wind season is not infirm. Forecasting helps to a certain extent but scheduling is very important for the utility to manage the grid. Wind energy generators are taking steps for

proper scheduling. Scheduling has to be done from the generator end as well as from the consumption side. On the low tariffs for solar power, he said that the companies who have won the bids are all companies who have funds from abroad at very low interest rates and the panels are being imported. It has to be seen whether these are sustainable. Hon'ble Commission should consider the above while fixing the tariff.

Thiru K.Kathirmathiyon – Tamil Nadu Government's steps in fixing a target of 3000 MW power and making solar power compulsory in Government buildings is a welcome measure. Net metering should be considered in a large measure as solar power also helps in reducing global warming as in the case of wind. Recent reports in newspapers suggest that forecasting accuracy of wind has reached 80%. He has suggested that all the amendments issued to various regulations may be updated and consolidated.

CMD/TANGEDCO – There is 65% reliability in forecasting done by wind. Proper scheduling of power will help the utility. Forecasting and scheduling requires separate discussion.

Thiru C.Muthusami – Solar power needs to be encouraged. Small scale industries use rooftop solar power. Attractive tariffs needs to be fixed.

After completion of the presentation and discussion in respect of Consultative Papers on Wind and Solar, Director/Tariff presented the important parameters adopted for determination of Tariff for Bagasse based Co-generation Plants and Biomass based Power Plants.

Director/Tariff discussed the details relating to the Capital Cost of the Project, Station Heat Rate, GCV, and the resultant Specific Fuel Consumption for generation of power, tariff proposed in Consultative Paper and its parameters. Director/Tariff after his presentation clarified the doubt raised by Dr.A.S. Kandasamy, SAC Member in regard to the method of Depreciation adopted. He

clarified that the Straight Line Method of Depreciation is adopted by the Commission for calculating the Depreciation. Further, he clarified with respect to the query raised by Thiru. G. S. Rajamani, Member, SAC that the insurance forms part of O & M Charges, however it is provided separately as per Hon'ble APTEL's directives in Appeal against Wind Tariff Order of 2012 issued by the Commission.

Dr. A.S.Kandasamy, Member, SAC - He enquired whether the presentation made by Director/Tariff for Biomass also includes the Biogas projects. Further, he suggested that instead of calling as Non-Conventional Energy Sources, the same may be called as Renewable Energy Sources.

Chairman/TNERC – Clarified that there are other sources like Municipal Solid Waste, Biogas. TANGEDCO has already signed agreement with them. Separate Orders will be issued later.

CMD/TANGEDCO – In Co-gen Power Plants, during non-crushing season coal is used as fuel. The procurement of power from Bagasse based Co-generation Plant is subject to Merit Order Dispatch and if lower tariff is fixed the same will not come under Merit Order Dispatch and they can supply power to TANGEDCO. Now they are discounting and instead of discounting the Commission may fix a lower tariff.

Chairman/TNERC - Renewable Energy is considered as separate and they have been assigned must run status. These energies do not come under Merit Order Dispatch. Grid Security alone can stop functioning of any of these machines. With respect to usage of Coal, the moment the Co-gen Plant uses more than 15% of the Coal, they lose the NCES status and will come under the regular conventional power plant. TANGEDCO need not take whatever is available. It has to comply only with Renewable Purchase Obligation (RPO) and has to decide on how much they can dispatch. Lot of resources are coming in and there are tariff with and without Accelerated Depreciation benefits. First we

may go in for the tariff with Accelerated Depreciation and the rest can be utilized later. TANGEDCO can take commercial decisions.

Member (I)/ TNERC – Bagasse based Co-gen also uses coal as input and in such case we should have dual tariff.

CMD / TANGEDCO – The Dispatching is done based on MOD and the variable cost is Rs.3.91 per unit and the total cost is Rs.4.70 and Rs.4.90. The power plant has to give discount to come within the MOD and getting dispatched. Hence, instead of fixing higher tariff and then the generators giving discount, Commission can fix a lower tariff. The Load Dispatch Centre issues dispatch instructions to cheaper power and for the must run also the tariff may be fixed between Rs.4.20 to Rs.4.30 per unit. The dispatch of power is related to farmers' issue, sugar cane price, payment to farmers will also become an issue. Hence, instead of fixing at a higher tariff, Commission may fix a lower tariff. There will be moderation. If I don't dispatch then all sugar mills will complain that TANGEDCO is not paying and hence, they were not able to pay the farmers.

In reply to the issue raised by CMD/TANGEDCO, the Chairman/TNERC has replied that TNERC has fixed certain tariff and Appeal has also been filed against the Orders of TNERC. Hon'ble APTEL has given directions to redo it and the Commission has no other way than to follow the directions and to fix the tariff. TNERC has to fall in line with CERC & APTEL to fix the tariff.

The matter of solar bundled power was raised and the Chairman/TNERC clarified that it is not hybrid, the new Tariff Policy talks about the renewable generation obligation which means that every Conventional power plant has to necessarily have a quantum of renewable power. The cost will be bundled and the rate will be fixed by CERC as per norms and it will be scheduled separately.

Thiru R.K.Kulshreshta, Member, SAC- He stated that the Railways is going to purchase directly and some people are offering bundled power. He further stated that they don't have any issues like banking.

Chairman/TNERC – has stated that the new tariff policy enable the Railways to be a Deemed Utility and it need not pay CSS. Further, more concessions are also offered to Railways.

Member (I) - thanked all the members for their participation and valuable suggestions made and assured that all information given would be considered by the Commission.

Capital cost	62000000
PLF	27.15%
Depreciation	3.60%
Interest	13.000% (10 + 1) yr.
Dt:Eq.	70 &30
O & M	1.1% on85%+0.22% on 15% with 5 % escl.
Insurance	0.75 % on 85% of capital cost to be reduced by 0.5% of previous year's value
Residual value	10%
ROE	20.00%
Life of Plant	25 Yr.
Aux.consump.	0%
W.Cap.	O&M 1m +Receivables 2m.
Inst. On W.Cap.	13.50%
Discount factor	10.21%

ANNEXURE III

Wind Tariff

Tariff Details--- Wind

Gross Gen	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340
Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ROE	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000	3720000
Depreciation	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200	1897200
Insurance cost	395250	393274	391307	389351	387404	385467	383540	381622	379714	377815	375926	374047	372176	370316	368464	366622	364789	362965	361150	359344	357547	355760	353981	352211	350450
Interest on Loan	5642000	5642000	5077800	4513600	3949400	3385200	2821000	2256800	1692600	1128400	564200														
O & M	600160	630168	661676	694760	729498	765973	804272	844485	886710	931045	977597	1026477	1077801	1131691	1188276	1247690	1310074	1375578	1444357	1516574	1592403	1672023	1755624	1843406	1935576
IOWC	288983	289973	278029	266140	254308	242536	230827	219185	207612	196112	184689	173347	175076	176894	178805	180814	182926	185145	187478	189930	192507	195215	198060	201050	204192
Total	**12543593**	**12572615**	**12026013**	**11481051**	**10937810**	**10396376**	**9856838**	**9319292**	**8783835**	**8250573**	**7719613**	**7191071**	**7242254**	**7296101**	**7352745**	**7412325**	**7474988**	**7540888**	**7610185**	**7683048**	**7759657**	**7840198**	**7924865**	**8013867**	**8107418**
	5.274	**5.286**	**5.056**	**4.827**	**4.599**	**4.371**	**4.144**	**3.918**	**3.693**	**3.469**	**3.246**	**3.024**	**3.045**	**3.068**	**3.092**	**3.117**	**3.143**	**3.171**	**3.200**	**3.230**	**3.263**	**3.296**	**3.332**	**3.370**	**3.409**
IOWC																									
O & M	50013	52514	55140	57897	60792	63831	67023	70374	73892	77587	81466	85540	89817	94308	99023	103974	109173	114631	120363	126381	132700	139335	146302	153617	161298
Receivables	2090599	2095436	2004335	1913508	1822968	1732729	1642806	1553215	1463973	1375095	1286602	1198512	1207042	1216017	1225457	1235387	1245831	1256815	1268364	1280508	1293276	1306700	1320811	1335644	1351236
Total	2140612	2147950	2059475	1971405	1883760	1796560	1709829	1623589	1537865	1452683	1368069	1284052	1296859	1310324	1324480	1339362	1355004	1371446	1388727	1406889	1425976	1446035	1467113	1489262	1512534
IOWC	288983	289973	278029	266140	254308	242536	230827	219185	207612	196112	184689	173347	175076	176894	178805	180814	182926	185145	187478	189930	192507	195215	198060	201050	204192
Discount Factor	1	0.91	0.82	0.75	0.68	0.62	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Present Value	**5.27**	**4.80**	**4.16**	**3.61**	**3.12**	**2.69**	**2.31**	**1.98**	**1.70**	**1.45**	**1.23**	**1.04**	**0.95**	**0.87**	**0.79**	**0.73**	**0.66**	**0.61**	**0.56**	**0.51**	**0.47**	**0.43**	**0.39**	**0.36**	**0.33**

Levelised tariff	**4.16**

Determination of accelerated depreciation benefit

Depreciation amount	90%																								
Book depreciation rate	5.28%																								
Tax depreciation rate	80%																								
Income Tax (Normal rate)	33.990%																								
Capital Cost	62000000																								
Years	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Book Depreciation	2.64%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	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%
Bk dep in lakhs	1636800	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	3273600	1785600	0	0	0	0	0	0	0
Accelerated Depreciation																									
Opening	100%	50%	5%	1.00%	0.20%	0.04%	0.01%	0.00%	0.000%																
Allowed	50%	45%	4.00%	0.80%	0.16%	0.03%	0.01%	0.000%	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
Closing	50%	5%	1.00%	0.20%	0.04%	0.01%	0.00%	0.000%	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
Accelerated Depreciation	31000000	27900000	2480000	496000	99200	20250	6750	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
Net dep benefit	29363200	24626400	-793600	-2777600	-3174400	-3253350	-3266850	-3273600	-3273600	-3273600	-3273600	-3273600	-3273600	-3273600	-3273600	-3273600	-3273600	-1785600	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tax benefit	9980552	8370513	-269745	-944106	-1078979	-1105814	-1110402	-1112697	-1112697	-1112697	-1112697	-1112697	-1112697	-1112697	-1112697	-1112697	-1112697	-606925	0	0	0	0	0	0	0
Discount factor	1.00	0.91	0.82	0.75	0.68	0.62	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Average discount factor	1.00	0.95	0.87	0.79	0.71	0.65	0.59	0.53	0.48	0.44	0.40	0.36	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.17	0.15	0.14	0.12	0.11	0.10
Net Energy gen	1189170	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340	2378340
Energy gen with DCF	1189170	2268173.72	2058047.11	1867386.91	1694389.72	1537419.22	1394990.67	1265756.89	1148495.50	1042097.36	945556.08	857958.52	778476.11	706357.05	640919.20	581543.60	527668.63	478784.71	434429.47	394183.35	357665.68	324531.06	294466.07	267186.35	242433.85
Tax benft with DCF	9980552	7982786	-233418	-741278	-768692	-714826	-651295	-592179	-537319	-487541	-442375	-401392	-364207	-330466	-299851	-272073	-246868	-122180	0	0	0	0	0	0	0
AD benefit	0.46																								
Levelised tariff with AD	3.70																								