

1. Introduction

This Tariff order is the second on Biomass based power generation. This is a culmination of a consultative process spread over eleven months beginning in July 2008. Tamil Nadu being a pioneer in renewable energy generation, the Commission has analysed the connected issues in great depth before finalising this comprehensive tariff order.

1.1 The importance of Renewable Energy Sources

Global concern over pollution and several related issues caused by the increase in green house gas emission and consequent changes in climate have resulted in a paradigm shift in the approach towards development of the energy sector in many countries. The need for adoption of clean technology, improving end use efficiency and diversifying energy bases etc., have all been seriously considered by the Government of India since the Sixth Five Year Plan and the country is poised for a considerable increase in the use of renewable energy sources in its transition to a sustainable energy base. Renewable energy sources such as wind, solar, hydro and bio mass not only augment energy generation but also contribute to improvement in the quality of the environment, drought control, energy conservation, employment generation, upgrading of health and hygiene, social welfare, security of drinking water, increased agricultural yield and production of bio-fertilizers. The pace of development has been accelerated by the Government through promotional policies and fiscal and tax incentives.

1.2 Commission's Regulation on New and Renewable Energy Source

Section 61 of the Electricity Act 2003 (Central Act 36 of 2003) stipulates that the State Electricity Regulatory Commission shall specify the terms and conditions for the determination of tariff. In accordance with the above stipulation, the Commission notified the "Power Procurement from New and Renewable Sources of Energy Regulations 2008" on 8-2-2008. It has been specified in the above Regulation that the tariff determined by the Commission shall be applicable for a period of twenty years and the control period may be ordinarily two years.

1.3 Commission's order on Non Conventional Energy Sources (NCES) based generation and allied Issues

The Commission notified Order No. 3 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 15-5-2006. The said order stipulates tariff rates for power procurement by the distribution licensee from Wind Energy Generators (WEGs), biomass based generators and bagasse based co-generators. In the said order the Commission decided to adopt a control period of three years. The next tariff revision is due from 15.6.2009.

1.4 Representation from biomass based power plant promoters

For the past one year, biomass based power plant developers have repeatedly represented to the Commission that fixed costs such as capital cost, interest rates, maintenance cost, etc and variable cost of the biomass fuel have considerably increased during the last two years. They have been repeatedly requesting the Commission to revise the tariff before the control period of three years, taking into account the above escalation in fixed and variable costs. Though there are many factors, which have contributed for the decline in capacity addition, it has been widely reported that the main factor for the decline in capacity is the unattractive tariff in Tamil Nadu.

1.5 Commission's initiative on tariff revision for NCES based generation

In response to the above representations, the Commission conducted a round table conference on 16-7-2008 to elicit the views of wind energy experts, wind turbine manufacturers, wind energy developers, biomass based power generators, bagasse based co-generators and other stake holders. Officials from the Ministry of New and Renewable Energy Source (MNRE), Government of India, Indian Renewable Energy Development Agency Limited (IREDA), Tamil Nadu Energy Development Agency (TEDA) and Tamil Nadu Electricity Board (TNEB) participated in the conference. Based on the views of the participants, the Commission has decided to initiate the process of tariff revision for power procurement from biomass based power generation by distribution licensees in the State.

1.6 Commission's order on relaxation of control period

The Commission in its order dated 19-09-2008, against the petitions M.P. Nos. 9, 14 & 23 of 2008 filed by Indian Wind Energy Association (InWEA) and others decided that "the control period of three years as specified in Order No. 3 dated 15.05.2006 is waived from the date of issue of this order".

2. Provisions of the Electricity Act 2003, National Electricity Policy and National Tariff Policy on NCES.

2.1. Preamble of the Electricity Act 2003 reads as follows:

*"An Act to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and **environmentally benign policies** constitution of Central Electricity Authority, Regulatory Commissions and establishment of Appellate Tribunal and for matters connected therewith or incidental thereto."*

2.2. Section 86 (1) (e) of the Electricity Act 2003 states that *the State Commission shall promote co-generation 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.*

2.3. Section 61 (h) of the Electricity Act 2003 states that *the Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for 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.*

2.4. Related provisions of the National Electricity Policy are quoted below.

“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.”

“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.”

2.5. Para 6.4 of the National Tariff Policy states as below:

“(1) Pursuant to provisions of section 86(1)(e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006. It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission.

(2) Such procurement by Distribution Licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.

(3) *The Central Commission should lay down guidelines within three months for pricing non-firm power, especially from non-conventional sources, to be followed in cases where such procurement is not through competitive bidding.*”

2.6. A reading of the National Tariff Policy, National Electricity Policy and the Electricity Act 2003 establishes the overwhelming emphasis on environmental friendly renewable sources of energy such as wind, hydel, solar and biomass.

3. Biomass based Power Scenario

3.1. Total installed capacity of power generation in the country is 1, 47,458 MW as on 31.1.2009. The contribution of NCES power to the country’s installed capacity is around 13,242 MW (*Source: Central Electricity Authority*). The NCES power represents 9% of the total installed capacity.

3.2 The year wise capacity addition of biomass based power plants in Tamil Nadu over the past 10 years is furnished below:

Period	capacity addition (MW)
Up to 1999-2000	12.00
2000-01	Nil
2001-02	Nil
2002-03	1.60
2003-04	Nil
2004-05	19.50
2005-06	7.75
2006-07	37.50
2007-08	26.50
2008-09 (upto 31-01-09)	42.70
Total	147.55

3.3. The steady increase in capacity addition of biomass based power generation in Tamil Nadu is mainly attributed to the favourable topographical conditions and the policies of the State that encourage NCES.

4. Generation – Demand gap in Tamil Nadu

4.1 The generating capacity connected to TNEB's grid including the allocation from Central Generating Station is 10214.55 MW as on 31.01.2009 comprising 2970 MW from TNEB's four thermal stations, 516 MW from four gas turbine stations, 2187 MW from 33 hydro stations, 17.55 MW from TNEB's wind farm, 1180 MW from private sector power projects, 214 MW as contribution to Tamil Nadu grid by sale of electricity from captive generating plants, 2825 MW as Tamil Nadu's share from central generating stations and 305 MW as external assistance.

4.2 Generating capacity from privately owned wind farms is 4119 MW. The installed capacity of cogeneration in sugar mills is 466.10 (including 20 MW contributed from co-operative sugar mills) MW and biomass power project is 147.55 MW.

4.3 The average power availability during 2008-09 is around 8000 MW while the peak demand is around 9500 MW which leaves a deficit of around 1500 MW. Since the infirm wind generation contributes about 15% to 20% of the peak demand during wind season and TNEB has no standby capacity to take care of this infirm power fully, in case of unexpected meteorological changes, the deficit goes up to 2000 MW. This deficit is likely to increase in the next few years since the capacity addition is expected to be less than the projected increase in demand. Therefore, any addition in power generation will help the State to a great extent to tide over the shortage of power.

5. Applicability of this Order

Order No.3 dated 15-5-2006 of the Commission lays down a control period of three years for that order and therefore normally the next order should take effect from 15-5-2009 or thereafter. The Commission in the Common Order in M.P.Nos.9, 14 and 23 of 2008 dated 19-9-2008 has ruled that the control period of three years specified in order No.3 dated 15-5-2006 is waived from the date of issue

of that order. The control period of three years, thus, stands terminated on 19-9-2008. Therefore, the Commission holds that all the biomass based power plant commissioned on or after 19-9-2008 shall become eligible for the benefits of the present order, subject to the condition that the monetary benefits shall accrue from the date of the present order. The existing agreements between the generators and the distribution licensee shall continue to be valid. The parties to the agreement are at liberty at any time to renegotiate the existing agreement mutually in accordance with the present order. The agreements between the generators and the distribution licensee in relation to all plants commissioned on or after 19-9-2008 shall be in conformity with this order.

6. Tariff Determination Process

6.1 With regard to tariff determination process, the relevant portion of Regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008 are reproduced below:

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) conducting public hearing on the above.*
- d) issuing general / specific tariff order for purchase of power from new and renewable sources based generators.*

6.2. The Commission in its order dated 19-09-2008, against the petitions M.P. Nos. 9, 14 & 23 of 2008 filed by Indian Wind Energy Association (InWEA) and others has ordered that “the prayer for revising the tariff for the NCES generators would be considered by the Commission separately”. In continuation of the above order, the Commission has issued this order

7. Tariffs / Pricing Methodology

The relevant portion of Tariff / Pricing Methodology as specified in Regulation 4 of the Commission's above said Regulation 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.

7.1 Preferential tariff or by bidding process

7.1.1. At this juncture it is relevant to discuss the following stipulations of National Tariff Policy which are reproduced below:

Section 6.4(1): *Pursuant to provisions of section 86(1)(e) of the Act, the appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006. It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the appropriate Commission.*

Section 6.4(2): *Such procurement by distribution licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.*

7.1.2. A view has been expressed by some stakeholders that competitive bidding process should be adopted for procurement of renewable energy, although the dominant opinion is in favour of continuing the present preferential tariff. The capital cost, variable cost and the cost of generation of renewable energy generators are still higher than coal based generation. It will take quite some time before renewable energy technology can compete with the conventional energy sources in terms of cost effectiveness. The Forum of Regulators, which is a body consisting of the Chairmen of all the State Electricity Regulatory Commissions and the Central Electricity Regulatory Commission considered this issue and has recommended that cost based tariff on reasonable norms should be permitted for renewable energy. The Commission endorses these recommendations of the Forum of Regulators and decides to continue the present system of preferential tariff.

7.2 Single Part vs. Two Part Tariff

In the Commission's order No. 3 dated 15-05-2006, the Commission adopted the "**cost plus single part average tariff**". Generally, the two

part tariff is recommended when the fuel cost varies sharply. The variable component of tariff would take care of such price escalation. The stakeholders expressed the view that the two part tariff is convenient to accommodate the fuel cost escalation. Accordingly, cost plus two part tariff is adopted to accommodate the variation in the fuel cost.

7.3 Project Specific Vs Generalized Tariff

A generalized tariff mechanism would provide incentive to the investors for use of most efficient equipment to maximize returns and for selecting the most efficient site while a project-specific tariff would provide each investor, irrespective of the machine type and the site selected the stipulated return on equity. It would shield the investor from the uncertainties involved in capacity utilization due to machine type and the site location. Capacity of most of the generators is limited to a few MWs. A view has been voiced by some stake holders pleading for project specific tariff. Some others suggested that as and when such occasion arises the Commission could take a view. Commission decides to adopt cost plus two parts generalized tariff. The Commission decides that if a larger capacity promoter seeks a project specific tariff, that application could be considered separately subjecting it to scrutiny.

8. Components of tariff

The following are the components of tariff for biomass based power generation:-

- 1 Capital investment
- 2 Plant Load Factor (PLF)
- 3 Debt-equity ratio
- 4 Term of the loan
- 5 Interest rate
- 6 Return on equity
- 7 Life of plant and machinery
- 8 Depreciation
- 9 Operation and maintenance expenditure
- 10 Insurance expenditure
- 11 Specific fuel consumption
- 12 Fuel Cost

- 13 Working Capital
- 14 Interest on Working Capital
- 15 Auxiliary Consumption

8.1 Capital Investment

8.1.1. The participants in the Expert Committee Meeting held on 16-7-2008 recommended a capital cost of Rs.5 to 5.5 crores per MW. TEDA was requested in the meeting to undertake a study on the cost escalation. No report from TEDA has been received by the Commission so far. The Indian Renewable Energy Development Agency (IREDA) reported on 26-12-2008 in their letter to the Commission that the capital cost ranged from Rs.4.70 crores to Rs.5.50 crores depending on boiler pressure and capacity. In their letter dated 9-2-2009, IREDA has stated that Biomass Power Projects are generally set up with boiler pressure of 66 ata and the capital cost of this prescription varies from Rs.4.70 crores to Rs.5.03 crores per MW. The Ministry of New and Renewable Energy Sources, Government of India has opined that the capital cost may be linked to escalation in prices of major inputs such as steel and cement. The TNEB has suggested a capital cost of Rs.4.65 crores per MW. Pranam Consultants have suggested a capital cost of Rs.4 crores per MW quoting a study of the Central Electricity Authority conducted in 2005. Evergreen Power Limited suggested a capital cost of Rs.7.5 crores per MW. Mohan Breweries suggested a capital cost of Rs.6 crores per MW.

8.1.2. IREDA has been financing Bio Mass and Co-generation projects since 1987. They have financed projects with a total capacity of 809 MWs at a cost of Rs.1533 crores, of which projects totaling 677 MW capacity have been commissioned. Therefore, the Commission places reliance on the experience of this public sector financing agency and determines the capital cost at Rs.4.87 crores per MW which is the average capital cost of 66 ata projects. As regards the cost of evacuation raised by the TNEB in the context of capital cost, the Commission wishes to clarify that the capital cost of Rs.5.10 crores per MW mentioned in the concept paper did not include the cost of evacuation. Evacuation is dealt with in Clause 3 of the Power Procurement from New and Renewable Sources of Energy Regulations 2008 of the Commission. This Clause is in conformity with the Sections 39 and 40 of the Electricity

Act 2003. Further, the Commission apportions the capital cost on machineries, civil works and land at 85%, 10% and 5% respectively.

8.2 Plant Load Factor (PLF)

The Plant Load Factor (PLF) of a biomass based power plant is a function of fuel availability, moisture content of the fuel, mechanical efficiency, age of the machine, steam pressure, heat rate and calorific value of the bio fuel. The Commission adopted a plant load factor of 80% in the last Order. The actual plant load factor of the biomass based power plants furnished by the TNEB for the year 2008-09 (upto January 2009) varied from 3% to 48%. The PLF for 2007-08 varied from 5% to 70%. The Ministry for New and Renewable Energy, Government of India wanted the PLF to be determined on the basis of past achievement. The Stakeholders have suggested PLF in the range of 70% to 75%. The TNEB proposed a PLF of 80%. The Commission wishes to observe that the poor capacity utilization of the biomass plants is attributable to the exorbitant fuel cost. Other users of biomass fuel have been procuring bio fuels at a much higher price making it unviable for biomass based power plants. Although the Commission would like to retain the Plant Load Factor of 80% which is physically achievable, all the same the question of achieving such capacity utilization through remunerative pricing of biomass fuel needs to be addressed effectively. In the final analysis, the Commission decides to retain the Plant Load Factor at 80%. Pricing of biomass fuel is being dealt with separately.

8.3 Debt - Equity Ratio

The Tariff Policy lays down a debt equity ratio of 70 : 30 for power projects. The Commission has adopted this ratio in the Tariff Regulations 2005 as well as in Order No.3 dated 15-5-2006. The Commission decides to retain the same ratio for this order.

8.4 Term of the Loan

The Commission fixed the tenure of term loan as ten years with moratorium of one year in Order No.3 dated 15-5-2006 on the consideration that term loans sanctioned by IREDA stipulated this tenure. The Commission proposes to retain the same tenure.

8.5. Interest Rate

The Indian Renewable Energy Development Agency which is a major financier of renewable energy projects in their letter dated 9-2-2009 have stated that project developers are mainly new and may not have any track record / rating and therefore has recommended interest rate of 13% to 14%. Some of the stakeholders have demanded interest rate in the range of 14% to 15.75%. The TNEB considers that a rate of 9% to 10% should be adequate on the ground that public financial institutions should offer a concessional rate for renewable energy generators. But, in reality there is no preferential treatment for renewable energy projects and therefore the Commission considers that interest rate of 12% is reasonable.

8.6 Return on Equity

8.6.1. Order No.3 dated 15-5-2006 prescribed a return on equity of 16% pre tax for biomass projects, although the Tariff Regulations 2005 of the Commission provides 14% post tax return for conventional power projects (which works out to 17.63% pre tax on the assumption that minimum alternate tax of 10.3 % is payable during the first ten years and corporate tax of 30.9% is payable during the remaining ten years). The treatment meted out to renewable energy projects is less favourable than conventional power projects. Therefore, the Commission proposed in the concept paper to offer 14% post tax return for biomass projects equivalent to 17.63% pre tax. Subsequent to the preparation of the consultative paper the Central Electricity Regulatory Commission has notified on 20th January 2009 a return of 15.5% post tax effective from 1-4-2009. The equivalent of 15.5% post tax would be 19.85% pre tax. The stakeholders have put forth demands for post tax return of 16% and 15.5%.

8.6.2. The TNEB is not in favour of converting the post tax return to a pre tax return. Although there is limited validity in their plea, it will be difficult in practice to assess the actual tax liability of each biomass generator. Therefore, it would be more practical to determine a pre tax return on equity, particularly in the case of small generators. The concept of post tax return can at best be implemented in conventional power projects. Therefore, the Commission decides that 19.85% pre-tax return on equity may be allowed for the biomass projects.

8.7. Life of Plant and Machinery

The Commission has considered a plant life of 20 years in the Order No.3 dated 15-5-2006. The Commission proposes to retain the same life period for this order.

8.8 Depreciation

The concept paper proposed a depreciation rate of 7.84% per annum at par with the Order No.3 dated 15-5-2006 of the Commission. The Commission has adopted a depreciation rate of 4.5% per annum for wind energy generators in Order No.1 of 2009 dated 20-3-2009, assuming a life period of 20 years and residual value of 10%. The Commission adopts the same rate of 4.5% per annum for bio mass plants also. 85% of the capital cost shall be reckoned as the cost of the plant and machinery and therefore depreciation shall be calculated with reference to this value.

8.9 Operation and Maintenance expenses

Presently, operation and maintenance expenses are charged as a percentage of capital investment. The Commission would like to modify this practice to lay down that 85% of the capital investment, being the plant and machinery cost, may be reckoned as the basis for calculating O & M expenses. The present rate of 4.5% per annum is retained. Escalation of 5% may commence from the second year. With regard to maintenance of land and civil works, which constitutes 15% of capital investment, 0.9% of 15% may be allowed every year with annual escalation of 5%.

8.10 Insurance Expenditure

The Commission proposes to modify the existing procedure of computing insurance charges. Insurance charges will be computed with reference to 85% of the capital investment, which represents the cost of plant and machinery. The Commission proposes an insurance rate of 0.75% of the machinery cost for the first year to be reduced by half a percent of the previous year's insurance cost every year thereafter.

8.11 Specific fuel consumption

The Commission adopted a specific fuel consumption of 1.16 kg per kwhr, station heat rate of 3700 kcal per kwhr and calorific value of 3200 kcal per kg in the last Order. The concept paper proposed station heat rate of 3518 kcal per kwhr, calorific value of 3200 kcal per kg and specific fuel consumption of 1.1 kg per kwhr. IREDA has suggested specific fuel consumption in the range of 1.30 – 1.40 kg per kwhr. The Biomass Power Producers Association has recommended a specific fuel consumption of 1.36 kg per kwhr. Pranam Consultants suggested a specific fuel consumption of 1.56 kg per kwhr and heat rate of 4500 kcal per kwhr. Empee Distilleries has suggested a specific fuel consumption of 1.16 kg per kwhr. Auromira and Mohan Breweries have suggested a specific fuel consumption of 1.62 – 1.9 kg per kwhr and station heat rate of 4250 kcal per kwhr. Aurobindo Agro Energy has suggested a specific fuel consumption of 1.3 kg per kwhr. TNEB recommends a ceiling of 1.10 kg per kwhr for specific fuel consumption. Taking into account the diverse opinions, the Commission decides to fix the specific fuel consumption at 1.20 kg per kwhr, lower than the figure suggested by IREDA. The calorific value, which is a characteristic of the fuel, is retained at 3200 kcal per kg and the station heat rate is reckoned at 3840 kcal per kwhr.

8.12 Fuel cost

A major factor responsible for under utilization of the capacities of biomass plants is the high cost of biomass fuels, which makes it unremunerative for power generation. Biomass fuels are utilized in other industries too. These industries are ready to offer much higher price for biomass fuels - much higher than the price of Rs.1000 / MT fixed in Order No.3 dated 15-5-2006. Thiru T.B.Chikkoba, Member of the State Advisory Committee considers Rs.2000 / MT as a reasonable price. Some of the stakeholders have demanded fuel price in the range of Rs.2400 to Rs.2500 / MT with an annual escalation of 5%. The TNEB considers that upper ceiling of Rs.1200 / MT is adequate. The Ministry for New and Renewable Energy, Government of India has recommended an additional Rs.200 / MT towards the cost of freight, loading, unloading, cutting and chipping. In order to revive the biomass based power generation, the Commission believes that it is necessary to enhance the fuel price and bring it some where close to the market value. In our opinion, Rs.2000/-

per MT with provision of 5% escalation per annum should serve as a reasonable price to ensure optimum capacity utilization of biomass based power plants.

8.13 Working Capital

The present order permits working capital of two months on account fuel and two months for O & M expenses. The concept paper has proposed fuel stock for two months, O & M expenses for two months and receivables for one month. Revision of working capital for receivables is necessitated as a fact that the grace period permitted to the licensee for settlement of the dues is one month. The Biomass Power Producers Association and Aurobindo Agro Energy have suggested fuel stock of three months, O & M expenses of two months and receivables of two months. TNEB has recommended O & M expenses for one month and fuel stock for one month. As the Commission proposes to provide one month working capital on account of receivables, it is sufficient to provide for one month working capital on account fuel stock and O & M expenses.

8.14 Interest on working capital

The present order provides for an interest rate of 11% for working capital. The concept paper has suggested an interest rate of 12%. IREDA has recommended an interest rate of 13% to 14%. Biomass Power Producers Association and Aurbindo Agro Energy have sought an interest rate of 14%. Auromira suggested an interest rate of 13%. Mohan Breweries hitches for an interest rate of 15.75%. TNEB considers 11% interest as reasonable. The Commission believes that an interest rate of 12% is reasonable in the present context. The same rate has been adopted for term loan.

8.15 Auxiliary consumption

The present Order permits utilization of 9% of the generated power towards auxiliary consumption. The concept paper proposes to retain the rate of auxiliary consumption at 9%. IREDA has suggested a rate of 10%. The Ministry for New and Renewable Energy, Government of India has proposed an additional 1% of auxiliary consumption for cutting and chipping operations. Pranam

Consultants and Auro Mira have suggested a rate of 10%. Thiru K.Raghu, President of Biomass Power Producers Association considers 10 to 10.5% auxiliary consumption as reasonable. Mohan Breweries recommends a rate of 11%. The TNEB accepts the 9% rate proposed in the concept paper. The Commission accepts the suggestions of Ministry for New and Renewable Energy and IREDA and fixes the auxiliary consumption at 10%.

9. Related Issues

The following are the related issues for energy generated from biomass power plant:

1. Transmission and wheeling charges
2. Cross subsidy surcharge
3. CDM benefits
4. Reactive power charges
5. Grid availability charges
6. Adjustment of energy generated
7. Scheduling and system operation charges
8. Application fees and Agreement fees
9. Billing and payments
10. Payment security and Security deposit
11. Power factor incentive / disincentive
12. Metering
13. Evacuation of Biomass energy
14. Energy purchase agreement
15. Energy wheeling agreement
16. Renewable energy purchase obligation
17. Control period

9.1 Transmission and Wheeling charges

Currently transmission and wheeling charges have been fixed at 3% for distances within 25 kms. and 6% for distances beyond 25 kms. The concept paper proposed to retain the same charges. Transmission and wheeling

charges for wind energy generators has been fixed at 5% uniformly by the Commission in Order No.1 of 2009 dated 20-3-2009. The Commission wishes to prescribe the same uniform rate of 5% for biomass generators irrespective of distance. As regards consumption in LT services, the transmission and wheeling charges are fixed at 7.5% as in the case of wind generators.

9.2 Cross subsidy surcharge

At present order No.2 dated 15-5-2006 of the Commission prescribes the rates of cross subsidy surcharge. The rate varies from 97 paise to Rs.3.02 paise per unit depending on the category of the consumer and the voltage level. The State Electricity Regulatory Commissions of Maharashtra, Uttar Pradesh and Andhra Pradesh have done away with cross subsidy surcharge altogether. Gujarat State Electricity Regulatory Commission has exempted renewable energy sources from cross subsidy surcharge. The TNEB has chosen to relinquish temporarily, since November 2008, the cross subsidy surcharge leviable in terms of Order No.2 of the Commission. The TNEB has opposed preferential treatment for renewable energy generators in the matter of cross subsidy surcharge. The Commission believes that it is time for Tamil Nadu to make a beginning in this respect and therefore, the Commission decides to levy 50% of the cross subsidy surcharge for biomass based power generators.

9.3 CDM benefits

Undoubtedly, a promoter of biomass energy is required to put in lot of efforts to secure the benefits of Clean Development Mechanism and therefore, there is merit in the views of certain stakeholders that the entire credit should accrue to the promoter as it obtains now. Some State Commissions have permitted the distribution licensee to share 25% of the CDM benefits. The Forum of Regulators has considered this issue and have recommended that 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. The Commission accepts the formula recommended by the Forum of Regulators.

9.4 Reactive power charges

Indian Electricity Grid Code promulgated by the Central Electricity Regulatory Commission came into force on 1-4-2006. Clause 1.7 of the Code prescribes reactive energy charges of 5 paise / kvarh with effect from 1-4-2006 with an escalation of 0.25 paise / kvarh every year thereafter. The present order stipulates reactive power charges at 6 paise / kvarh. The Commission wishes to adopt the Indian Electricity Grid Code and therefore prescribes 5.75 paise / kvarh as on 1-4-2009 and escalated by 0.25 paise / kvarh every year thereafter.

9.5 Grid Availability Charges

At present, the biomass power plants are being treated at par with fossil fuel based power plants for levy of grid availability charges, start up power, demand charges and energy charges as per Order No.2 dated 15-5-2006 of the Commission. The Commission proposes to retain the same charges for this Order also. As captive use of biomass power plants has been permitted for LT consumption in this Order, the Commission decides that LT consumers shall pay the tariff applicable to temporary supply in the case of outage of the generator. Similarly, the LT captive consumer shall pay to the licensee the appropriate tariff whenever the scheduled generation does not materialize or when consumption exceeds generation.

9.6 Adjustment of Generated Energy

9.6.1 Section 9 (2) of the Electricity Act 2003, confers on the captive generator the right to open access for the purpose of carrying electricity from the captive plant to the destination of his use. Therefore, a renewable energy generator shall be entitled to adjust the generated energy for captive consumption whether as a LT or a HT consumer. As regards sale to third parties, Clause 11 of the Intra State Open Access Regulations 2005 of the Commission, which prescribes a minimum limit of 1 MW, shall apply to renewable energy also.

9.6.2 Views have been expressed by some stakeholders against adjustment of captive generation for LT services. Acceptance of such a view would run counter to law and therefore, the Commission does not favour that view.

9.7 Scheduling and system operation charges

The scheduling and system operation charges have been prescribed in Order No.2 dated 15-5-2006 of the Commission. The prescribed charges are Rs.1000 / day irrespective of capacity. With a view to incentivise renewable energy project, the Commission, by an amendment to the Order No.2 , prescribed charges of Rs.1000 / day per 1.65 MW and above. For capacity less than 1.65 MW, proportionate charges were prescribed. This order shall continue to apply for biomass generators.

9.8 Application fees and agreement fees

9.8.1 The Intra State Open Access Regulations 2005 of the Commission were amended in 2008 to provide for concessional application fees and agreement fees for generators of non conventional and renewable sources of energy. The application fees under the Energy Wheeling Agreement was fixed at Rs.200 per MW subject to a maximum of Rs.5000 and the agreement fees under Energy Wheeling Agreement was fixed at Rs.2000 per MW subject to a maximum of Rs.50000 on the consideration that generators of renewable sources of energy have small capacities compared to generators of conventional energy. The agreement fees for Energy Purchase Agreement have been fixed at Rs.2000 per MW or part thereof. As regards the Energy Purchase Agreement, the TNERC – Fees and Fines Regulations 2004 prescribes Rs.2000 per MW or part thereof as the fees for approval of Power Purchase Agreement by the Commission as against Rs.2500 per MW or part thereof leviable for conventional power plants. This fee shall be collected by the licensee and passed on to the Commission.

9.8.2 There is some validity in the plea of the TNEB that frequent changes in the usage of the renewable energy as well as the change of drawal point necessitate extra clerical work. Therefore, the Commission decides that every time a generator seeks such a change either through an amendment to an existing agreement or through a fresh agreement, an additional charge equivalent to the application fees and agreement fees shall be leviable by the licensee on the generator.

9.9 Billing and payments

9.9.1 When a renewable energy generator sells power to the distribution licensee, the generator will raise a bill every month for the net energy sold after deducting the charges for start up power and reactive power. The distribution licensee shall make payment to the generator within 30 days of receipt of the bill. Any delayed payment beyond 30 days will attract interest at the rate of 1% per month.

9.9.2 If a biomass based energy generator utilizes the power for captive use or if he sells it to a third party, the distribution licensee shall raise the bill at the end of the month for the net energy supplied. The licensee should record the generation and consumption simultaneously. While preparing the bill peak hour generation shall be adjusted against peak hour consumption. Off peak generation shall be adjusted against off peak consumption. Normal generation shall be adjusted against normal consumption. Peak hour generation and normal hour generation can be adjusted against lower slot consumption. Excess consumption will be charged at the tariff applicable to the consumer. Transmission and wheeling charges, scheduling and system operation charges and cross subsidy surcharge wherever applicable shall be recovered from the bill. The net amount recoverable from the consumer shall be raised in the bill.

9.10 Payment security and security deposit

9.10.1 The National Tariff Policy calls for adequate and bankable security arrangements to the generating companies. Order No.3 dated 15-5-2006 of the Commission stipulates a bankable security in favour of generator. This mechanism has been found impractical, as there are more number of generators and the monolith distribution licensee is unable to offer security for such numbers. Therefore, the Commission believes that penalty for delayed payment by the licensee would serve the ends of justice.

9.10.2 As regards the security deposit of the consumer, the Commission decides to retain the present arrangements. i.e., two times the maximum net energy supplied by the distribution licensee in any month in the preceding financial year shall be taken as the basis for the payment of security deposit by the consumers.

9.11 Power Factor incentive / disincentive

As per Clause 7.17 of the Tariff Order dated 15-3-2003 of the Commission, power factor incentive / disincentive is applicable to a consumer as a percentage of current consumption charges. The average power factor recorded by the meter shall be the reference for calculation of the incentive / disincentive. On the same analogy, captive consumers of biomass energy shall be eligible for incentive or liable for disincentive based on the gross energy consumption and the applicable demand. This formula was adopted in Order No.3 dated 15-5-2006 and the Commission retains the same formula.

9.12 Metering

9.12.1 The Commission decides that metering and communication shall be in accordance with the following:

- (1) Central Electricity Authority (Installation and Operation of Meters) Regulations 2006
- (2) Tamil Nadu Electricity Distribution Code 2004
- (3) Tamil Nadu Grid Code 2004
- (4) Tamil Nadu Electricity Intra State Open Access Regulations 2005

9.12.2 Time of the day meter (ToD) / special energy meters shall be provided both at the generator end and consumer end, if open access is availed of. The consumers have been given the option to procure meters as specified in the Central Electricity Authority (Installation and Operation of meters) Regulations 2006.

9.13 Evacuation of Biomass Energy

9.13.1 Section 39(2)(c) of the Act states that the State Transmission Utility shall ensure development of an efficient, co-ordinated and economical system of intra State transmission lines for smooth flow of electricity from a generating station to the load centres. Section 40 of the Act stipulates that it shall be the duty of the transmission licensee to build, maintain and operate an efficient, co-ordinated and economical system of intra State transmission and to provide non-discriminatory open access to its transmission system for use by any licensee or generating company

on payment of the transmission charges or any consumer as and when such open access is provided by the State Commission under section 42(2) on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission. Section 42 of the Act states that it shall be the duty of the distribution licensee to develop and maintain an efficient, co-ordinated and economical distribution system in his area of supply.

9.13.2 The Forum of Regulators has recommended that grid connectivity should be provided by the transmission licensee / distribution licensees for renewable energy sources in an optimum manner, through their capital expenditure plans to be submitted to the appropriate Commissions for their approval. Clause 3 of the Power Procurement from New and Renewable Sources of Energy Regulations, 2008 states as follows:

“Provided that, in the case of sale of entire power to the distribution licensee by any new and renewable source based generator, the cost of interfacing lines up to the interconnection point shall have to be borne only by the STU/ distribution licensee provided further that in case where the new and renewable source based generator referred to in the first proviso who has entered into an EPA with the distribution licensee referred to therein for the sale of entire power to the said distribution licensee decides to use such power agreed to be sold to the said distribution licensee, for his captive use or for sale of such power to a third person or to a distribution licensee other than the distribution licensee referred to above before the expiry of the period referred to in such EPA, then he shall be bound to reimburse the entire cost of interfacing lines to the distribution licensee with whom he has executed such EPA, before the wheeling of power to his captive use or sale to third person or distribution licensee other than the distribution licensee with whom the said EPA has been executed by him”.

9.13.3 The TNEB submits that evacuation facility could be provided by them on priority basis, if they are permitted to collect infrastructural development charges. The Commission does not accept this plea because the Electricity Act 2003 makes it clear that it shall be the responsibility of the transmission utilities and the distribution licensee to create the appropriate infrastructure. Therefore, the Commission prescribes the following procedure for creation of evacuation facilities.

- (a) STU shall within 30 days of receipt of application from generators, intimate whether or not the long term access can be allowed without further system strengthening.
- (b) If further system strengthening is essential, the results of study conducted by the STU based on the request of generators shall be intimated within ninety days of such request of generators
- (c) Feasibility based on system studies shall be established within six months at the latest.
- (d) Clearances, approvals, certificate, if any, required by generators shall be issued within a month time.
- (e) The distribution licensee is not liable to pay compensation to the consumer on Open Access for deemed generation benefits in case the distribution licensee is unable to evacuate power due to failure of the Transmission and Distribution facility

9.13.4 The Commission decides that the cost of interfacing line upto the interconnection point shall have to be borne by the STU/Distribution Licensee in case of sale of entire power to Distribution Licensee by generators. For the captive use or sale of such power to third parties or to Distribution Licensee other than the Distribution Licensee of that area, the entire cost of inter facing line upto inter connection point shall have to be borne by the biomass based power generators and the work will be executed by the Distribution Licensee under Deposit Contribution Work basis. The STU/ Distribution Licensee shall have to maintain the standards as per CEA norms and Tamil Nadu Electricity Grid Code.

9.14 Energy purchase agreement (EPA)

The format of the Energy Purchase Agreement (EPA) shall be evolved by the Commission after discussion with biomass based power generators and the distribution licensee within a month of this order. The agreement shall be valid for a minimum period of 20 years. The distribution licensee shall execute the Energy Purchase Agreement within a month of receipt of application from the generator. The parties to the agreement may be given the option of exiting in case of violation with three months notice to the other party.

9.15 Energy wheeling agreement (EWA)

The format of the Energy Wheeling Agreement (EWA) shall be evolved by the Commission within a month of the order after consultation with biomass based power generators and the distribution licensee. The agreement shall be valid for a minimum period of 5 years. The parties to the agreement shall be given the option to exit for violation of the agreement after serving a notice of three months on the other party. The plea of the TNEB for discontinuance of wheeling in case of default is taken care of by the relevant provisions in the Intra State Open Access Regulations 2005 of the Commission.

9.16 Renewable Energy Purchase Obligations (RPO)

9.16.1 Section 86(1)(e) enjoins upon the Commission to specify, for purchase of electricity from renewable sources of energy, a percentage of the total consumption of electricity in the area of a distribution licensee. The above statutory provisions is supplemented by Clause 6.4 of the National Tariff Policy which states that the Appropriate Commission shall fix a minimum percentage for purchase of energy from renewable energy sources, taking into account availability of such resources in the region and its impact on retail tariff. The Forum of Regulators (FOR) has recommended that renewable purchase obligation should be computed with reference to the energy input into the system and not the energy consumed.

9.16.2 As per the statistics furnished by the TNEB, the energy injected into the grid by the TNEB was 65085 MU for 2007-08. The Chief Electrical Inspector, Government of Tamil Nadu has reported that 2,570 MU were generated by standby generator sets during 2007-08. As it is not possible to estimate the energy generated by unorganized standby generators, it is sufficient to estimate the energy input on the basis of the above two figures, at 67,655 MU.

9.16.3 The energy injected by renewable sources of energy into the TNEB grid during 2007-08 was 7,615 MU. The percentage of energy injected by the renewable energy sources works out to 11.26% of the total energy consumption in the area of the distribution licensee ($7615 \div 67655$). Excluding the energy generated by the standby generators, the percentage works out to 11.70 as against 11.26.

9.16.4 The Commission decides to fix the Renewable Energy Purchase Obligation at minimum of 13% for 2009-10 and minimum of 14% for 2010-11.

9.17 Control period

The Order No.3 dated 15-5-2006 of the Commission lays down a control period of three years. As the determinants of tariff underwent radical changes during the control period, some of the stakeholders represented for curtailing the control period. In pursuance of that effort the Commission consulted experts on 16-7-2008 and delivered an Order on 19-9-2008 in M.P. Nos. 9, 14 and 23 of 2008 scaling down the control period to two years. Clause 6 of the Power Procurement from New and Renewable Sources of Energy Regulations 2008 of the Commission promulgated on 8-2-2008 specifies that the control period may be ordinarily two years. Taking into account the views of the stakeholders, the Commission decides that the control period of this Order shall extend upto 31-3-2011.

10. Biomass Energy Tariff

10.1 Tariff for the projects commissioned on or after 19-09-2008: Biomass Energy tariff is computed with reference to the determinants listed in para 8.0 of this order. The fixed cost per unit for 20 years and variable cost per unit for three years from the date of this order for the projects commissioned on or after 19-09-2008 are furnished below:

Year	1	2	3	4	5	6	7	8	9	10
Fixed Cost (Rs / unit)	1.833	1.851	1.805	1.759	1.715	1.671	1.629	1.588	1.548	1.509
Variable Cost (Rs/unit)	2.667	2.800	2.940							
Total Cost (Rs/Unit)	4.500	4.651	4.745							

Year	11	12	13	14	15	16	17	18	19	20
Fixed Cost (Rs / unit)	1.471	1.435	1.467	1.499	1.533	1.569	1.607	1.647	1.689	1.732

10.2 The components of tariff prescribed in Order No.3 dated 15-5-2006 have been classified into two categories – variable and fixed. The fixed components have been retained. The variable components have been adopted for this order. The revised tariff is displayed below:

Year	1	2	3	4	5	6	7	8	9	10
Fixed Cost (Rs / unit)	1.546	1.561	1.538	1.516	1.494	1.473	1.453	1.435	1.417	1.400
Variable Cost (Rs/unit)				2.667	2.800	2.940				
Total Cost (Rs/Unit)	3.15	3.15	3.15	4.183	4.294	4.413				

Year	11	12								
Fixed Cost (Rs / unit)	1.384	1.114								

11. Acknowledgement

The Commission acknowledges with gratitude the contribution of the officers and staff of the Commission, the valuable guidance provided by experts, the active participation and advice of the Members of the State Advisory Committee and the pains taken by the Members of the public in offering their suggestions. The Commission particularly is indebted to the valuable input of the Tamil Nadu Electricity Board, Tamil Nadu Energy Development Agency, Indian Renewable Energy Development Agency and the Ministry of New and Renewable Energy Sources, Government of India.

Sd.....

(R. Rajupandi)
Member

Sd.....

(B. Jeyaraman)
Member

Sd.....

(S. Kabilan)
Chairman

/By order of the Commission/

R. Balasubramanian
Secretary

Annexure I

Consultative Paper on Power Procurement by Distribution Licensee from Biomass based Generation Plants and allied issues relating to Captive Use and Third Party Sale

Consultative Paper on Power Procurement by Distribution Licensee from Biomass based Generation Plants and allied issues relating to Captive Use and Third Party Sale

1.0 PREAMBLE

1.1 Power Scenario in Tamil Nadu

The TNEB's generating capacity as on **31.03.2008** is **10122.55MW** comprising **2970 MW** from four Thermal Stations, **424 MW** from four Gas Turbine Stations, **2187 MW** from 33 Hydro Stations, **1180 MW** from Private Sector Projects, **214 MW** as contribution to Tamil Nadu grid by sale of electricity from Captive Generating Plants, **2825 MW** as Tamil Nadu's share from Central Generating Stations, **305 MW** as external assistance. Generating capacity from privately owned wind farms is **3839 MW** and TNEB's wind farm capacity is **17.55 MW**. The installed capacity of Cogeneration in sugar mills is **451.60 MW** and of Biomass power project is **104.85 MW**. The average generation during **2008-09** is around **8000 MW** while the peak demand is around **9500 MW** which leaves behind an **approximate deficit of around 1500 MW.** The infirm power generation contributes around 15 to 20 percent of the peak demand during wind season. As TNEB has no standby capacity to take care of this infirm power fully, in case of unexpected meteorological changes, the deficit shoots up to **2000 MW** during such times. This deficit is likely to increase in the next few years since the expected generation addition is found to be less than the projected increase in demand.

1.2 Importance of Non Conventional Energy Sources:

Global concern over pollution problems caused by the increase in green house gases emission and consequent climate changes have resulted in paradigm shift in the approach towards development of energy sector in all the countries. The need for adoption of clean technology, improving end use efficiency and diversifying energy bases etc., have all been seriously considered by the Government of India since the Sixth Five Year Plan, and the country is poised for a considerable increase in the use of renewable energy sources in its transition to a sustainable energy base. Renewable energy sources such as wind, solar, mini hydro power, bio mass and bagasse based co-

generation are abundant and they not only augment the energy generation, but also contribute to improvement in the environment, drought control, energy conservation, employment generation, upgrading of health and hygiene, social welfare, security of drinking water, increased agricultural yield and production of bio-fertilizers. The pace of development has been accelerated through fiscal and tax incentives.

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

1.3 Commission's order on NCES based generation and allied Issues.

The Commission issued Order No. 3 dated 15.5.2006 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**”. This order covered tariff rates for power procurement by the distribution licensee from Wind Energy Generators (WEGs), Biomass based generators and Bagasse based generators. In the said order the Commission decided to adopt **a control period of 3 years and therefore the next tariff revision is due from 15.5.2009.**

1.4 Representation of Generators

For the past one year, the generators have been representing that the capital cost, interest rates, maintenance cost, etc. have all considerably increased in the last two years and are repeatedly requesting the Commission to revise the tariff before the control period of three years taking into account the above escalation in input cost.

Considering all these factors while disposing of a petition by wind energy generators, the Commission relaxed the three years control period stipulated in order No.3 dated 15-05-2006.

In such a context, it has become necessary to revisit the order No.3 dated 15-05-2006. Order No.3 dated 15-05-2006 is a comprehensive one covering wind energy, biomass and bagasse based co-generation. It has now been decided to review each source separately.

Accordingly, this consultative paper addressed the “Power procurement by Distribution licensee from Biomass based generation plants and allied issues related to captive use and third party sale.”

2.0 Biomass Based Power Generation Scenario in Tamil Nadu

Tamil Nadu is blessed with conducive meteorological and topographical settings for electricity generation through NCES. The installed capacity Tamil Nadu is 114.85 MW as on **31.3.2008**. The year wise capacity addition in Tamil Nadu over the past 10 years is furnished below:

Year	capacity addition in MW
Upto 1996-97	10.43
1997-98	12.0
1998-99	-
1999-00	-
2000-01	-
2001-02	-
2002-03	1.6
2003-04	18.0
2004-05	1.0
2005-06	7.75
2006-07	27.5
2007-08	26.57
Total as on 31.3.2008	104.85

3.0 Legal Provisions

3.1 Related Provisions of the Act:

(1) The following provisions in Section 61 of the Electricity Act 2003 are relevant to this consultative paper:

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

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

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

- (c) *the factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;*
- (d) *safeguarding of consumers' interest and at the same time, recovery of the cost of electricity in a reasonable manner;*
- (e) *the principles rewarding efficiency in performance;*
- (f) *multi year tariff principles;*
- (g) *that the tariff progressively reflects the cost of supply of electricity and also, reduces cross-subsidies in the manner specified by the Appropriate Commission;*
- (h) *the promotion of co-generation and generation of electricity from renewable sources of energy;***
- (i) *the National Electricity Policy and tariff policy:*

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

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

3.2 Related Provisions of the National Electricity Policy:

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

Section 5.2.20: *Feasible potential of non-conventional energy resources, mainly small hydro, and 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 5.12.1: *Non-conventional sources of energy being the most environment friendly there is an urgent need to promote generation of electricity based on such sources of energy. For this purpose, efforts need to be made to reduce the capital cost of projects based on non-conventional and renewable sources of energy. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources.*

Section 5.12.2: *The Electricity Act 2003 provides that co-generation and generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from non-conventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commissions. Such purchase by distribution companies shall be through competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies.*

3.3 Related Provisions in the National Tariff Policy

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

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

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

(3) Section 6.4(1): *Pursuant to provisions of section 86(1)(e) of the Act, the appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006. It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the appropriate Commission.*

(4) Section 6.4(2): Such procurement by distribution licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.

3.4 Regulation on Non-Conventional Energy

In line with the provision of Electricity Act 2003, National Electricity Policy and National Tariff Policy the Commission notified the regulations on “Power Procurement from New and Renewable Sources of Energy Regulations, 2008 on 08-02-2008”. The Regulations stipulate guidelines for fixing tariff and various issues relating to new and renewable sources of energy.

4.0 Promotion of New and Renewable source of Energy and Tariff Determination Process

4.1. Promotion of new and renewable sources of energy

The minimum percentage of electrical energy which each distribution licensee shall purchase from new and renewable sources generators shall be as stipulated in the Commission’s order issued from time to time, subject to the availability of such power.

In the Commission’s order No. 3 dated 15.5.2006, the Commission fixed 10% as the minimum percentage of power each distribution licensee should purchase from NCES sources out of his total consumption in his area of supply. As per the statistics provided by TNEB for 2007-08 energy available for sale is 64430 MU out of which the contribution from NCES to the grid (for their own use and sale to TNEB) was 7507 MU. Assuming TNEB’s purchase from NCES power as 35%, the purchase from NCES generators constitutes only 4.08% out of their total consumption. Since the minimum purchase obligation is well within the limit specified by the Commission, it has been decided that the distribution licensee will continue to purchase the NCES power on preferential tariff as fixed by the Commission in line with section 6.4(2) of the National Tariff Policy.

4.2 Tariff Determination Process

With regard to tariff determination, the relevant portions of regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008 are reproduced below:

(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:-

- e) initiating the process of fixing the tariff either suo motu or on an application filed by the distribution licensee or by the generator.*
- f) inviting public response on the suo motu proceedings or on the application filed by the distribution licensee or by the generator.*
- g) conducting public hearing on the above.*
- h) issuing general / specific tariff order for purchase of power from new and renewable sources based generators.*

Tariff petition has not been filed either by TNEB or by the generators. However, considering the importance of promoting the NCES power in the State, the Commission has initiated the process of determination of tariff for biomass based generation as provided in the regulation 4(1) of the above said regulation. Taking into consideration, the views from the experts in a round table conference held on 16-07-2008 the **Commission have prepared this consultative paper to invite public / stake holder's view on the proposed financial, operational and other related parameters / issues.**

5.0 Tariff / Pricing Methodology

The relevant portion of Tariff / Pricing Methodology as specified in regulation 4 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 Commission*
- (b) National Electricity Policy*
- (c) Tariff Policy*
- (d) Rural Electrification Policy*
- (e) Forum of Regulators (FOR)*
- (f) Central and State Governments*

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

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

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

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

(6) While determining the tariff the Commission may adopt cost plus single part average tariff which can be reviewed later.

5.1 Market Determined Pricing

In a free market, where there is perfect competition, market determines the price. But there is a shortage of power in the State and it is likely to continue for a few more years. There is a good reason that the market driven pricing mechanism may be difficult to apply in the case of renewable source of energy. Under market determined prices, the buyer of power would go in for merit-order dispatch and purchase power from the cheapest source. However, renewable power is comparatively a costlier source when compared to conventional sources of power. Adopting merit order dispatch may lead to renewable power not getting dispatched at all. The ABT mechanism provides for marginal price determination wherein the marginal price of power depends on the current frequency of the grid. These factors make market pricing of power purchase from renewable, difficult to implement.

5.2 Cost-Plus Tariff Determination

Cost-plus tariff determination is a more practicable method. It can be easily designed to provide adequate return to the investor as assured return will lead to larger investment in renewable power.

5.3 Single Part vs. Two Part Tariff

In the Commission's order No. 3 dated 15-05-2006, the Commission adopted the "**cost plus single part average tariff**". Generally, the two part tariff is recommended when the fuel cost varies sharply. The variable component of tariff would take care of such price escalation.

During the Round table conference conducted on 16-07-2008, the experts expressed the view that the two part tariff is convenient to accommodate the fuel cost escalation

6.0 Issues Relating to Energy Purchase:

6.1 Tariff Components

The above said regulation of the Commission specifies that while determining the tariff, the Commission shall adopt appropriate financial and operational parameters for the tariff determined in a cost-plus scenario. The Commission has carried out a detailed analysis of the existing policies/procedures and commercial mechanisms in respect of biomass based generation. The following important factors have been considered to arrive at the tariff for biomass based generation.

- Capital investment
- Capacity Utilization Factor / Plant Load factor
- Debt-equity ratio
- Life of plant and salvage value
- Depreciation rate applicable
- Interest costs on debt (cost of loan / debt)
- Term of Loan
- Return on equity
- Operation and maintenance expenses
- Insurance Cost
- Fuel cost
- Power Evacuation Facilities
- CDM Benefits

The comments / suggestions provided in the round table conference of experts held on 16-07-2008 were also considered. The issue-wise comments / suggestions are discussed below.

6.1.1. Capital Investment :

The Commission has assumed Rs.4.00 Crores / MW as the capital investment. For order No.3 dated 15-05-2006.

During the Round table conference conducted on 16-07-2008 the experts have recommended that the capital cost may be adopted as Rs. 5.20 Crores / MW as the cost of steel has gone up. They also expressed that the shift from water cooled condensers to Air cooled condensers has increased the cost by Rs.30.00 lakhs to

Rs.40.00 lakhs and the equipment suppliers are not willing to sign firm price contract without escalation clause.

The IREDA in its letter dated 26-12-2008 has furnished the bench marked rate varying from Rs.4.70 Crores / MW to Rs. 5.50 Crores / MW depending on boiler pressure and capacity. The average project cost works out to Rs.5.07 Crores / MW.

The Project cost approved by the IREDA during 2008-09 for a Biomass project developer was Rs.4.65 Crores / MW for a boiler pressure of 66 ata.

Orders of other Commissions on Capital Investment

Particulars	Gujarat	Madhya Pradesh	Karnataka	Maharashtra	Andhra
Date of Order	11-08-06	07-08-07	18-01-05	Aug 2005	20-03-04
Capital cost (Rs in Crs/MW)	3.50	4.25	4.00	4.00	4.00

It is proposed to adopt the average bench marked project cost or the approved project cost which ever is higher. Therefore, the Commission proposes a capital cost of Rs.5.10 Crores / MW.

6.1.2. Plant Load Factor:

The PLF adopted for the biomass based generation plant in the present order dated 15-05-2006 is 80% considering the availability of fuels.

During the Round table conference conducted on 16-07-2008 the experts opined that the PLF depends on the availability of fuel. They have suggested adoption of block period instead of year to year.

Orders of other commissions on PLF

Particulars	Gujarat	Madhya Pradesh	Karnataka	Maharashtra	Andhra	Haryana
PLF (in %)	80	70	75	70 for 1 st year and 80 for subsequent years.	80	80

It is proposed to retain the existing rate of 80%. The TNEB is requested to furnish the PLF reached by the generators in last three years for consideration, while furnishing their comments on this consultative paper.

6.1.3. Debt - Equity Ratio :

Debt-equity ratio is mainly determined by IREDA / financial institutions. They have generally adopted debt-equity ratio of 70: 30 and as such ratio of 70: 30 is assumed. Other Commissions have adopted the same ratio.

6.1.4. Life of plant:

Generally the project life of a plant is considered as 20 years for tariff determination process.

Orders of other Commissions on life of plant.

Particulars	Gujarat	Madhya Pradesh	Karnataka	Maharashtra	Andhra
Life of Plant (in Years)	20	20	20	20	20

Plant life of 20 years is considered as reasonable for tariff determination.

6.1.5. Depreciation:

Depreciation rate of 7.84% p.a on straight line method is proposed. The same rate has been adopted for independent power projects. A uniform rate of depreciation is proposed both for existing as well as new projects, at the rate of 7.84% per annum till the depreciation accumulates to 90% of the project cost.

Orders of other Commissions on Depreciation.

Particulars	Gujarat	Madhya Pradesh	Karnataka	Maharashtra	Andhra
Depreciation (in %)	6.00	7.84% upto loan repayment period and the balance 20% spread over to the remaining life period	7.00	5.28	7.84

It is proposed to retain 7.84% for depreciation upto the accumulated value of 90% of the project cost as at present.

6.1.6. Interest Costs on Debt (cost of loan / debt) :

As per the existing order, interest on debt allowed is 9%. During the Round table conference conducted on 16-07-2008, the experts opined that the rate of interest varies from 12% to 14% for a loan period of seven years with one year moratorium.

Orders of other Commissions on Interest

Particulars	Gujarat	Madhya Pradesh	Karnataka	Maharashtra	Andhra
Interest on loan (in %)	10.75	11	11	12	12

IREDA charges interest of 11.75% to 12.5%. The Commission proposes to adopt 12 % for tariff determination purpose. The investor may be allowed to avail a cheaper loans, if available.

The term of loan may be extended upto 11 years including one year moratorium.

6.1.7. Return on Equity:

RoE presently allowed is 16% pre tax.

Other Commissions order on RoE

Particulars	Gujarat	Madhya Pradesh	Karnataka	Maharashtra	Andhra
RoE (in %)	16	16	16	16	16

The National Tariff Policy specifies that the rate of return should be such that it allows generation of reasonable surplus for growth of the sector. The above policy also specifies that the CERC would notify, from time to time, the rate of return on equity. Accordingly, the CERC has notified 14% post tax return on Equity. In line with the CERC's regulations the Commission's Tariff Regulations provides RoE of 14% post tax for conventional fuel based generating stations. The RoE 16% pre-tax allowed to NCES Projects in the present order works out to 12.70% post-tax. With the objective of promoting renewable source of energy, the Commission proposes to adopt 14% post tax. The corresponding pre tax RoE would be 17.63% at the current rate of corporate income tax.

6.1.8. Operation and Maintenance Expenses

The Commission has allowed operation and maintenance expense of 4.5% for the first year on the capital cost with 5% escalation every year thereafter in the present order.

During the Round table conference conducted on 16-07-2008 experts have suggested that operation and maintenance expenses should be indexed to inflation.

Orders of other Commissions on O & M Expenses

Particulars	Gujarat	Madhya Pradesh	Karnataka	Maharashtra	Andhra
O & M Expenses (in %)	7% on capital cost with 5% escl.	4% on capital cost with 5% escl	4% on capital cost with 5% escl	4% on capital cost with 5% escl	4% on capital cost with 4% escl

It is proposed to retain the existing rate of 4.5% with 5% escalation every year.

6.1.9. Insurance Cost

The Commission has allowed in the present order insurance at 0.75% of the project cost for the first five years. Thereafter; the above cost was reduced by 0.5% every year. The same formula would be retained now.

6.1.10: Working Capital

As per the existing order, the working capital is based on the following norms:

- Fuel stock – two months
- O & M Expenses – Two Months
- Interest on working capital -11%

Orders of other Commission on Working Capital

Particulars	Madhya Pradesh	Karnataka	Maharashtra	Andhra
Working Capital Component	Fuel Stock – 3 months O & M Expenses – 1 month Receivables – 2 months	Receivables – 2 months	Fuel Stock – 2 months O & M Expenses – 1 month Receivables – 1.5 months	Fuel stock – 1 month

It is proposed to adopt the following norms with respect to working capital

- Fuel stock – two months
- O & M Expenses – Two Months
- Receivables – One month
- Interest on working capital -12%

6.1.11. Specific Fuel Consumption

Non-conventional power projects should improve their operational efficiency, notwithstanding the preference shown for them. The burden of higher fuel consumption by the power projects resulting in higher costs should not be passed on to the consumers.

Orders of other Commissions on Fuel Consumption.

Particulars	Gujarat	Karnataka	Haryana	Andhra
Specific fuel consumption (kg/ kwh)	1.30	1.16	1.36	1.16

Considering the fact of available technology for the corresponding capital cost the Commission proposed the station heat rate of 3518 kcal / kWh and fuel calorific value of 3200 kcal / kg, which corresponds to a fuel consumption of 1.10 kg / kWh.

6.1.12. Fuel Cost:

During the Round table conference experts opined that as the cost of agricultural input has been increasing every year, the fuel cost cannot be revisited every time. They recommended adoption of an index to accommodate the cost increase instead of adopting an adhoc percentage of escalation.

CMD TEDA stated that the cost of Biomass fuel is around Rs.1800 to 2000 / MT. Process optimization may be difficult with other fuels.

Orders of other Commissions on Fuel Cost

Particulars	Gujarat	Karnataka	Haryana	Andhra	Maharastra	MP
Fuel Cost (Rs / MT)	1000	1000 with 5% escl.	1600	1000 with 5% escl	1075 with 5% escl	1181 with 5% escl

Cost of fuel is the most important parameter that determines the cost of generation in a biomass power plant. The biomass plant uses a mix of fuels like rice husk, woody biomass, cotton stacks, chilly stacks etc. and to some extent coal, as permitted by MNES. The price of agricultural input may vary depending on the season.

Taking into consideration of the above facts and increase in price of the agricultural input, it is proposed to fix the fuel cost at Rs.2000/MT with 5% escalation p.a. during the control period.

If the finalization of next tariff order is delayed, the same escalation of 5% may be adopted during that period.

6.1.13. Auxiliary Consumption

The auxiliary consumption presently allowed is 9%.

Orders of other Commissions on Auxiliary Consumption

Particulars	Gujarat	Karnataka	Andhra	Maharashtra	MP
Auxiliary Consumption (in %)	10	9	9	10	10

Till such time these plants are properly audited and operated efficiently to minimize losses and maximize production as enunciated by the Energy Conservation Act, the auxiliary consumption may remain at 9.00%.

6.1.14 : Evacuation Facilities:

It is the responsibility of the STU to have enough spare capacity in all the transmission corridors for free power flow and ensure maximum grid availability. The procedure for application and to obtain evacuation facilities is given below.

- a. The interconnecting network up to the point of grid connection may be executed on DCW basis by the TNEB.
- b. STU shall within 30 days of receipt of application from generators, intimate whether or not the long term open access can be allowed without further system strengthening.
- c. If further system strengthening is essential, the results of study conducted by the STU based on the request of generators shall be intimated within ninety days of such request of generators.
- d. Feasibility based on the system studies shall be established at the earliest possible but not later than six months.
- e. Clearances, approvals, certificate, if any, required by generators shall be issued within a month time.

- f. The cost of interfacing lines, switch gear, metering and protection arrangement shall have to be borne by the owner of generators, but the work will be executed by distribution licensee on Deposit Contribution Work basis.
- g. When the owner of the generators happens to be a consumer and when the power fed to the distribution licensee grid is less than 2 MVA, dedicated line from the location of the generators to near by distribution licensee substation will not be required. The service line itself will cater to the need to export the power to the distribution licensee grid.
- h. When the owner of the generators happens to be a consumer and when the power fed to the distribution licensee grid is more than 2 MVA, then a dedicated feeder to a nearby substation will be required. If already the consumer is availing himself of supply through a dedicated feeder and if the capacity of the feeder is adequate to carry the quantum of export of power, then the same feeder can be used for export of power and no additional installation is required.
- i. In case the dedicated feeder is not adequate to carry the power exported, then the existing dedicated feeder has to be strengthened or a new line has to be erected.
- j. For a non-consumer (user) the new interfacing line of appropriate capacity and voltage shall be at his cost and will be executed by distribution licensee.
- k. No compensation shall be provided to the generators or the third party purchaser by the distribution licensee for deemed generation benefits in case the distribution licensee fails to evacuate power due to failure of the Transmission facility. However, the distribution licensee shall have to maintain the standards as per Commission's regulation on distribution standard of performance.
- l. In case the generator decides to sell the entire energy to the licensee, the cost of evacuation facilities shall be borne by the licensee.
- m. In case the generator opts for open access (either partly or fully) by terminating the EPA, the entire cost of evacuation already incurred by the licensee is to be reimbursed.

6.1.15. CDM Benefit:

The guide lines specified in the National Tariff Policy in this regard is reproduced below:

5.0 GENERAL APPROACH TO TARIFF

(i) Benefits under CDM

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

It is proposed to share the CDM benefit in the following manner:

- (i) If the generator decides to sell the entire energy to the licensee, the CDM benefit may be shared in the ratio of 50:20:30 between the generator, STU and the distribution licensee.
- (ii) If the generator opt open access for captive use (adjustment against consumption), the CDM benefit may be shared in the ratio of 50:30:20 between the generator, STU and the distribution licensee.
- (iii) If the generator opts for open access (third party sale), the CDM benefit may be shared in the ratio of 60:40 between the generator and the STU.
- (iv) If the generator opts for partly open access and sell the balance energy to the licensee, the CDM benefit may be shared in the above proportion as in (ii) above.

6.1.16. Purchase Price:

In Tamil Nadu, the purchase rate determined by the Commission is Rs.3.15/ unit.

During the Round table conference conducted on 16-07-2008 the experts felt that though Input cost has gone up sharply, tariff remains at Rs. 3.15/ unit because of linkage to the HT tariff. The tariff is subject to a ceiling of 90% of the HT tariff.

Orders of other commissions on Purchase Price

Year	Gujarat (Rs / Unit)	Karnataka (Rs/ Unit)	Andhra			Maharastra		
			FCC (Rs / Unit)	VC (Rs / Unit)	TC (Rs / Unit)	FCC (Rs / Unit)	VC (Rs / Unit)	TC (Rs / Unit)
Date of Order	11.08.09	18-01-05	20-03-04			Aug-05		
1	3.08 constant for 20 years	2.85 per unit for the first year and 2% escl. p.a for subsequent 9 years	1.61	1.27	2.88	1.71	1.34	3.05
2			1.57	1.33	2.9	1.63	1.41	3.04
3			1.53	1.4	2.93	1.58	1.48	3.06
4			1.49	1.47	2.96	1.54	1.55	3.09
5			1.45	1.54	2.99	1.5	1.63	3.13
6			1.41			1.46	1.71	3.17
7			1.37			1.42	1.8	3.22
8			1.33			1.38	1.89	3.27
9			1.26			1.34	1.98	3.32
10			0.87			1.3	2.08	3.38
11					1.18	2.18	3.36	
12					1.21	2.29	3.5	
13					1.24	2.41	3.65	

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

Year	FCC (Rs/Unit)	VC (Rs/Unit)	Total cost (Rs / Unit)	Year	FCC (Rs/Unit)	VC (Rs/Unit)	Total cost (Rs / Unit)
1	2.243	2.418	4.660	11	1.909		
2	2.265	2.538	4.803	12	1.547		
3	2.220	2.665	4.886	13	1.281		
4	2.177			14	1.321		
5	2.135			15	1.362		
6	2.093			16	1.406		
7	2.054			17	1.452		
8	2.015			18	1.500		
9	1.978			19	1.550		
10	1.943			20	1.603		

The above proposed rate will be applicable for the project commissioned on or after issue of this order.

The Fixed capacity charges specified above will be continued for the entire agreement period of 20 years.

In order to consider the abnormal increase in the fuel cost, and to safeguard the existing agreements, the rate prescribed in the existing order dated 15-05-2006 has been segregated into two part tariff with the factors / parameters already prescribed. The fixed cost has been proposed based on the parameters in the existing order dated 15-05-2006 and the variable cost as per this consultative paper.

Tariff for existing projects may be as below from 15-05-2006

Year	Fixed cost (Rs / unit)	VC (Rs / Unit)	Total Cost (Rs/Unit)
1			3.15
2			3.15
3			3.15
4	1.516	2.418	3.934
5	1.494	2.538	4.032
6	1.473	2.665	4.138
7	1.453		
8	1.435		
9	1.417		
10	1.400		
11	1.384		
12	1.114		

6.1.17. Tariff Review Period/Control Period:

As per the existing order, the control period fixed by the Commission is three years.

During the Round table conference conducted on 16-07-2008 the experts suggested that the control period may continue as three years with indexing formula for input escalation.

Orders of other commissions on Control Period

Particulars	Gujarat	Karnataka	Andhra	Maharashtra	MP
Control Period (in years)	3	5	5	3	5

The Electricity Act 2003 has brought out far reaching changes in the Indian power sector. Radical changes have been introduced in the power sector, the impact of which is yet to be studied even though 5 years passed. It is a transition period. At this stage, the Commission is of the opinion that it is not appropriate to bring out an order which has long term impact. As far as bagasse based co-generation is concerned, new technology with higher capacity and efficient generators are coming up. The interest rate on loan is

in increasing trend. **Therefore, a short period of two years control period is considered prudent.**

6.1.18. Reactive Power Charges:

For Biomass based generators, the conditions and charges as provided in the Tamil Nadu Electricity Grid Code and the Commission's order on Transmission, wheeling and other charges will apply.

At present the applicable reactive charges is 6 paise / KVARh.

Practice followed in other States

Particulars	Karnataka	Andhra	Maharashtra	MP
Reactive Power Charges (in paise / KVARh)	40	10	25	27

7.0 Issues Relating to Energy Purchase Agreement

7.1. Energy Purchase Agreement:

The generator shall sign an EPA with distribution licensee for a period of twenty years for sale of power. It is not intended that the Commission would approve EPA for each generator individually. The Commission has approved a model energy purchase agreement. The licensee may adopt the same.

The distribution licensee should sign the EPA within a month of submission of the application by the NCES generators.

The agreement period for power purchase may be maximum 20 years. The existing agreements between the distribution licensee and the generators shall be honoured.

If the generator / licensee desire to terminate the agreement, they may terminate the agreement by serving three months notice to the other party.

7.2. Payment Security for Power Purchase by Distribution licensee :

Section 6.2 of the Tariff Policy requires ensuring adequate and bankable payment security arrangements to the generating companies. On the same line Commission proposes that a bankable security in favour of the generator for an amount equivalent to an average monthly bill shall be opened by the distribution licensee, in case an EPA is signed for power purchase between distribution licensee and the generator.

8.0 Issues Relating to Energy Wheeling

8.1. Adjustment of Wheeled Energy :

The Electricity Act 2003 does not contemplate any restrictions for self use of energy by a generator in regard to service category. Therefore, the generator can adjust the energy on unit-to-unit basis for self use in any HT service.

Regarding the captive usage for LT consumers, Commission accepts the difficulties expressed by TNEB. Further, since the LT services do not have ToD metering arrangement, it may not be possible to uniformly implement the various provisions covered in this order. Therefore, it is decided to restrict the captive usage to HT services for the present.

The captive usage to HT services is permitted subject to the eligibility criteria of Electricity Rules 2005 issued by the Government of India

8.2. Peak & off Peak power, unit to unit adjustment:

As all the generators and the tied up users would be provided with TOD meters, the adjustment of energy shall be done on slot to slot basis within the monthly billing cycle as follows for Biomass based generation.

- (i) Peak hour generation with peak hour consumption
- (ii) Off-peak hour generation with off-peak hour consumption and
- (iii) Normal hour generation with normal hour consumption.

It should be noted that units generated during a higher tariff ToD-slot could be consumed in a lower tariff ToD slot at the option of generators/users, but the reverse would not be allowed (i.e. units generated during a lower tariff ToD-slot cannot be drawn by the CGP Holder during a higher tariff ToD-slot). No carry over is allowed for the following month.

The peak hour extra charges and off peak hour rebate shall be on net energy consumption after deducting captive generation during the respective period.

8.3. Third Party Sale :

The present order permits third party sale subject to the regulations provided in open access regulations and provisions in Commission's order on transmission and wheeling charges.

During the Round table conference conducted on 16-07-2008 the experts opined that sale to PTC, Tata, Adani etc. may be permitted through inter state trading as allowed in Karnataka.

The rate of purchase of power from the biomass power plant by the third party consumer is not within the purview of the Commission. Third party sale through the grid will be as specified by the Commission's regulation on Open Access and order on Transmission and other charges.

ToD / Special energy meters shall be installed by the generators as well as the third party consumers at the receiving end.

8.4. Transmission & Wheeling charges and line losses

Regarding the transmission and wheeling charges, the existing practice (which includes the line losses in kind in terms of energy) is given below:

Within 25 KM usage	3 %
Beyond 25 KM usage	6 %

Orders of other Commissions on Charges:

Particulars	Gujarat	Andhra	Maharastra	Haryana
Transmission & Wheeling charges	4% of the generated unit	50 paise / unit as network charge and 2.84% of energy	Transmission 5% and wheeling 2% (in energy terms)	Wheeling 2%

Total transmission and wheeling charges including transmission and distribution losses for various voltage levels of injection and drawal have been specified in the orders of the Commission on transmission and wheeling charges. As per that order, if the point of injection and point of drawal is at 33 KV level, the total transmission and wheeling charges will be very much less than 10%. To give encouragement for promotion of renewable energy, the Commission proposes to retain the existing charges which include the line losses in kind in terms of energy generated as below:

Within 25 KM usage	3 %
Beyond 25 KM usage	6 %

For those who avail open access for third party sale, the charges shall be levied as per the orders of the Commission on transmission and wheeling charges.

8.5. Demand Charges / Grid Availability Charges:

The grid support / grid availability charges have been fixed by the Commission in its order on transmission and wheeling charges etc., wherein, the following conditions and the applicable charges for the same are specified. They are applicable for Bio mass based generators.

1. Outage of generator conditions and providing start up power
2. When scheduled generation is not maintained and / or when the drawal by the consumer is in excess of the schedule.

a) Applicable Energy Charges: When the generator is synchronized with the Grid, energy charges shall be payable by the energy user, for the units supplied by the Distribution Licensee (i.e. balance units arrived at after subtracting the units supplied by the generator from the total consumption of the user during the billing month) at the applicable rate for that category. The time of day consumption (TOD) shall be charged for the net consumption only (deducting the generated energy from the energy consumed during the respective time slots).

b) Applicable Demand charges: In addition to energy charges stipulated above, the energy user shall pay applicable demand charges as below:

There are 2880 time blocks of 15 minutes interval in a billing month. It is not feasible to segregate precisely the quantum of demand supplied in each time block in the billing month to the energy user by the generator and by the licensee distinctly. This segregation may be computed by matching the demand recorded in each time block at the generator end (A) with the demand recorded in the corresponding time block at the energy users end (B) then

Case I: If (B) is lesser than (A), it means there is no supply of demand by the licensee to the energy user.

Case II: If (B) is greater than (A), it means that there is supply of demand by the licensee in that respective time block.

As per the tariff order dated 15-3-2003, a demand charge in a billing month by any HT consumer is 90% of sanctioned demand or recorded demand which ever is higher. As

the demand is recorded at every 15 minutes time block, the recorded demand will show the maximum demand recorded in any of the 15 minutes time block in that billing period of one month.

The probability of occurrence of case I is zero and the probability of licensee supplying the demand in any one of the time blocks in a billing month as in case II is 100 percent. In such a scenario, whether the licensee is entitled to receive the demand charges in full, even though the generator is also injecting the demand into the grid continuously, needs to be addressed. It is no doubt that, all the fluctuation in the generator end and user end is met by the licensee. However, the percentage of the demand, injected by generator is also to be taken for consideration and to that extent, the demand charges receivable by the Licensee is to be restricted.

Till a mechanism is put in place to ascertain the relation between the demand generated in each of the 2880 fifteen minutes time blocks and the demand recorded at the consumer end in the related time blocks, a reasonable approximation has to be followed to arrive at the demand supplied by the generator. The probability of meeting the demand of the user both by the generator and the licensee varies from 0 to 100 %. Therefore, it is considered prudent to convert the energy supplied by the generator into an equated demand with reasonable approximations as to be the deemed demand supplied by the generator to the user as specified in the order of the Commission on Transmission and wheeling charges.

8.6. Reactive Energy Charges:

As proposed in clause 6.1.18 in the provisions relating to energy purchase.

8.7. Banking :

As Biomass based generation is considered as firm power, banking provisions shall not apply.

8.8. Payment of Security Deposit:

The security deposit shall be equivalent to two times of the maximum of net energy supplied by the distribution licensee in a month in the preceding twelve months prior to April.

8.9. Billing and Payment to Biomass based generator by Distribution licensee :

In case of captive use, the distribution licensee shall raise the bill after accounting for the net energy supplied at the end of each monthly billing cycle. Meter reading should be taken on the same day at Biomass based generator end and captive user / third party purchaser end. The generation at generator end shall be communicated to all the circles of the captive users / third party purchaser within two days so as to facilitate for matching generation with consumption in the same billing month. This adjustment will be done on slot to slot basis taking into account the (i) peak (ii) off peak and (iii) normal generation / consumption within monthly billing cycle. Excess generation in a monthly billing cycle can be sold to the Licensee at the rate fixed by the Commission. Excess drawal will be charged under respective tariff applicable to the user. The distribution licensee shall raise the bill to the user after accounting for generation and consumption at the end of each monthly billing cycle subject to recovery of transmission and wheeling charges in kind.

In case of Biomass based generators selling power to distribution licensee, the generator will raise the bill every month for the net energy supplied after adjusting the start up power, reactive power charges, etc as per this Order.

The payments to the generators in respect of the energy supplied shall be made by the distribution licensee within the same period as provided by the distribution licensee to recover payments from its HT consumers.

8.10. Cross Subsidy Surcharge:

The present order of the Commission stipulates the same cross subsidy surcharges both for generation from conventional sources as well as renewable sources. Certain Commissions such as Maharashtra, Gujarat, Karnataka have adopted a lower figure for generation from renewable sources. MERC has totally done away with cross subsidy surcharge for generation from renewable sources. The following tabulation indicates the situation.

State	Cross subsidy surcharge in rupees for generation from conventional	Cross subsidy surcharge in rupees for generation from renewable source
Maharashtra	Nil	Nil
Gujarat	1.00 0.37 (draft order issued)	1.00 0.37 (draft order issued)
Uttar Pradesh	Nil	Nil
Andhra Pradesh	Nil	Nil
Karnataka	Nil	Nil

In order to promote generation from renewable energy sources, the Commission proposes to determine the cross subsidy surcharge at 50% of the level prescribed for generation from conventional energy sources.

8.11. Power factor incentive / disincentive

Power factor incentive / disincentive shall be levied as per the tariff order of the Commission for the time being in force. Power factor incentive / disincentive is applicable to the consumer **as a percentage of current consumption charges**. In the same line, the pf incentive / disincentive is applicable to all the users on the current consumption charges bill prepared based on the gross energy and applicable demand as per this order. However, the average pf recorded by the meter will be the reference for calculation of pf incentive / disincentive

8.12. Energy Wheeling Agreement (EWA):

The generators / third party buyer of power and the concerned distribution licensee shall sign a EWA for the purpose of wheeling of power from the biomass based generators to the third party buyer. It is not intended that the Commission would approve EPA for each generator individually. The Commission has approved a model energy wheeling agreement. The licensee may adopt the same

The distribution licensee should execute the EWA within a month of submission of application by the generators or the third party buyer of power, as the case may be.

9.0 APPLICABILITY OF ORDER

This order after finalization will become operational from the date of its issue. This order would apply to all future contracts / agreements as well as renewal of existing

contracts / agreements for the biomass based generation plants located within the State of Tamil Nadu. It should be noted that the existing contracts and agreements between the above type of generators and the distribution licensee signed prior to the date of issue of this order would continue to remain in force.

The generators and the licensees shall have the option to mutually re-negotiate the existing agreements / contracts, in line with this order including the rate for purchase in two parts applicable to that project, even before the expiry of the contracts.

Annexure II

**COMMENTS OF THE STAKE HOLDERS ON THE CONSULTATIVE PAPER ON
“POWER PROCUREMENT BY DISTRIBUTION LICENSEES FROM BIOMASS
BASED POWER GENERATORS AND ALLIED OPEN ACCESS ISSUES”**

**COMMENTS OF THE STAKE HOLDERS ON THE CONSULTATIVE PAPER ON
“POWER PROCUREMENT BY DISTRIBUTION LICENSEES FROM BIOMASS
BASED POWER GENERATORS AND ALLIED OPEN ACCESS ISSUES”**

1. Capital Cost

Indian Renewable Energy Development Agency Limited (IREDA): The capital costs are in the range of Rs.4.70 Cores / MW to Rs.5.03 Cores / MW for the boiler configuration of 66 ata. Accordingly, the capital cost may be reconciled.

TNEB: The power evacuation cost has been excluded in the proposed capital cost. Hence, the cost of Rs.5.10 Cores/MW is considered to be high and a cost of Rs.4.65 Cores/MW may be adopted.

Ministry of New and Renewable Energy (MNRE): The capital cost may be linked to escalation indices for major input cost such as steel, cement, etc

M/s. Auro Mira Bio Energy Pudukottai India Limited: due to installation of Air cooled condenser the capital cost may be considered as Rs.5.50 Cores

M/s. Mohan Breweries and Distilleries Limited: due to installation of air cooled condenser and other variable frequency drives the cost may be considered as Rs. 6.00 Cores.

Pranam Consultants, Pune: recommended at the rate of Rs.4 Crs / MW as recommended by CEA in report on “operation norms for biomass based power plants dated September 2005.

2. PLF

MNRE – May be fixation based on the past achievement

TNEB – 80% PLF proposed, is accepted

Biomass Power Producers Association & M/s. Auro Mira Bio Energy Pudukottai India Limited: Due to high moisture in the available biomass, the PLF may be considered at 70%

M/s. Auro Mira Bio Energy Pudukottai India Limited & M/s. Mohan Breweries and Distilleries Limited: Due to frequent shutdown for maintenance, different varieties of fuels used the plants are not able to operate at designed capacity.

Hence, the PLF may be fixed in the range of 70% to 75%

M/s. Empee Distilleries Limited: may be fixed at 70%

Pranam Consultants, Pune : may be fixed at 80%

3. Depreciation

TNEB – Suitably altered based on the extended loan tenure of 15 years. Therefore, 6% p.a may be adopted

Pranam Consultants, Pune: may be fixed at 7.84% until the debt is repaid. Beyond that 20% is to be spread over the remaining life of the plants.

4. Cost of Loan / Debt

IREDA – Interest rate may be considered at 13% - 14% (or linked to PLR of SBI +1%)

TNEB- Loan tenure may be extended to 15 years. With the efforts taken by RBI there is a downward trend in the rate of interest. Hence, the interest rate may be adopted at 9% to 10%

MNRE -suggest to accommodate the interest rate variation for future requirement

M/s. Auro Mira Bio Energy Pudukottai India Limited: prevailing PLR varying 12.5% to 18%. Hence, the rate may be fixed at a minimum of 14%

M/s. Mohan Breweries and Distilleries Limited: Prevailing PLR varying 12.5% to 18%. Hence, the rate may be fixed at a minimum of 15.75%

5. Return on Equity (RoE):

MNRE – Keeping in view the risk involved, higher rate may fixed

1. **TNEB –** May be considered at 14%. Any tax is to be borne by the generator.

2. **M/s. Auro Mira Bio Energy Pudukottai India Limited & M/s. Mohan Breweries and Distilleries Limited:** CERC fixed 15.5% post tax for

conventional fuel. Hence, the RoE may be fixed at 22% pre-tax including 2% differential return to NCES projects.

6. O & M Expenses

IREDA – On usage of variety of biomass fuels, the project equipments are damaged frequently by corrosion / erosion. Hence, it may be fixed 6% - 7%.

TNEB – 4.5% with 5% escalation including insurance may be considered

M/s. Auro Mira Bio Energy Pudukottai India Limited: Considering the cost of escalation for the spares, nature of the raw material which leads to high corrosion. The O & M expenses may be fixed at minimum of 5% with 7% escl.

M/s. Mohan Breweries and Distilleries Limited: considering the increase in establishment expenses, cost of spares and frequent maintenance, it may be fixed 6% with 8% escalation.

Pranam Consultants, Pune: Including insurance it may be fixed at 7% with annual escalation of 5%.

7. Working Capital and Interest on Working Capital

IREDA - Interest rate may be considered at 13% - 14% (or linked to PLR of SBI +2%)

TNEB – Two months O & M is high one month may be considered. Fuel stock may be considered for one month. Interest may be considered at 11%.

MNRE – Accommodate the interest rate variation for future requirement.

Biomass Power Producers Association & M/s. Aurobindo Agro Energy (P) Ltd:

The components of working capital may be

- Fuel Stock – 3 months, O & M Expn- 2 months
- Receivables - 2 months & Interest on w/c – 14%

M/s. Auro Mira Bio Energy Pudukottai India Limited: The interest rate may be increased to at least 14%

M/s. Mohan Breweries and Distilleries Limited: The interest rate may be increased to at least 15.75%

8. Specific Fuel Consumption

IREDA – It may be in the range of 1.30 – 1.40 kg / kWhr

TNEB – The average consumption indicated in the DPRs may be considered subject to a ceiling of 1.10 kg/kwhr.

M/s. Aurobindo Agro Energy (P) Ltd: All plants in Tamil Nadu are having Air Cooled Condensers. The fuels available are with high moisture and needs chipping before feeding into the boiler. Hence, it may be fixed not less than 1.30 kg / kWhr

The Biomass power Producers Association : 1.30 kg / kWhr

M/s. Auro Mira Bio Energy Pudukottai India Limited & M/s. Mohan Breweries and Distilleries Limited: The station heat rate may be 4250 kcal / kwh and the calorific value may be 2200 kcal / kg. Hence, the fuel consumption may be fixed in the range of 1.6 to 1.9 kg / kwhr

M/s. Empee Distilleries Limited:– may be fixed at 1.16 kg/ kwhr

Pranam Consultants, Pune: Normative heat rate may be 4500 kcal / Kwh and the specific fuel consumption may be 1.36 kg / Kwh with average calorific value of 3300 kcal / kg

9. Fuel Cost

M/s. Auro Mira Bio Energy Pudukottai India Limited & M/s. Empee Distilleries Limited: Fuel cost in the range of Rs.2400 to 2500 / MT with an annual escalation of 10% during the control period.

TNEB – Cost prevailing in the other states in the order of Rs.1000 – Rs1200/MT. It may be fixed below Rs.1200/MT

MNRE – Minimum Rs.200/-MT may be added towards the cost of freight, loading, unloading, cutting and chipping

10. Auxiliary Consumption

TNEB: 9% is accepted

IREDA: The auxiliary consumption is in the range of 10%

MNRE: The auxiliary consumption needed for cutting and chipping which may be about 1%

Pranam Consultants, Pune & M/s. Auro Mira Bio Energy Pudukottai India Limited: Due to usage of many biomass fuels it may be fixed at 10%

M/s. Mohan Breweries and Distilleries Limited: It requires additional power for chipping and feeding and hence it may be fixed at 11%

11. CDM Benefit

IREDA - Normally available for projects with marginal viability and it is not usual practice of sharing with the STU and Distribution licensee and it is difficult to monitor.

TNEB – Passed on to the utility in proportion to the energy exported.

MNRE – Consider the recommendation of the FOR working group which shared on gross basis starting from 100% to developers in the first year and reducing 10% every year till the sharing becomes equal between the developers and the licensee.

M/s. Auro Mira Bio Energy Pudukottai India Limited:– May be used in following manner

- First set off against carried forward business loss
- Balance will be adjusted to satisfy the eligible return on equity to the generator
- Balance may be shared as proposed after meeting out the expenditure.

12. Evacuation Facilities

TNEB - Restoration of earlier practice of carrying by Board on DCW basis may be considered.

List of Persons / Organizations

1. Indian Renewable Energy Development Agency Limited (IREDA)
2. Ministry of New and Renewable Energy (MNRE)
3. Biomass Power Producers Association
4. M/s. Aurobindo Agro Energy (P) Ltd
5. M/s. Auro Mira Bio Energy Pudukottai India Limited
6. M/s. Empee Distilleries Limited
7. M/s. Mohan Breweries and Distilleries Limited
8. M/s. Pranam Consultants, Pune.
9. Tamil Nadu Electricity Board

Annexure – III

**PROCEEDINGS OF THE EXPERT COMMITTEE MEETING ON NON-
CONVENTIONAL ENERGY SOURCES HELD ON 16-07-2008 (Biomass Based Power
Generators)**

Proceedings of the Expert Committee meeting on Non-Conventional Energy Sources held on 16-07-2008 (Biomass Based Power Generators)

BIO MASS & CO-GENERATION

Mr.K.Raghunandan, MD, EID Parry India Ltd.

- Capital cost increased due to increase in steel & cement cost and due to inflation; the capital cost is around Rs.5.2 Cr/MW.
- Fuel cost is around Rs.1800 to Rs.2000 per tonne.
- Interest rate is 12.5%.
- Tariff shall be revised considering these escalated inputs

Mr.Ram V.Thiagaraian, CMD,M/s.Thiru Arooran Sugars Ltd.

- Capital cost is around Rs.5.2 Cr/MW.
- Interest rate is 13% to 14%
- Sugar cane cost increased to Rs.1050/tonne from Rs.800/tonne. Bagasse cost can be derived from it.
- Reapment period is made shorter.

Mr.R.Murugesan, VP, M/s.Bannari Amman Sugars

- Tariff remains the same for the last 10 years.
- Transmission corridor is not available to sell the power to other States.

Mr.K. Raghu, MD, M/s.Ind Bharath

- All the textile mills shifted to Bagasse from Biomass fuel. Now the cost is more than Rs.2000 per tonne. Capital Cost is 5.2 to 5.5 Cr./MW.
- Give us one time exit from the PPA or give a better tariff.

Mr.Santhosh Kamat, Co-founder, M/s.Auromira Energy

- Fixed cost & variable cost increased to Rs.4.35
- Rs.5 Cr./MW to 5.50 Cr./MW capital cost is reasonable.

- Fuel cost gone upto Rs.2000 to 2500
- Give us one time exit from PPA.

Mr.S. BalaSubramanian, Director, Avante Garde Engineers & Consultants (P) Ltd.:

- Without modification of the sugar mill, it is not possible to go in for full fledged efficient cogeneration plant.
- That modification alone cost around 10 Crores for a 3500 TCD sugar mill.
- On the bagasse cost, the Commission has taken a view already that it should be compared with the pit head cost of coal which is agreeable. We should work out the latest figures on that. But it is more appropriate in Tamil Nadu that the cost of Lignite what is available in Neyveli can be considered.

Mr.S.C. Natu, Senior Vice President, MITCON, Pune:

- The cost of air cooled plant of one and half year old is Rs.5.3 Cr./MW. 5.5 Cr. per MW is reasonable.
- In Tamil Nadu, in the area around the sugar factory, the quality of power has improved to a great extent. Power for pumpsets has improved substantially. Next is the emission reduction benefits, such as environmental benefits, social benefits and sustainability benefits are not factorized in the tariff.
- Tamil Nadu has been a leading example, but of late they have skipped to the 2nd position or 3rd position.
- Technology has improved initially with 45 kg. pressure and has gone upto 67, 97 and 105 kgs. only because of efficiency improvement which saves more bagasse for the off season
- Financing cost has also gone up. Interest rates in 2005 for 1+10year at the rate of 8% to 10% has now become 1 + 6 years @ at the rate of 12% to 13%. Raw material cost has also increased by 8 to 10%. Maintenance, salary, etc. have also gone up by 40%.
- The promoters want to have a better RR (Rate of Return) 17, 18 to 20%. When the financial cost of implementation is around 5 to 6 Crs. / MW, the repayment being (1 + 6) years at 13% interest, the reverse working gives a tariff of around Rs.4.50 and an escalation should also be provided.
- In a recent move of TNEB to set up cogen plants in seventeen co-operative sugar mills, the capital cost worked out as 4.5 to 5 Crores in March.

- Including sugar mill modification it works out to 5 to 6 Crs. / MW. If Tamil Nadu comes out with better tariff orders, taking into account the above parameters, another 600 MW could be added (today we are around 800 MW). Innovative actions by TNERC will help not only in Tamil Nadu but also other States.

Mr. Mohan Varghese Chunkath, CMD/TEDA:

- TEDA also did a small exercise in finding out the input cost for biomass units and we can confirm from that the price of Rs.1200 to Rs.1800 as indicated in the current market rate.
- The area which should be looked into is how to index the escalation that we find in the input costs. Unless the indexing is done, whatever increase is given, it may still become unviable at a future point of time. Capital Cost has increased quite considerably because of the steel cost, which is a major component.
- Chairman/TNERC requested TEDA to study and confirm the increase in different components of cost, which TEDA readily agreed.

Mr. Debashish Majumdar, CMD/IREDA:

- Of late we have worked out a price, which has an index built in based on the rise in material cost. Therefore we had a benchmark cost fixed from time to time. Based on that we have worked out the cost more or less on the line mentioned by Mr. Natu.
- Interest rates are also fluctuating. Another important fact is that the banks and financial institutions are lending on floating rates which would be reset every year. This leads to a situation where project promoter has no idea as to what would be the real cost during the repayment.
- Even in IREDA, it was fixed rate of interest, as recently as 1 year back. We have revised it and we have interest rates every 3 years and we will now change it in line with bank with resetting every year.
- The current rate is about 12% which would go up. The market and SBI rate is around 13.5%. The feed stock on the biomass is increasing upto Rs.1800 per tonne.
- Biomass based power projects and cogen are distinctly different from other renewable sector. The other renewable sectors have no cost for fuel whether it

is solar, wind or small hydro. Therefore there should be a built in variable / indexing for fuel cost escalation.

Mr.K.P. Sukumaran, Advisor, Cogen, MNRE:

- In the initial stages, the ERCs were very logical in giving a 14% return on post tax. But that situation no longer exists.
- When the Ministry indicated the guideline with price of Rs.2.25 / unit, we had built in escalation factor at 5%. Because of the unprecedented increase in commodity cost and other input cost, the Commission should also include an escalation factor into the tariff so that for certain period of time, the tariff remains logical.
- The Ministry supports the submission made by various groups and requests the Commission to look at it rationally and come out with a policy so that the entire renewable sector in Tamil Nadu comes up to the expected level.
- Another issue is the RPS issue, we had a 10% minimum. But a technology based RPS or an increased RPS by TNERC would also go in a long way for the development of more renewable source projects.

Mr.T.B. Chikkoba, Former Member, TNEB & SAC Member, TNERC:

- The Commission has fixed a control period for 3 years.
- But we find from their deliberations that the costs have gone up during 3 years and that they have to put up with a higher cost than what the Commission was reckoning.
- So the only way to correct this is to reduce the control period from 3 to 2 years so as to minimize this problem to the extent possible.
- With the increasing rise at fast rate, whether reduction of control period from 3 years to 2 years will solve the problem is a question.
- The principle is, once a tariff is fixed it should hold good for a period of 20 years or so as prescribed, should continue. Otherwise there is no point in fixing a tariff.
- In case of biomass and cogen, with the fuel cost going up, it will be reasonable to go in for two part tariff with fuel price adjusted for real cost every year. That way, there will not be a problem of fuel cost.
- The biomass plants should enter into a contract with their fuel suppliers so that escalation in the orders of 200% or 300% does not take place for so many years

- which binds them to supply for fixed years. We should develop the atmosphere of entering into contracts with everybody.
- The market fixes the rates. As planners, we should be judicious enough not to develop one industry where the industry cannot sustain the fuel. We have to take such an approach.
 - My suggestion would be 3 years control period could be for the capital cost and have an annual formula for input escalation so that for biomass & cogen which are primarily dependent on fuel outside, the fuel cost could be provided annually by means of a formula. Member II informed that FSA may not be possible as it is from rural source.

Mr.K.Venkatesan, IAS (Retd.), SAC Member:

- Three years control period is ok for capital cost. But for other inputs we should have some variable factor.

List of participants:

1. Mr. E.V.R. Sastry, Senior Advisor, Centre for Energy Technology, Osmania University, Hyderabad
2. Mr. Debashish Majumdar, CMD, IREDA
3. Mr. T.C. Tripathi, Adviser, Solar, MNRE
4. Mr. C.R. Nagarajan, Tata BP Solar
5. M/s. Sri Power, Hyderabad
6. Mr. K.E. Raghunathan, M.D., SOLKAR Energy
7. Dr. M. Kumaravel, Professor, IIT, Chennai
8. Mr. Rajendra V. Kharul, Head, CWP, WISE, Pune
9. Mr. Mohan Varghese Chankath, IAS, CMD, TEDA
10. Mr. C.S.Y.S. Rao, MD, Titan Energy Systems
11. Mr. R. Chellappan, M.D., Numeric Power Systems
12. Mr. S. Kathiresan, Member (Accounts) / TNEB
13. Mr. T.K. Chikkoba, Former Member, TNEB & SAC Member, TNERC
14. Mr. K. Venkatesan, IAS (Retd), SAC Member
15. Mr. K. Raghunandan, MD, EID Parry India Ltd.
16. Mr. Ram V. Thiagarajan, CMD, M/s. Thiru Arooran Sugars Ltd.
17. Mr. R. Murugesan, VP, M/s. Bannari Amman Sugars
18. Mr. K. Raghun, MD, M/s. Ind Bharath
19. Mr. Santhosh Kamat, Co-founder, M/s. Auromira Energy
20. Mr. S. Bala Subramanian, Director, Avante Garde Engineers & Consultants (P) Ltd.
21. Mr. S.C. Natu, Senior Vice President, MITCON, Pune
22. Mr. K.P. Sukumaran, Advisor, Cogen, MNRE
23. Mr. Kasthuri Rangaiyan, VP, Indian Wind Power Association
24. Mr. A.H. Pandit, Consultant, IWEA

25. Mr. K. Venkatachalam, Chief Advisor, TNSMA
26. Mr.P.Vetrivelan, M/s. Sri Shanmugavel Mills
27. Mr.Jayachandran, M/s.Premier Mills, Coimbatore
28. Mr.Ramesh Kymal, M/s.Vestas
29. Mr. Ramani, M/s. Indian Wind Turbine Manufacturers Association

**PROCEEDINGS OF THE SEVENTEENTH STATE ADVISORY COMMITTEE MEETING
HELD ON 26-02-2009**

**PROCEEDINGS OF THE SEVENTEENTH STATE ADVISORY COMMITTEE MEETING
HELD ON 26-02-2009.**

Members Present:

- | | |
|--|--|
| 1. Thiru. S.Kabilan | Chairman / TNERC |
| 2. Thiru. B. Jeyaraman | Member / TNERC |
| 3. Thiru. R.Rajupandi | Member / TNERC |
| 4. Thiru.P.W.C.Davidar. I.A.S. | Secretary to Government
Energy Department (I/c),
Special Invitee |
| 5. Thiru. Mohan Verghese Chunkath.I.A.S. | Member / SAC |
| 6. Thiru. K.Venkatesan. I.A.S. (Retd) | Member / SAC |
| 7. Thiru. T.B.Chikkoba | Member / SAC |
| 8. Dr. M.Abdullah Khan | Member / SAC |
| 9. Dr. U.Shankar | Member / SAC |
| 10. Thiru. K.V. Shetty | Member / SAC |
| 11. Thiru. D.Kumaravelu | Member / SAC |
| 12. Thiru.S.V.Balasubramaniam | Member / SAC |
| 13. Thiru. A.Vellayan | Member / SAC |
| 14. Thiru. S.Rathinavelu | Member / SAC |
| 15. Thiru. Vipin Jha. | Member / SAC |
| 16. Thiru. D.E.Ramakrishnan | Member / SAC |
| 17. Thiru. K.P.Sukumaran | Special Invitee |
| 18. Thiru Debashish Majumdar | Special Invitee |
| 19. Thiru. S.Kathiresan | Special Invitee |
| 20. Thiru K.Raghu | Special Invitee |

i) The meeting commenced with welcome address by Chairman, TNERC. The Chairman, TNERC stated that 17th SAC meeting is a continuation of the last SAC meeting held on 16-06-2009. The subjects of establishment of evacuation facility particularly tie lines, where it was left in the last meeting was taken up. It was indicated that the cost of tie lines can be borne by the generator or by the TNEB and in either case

it is recovered through tariff from consumers. However, as the assets are in the books of TNEB, it is not logical to account the same in the books of the generators. Chairman highlighted the importance of NCES and that the Hon'ble Minister for Electricity in his speech on the floor of the State Legislature has also expressed the same. Subsequently, Chairman requested the SAC members to offer their views on issue basis on the subject.

This was followed by a presentation by the Deputy Director / Tariff on Bagasse based Co-generation and the issue wise discussion was taken up:

1. **Capital Cost**

Chairman / TNERC: TNERC's proposal of Rs.4.96 Crores / MW is based on the project cost approved by IREDA in 2008-09.

Thiru. T.B.Chikkoba: Marginal cost for generation of power is to be taken to fix the capital cost and not the entire cost.

Thiru S.V.Balasubramaniam: Sugar production does not need the high pressure boilers. Therefore, cost should not be apportioned. Further, due to shortage of water, air cooled condensers are installed instead of water cooled condensers. The additional cost works out to Rs. 40 to Rs. 50 lakhs. We need not go into such details for fixing the capital cost.

Dr.U.Shankar: Financial Gain to sugar mills because of establishment of co-gen is to be taken into account.

Thiru D.Kumaravelu: 66 ata boiler etc are for co-gen only. However, Rs.4.96 Crores/MW is on the high side. Rs.4.00 Crores / MW is reasonable based on the rate adopted in Gujarat State.

Thiru. Mohan Verghese Chunkath: Rs.5.00 Crores / MW is on the high side. This may be discounted by 10 to 15%.

Thiru Debashish Majumdar: Costing is very difficult as it varies with reference to boiler pressure, peripheral equipments, condensing equipments etc.

Thiru DE.Ramakrishnan: Co-gen is a firm power and there is severe shortage of power in the State. There is no need for meticulous accounting of minute details as it is a generalized tariff and the impact is negligible.

Thiru S.Kathiresan: Unless the cost is segregated between sugar industry and co-gen, it will not represent the correct cost.

Thiru.S.Rathinavelu: There is a severe shortage of power in Tamil Nadu. Karnataka tariff is much liberal. Now it is right time to encourage industries for setting power projects.

Thiru. K.Raghu: It is a generalized tariff. Some may gain and others may lose. Therefore, the capital cost shall not be curtailed.

2. Plant Load Factor

Chairman/TNERC, read out a statement received from the TNEB regarding the PLF achieved by various plants.

Thiru. T.B.Chikkoba: Low PLF is due to inadequate fuel as sugar factory is a seasonal industry. Therefore, allow coal etc, to attain higher PLF in national interest. De-rating as allowed to wind may be allowed here for co-gen also.

Thiru S.V.Balasubramaniam: Production of sugar factory has come down due to low quality of sugar cane. Sugar cane price is comparatively less. Therefore, there is a shift to other crops by the farmers. PLF is different in different years.

Dr. M.Abdullah Khan: As seen from the figures furnished by TNEB, variability between different years for PLF is high. Therefore, average is to be fixed appropriately.

Thiru Debashish Majumdar: Due to seasonal nature of sugar industry, the PLF is less for co-gen. Even though MNRE restricts use of conventional fuel, they shall be allowed to use coal etc, to reach higher PLF. Otherwise, it is a national waste.

Member II / TNERC: As per order No.3 dated 15-05-2006, for the generation over and above 55% PLF, they are paid at the rates applicable to fossil fuel co-gen rate which has a floor and ceiling rate.

3. Depreciation

Thiru. S.Kathiresan: Depreciation rate shall be 6% by enhancing the loan tenure to 15 years.

Chairman / TNERC: We have to go by the prevailing market condition.

4. Return on Equity (RoE)

Thiru. K.Raghu: Higher percentage of RoE may be allowed, since PLF achieved is much less. Tax holiday is available for power industry only and therefore, co-gen may not have the benefit of tax holiday. Hence, the percentage of RoE may be increased appropriately.

Thiru. S.Kathiresan: As this a personal taxation, it shall be borne by the generator and the RoE may be 14%.

Thiru. DE.Ramakrishnan: Since the benefit of tax holiday is not there for co-gen and if the income tax is paid by themselves, to that extent the effective rate of RoE will come down. This is to be necessarily addressed.

Chairman / TNERC: This percentage is specified for power producing industrial activity and for them the RoE will match with income tax.

5. Interest on Loan:

Thiru. S.Kathiresan: Loan tenure may be extended to 15 years. With the efforts taken by RBI there is a downward trend in the rate of interest. Hence, the interest rate may be adopted at 9% to 10%

6. Working Capital:

Thiru DE.Ramakarihnan: Receivable may be for two months instead of one month

Thiru A.Vellayan: Actual practice for working capital norms are O&M two months, fuel two months and receivable two months.

Thiru S.Kathiresan: Two months O & M is high, one month may be considered. Fuel stock may be considered for one month. Interest may be considered at 11%.

7. Operation and Maintenance Expenses

Thiru D.Kumaravelu: Insurance shall be allowed within O & M and 4.5% is in the high side. 4% including insurance is reasonable.

Thiru S.Kathiresan: 4.5% with 5% escalation including insurance may be considered.

Member II / TNERC: While O & M will increase over the period and insurance will decrease over the period. Hence it cannot be combined.

Thiru T.B.Chikkoba: 0.75% for insurance shall be for equipment cost and not on project cost.

Thiru K.Raghu: 4% for O & M including insurance is not sufficient for smaller configuration plants.

Thiru S.V.Balasubramaniam: The present rate of 4.5% for O & M and 0.75% for insurance may continue and need not be reduced.

Thiru K.Venkatesan: As the impact is very meager, this may be continued

8. Specific Fuel Consumption

Thiru S.Kathiresan:The average consumption indicated in the DPRs may be considered subject to a ceiling of 1.53 kg/kwhr.

Thiru S.V.Balasubramaniam: Due to quality of sugar cane, moisture etc, station heat rate is different which may be 4000 +/- 100 kcal / kwh. What is given in the DPR is not to be taken as it is not the actual.

9. Fuel Cost

Thiru A.Vellayan: TNPL pays Rs. 2000/-MT; this may be taken into account.

Thiru S.V.Balasubramaniam: The price paid to Co-op. Sugar Mills is Rs.1040/-. To arrive at the delivery cost, transport cost of Rs.250/- MT is to be added.

Thiru S.Kathiresan: As per the order of other Commissions, the fuel prices are in the range of Rs.800 to 900 per MT.

Chairman / TNERC: Other Commissions prices relate to much earlier periods. As per the price paid by TNPL to 14 Co-op Sugar Mills, the Commission has arrived the weighted Average price of Rs.923-/MT. The price arrived seems reasonable.

Thiru T.B.Chikkoba and Thiru. K.Venkatesan: Rs 1000/MT with 5% escalation per annum seems to be reasonable

After the discussion on Bagasse based Co-generation, another presentation was made by the Deputy Director / Tariff on the details of discussion on Biomass based generation of power, and the details of discussion on the subject are as below:

1. Capital Cost

Chairman / TNERC: TNERC proposal of Rs.5.10 Crores / MW is based on the project cost approved IREDA in 2008-09

Thiru. K.Raghu: Cost of Air cooled condensers is to be included in the proposed capital cost.

Thiru S.Kathiresan: The power evacuation cost has been excluded in the proposed capital cost. Hence, the cost of Rs.5.10 Crores/MW is considered to be high and a cost of Rs.4.65 Crores/MW as per IREDA approval may be adopted.

Thiru D.Kumaravelu: TNEB stand of Rs.4.65 Cr. /MW is reasonable.

2. Plant Load Factor

Chairman/TNERC, read out a statement received from the TNEB regarding the PLF achieved by various Biomass plants.

Thiru.K.Raghu: Cost of raw material has gone up from Rs.750/MT to Rs.2250/MT. With the present tariff even the variable cost cannot be recovered. There is a shift in the usage of Biomass by Co-gen., Textile Industry etc.

Thiru. Mohan Verghese Chunkath: Seasonal power is also infirm. If good tariff is given more and more Biomass plants will come up.

Thiru. T.B.Chikkoba: There is scarcity of fuel. Fuel is not available even if good tariff is given.

Thiru S.V.Balasubramaniam: Cost is prohibitive compared to tariff. We had an idea to put up a Biomass Plant and we deferred the same on scarcity for fuel availability and cost.

Thiru Debashish Majumdar: Un-organized biomass is still available as per study conducted on this. Suddenly it has competitive uses and since tariff is not much they cannot even survive. Sugar Industry has a command area but not for Biomass.

3. Specific Fuel Consumption

Thiru S.Kathiresan: The average consumption indicated in the DPRs may be considered subject to a ceiling of 1.10 kg/kwhr.

Thiru. K.Raghu: The Commission may take up the IREDA view points as they have the experience as financiers for the past several years.

Dr. M.Abdullah Khan: Actual data from various plants are to be collected and a decision must be taken.

4. Fuel Cost

Thiru T.B.Chikkoba: It may be fixed at Rs.2000/MT and they may also be given exit option.

Member II / TNERC: All power purchase agreements were already executed without exit clause. The Commission cannot do anything in a bilateral agreement.

Thiru S.Kathiresan: As per the order of the other Commissions, the fuel prices are in the order of Rs.1000/MT.

Thiru K.Raghu: We are ready to hand over the plants to TNEB and they may run the plant at this cost.

5. Auxiliary Consumption

Thiru K.Venkatesan: The Commission may ask the generators to furnish the data

Thiru K.Raghu: Minimum auxiliary consumption of 10 to 10.5% is reasonable. Maintenance of data is very tough and costly. Because different raw materials with different moistures are used. Further it involves cost for testing of samples.

Thiru S.Kathiresan: If the increase is beyond 9%, it must be based on the data.

Chairman/TNERC, in his concluding remarks, thanked all the members for their valuable suggestions.

PROCEEDINGS OF THE PUBLIC HEARING HELD ON 5TH MARCH 2009

PROCEEDINGS OF THE PUBLIC HEARING HELD ON 5TH MARCH 2009

Secretary, TNERC welcomed all the participants gathered for public hearing and requested to offer their views on the consultative papers for determination of tariff for wind Energy, Bio-Mass and bagasse based Cogeneration power.

Thiru.V.Raghu, Secretary General, M/s.Indian Wind Power Association.

Requested the Commission to set the following parameters for determination of wind tariff.

CUF 23 % ; Capital Cost – Rs.6.00 cr./MW ; O&M Expenses – 1.80% for 2 years with 5% escalation per annum ; Insurance - 0.75% on replacement value with 5% escalation thereafter; Interest – 13% ; ROE – 15.5 % (post tax) as per CERC norms ; tariff rate of Rs.3.90 per unit with annual escalation of 9 paise per unit. The tariff rate for group 1 and group 2 WEGs should also be revised on the principles of equality before law. The actual de-rating for the WEGs is around 7% in the last 3 – 4 years. The O&M charges has increased to 21 paise per unit and requested to follow the Maharashtra model of wind tariff determination.

If Commission imposes sharing of CDM benefits with the licensee, the promoter will not get any CDM benefits. No cross subsidy surcharge for wheeling to third parties be levied; RPO should be at 15% ; Rebate for payment made within 15 days shall be as in Gujarat ; BPSC for payment made over 15 days shall be charged at SBI PLR ; permission for outside State sale be given ; Demand charges may be calculated based on the actual generation units only; adjustment of higher TOD slot units against lower TOD be allowed ; no scheduling and system operation charges be levied ; Permission for availing banked units during R & C period in addition to the TNEB quota shall be given. The lapsed units shall be sold to TNEB or permission must be given to carry over the lapsed units to the forthcoming years without any time restrictions. Prior discussion with generators is required for finalizing model EPA/EWA .

Thiru.K.Venkatachalam, Chief Adviser to Tamil Nadu Spinning Mills Association.

Requested the Commission to set the following parameters for determination of wind tariff.

CUF – 22%; Capital Cost – Rs.5.45 cr./MW ; The actual O&M cost is around 1.89%. Commission may consider 1.69% of capital cost as O&M with the escalation prevailing in the market. Loan tenure may be fixed at 7 years with one year moratorium period. Interest on loan may be fixed at 13.5 %. The projects will get CDM benefits only if there is any viability gap. Hence, there shall not be any sharing of CDM benefits and it may be given to the Generators in full. The tariff for group1, group2 and proposed tariff may be fixed at Rs.3/- , Rs.3.20/- and Rs.3.40 respectively.

Thiru.Ajit Pandit appeared for M/s.Indian Wind Energy Association, M/s.Simran wind power and M/s Super wind Power.

The Control period of 2 year and the ROE of 17.63% specified in the consultative paper is agreeable. For the RPO there is no maximum limit mentioned in NTP, trajectory kind of target may be fixed. Regarding CUF, the wind potential sites are already exploited and 26.5% may be considered. Regarding capital cost, indexation with respect to steel and cement price movement may be introduced as introduced by Rajasthan ERC in their MYT order. The project may be exposed for 10 years MAT and 10 years corporate tax. The interest on debt shall be based on PLR movement. Time value of money may be considered. The Cross subsidy Surcharge should be made nil since the cross subsidy surcharge formula introduced in the National Tariff Policy does not include the NCES sources. Control period was waived on 19-09-2008, the new order should have retrospective effect from that date otherwise there will be Regulatory vacuum for the intermediate period.

Thiru V.Thiagarajan, CMD, Thiruarooran Sugars.

As PLF variability is there due to switching over of crops by farmers, availability of bagasse, etc. The availability of bagasse for the year 2009-10 will be lower than the availability in the year 2008-09. Commission may consider a block of 5 years for PLF calculation. Any variation may be adjured in the next year PLF requirement. Due to lower achievable PLF, the promoters could not take back their fixed cost. Generation over 55% PLF, such sale is paid at ABT rates which may be less than even the variable cost ; The actual calorific value of the bagasse is only 2272 Kcal/Kg due to higher moisture

content and hence, the actual station heat rate comes to 4000 k.cal./kwh. Cross subsidy surcharge may be waived. Capital cost shall be Rs.5.25 cr./MW. Payment to the promoters shall be paid within 30 days and any delayed payment over 30 days, interest at 18% per annum shall be paid to the promoter. Generator alone may avail the entire CDM benefits. The matter of levying taxes on generation and consumption is under litigation and the same may be accommodated in the tariff order. Commission may permit to use coal in the off season so that the promoters can get the variable cost of coal along with the fixed cost.

Thiru K.Raghunathan, MD, EID (P) Ltd.

PLF must be bankable and adjustment may be done every year. An average of 55% PLF over a period of 5 years block may be considered by the Commission. Power from higher PLF shall be given the same rate. For the units generated using bagasse, even if the PLF is beyond 55 %, NCES tariff may be permitted instead of ABT rates. Cane crushing data furnished to the Government may be verified for fuel quantity for achieving 55% PLF. As various administrative expenses are involved in getting the CDM benefits, it may be permitted to be held by the Generators.

Thiru N. Ramani, Indian Wind Turbine Manufacturers Association.

The 3 years control period should be reduced from the date it was announced. The effective date for the new tariff should be either from 15th May, 2008 or 19th September, 2008. 15.5% post tax should be considered for ROE as prescribed by CERC. Incentives for better performing projects. Removal of cross subsidy payment for wheeling to third parties, determination of project specific pricing for large projects; allowing of 100% CDM benefits to generators atleast for 2 years; Payment by Letter of Credit and exit clause should be introduced to attract international developers. IDC should not be included in the project cost. If TNEB is charging evacuation charging, the wind tariff should not be Rs.3.40 per unit. Wind potential is not same in all areas.

Thiru K.Venkatesh, M/s.Rajshree Sugars, Coimbatore

The proposed order may be applicable from 15-05-2008. The projects commissioned prior to the proposed order and after the end of the control period should be treated as new projects for the purpose of fixing new tariff order.

Thiru S.Gandhi, President, Power Engineers Society of India.

Only 6 days are given for preparation of public hearing and the Tamil version of the consultative paper have not been posted in the Commission's website. Wind power is infirm in nature and not facilitating TNEB, TNEB consolidate all kind of power and distribute. Regarding capital cost, it is on higher side and no evidence for fixing the capital cost is given. Cost of the WEG can not be more than 2 crores/ MW. WEGs are getting central subsidy and corporate tax benefits and hence there is no reason to fix a RoE of 17.63%. Electricity Act, 2003 does not permit banking and hence banking arrangement should not be given to the WEGs. TNEB has not made any study on the impact of TNEB grid due to 4200 MW WEGs because they are all inductive in nature. As per European standards the fault level in each feeder can not be more than 5%. But due to WEGs, the fault level is more. In the state of Kerala the tie feeders with the WEGs are directly connected to the bus bar of the substation. But in Tamil Nadu it is not so. There should be heavy penalty mechanism for VAR component injected into the grid. CUF should be arrived based on the machines commissioned in the last 3 years. The actual CUF in Theni area is around 37.5%. IDC should be charged with the promoters or the promoters themselves can lay the transmission line. No justification in waiving the cross subsidy and the poor people will get affected. Due to WEGs 36,000 acres of land is barren and there is no agricultural production in these lands. Consultative paper reflects the policy of privatizing the profits and socialize the losses.

Thiru Siva Subramanian, Sakthi Sugars:-

Very few plants came up after 15-05-2006. Two plants were commissioned in 2007 & 2008. Escalation of expenditures after 2006 is high. We achieved less than 55% PLF in the past. For the existing projects capital cost may be revised to Rs.4.5 crores/MW and the tariff may be reworked accordingly. We have spent around Rs.5.5 crores for evacuation and this amount may be included in the capital cost. RoE of 15.5% post tax may be given as prescribed by CERC. This should translate into 20.771% pre-tax. TNEB is purchasing power at Rs.9 per unit and the co-generators are ready to supply at less than Rs.9 per unit.

Thiru R.Varadarajan, DGM, DCW Ltd.

The old projects should be included in the new tariff regime and the promoters are not getting payment from TNEB in time.

Thiru A.Senthilkumar, M/s.TANFAC India Ltd.

We have captive power plant based on waste heat recovery from chemical process. The tariff fixed by TNERC is only Rs.3.15 per unit. Since ours is a co-generation plant, this should be treated on par with the bio-mass power plant. We are not able to make agreement with TNEB for sale of electricity since our consumption is less than 51%.

Thiru N.Nagarajan, DGM(O&M), M/s.Subashree Bio energies (P) Ltd.

We have biological biomass production and the plant is classified under biomass group. The capital cost is around Rs.11 crores per MW and the generation cost is Rs.10.50 per unit. The demand charges imposed should be waived. Charges may be levied under Tariff – I instead of Traiff – III in the case of drawal from TNEB.

Dr.Rajapandian, Professor, Panimalar Engineering College.

If there is more demand for the wind machines, cost will come down. The WEGs shall be allowed to realize the market price and should be allowed to sell any body.

Thiru K.Periasamy, Director (Technical), M/s.Precision Equipments (P) Ltd.

Bio-mass should not be encouraged as it affects the fertility of the top soil and agriculture productivity. Pumped storage power plant may be categorized under NCES as it reduces the peak load. Solar power plant can be encouraged only in the villages where standalone system is required. NCES sources shall be encouraged only when it is economically viable. Power Plants with de-salination shall also comes under NCES.

Thiru K.Nagaraju, M/s.Lakshmi Electrical Control System Ltd.,

Surplus units can be carry over to the next year to those people who have not signed agreement with TNEB. Adjustment of peak hour units to other slots should be allowed due to power cut.

Thiru M.P.Vasanth.

The date of commissioning is not relevant since previously it was a single part tariff, but the proposed tariff is two part tariff and therefore the applicability is to be clearly spelt out. Agreement period is 20 years but the tariff is calculated based on the 12 years.

Thiru M.R.Krishnan, Consumers Association of India.

The time given by the Commission for public hearing is not sufficient for preparing the notes. Competitive bidding in procurement should be introduced. Commission can review the performances of service providers. Most of the assumptions in the consultative paper is based on the better parts of the other Commission reports. Using of Coal should not be allowed in bagasse based generation.

Thiru V.Mageswaran, Unorganised workers federation

Consumer burden should be reduced. Solar and wind energy should be promoted under public sector projects. Land is affected due to wind energy project.

Thiru K.Vijayarajan, Director, M/s.ABI Energy Consultancy Service (P) Ltd.

It is only after the year 2000, few projects have been registered for CDM benefits. Only the projects which requires financial additionality have been considered for CDM benefits. The transaction cost for getting CDM benefits is about 5 to 25% of the CERs.

Thiru S.V.Angappan, GS, TNEB Accounts & Executive staff union.

There is no evidence for the capital cost fixed by the Commission. TNEB does not have the capacity to buy the costly power. Tariff should be revised so that TNEB will have sufficient RoE. Banking shall be left to the decision between distribution licensee and WEGs.

Thiru T.R.Krishnasamy, Director, Energreen Power Ltd.

The capital cost of biomass gasification plant is high which is about Rs.7.5 crores / MW. This should be bench marked . The cost of engine itself is more than Rs.3.5 crores/MW. Commission should provide some incentive to encourage technological advancements. Evacuation shall be provided at 100 KW level in villages.

Thiru Yuvaraj, Tamil Nadu Farmers Sangam, Kumbakonam,

Supply is not available even for 6 hours a day for agriculture purpose in last month in Tanjore area. At least 8 hours supply should be given to the agriculture sector. Farmers are not getting higher rate for bagasse. WEGs may be encouraged.

List of Persons/Organization

1. Thiru.V.Raghu, Secretary General, M/s.Indian Wind Power Association.
2. Thiru.K.Venkatachalam, Chief Adviser to Tamil Nadu Spinning Mills Association.
3. Thiru.Ajit Pandit appeared for M/s.Indian Wind Energy Association, M/s.Simran wind power and M/s Super wind Power.
4. Thiru V.Thiagarajan, CMD, Thiruarooran Sugars.
5. Thiru K.Raghunathan, MD, EID (P) Ltd.
6. Thiru N. Ramani, Indian Wind Turbine Manufacturers Association.
7. Thiru K.Venkatesh, M/s.Rajshree Sugars, Coimbatore
8. Thiru S.Gandhi, President, Power Engineers Society of India.
9. Thiru Siva Subramanian, Sakthi Sugars
10. Thiru R.Varadarajan, DGM, DCW Ltd.
11. Thiru A.Senthilkumar, M/s.TANFAC India Ltd.
12. Thiru N.Nagarajan, DGM(O&M), M/s.Subashree Bio energies (P) Ltd.
13. Dr.Rajapandian, Professor, Panimalar Engineering College.
14. Thiru K.Periasamy, Director (Technical), M/s.Precision Equipments (P) Ltd.
15. Thiru K.Nagaraju, M/s.Lakshmi Electrical Control System Ltd.
16. Thiru M.P.Vasanth.
17. Thiru M.R.Krishnan, Consumrs Association of India.
18. Thiru V.Mageswaran, Unorganised workers federation
19. Thiru K.Vijayarajan, Director, M/s.ABI Energy Consultancy Service (P) Ltd.
20. Thiru S.V.Angappan, GS, TNEB Accounts & Executive staff union.
21. Thiru T.R.Krishnasamy, Director, Energreen Power Ltd.
22. Thiru Yuvaraj, Tamil Nadu Farmers Sangam, Kumbakonam,

**SUMMARY OF COMMENTS RECEIVED FROM THE STAKE HOLDERS, ADVISORY
COMMITTEE MEMBERS AND PUBLIC ON THE CONSULTATIVE PAPER
CIRCULATED BY THE COMMISSION.**

SUMMARY OF COMMENTS RECEIVED FROM THE STAKE HOLDERS, ADVISORY COMMITTEE MEMBERS AND PUBLIC ON THE CONSULTATIVE PAPER CIRCULATED BY THE COMMISSION.

1. Capital Cost

Indian Renewable Energy Development Agency (IREDA): The capital cost are in the range of Rs.4.70 Cores / MW to Rs.5.03 Crores / MW for the boiler configuration of 66 ata. Accordingly, the capital cost may be reconciled.

TNEB –The power evacuation cost has been excluded in the proposed capital cost. Hence, the cost of Rs.5.10 Crores/MW is considered to be high and a cost of Rs.4.65 Crores/MW may be adopted.

Ministry of New and Renewable Energy (MNRE): The capital cost may be linked to escalation indices for major input cost such as steel, cement, etc

M/s. Auro Mira Bio Energy Pudukottai India Limited: due to installation of Air cooled condenser the capital cost may be considered as Rs.5.50 Crores

M/s. Mohan Breweries and Distilleries Limited: due to installation of air cooled condenser and other variable frequency drives the cost may be considered as Rs. 6.00 Crores.

M/s. Pranam Consultants, Pune: recommended at the rate of Rs.4 Crs / MW as recommended by CEA in report on “operation norms for biomass based power plants dated September 2005.

Thiru. K.Raghu, President Biomass Power Producers Association: Cost of Air cooled condensers is to be included in the proposed capital cost.

Thiru S.Kathiresan: The power evacuation cost has been excluded in the proposed capital cost. Hence, the cost of Rs.5.10 Crores/MW is considered to be high and a cost of Rs.4.65 Crores/MW as per IREDA approval may be adopted.

Thiru D.Kumaravelu: TNEB stand of Rs.4.65 Cr. /MW is reasonable.

Thiru N.Nagarajan, DGM(O&M), M/s.Subashree Bio energies (P) Ltd: We have biological biomass production and the plant is classified under biomass group. The capital cost is around Rs.11 crores per MW and the generation cost is Rs.10.50 per unit. The demand charges imposed should be waived. Charges may be levied under Tariff – I instead of Traiff – III in the case of drawal from TNEB.

Thiru T.R.Krishnasamy, Director, Energreen Power Ltd: The capital cost of biomass gasification plant is high which is about Rs.7.5 crores / MW. This should be bench marked. The cost of engine itself is more than Rs.3.5 crores/MW. Commission should provide some incentive to encourage technological advancements. Evacuation shall be provided at 100 KW level in villages.

2. PLF

MNRE –Fixation may be based on the past achievement

TNEB – 80% PLF proposed, is accepted

Biomass Power Producers Association & M/s. Aurobindo Agro Energy (P) Ltd: due to high moisture in the available biomass, the PLF may be considered at 70%

M/s. Auro Mira Bio Energy Pudukottai India Limited: due to frequent shutdown for maintenance, different varieties of fuels used, the plants are not able to operate at designed capacity. Hence, the PLF may be fixed in the range of 70% to 75%.

Thiru.K.Raghu President Biomass Power Producers Association: Cost of raw material has gone up from Rs.750/MT to Rs.2250/MT. With the present tariff even the variable cost cannot be recovered. There is a shift in the usage of Biomass by Co-gen., Textile Industry etc(SAC)

M/s. Empee Distilleries Limited: may be fixed at 70%

M/s. Pranam Consultants, Pune: may be fixed at 80%

Thiru. Mohan Verghese Chunkath, CMD TEDA: Seasonal power is also infirm. If good tariff is given more and more Biomass plants will come up.

Thiru. T.B.Chikkoba: There is scarcity of fuel. Fuel is not available even if good tariff is given.

Thiru S.V.Balasubramaniam: Cost is prohibitive compared to tariff. We had an idea to put up a Biomass Plant and we deferred the same on scarcity for fuel availability and cost.

Thiru Debashish Majumdar, CMD IREDA: Un-organized biomass is still available as per study conducted on this. Suddenly it has competitive uses and since tariff is not much they cannot even survive. Sugar Industry has a command area but not for Biomass.

3. Depreciation

TNEB: Suitably altered based on the extended loan tenure of 15 years. Therefore, 6% p.a may be adopted

Pranam Consultants, Pune: may be fixed at 7.84% until the debt is repaid. Beyond that 20% is to be spread over the remaining life of the plants.

4. Return on Equity (RoE)

MNRE – Keeping in view the risk involved, higher rate may fixed

TNEB – May be considered at 14%. Any tax is to be borne by the generator.

M/s. Auro Mira Bio Energy Pudukottai India Limited & M/s. Mohan Breweries and Distilleries Limited: CERC fixed 15.5% post tax for conventional fuel. Hence, the RoE may be fixed at 22% pre-tax including 2% differential return to NCES projects.

Thiru S.V.Angappan, GS, TNEB Accounts & Executive staff union: There is no evidence for the capital cost fixed by the Commission. TNEB does not have the capacity to buy the costly power. Tariff should be revised so that TNEB will have sufficient RoE. Banking shall be left to the decision between distribution licensee and WEGs.

5. Cost of Loan / Debt

IREDA: Interest rate may be considered at 13% - 14% (or linked to PLR of SBI +1%)

TNEB: Loan tenure may be extended to 15 years. With the efforts taken by RBI there is a downward trend in the rate of interest. Hence, the interest rate may be adopted at 9% to 10%.

MNRE -suggest to accommodate the interest rate variation for future requirement

M/s. Auro Mira Bio Energy Pudukottai India Limited: prevailing PLR varying 12.5% to 18%. Hence, the rate may be fixed at a minimum of 14%

M/s. Mohan Breweries and Distilleries Limited: Prevailing PLR varying 12.5% to 18%. Hence, the rate may be fixed at a minimum of 15.75%

6. O & M Expenses

IREDA – On usage of variety of biomass fuels, the project equipments are damaged frequently by corrosion / erosion. Hence, it may be fixed 6% - 7%

TNEB – 4.5% with 5% escalation including insurance may be considered

M/s. Auro Mira Bio Energy Pudukottai India Limited: Considering the cost of escalation for the spares, nature of the raw material which leads to high corrosion, the O & M expenses may be fixed at minimum of 5% with 7% escalation.

M/s. Mohan Breweries and Distilleries Limited: considering the increase in establishment expenses, cost of spares and frequent maintenance, it may be fixed 6% with 8% escl.

Pranam Consultants, Pune: Including insurance it may be fixed at 7% with annual escalation of 5%.

7. Working Capital and Interest on Working Capital

IREDA - Interest rate may be considered at 13% - 14% (or linked to PLR of SBI +2%)

TNEB – Two months O & M is high one month may be considered. Fuel stock may be considered for one month. Interest may be considered at 11%.

MNRE – Accommodate the interest rate variation for future requirement.

Biomass Power Producers Association & M/s. Aurobindo Agro Energy (P) Ltd: The components of working capital may be

- Fuel Stock – 3 months, O & M Expn- 2 months
- Receivables - 2 months & Interest on w/c – 14%

M/s. Auro Mira Bio Energy Pudukottai India Limited: The interest rate may be increased to at least 14%

M/s. Mohan Breweries and Distilleries Limited: The interest rate may be increased to at least 15.75%

8. Specific Fuel Consumption

IREDA – It may be in the range of 1.30 – 1.40 kg / kWhr

TNEB – The average consumption indicated in the DPRs may be considered subject to a ceiling of 1.10 kg/kwhr.

M/s. Aurobindo Agro Energy (P) Ltd: All plants in Tamil Nadu are having Air Cooled condensers. The fuels available are with high moisture and needs chipping before feeding into the boiler. Hence, it may be fixed not less than 1.30 kg / kWh

The Biomass Power Producers Association: The fuel consumption is in the range of 1.30 kg / kWh

M/s. Auro Mira Bio Energy Pudukottai India Limited: The station heat rate may be 4250 kcal / kWh and the calorific value may be 2200 kcal / kg. Hence, the fuel consumption may be fixed in the range of 1.6 to 1.9 kg / kWh

M/s. Empee Distilleries Limited: may be fixed at 1.16 kg/ kWh

M/s. Pranam Consultants, Pune: Normative heat rate may be 4500 kcal / Kwh and the specific fuel consumption may be 1.36 kg / Kwh with average calorific value of 3300 kcal / kg

Thiru. K.Raghu, President Biomass Power Producers Association: The Commission may take up the IREDA view points as they have the experience as financiers for the past several years.

Dr. M.Abdullah Khan: Actual data from various plants are to be collected and a decision must be taken.

9. Fuel Cost

M/s. Auro Mira Bio Energy Pudukottai India Limited & M/s. Empee Distilleries Limited: Fuel cost in the range of Rs.2400 to 2500 / MT with an annual escalation of 10% during the control period.

TNEB – Cost prevailing in the other states in the order of Rs.1000 – Rs1200/MT. It may be fixed below Rs.1200/MT.

MNRE – Minimum Rs.200/-MT may be added towards the cost of freight, loading, unloading, cutting and chipping

Thiru T.B.Chikkoba: It may be fixed at Rs.2000/MT and they may also be given exit option.

Thiru K.Raghu, President Biomass Power Producers Association: We are ready to hand over the plants to TNEB and they may run the plant at this cost.

10. Auxiliary Consumption

TNEB – 9% is accepted

IREDA – The auxiliary consumption is in the range of 10%

MNRE – The auxiliary consumption needed for cutting and chipping which may be about 1%

Pranam Consultants, Pune & M/s. Auro Mira Bio Energy Pudukottai India Limited: Due to usage of many biomass fuels it may be fixed at 10%

M/s. Mohan Breweries and Distilleries Limited: It requires additional power for chipping and feeding and hence it may be fixed at 11%

Thiru K.Venkatesan: The Commission may ask the generators to furnish the data

Thiru K.Raghu, President Biomass Power Producers Association: Minimum auxiliary consumption of 10 to 10.5% is reasonable. Maintenance of data is very tough and costly, because different raw materials with different moistures are used. Further it involves cost for testing of samples.

11. CDM Benefit

IREDA: Normally available for projects with marginal viability and it is not usual practice of sharing with the STU and Distribution licensee and it is difficult to monitor.

TNEB: Passed on to the utility in proportion to the energy exported.

MNRE – Consider the recommendation of the FOR working group which shared on gross basis starting from 100% to developers in the first year and reducing 10% every year till the sharing becomes equal between the developers and the licensee.

M/s. Auro Mira Bio Energy Pudukottai India Limited: May be used in following manner

- First set off against carried forward business loss
- Balance will be adjusted to satisfy the eligible return on equity to the generator
- Balance may be shared as proposed after meeting out the expenditure.

Thiru K.Vijayarajan, Director, M/s.ABI Energy Consultancy Service (P) Ltd: It is only after the year 2000, few projects have been registered for CDM benefits. Only the project which requires financial additionality have been considered for CDM benefits. The transaction cost for getting CDM benefits is about 5 to 25% of the CERs.

12. Evacuation Facilities

TNEB: Restoration of earlier practice of carrying out the works by Board on DCW basis may be considered.

Thiru T.R.Krishnasamy, Director, Energreen Power Ltd: The capital cost of biomass gasification plant is high which is about Rs.7.5 crores / MW. This should be bench marked. The cost of engine itself is more than Rs.3.5 crores/MW. Commission should provide some incentive to encourage technological advancements. Evacuation shall be provided at 100 KW level in villages.

13. Grid availability Charges

Thiru N.Nagarajan, DGM(O&M), M/s.Subashree Bio energies (P) Ltd: We have biological biomass production and the plant is classified under biomass group. The capital cost is around Rs.11 crores per MW and the generation cost is Rs.10.50 per unit. The demand charges imposed should be waived. Charges may be levied under Tariff – I instead of Tariff – III in the case of drawal from TNEB.

14. Applicability of Order

Thiru M.P.Vasanth: The date of commissioning is not relevant since previously it was a single part tariff, but the proposed tariff is two part tariff and therefore the applicability is to be clearly spelt out. Agreement period is 20 years but the tariff is calculated based on the 12 years.

**GUIDELINES OF THE GOVERNMENT OF INDIA ON POWER GENERATION FROM
NON-CONVENTIONAL ENERGY SOURCES**

GUIDELINES FOR PROMOTIONAL AND FISCAL INCENTIVES BY STATE GOVERNMENTS FOR POWER GENERATION FROM NON-CONVENTIONAL ENERGY SOURCES

1. OPERATIVE PERIOD

The scheme of promotional and fiscal incentives will come into operation with immediate effect and will remain in force for a period of five years.

ELIGIBLE PRODUCERS

Those generating electricity and feeding in full or part to the State Grid from Non-Conventional Energy Sources such as wind electric generators, small hydro plants, biomass combustion and co-generation, etc., there will be no restriction on generation capacity or supply of electricity to the grid. Consortia or co-operatives will also be eligible.

2. GRID INTERFACING

i) Interfacing, including transformers, panels, kiosk, protection, metering, H.T. lines from the points of generation to the Board's nearest HT lines, etc., as well as maintenance, will be undertaken by the producer as per the specifications and requirements by the producer as per the specifications and requirements of the Board, for which he will bear the entire cost. Alternatively, these works and their maintenance could be undertaken by the Board, at charges to be decided by the board.

ii) Depending upon the generation capacity, if the sub-station capacity at 33/11 KV or higher levels is required to be augmented or 66 KV or higher capacity transmission lines are to be provided, this will be undertaken by the Board, at their cost.

iii) Two separate meters one for the export of power to the grid, and another for import from the grid, will be installed on the HT side by the producer. The meters and metering boxes will be sealed by the Board.

iv) Necessary current limiting devices such as thyristors will be installed in the generating equipment of the producer. Capacitors of sufficient rating will also be provided in the equipment to ensure that the power factor is always maintained above 0.80

3. FACILITY BY SEB

i) Wheeling

The State Electricity Board will undertake to transmit on its grid the power generated, and make it available to the producer for captive use or to a Third Party within the State, at a uniform wheeling charge of 2 % of the energy fed to the Grid, irrespective of the distance from the generating station. The Third Party must be a H.T. Consumer of the Board, unless this stipulation is relaxed specifically by the SEB.

ii) Banking

The State Electricity Board will permit the electricity generated to be banked for a period upto to one year.

iii) Sale of Power

The State Electricity Board will purchase electricity offered by the producer at a minimum rate of Rs.2.25 /unit, with no restriction on time or quantum of electricity supplied for sale. This rate will be reviewed every year, and will be linked to standard criteria such as wholesale price index. The producer will also have the option to sell the electricity generated by him to a Third Party within the State (as defined 3 (i) above), at a rate to be mutually settled between them.

iv) All transactions between the Board and the producer involving wheeling, banking or sale of power will be settled on a monthly basis.

v) Exemption from duty

Consumption of electricity generated by the producer will be exempted from electricity duty.

vi) Exemption from demand cut

The exemption from demand cut to the extent of 30% of the installed capacity of the producer will be given by the Board.

4. OTHER INCENTIVES

- i) Sales Tax benefits will be available to the producer, who owns the project (Resolution of the Govt., off Gujarat dated 27th January, 1993 is enclosed for guidance)
- ii) The producer will be allowed to use the water for power generation. Royalty on the water used for small hydro projects will be charged at a rate not exceeding 10% of the prevailing electricity tariff for HT consumers.
- iii) Power generation from non-conventional energy sources will be treated like any other industry, and incentives normally available to new industrial units can be availed.
- iv) Concessions given to industrial units in backward areas will be provided, such as exemption from taxes and duties, capital subsidies, etc.
- v) Infrastructural facilities such as approach roads, water supply, crane, power during construction period, etc., will be provided on the lines of industrial estates.

5. APPLICATION AND CLEARANCES

- i) Producers should submit their application for setting up the project and for grid interface in the Proforma to the State Nodal Agency / State Electricity Board (simple composite application form should be devised which include all statutory approvals such as Chief Electrical Inspector, etc.,)
- ii) Clearance will be provided within a period of two months from the date of application.
- iii) An agreement will be entered into with the producer within a period of one month from the date the clearance is provided.
- iv) If the applicant does not take effective steps (i.e., at least 10 % of the total project cost should be incurred) to implement the project within six months from the date of obtaining possession of land, the Agreement could be terminated and the site allotted to another applicant. If, on the other hand, land is not provided within three months from the date of Agreement, the applicant will have the option to terminate the Agreement.

GUIDELINES FOR FIXATION OF PURCHASE PRICE FOR POWER PRODUCED FROM NON-CONVENTIONAL ENERGY

1. The State Electricity Board will announce a base purchase price every year for the electrical energy purchased by it from non-conventional energy based power projects. These rates shall be valid from 1st April to 31st March of the following year.

The base electrical energy purchase price valid for 1994-95 shall be a minimum of Rs. 2.25 / kWh.

The base price shall be escalated at a minimum rate of 5% every year. Announcement of revised base prices shall be made by the SEB on 1st April every year.

The base prices shall be applicable to all non-conventional energy based power projects based on solar, wind, hydro, biomass, etc., for which Power Purchase Agreements are signed during a year.

2. A promoter / developer shall be entitled to receive the base price set out in PPA for all electrical energy delivered from his project to the State grid for the duration of the Power Purchase Agreement. The rate shall be equal to the base price in the year of signing of PPA, escalated at a rate of 5% per year for a period of 10 years, from the date of signing of the Power Purchase Agreement. From the end of the 10th year, and for the remaining duration of the Power Purchase Agreement, the new purchase price shall be equal to the purchase price at the end of the 10th year, or the High Tension (HT) tariff prevalent in the State at that time, whichever is higher.

3. A monthly invoice shall be submitted by the promoter / developer to the State Electricity Board, at its designated offices, for the net electricity supplied by him to the Board. The Board shall make payment of amounts due, calculated at the purchase price for that particular year, within a period of 30 days.

The Board shall also provide facilities of an escrow amount or an irrevocable, transferable, divisible and confirmed standby letter of credit issued by State Bank of India, or another nationalized bank, acceptable to the promoter / developer. The amount of the letter of credit shall be equal to the expected total of two years payment by the Board.

The ensure prompt realization of the dues, and in order to provide a security cover, the Board shall issue 'Electricity Credit Notes' to the promoter / developer equivalent to the amount of electricity received by the Board, whenever it is unable to pay in cash within the stipulated period. The Electricity Credit Notes shall be transferable to one or more High Tension consumers of the Board, who will be allowed to adjust the amount for which the Credit Notes have been issued, from their electricity bills due to the Board. The validity of Credit Notes shall be six months.

4. The duration of the Power Purchase Agreement shall be a minimum of 20 years, which could be extended by another 10 year, through mutual agreement.

Annexure VIII

Components of Biomass Tariff

SI. No	Parameters	Values
1	Capital Investment	Rs.4.87 Crores per MW
2	Plant load factor (PLF)	80%
3	Debt Equity Ratio	70 : 30
4	Term of Loan	10 years with one year moratorium period
5	Interest on Loan	12.00% p.a
6	Return on Equity (RoE)	19.85%
7	Life of the Plant	20 years
8	Depreciation on 85% of capital investment	4.5% p.a on SLM
9	O & M Charges for Machinery on 85% of Capital investment	4.50% with escalation of 5% from 2nd year
10	O & M Charges for land and civil works on 15% of Capital investment	0.90% with escalation of 5% from 2nd year
11	Insurance charges for machinery on 85% of capital investment	0.75% with reduction of 0.50% after one year
12	Station Heat Rate	3840 kcal per kwh
13	Calorific value of fuel	3200 kcal per kg
14	Specific fuel consumption	1.20 kg per kwh
15	Fuel Cost	Rs.2000 per MT
16	Working Capital	Fuel stock - one month, O & M - one month and Receivables - one month
17	Interest on working capital	12.00% p.a
18	Auxiliary consumption	10%

Annexure - IX

Working Sheet of Tariff computation for the projects commissioned on or after 19-9-2008,

Year	O & M charges at 4.5% for machinery on 85% of capital investment and at 0.90% for land and civil works on 15% of capital investment with 5% escalation from 2nd year	Insurance at 0.75% on 85% of capital investment and reduction of 0.5% escalation after one year	Interest on loan @ 12.00 % p.a	Depreciation at 4.5% on 85 of capital investment	Working capital					Return on Equity @ 19.85% p.a	Total fixed cost	Fuel Cost @ Rs.2000 per MT with 5% annual escalation	Nett Units generated for one MW @ 80% PLF with 10% auxiliary consumption	Fixed Cost per unit	Variable cost per unit	Total Cost per unit
					one month O & M Expenses	One month Fuel stock	One month receivables	Total	Interest @ 12%.p.a							
	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Units)	(Rs)	(Rs)	(Rs)
1	1928520	310463	4090800	1862775	160710	1401600	2365263	3927573	471309	2900085	11563951	16819200	6307200	1.833	2.667	4.500
2	2024946	308910	4090800	1862775	168746	1471680	2444826	4085251	490230	2900085	11677746	17660160	6307200	1.851	2.800	4.651
3	2126193	307366	3681720	1862775	177183	1545264	2493939	4216386	505966	2900085	11384105	18543168	6307200	1.805	2.940	4.745
4	2232503	305829	3272640	1862775	186042	1622527	2547238	4355807	522697	2900085	11096529	19470326	6307200	1.759	3.087	4.846
5	2344128	304300	2863560	1862775	195344	1703654	2604930	4503928	540471	2900085	10815319	20443843	6307200	1.715	3.241	4.956
6	2461335	302778	2454480	1862775	205111	1788836	2667236	4661183	559342	2900085	10540795	21466035	6307200	1.671	3.403	5.075
7	2584401	301264	2045400	1862775	215367	1878278	2734385	4828030	579364	2900085	10273289	22539337	6307200	1.629	3.574	5.202
8	2713621	299758	1636320	1862775	226135	1972192	2806621	5004948	600594	2900085	10013153	23666303	6307200	1.588	3.752	5.340
9	2849302	298259	1227240	1862775	237442	2070802	2884198	5192441	623093	2900085	9760754	24849619	6307200	1.548	3.940	5.487
10	2991767	296768	818160	1862775	249314	2174342	2967382	5391037	646924	2900085	9516480	26092100	6307200	1.509	4.137	5.646
11	3141356	295284	409080	1862775	261780	2283059	3056453	5601292	672155	2900085	9280735	27396705	6307200	1.471	4.344	5.815
12	3298424	293808		1862775	274869	2397212	3151707	5823787	698854	2900085	9053946	28766540	6307200	1.435	4.561	5.996
13	3463345	292339		1862775	288612	2517072	3287887	6093571	731229	2900085	9249772	30204867	6307200	1.467	4.789	6.255
14	3636512	290877		1862775	303043	2642926	3430882	6376850	765222	2900085	9455471	31715110	6307200	1.499	5.028	6.528
15	3818338	289422		1862775	318195	2775072	3581033	6674300	800916	2900085	9671536	33300866	6307200	1.533	5.280	6.813
16	4009255	287975		1862775	334105	2913826	3738700	6986630	838396	2900085	9898486	34965909	6307200	1.569	5.544	7.113
17	4209717	286536		1862775	350810	3059517	3904256	7314582	877750	2900085	10136863	36714204	6307200	1.607	5.821	7.428
18	4420203	285103		1862775	368350	3212493	4078096	7658939	919073	2900085	10387239	38549914	6307200	1.647	6.112	7.759
19	4641213	283677		1862775	386768	3373118	4260635	8020521	962462	2900085	10650213	40477410	6307200	1.689	6.418	8.106
20	4873274	282259		1862775	406106	3541773	4452308	8400188	1008023	2900085	10926415	42501281	6307200	1.732	6.739	8.471

Annexure - X

Fixed Cost Computation for the projects commissioned prior to 19-09-2008

Year	Interest @ 9% for ten years with one year moratorium	O & M Exp 4.5% with 5% escl	Insurance 0.75% for five years and reduction of 0.5% p.a	Depreciation 7.84%	ROE 16%	Interest on working capital				Total FC	Units generated for one MW @ 80% PLF	Fixed cost per unit
						O&M 2 months	Fule 2 Months	Total	Interest			
	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(units)	(Rs)
1	2520000	1800000	300000	3136000	1920000	300000	1354880	1654880	182037	9858037	6377280	1.546
2	2520000	1890000	300000	3136000	1920000	315000	1422624	1737624	191139	9957139	6377280	1.561
3	2268000	1984500	300000	3136000	1920000	330750	1493755	1824505	200696	9809196	6377280	1.538
4	2016000	2083725	300000	3136000	1920000	347288	1568443	1915730	210730	9666455	6377280	1.516
5	1764000	2187911	300000	3136000	1920000	364652	1646865	2011517	221267	9529178	6377280	1.494
6	1512000	2297307	298500	3136000	1920000	382884	1729208	2112093	232330	9396137	6377280	1.473
7	1260000	2412172	297008	3136000	1920000	402029	1815669	2217697	243947	9269126	6377280	1.453
8	1008000	2532781	295522	3136000	1920000	422130	1906452	2328582	256144	9148447	6377280	1.435
9	756000	2659420	294045	3136000	1920000	443237	2001775	2445011	268951	9034416	6377280	1.417
10	504000	2792391	292575	3136000	1920000	465398	2101864	2567262	282399	8927364	6377280	1.400
11	252000	2932010	291112	3136000	1920000	488668	2206957	2695625	296519	8827641	6377280	1.384
12	0	3078611	289656	1504000	1920000	513102	2317305	2830406	311345	7103612	6377280	1.114
	16380000	28650828	3558417	36000000	23040000	4775138	21565796	26340934	2897503	110526748		