

## GUJARAT ELECTRICITY REGULATORY COMMISSION

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### Discussion Paper on “Determination of tariff for Procurement of Power by Distribution Licensees from Biomass based Power Generator and Other Commercial Issues”.

#### **Background**

The Electricity Act, 2003, inter-alia, seeks to promote renewable and alternative sources of energy. With this in view, the Act casts upon the State Electricity Regulatory Commissions, duty to promote renewable energy generation and co-generation by providing suitable measures for connectivity with the grid and to specify for purchase of electricity from such sources a percentage of the total consumption of electricity in the area of a distribution licensee. The National Electricity Policy also mandates exploitation of feasible potential of non-conventional energy sources. The Tariff Policy of the Government of India, recognizes the fact that 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.

Keeping the above in view, the Gujarat Electricity Regulatory Commission (GERC) had notified the GERC (Power Procurement from Renewable Sources) Regulations, 2005 on 29<sup>th</sup> October, 2005 fixing the Renewable Power Purchase Obligation of the Distribution Licensees in the State of Gujarat for the years 2006-07 to 2008-09. For the further periods, the Commission has already published draft regulations, which are under finalization.



Biomass is an end product, usually available as waste, from the agriculture and forestry product and prosopis. However, it has considerable amount of intrinsic energy, which can be used for production of steam and electricity generation. As such, biomass has been accepted as a recognized form of non-conventional energy source. To promote biomass based generation, the Commission decided to determine preferential tariff for energy generated from such plants. Accordingly, the Commission issued its Order No.2 of 2007 dated 17<sup>th</sup> August, 2007, determining tariff for biomass based power generation for a control period of 3 (three) years. In view of technological developments in the field of non-conventional sources of energy and also overall increase in prices, the Commission feels the need for review of its earlier order on tariff from biomass based power generators. The Commission, therefore, decided to prepare and circulate this discussion paper on the subject. The Commission proposes to invite views from stakeholders and after giving opportunity to them to present their views, determine the tariff for procurement of power by Distribution Licensees and others from biomass based power plants. This paper, in addition to tariff issues, also discusses various relevant commercial issues.

## **2. Process of Determination of Tariff**

The tariff determination process has to be open, transparent and take into consideration the views of stakeholders. Therefore, the Commission invites views of the stakeholders by issuing this discussion paper so that they could be considered while finalizing the tariff. Some broad principles regarding determination of Tariff have been laid down by the Commission in its earlier Regulations.



Clauses 6.4(1) of the Tariff Policy provides that the State Electricity Regulatory Commissions shall fix minimum percentage of power purchase from non-conventional energy sources in the State and determine its tariff. Distribution companies shall procure such energy at preferential tariff determined by the State Commission. The Working Group constituted by the Forum of Regulators (FOR) for Policies on Renewable have in their recommendation suggested that a cost-plus tariff based on appropriate norms should be adopted for Renewable Energy (RE).

The Gujarat Electricity Regulatory Commission had earlier notified Regulations on Procurement of Power from Renewable Sources on 29.10.2005. Clause 5.6 of these regulations allowed Unscheduled Interchange (UI) rate for injection of energy into the grid by the renewable energy generators. Clause 15(ii) of the Open Access Regulations, 2005 of the Commission also stipulates that a power plant of size upto 15 MW is entitled to inject energy in the grid at UI rate. Subsequently, the Commission issued its order no. 2 of 2007 determining the preferential tariff for Biomass based power generation for a period of three (3) years.

The Commission is of the view that renewable energy sources should continue to be promoted with preferential tariff . Once such renewable sources become competitive vis-a-vis conventional power, a competitive bidding process for renewable sources would be put into place in future.



### **3. Approaches for Tariff Determination**

#### **3.1 Two-Part and Levelised Tariff**

Tariff for any type of power generating projects may be determined in various ways:

- i. Market Based or Cost Plus Tariff
- ii. Project Specific or Generalised Tariff.
- iii. Single- Part or Two- Part Tariff
- iv. Front Loaded, Back Loaded or Levelised Tariff.

The renewable energy market is at present in developmental stage and as such market based tariff for such energy is not practicable to adopt. As such, in line with the recommendation of the working group of FOR, the Commission decides to determine tariff for Biomass based power projects on cost-plus basis. Further, the preferential tariff has to be a generalized tariff for the category of the renewable energy sources.

The next issue before the Commission is whether the tariff should be single-part or two-part tariff. Biomass based generation has a fuel component to be accounted for and conceptually it has to be a two-part tariff. But, in order to encourage its spread, to keep the accounts simple and to allow preferential treatment to this renewable source of energy, the Commission has decided to adopt a single-part levelised tariff for the purpose of this order.

### **4. Rationale for Development of Tariff Structure**

Design of a Biomass based power generation plant faces wide range of challenges in terms of plant capacity, configuration, boiler technology (e.g. travelling grate or dumping grate boilers, atmospheric or pressurized bed technology, bubbling fluidized boilers or circulating fluidized bed boilers), steam turbines design, condensers configuration, back pressure, firing equipments, pollution control system etc. Further, biomass fuel mix and



availability, Station Heat Rate (SHR), project cost, financing plan etc. are also key factors in determination of tariff. Considering the different size of plants functioning in various parts of the country and projects likely to come up in future, application of cost-plus approach would require considerable time, resources, and skills on the part of the licensees, project developers and the Commission, in case the tariff for each project is determined separately. This would not only be time consuming, but would also not be feasible at present. The Commission also believes that regulatory clarity and certainty in tariff setting is necessary from the perspective of the developers, investors and lenders in order to support investments in non-fossil fuel energy projects such as biomass which are still in nascent stage of development in Gujarat. Thus, there is merit in setting a uniform tariff level for the Biomass based power generation projects. The Commission therefore proposes to determine a generalized tariff for biomass based energy generation, based on normative performance standards in terms of specific fuel consumption (station heat rate), auxiliary consumption, plant load factor, price of fuel, capital cost of project, interest on loans, interest on working capital, O&M cost etc.

## **5. Government Policies**

The Central Government provides financial assistance and fiscal incentives such as 80% accelerated depreciation, concessional import duty, excise duty, tax holiday etc. for biomass based power generation projects.

## **6. Technology Norms**

Tariff to be determined under the proposed order shall be applicable to power projects based on Rankine cycle technology application using water cooled condenser with biomass fuel either fed directly or in pallettised form.



## 7. Components of Tariff

While determining the biomass based power generation tariff, it is essential to consider financial and operational parameters. In the context of tariff determined on cost-plus basis, it significantly depends on the following financial and operational parameters:

1. Capital cost
2. Evacuation Cost
3. Tenure of Loan
4. Interest on loan
5. Return on Equity
6. Life of plant and machinery and agreement period.
7. Depreciation
8. Debt-Equity Ratio
9. Operations and Maintenance expenses
10. Interest on Working Capital
11. Plant Load Factor (PLF)
12. Auxiliary Energy Consumption
13. Station Heat Rate (SHR)
14. Fuel Related Assumptions
  - a) Fuel Mix and types.
  - b) Gross Calorific Value (GCV)
  - c) Price of fuel.

### 7.1 Capital Cost

While determining the tariff for the biomass based power generation, it is essential to verify the capital cost for determination of the tariff. Capital cost is the most critical element while determining the tariff in a regulated environment. The capital cost of biomass based power plant comprises the cost of (i) boiler, (ii) turbine generators, (iii) condenser, (iv) control cabinets, (v) chimney for flue gases, (vi) transformer and associated equipments, (viii) land and its development (ix) processing fee of Gujarat Energy Development



Agency, (x) erection and commissioning charges, and (xi) creation of transmission system upto interconnection point of State Transmission Utility. The above components are grouped into four important categories, i.e. (i) Plant and Machinery, (ii) Land , (iii) Evacuation Infrastructure and (iv) Associated service charges. On verification of orders pronounced by various State Electricity Regulatory Commissions, it is observed that separate item-wise details of capital cost have not been shown in any order. It is, therefore, necessary to analyze various approaches for determination of the capital cost of biomass based power generation.

CERC, in its Explanatory Memorandum for Draft Terms and Conditions for determination of Tariff For Renewable Energy Sources has analyzed the capital costs adopted by different state Commissions and arrived at pooled capital costs for different years as under.

Capital cost (Rs. Cr/MW)

Year	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Pooled Cost	4.00	4.00	4.00	4.11	4.00	4.19

The CERC in its order dated 3<sup>rd</sup> December, 2009 considered the capital cost of Biomass based power generation as Rs.4.50 crores/MW for the year 2009-10 and, the same is linked to indexation formula as specified in the regulations.

Keeping the above in view, the Commission proposes to consider the capital cost of Rs.4.25 crores/MW for the control period of 3 years with effect from 2010-11. This capital cost does not include the evacuation cost.



## 7.2 Evacuation Cost

Section 86(1) (e) of the Electricity Act, 2003 stipulates that the State Commission should take suitable measures for providing grid connectivity to the renewable energy sources. The Working Group constituted by the Forum of Regulators has also in its report on “Renewable Policy” recommended that grid connectivity be provided by the transmission and distribution licensees for renewable energy sources in an optimal manner. The requirement of transmission system for evacuation of power depends upon the quantum of power generated from the generating stations. Cost of creation of 11/33/66/132 /220/ 400 KV lines and associated systems varies. The size of biomass plants are in the range of 1 to 25 MW, quite small in comparison with conventional power plants. Hence, power generated from such plants can be evacuated through 11 KV, 33 KV or 66 KV lines. The Commission had in its Order No.2 of 2007 dated 17.8.2007 approved Rs25 lakhs per MW as development charge for evacuation arrangements including inter-connecting line to the nearest GETCO sub-station. The materials required for creation of transmission system consist of line conductors, insulators, steel structures, civil works, electrical goods, and labour charges etc. It is observed that during the last three years the cost of labour and materials for creation of transmission/distribution system has increased. It is essential to consider this aspect while estimating the evacuation cost for evacuation of power from biomass based power generation.

The Commission, considering the above aspects, proposes to increase evacuation cost to Rs.29.00 lakhs per MW for biomass based power projects for the next three years.





### **7.3 Tenure of Loan**

The Commission had in its earlier order dated. 17<sup>th</sup> August, 2007 considered the loan tenure as 10 years with repayment in equal installments. The CERC has in its order dated 3<sup>rd</sup> December 2009 adopted normative loan tenure of 10 years. TNERC has also in its order of 2009 considered the tenure of loan as 10 years with a moratorium of one year as considered by IREDA.

Considering the above, the Commission proposes the tenure of term loan as 10 years with repayment in equal installments.

### **7.4 Interest on Loan**

In line with the Commission's approach in case of Wind and Solar Power Tariffs; the Commission proposes interest on loan at 10.75% for this discussion paper. This is equal to the SBI PLR minus 1 (one) percent.

### **7.5 Return on Equity**

The Commission had in its Order No.2 of 2007 dated 17<sup>th</sup> August, 2007 adopted a Rate of Return on equity at 14%.

After considering the interest of various stakeholders, such as Project developers, Discoms, retail consumers and others, the Commission proposes to retain rate of return on equity at 14% and additionally to allow MAT @ 16.995% per annum for the initial 10 years of the project from commercial operation date of the plant and Corporate Tax @ 33.99% from the 11<sup>th</sup> year to 20<sup>th</sup> year of the plant on the Return on Equity.



## **7.6 Life of Plant and Machinery and Agreement Period**

The Commission had in its earlier Order No.2 of 2007 dated 17<sup>th</sup> August, 2007 decided the period of agreement of 20 years with the distribution licensee. For present order also, the Commission has considered plant life of 20 years. The power plants established on or after the date of final order in this matter and fulfilling the criteria laid down in this order are eligible for the tariff determined by the Commission for the entire plant life of 20 years.

The biomass based power generation project developers/ Distribution Licensees who are willing to supply/ purchase power shall sign a Power Purchase Agreement (PPA) for a period of 20 years.

## **7.7 Depreciation**

Depreciation needs to be linked to the loan repayment. The loan repayment period considered by the Commission is 10 years. Hence, the requirement of cash flow in the initial 10 years is more to match with the loan repayment. The Commission therefore proposes to allow 6% of the capital cost per annum as depreciation for the initial 10 years and 3% per annum from 11<sup>th</sup> to 20<sup>th</sup> year of the plant.

The provisions of Accelerated Depreciation are provided in the Income Tax Act, 1961 and Rules framed there under. A person who qualifies under the above statutory provisions is entitled to get benefits of the Accelerated Depreciation. Hence, the Commission proposes to determine the tariff taking into account the benefit of accelerated depreciation available under Income Tax Act, 1961 and Rules framed under it. Those who do not avail of such



benefit may submit petitions which will be dealt by the Commission on case-to-case basis.

## **7.8 Debt-Equity Ratio**

Clause 5.3(b) of the Tariff Policy notified by the Ministry of Power, Government of India stipulates debt-equity ratio of 70:30 for financing of power project. The Terms and Conditions of Tariff Regulations, 2005 notified by the Commission also provides a normative debt-equity ratio of 70:30 for Generating Companies/Licensees. If the equity employed is more than 30%, the amount of equity for the purpose of determining the tariff will be limited to 30% only. However, in case the equity employed is less than 30%, the actual equity employed will be considered. The Commission had in its Order No.2 of 2007 dated 17.8.2007 considered debt-equity ratio as 70:30. Accordingly, the Commission proposes the debt-equity ratio of 70:30 as per existing practice in line with the Tariff Regulations, 2005 for determination of tariff of biomass based power generation.

## **7.9 Operations & Maintenance expenses**

The Commission had, in its earlier Order No.2 of 2007 dated 17<sup>th</sup> August, 2007 considered O&M cost as 7.0% of the capital cost for the first year, to be escalated thereafter by 5% per annum.

The CERC has in its order dated 3<sup>rd</sup> December, 2009 adopted the O&M expenses as Rs.20.25 lakhs per MW for FY 2009-10(which works out to 4.46% of the capital cost) and escalated at the rate of 5.72% per annum thereafter. Various State ERCs have considered O&M expenses varying from 3.0 to 4.0% of the capital cost for the first year with annual escalation of 4 to 5% thereafter.



Based on above observations, the Commission proposes to allow O&M cost including insurance cost at the rate of 5% of the capital cost for the first year, to be escalated a 5% per annum thereafter.

### **7.10 Interest on Working Capital**

The fuel storage requirement depends on factors such as types of fuel, their availability on a continuous basis round the year, the availability of storage facilities, procurement arrangements, the price during season/ off-season etc.

Biomass in Gujarat consists of agriculture and forestry residues and prosopis, which are seasonal and would require storage for longer period. Therefore, the Commission has considered the following items as components of working capital for the purpose of allowing interest on working capital.

- i) Fuel Stock of 30 days.
- ii) O&M expenses for one month
- iii) Receivables equivalent to one month charges for sale of electricity calculated and
- iv) Maintenance spare at 1% of the capital cost escalated @ 5% per annum.

The Commission proposes to allow interest on working capital at the rate of 11.75% as considered for other similar cases of RE tariff determination.

### **7.11 Plant Load Factor (PLF)**

The Plant Load Factor (PLF) is a critical performance parameter for any power plant installation. It depends on factors such as reliable and timely fuel supply, plant availability etc.



CERC has in its order dated 3.12.2009 in Petition No.284 of 2009 considered the Plant Load Factor as under:

During stabilization = 60%  
 During the first year after stabilization = 70%  
 From second year onwards = 80%

The PLF considered by various Commissions in their Regulations / Order is stated in the table below:

Name of Commission	KERC	MERC	MPERC	HERC	PERC	TNERC	RERC	BERC	CHERC
PLF approved	75%	70% for first year 80% from 2 <sup>nd</sup> year onwards	70%	80%	70% for first year 80% from 2 <sup>nd</sup> year onwards	80%	65% for first year, 70% for 2 <sup>nd</sup> year & 75% for 3 <sup>rd</sup> year.	70%	80%

The CEA in its report on “Operation Norms for Biomass based Power Plant” of September, 2005 recommended Plant Load Factor (PLF) as 80 % for recovery of the full fixed cost. The Commission had in its order No.2 of 2007 considered PLF as 80%.

The Commission considers it necessary for biomass projects to avail some time for stabilization of its operation in initial period. Once the plant stabilizes, it can operate at the optimal level. Therefore, the plant shall operate at 80% of PLF from the second year onwards. Considering the above, the Commission proposes the PLF for the Biomass Power Project as stated below:



During 1<sup>st</sup> year which covers stabilization period = 70%  
 From 2<sup>nd</sup> year onwards = 80%

## 7.12 Auxiliary Energy Consumption

Auxiliary consumption is the quantum of energy consumed by auxiliary equipment and transformer losses as a percentage of gross energy generated. It is a function of plant efficiency and the energy conservation methods adopted by the developers.

The auxiliary consumption considered by various Commissions in their Regulations / Order is stated in the table below

Name of Commission	MERC	APERC	HERC	RERC	TNERC	MPERC	PERC	CHERC
% of Aux consumption approved	10%	9%	10%	W/c 10% A/c 12%	10%	10%	9%	10%
W/c= Water cooled A/c = Air cooled								

The CERC has in its notification and order in Petition No.284 (suo motu) of 2009 considered auxiliary consumption as 10% of gross energy generated.

Expert Committee of CEA had in its report on “Operation Norms for Biomass based Power Plants” of September, 2005 recommended Auxiliary Power consumption at 10% for the Biomass Power Plant.

The Commission had in its earlier Order No.2 of 2007 dated 17<sup>th</sup> August, 2007 considered auxiliary consumption at 10% for biomass based power generation.

Based on the above observations, the Commission proposes Auxiliary Consumption at 10% for determination of tariff for biomass based generation.



### 7.13 Station Heat Rate (SHR)

The SHR depends on several factors such as plant capacity, plant design and configuration, technology (boiler type and pressure levels etc.), plant operations and maintenance practices, quality of fuel received and operational parameters taking varying load conditions.

The SHR considered by various Commissions in their Regulations / Order is stated in the table below

Name of Commission	MERC	PERC	MPERC	TNERC	RERC
SHR Kcal/kWh	3650	3700	3600	3840	W/c- 4200 A/c -4440

The Commission has in its earlier order No.2 of 2007 dt.17.8.2007 considered that specific fuel consumption at 1.30 Kg/ kWh and calorific value of fuel at 3300 Kcal/Kg (SHR at 4290 Kcal/kWh).

The CERC, in its order dated 3<sup>rd</sup> December, 2009 in Suo-Motu Petition No.284 of 2009 considered normative Station Heat Rate of 3800Kcal/Kwh for computation of tariff for biomass based power generation. The Commission proposes to adopt the same.

### 7.14 Fuel Related Assumptions

#### (a) Fuel Mix and Types

As provided in the guidelines issued by Ministry of New and Renewable Energy the Commission proposes to allow use of fossil fuel upto 15% of total energy consumption in kCal on annual basis.



**(b) Gross Calorific Value (GCV)**

The Gross Calorific Value (GCV) is the heat produced in kCal by complete combustion of one Kg of fuel. There are various types of biomass available from agricultural and forestry residues like Paddy, Wheat, Mustard, Bajara, Maize, Cotton, Groundnut, Coffee, Coconut, Jawar, Gram, Soyabeen, Sunflower etc. in various states of the country. Each biomass has different Gross Calorific Value (GCV) and its availability also varies from state to state and season to season. Hence, it will be appropriate to consider weighted average calorific value of the available various types of biomass fuel sources.

The value of Biomass GCV considered by various Commissions in their Regulations / Order is stated in the table below:

<b>Name of Commission</b>	<b>APERC</b>	<b>TNERC</b>	<b>RERC</b>	<b>MPERC</b>	<b>KERC</b>	<b>BERC</b>	<b>CHERC</b>
Value of GCV in Kcal/ Kg) considered for Tariff Determination	3200	3200 Kcal/Kg	3400	3325	3200	3150	3300

Expert Committee of CEA in its’ report on “Operation Norms for Biomass based Power Plants” of September, 2005 recommended specific fuel consumption of 1.36 Kg/ kWh with average calorific value of fuel as 3300 Kcal/kg. The Commission had in its earlier order No.2 of 2007 dt.17.8.2007 considered the calorific value of biomass as 3,300 Kcal/ Kg.

The CERC has in its suo motu order in Petition No.284 of 2009 considered Pooled GCV of Biomass fuel across the state as under:





### Pooled GCV of Biomass fuel across the State

State	Calorific value [Kcal/ Kg.]
Andhra Pradesh	3275
Haryana	3458
Maharashtra	3611
Madhya Pradesh	3612
Punjab	3368
Rajasthan	3689
Tamilnadu	3300
Uttar Pradesh	3371
Other States	3467

On enquiry with GEDA, it is informed that weighted average GCV of Biomass available in the State is about 3300 Kcal/ kg.

Based on the foregoing observations, the Commission proposes the Gross Calorific Value of biomass at 3300 kCal/kg. for determination of tariff of biomass based power generation.

#### **(c) Price of Fuel**

The price of biomass fuel depends on price paid to farmers, cost of biomass charged by forest Department/ State Government, cost related to collection, storage, transportation, loading and unloading cost, agents commission etc. The fuel procurement and transportation are handled by unorganized sector and thus the prices are influenced by the local factors.



The energy that can be generated using biomass as fuel depends on properties such as moisture content, calorific value and non-combustible materials in the biomass. The heat energy content of biomass of one crop residue differs from that of another. The projects may have a fuel mix of various combinations and varying percentages.

Economic or opportunity cost of biomass could also be determined on the principle of avoided cost of coal/ oil burnt for getting equivalent amount of heat in a thermal generating station.

The CERC has in its suo motu order dated 3<sup>rd</sup> December,2009 in Petition No.284 of 2009 considered Biomass fuel price across the country as under:

Biomass fuel price assumption for FY 2009-10 (Rs./MT)

State	Biomass Price
Andhra Pradesh	1301
Haryana	2168
Maharashtra	1801
Madhya Pradesh	1299
Punjab	2092
Rajasthan	1822
Tamilnadu	1823
Uttar Pradesh	1518
Other States	1797

CERC had considered the above fuel cost for the year 2009-10, component which shall be escalated at 5% per annum thereafter.



The price of biomass considered by various Commissions in their Regulations / Order is stated in the table below:

State	Biomass Price (Rs/MT)
Andhra Pradesh	1231
Haryana	2039
Maharashtra	1694*/ 2045**
Madhya Pradesh	1222
Punjab	1967
Rajasthan	1807
Tamilnadu	1715
Uttar Pradesh	1428
Other States	1685
* 1694 as per Order dt.8.8.05 ** 2045 as per Order dt.25.3.09 in Case No.83 of 2008	

The Commission had in its earlier order dated 17<sup>th</sup> August, 2007 considered the biomass price @ Rs.800/ MT and transportation charges at Rs.200/ MT. Thus, total price for Biomass for the first year was considered at Rs.1000/ MT which will be escalated @ 5% annually.

On enquiry with GEDA, it is informed that price of Biomass available in the State is about Rs.1500/ MT.

Considering the foregoing, the Commission proposes biomass fuel cost at Rs.1500/ MT (including transportation cost) with escalation of 5% per



annum and fuel cost of coal at Rs.1775 /MT with escalation of 5% per annum thereafter.

## 8. Tariff for Biomass based power projects

In view of the foregoing, the various parameters considered by the Commission for determination of tariff are given in table below:

### Parameters for Determination of Tariff

No	Parameter (per MW basis)	17 <sup>th</sup> August 2007 Order	Proposed for the 2010 discussion paper
<b>Project Cost</b>			
1	Land+ Plant & Machinery + Erection cost (Rs. lakhs)	325	425
2	Evacuation Infrastructure	25	29
	Less: Capital Financial Assistance for Biomass Gasifier Programme Scheme of MNRE	1.5	Nil
	Total Capex (Rs. lakhs)	200	454
<b>Operational parameters</b>			
3	Debt-Equity ratio	70:30	70:30
4	Interest on Loan (tenure 10 years)	12.00%	10.75%
5	Return on Equity	14%	14%
6	O&M cost (% of project cost- including Insurance cost)	7%	5%
7	Escalation on O&M	5%	5%
8	PLF (at 100% grid & machine availability)	80%	70% for 1 <sup>st</sup> year & 80% from 2 <sup>nd</sup> year onwards.
9	Actual machine availability	100%	100%
10	Actual grid availability	100%	100%
11	Depreciation	4.5%	6% for initial



			10 <sup>th</sup> year and 3% from 11 <sup>th</sup> to 20 <sup>th</sup> year of the plant.
12	Project life (years)	20	20
13	Minimum Alternate Tax (MAT) for initial 10 years of the plant	11.33%	16.995%
14	Corporate Income Tax from 11 <sup>th</sup> year to 20 <sup>th</sup> year.	33.66%	33.99%
15.	Interest on Working Capital	10.75%	11.75%
	(i) Fuel cost for one month		
	(ii) O&M expenses for one month		
	(iii) Receivables equivalent to one month charges for sale of electricity calculated and		
	(iv) Maintenance spare at 1% of the capital cost escalated @ 5% per annum.		
16	Station Heat Rate (kCal/ kwh)	4250	3800
17	Gross Calorific Value(kCal/kg)	3300	3300
18	Price of Biomass in Rs/Tonne with 5% escalation from second year onward	1000	1500
19	Price of Coal in Rs/Tonne with 5% escalation from second year onward	1000	1775

Based on the various parameters as discussed above, the levelised tariff including RoE of biomass based power generation using a discounting rate of 10.19% works out to Rs.4.36 per kWh and with accelerated depreciation, it works out to Rs. 4.31 per kWh.



However, the Commission feels that it would be appropriate to determine tariff for two sub-periods: one tariff for the initial 10 years and another tariff from 11<sup>th</sup> year onward upto 20<sup>th</sup> year. Hence, the Commission determines the tariff for generation of electricity from biomass based generation Power project at **Rs. 4.25** per kWh for the initial 10(ten) years starting from the date of Commercial operation of the project and **Rs. 4.50 per KWh** from the 11th (Eleventh) year to 20th (twentieth) year.

However, in case a project developer has received any capital subsidy from the Government or any statutory authority, it will be passed on to the distribution licensee concerned.

The above tariff takes into account the benefit of accelerated depreciation under the Income Tax Act and Rules. For a project that does not get such benefit, the Commission would, on a petition in that respect, determine a separate tariff taking into account all the relevant facts.

The Commission proposes to adopt the tariff for generation of electricity from Biomass based power project at **Rs. 4.25** per kWh for the initial 10(ten) years starting from the date of Commercial operation of the project and **Rs. 4.50 per KWh** from the 11<sup>th</sup> (Eleventh) year to 20<sup>th</sup> (twentieth) year. This tariff rate shall be applicable for purchase of biomass based power by Distribution Licensees and others in Gujarat for complying with the renewable power purchase obligation specified in the relevant Regulations of this Commission from time to time. This tariff shall be applicable to biomass based power generators who will commission new biomass based power plants and equipments during the control period.



## **9. Other Commercial Issues**

Following are the other commercial issues, connected with electricity generated from biomass based power generation projects, proposed to be addressed.

1. Transmission and wheeling charges.
2. Security Deposit
3. Sharing of CDM benefit
4. Pricing of Reactive Power
5. Third party sales and Cross-subsidy Surcharge
6. Metering
7. Applicability of Intra-State ABT.
8. Merit order/ Must run station
- 9 Monitoring Mechanism for the use of Fossil and Non-fossil fuel
  - (A) Fuel usage statement
  - (B) Information system for creation of Database.

### **9.1 Transmission and Wheeling charges**

The Commission in its earlier order dated 17.8.2007 had decided that whenever a biomass based power Generator opts for wheeling of power for his own use, the GETCO (STU) /Distribution Licensee shall transmit the same to the point of use. For transmitting the power to the point of use, GETCO was entitled to charge 4% of the energy injected (in kind) as all inclusive Transmission charges/wheeling charges.

The transmission and distribution licensees incur expense for creation of transmission and distribution network. Whenever any person desires to utilize such network, he shall have to pay necessary charges to the licensees concerned. Hence, the Commission proposes that whenever biomass based power generators opt to wheel power through transmission and distribution



networks for own use, they shall pay the transmission and wheeling charges as under:

- (a) Wheeling of power to consumption point at 66 KV voltage level and above.

The wheeling of electricity generated from the biomass based power generation to the desired location(s) within the State shall be allowed on payment of transmission charges and transmission losses applicable to normal Open Access Consumer.

- (b) Wheeling of power to consumption point at below 66 KV voltage level.

(i) The wheeling of electricity generated from the Biomass based power generation, the desired location(s) within the State, shall be allowed on payment of transmission charges, applicable to normal Open Access Consumer and transmission and wheeling loss @ 10% of the energy fed to the grid. The above loss is to be shared between the transmission and distribution licensees in the ratio of 4:6.

(ii) The wheeling of electricity generated by smaller investors, having capacity of below 5 MW in the State, to the desired location(s), shall be allowed on payment of transmission charges, applicable to normal open access consumer, and transmission and wheeling losses @ 7% of the energy fed to the grid. The above losses are to be shared between the transmission and distribution licensees in the ratio of 4:3.

Biomass based power generation plant owners, who desire to wheel electricity to more than two locations shall pay 5 paise per unit on energy fed in the grid to the Distribution Company concerned in whose area power is consumed in addition to above mentioned transmission charges and losses, as applicable.

- (c) Injection at 11 KV and drawal at 11 KV and below voltage level.





When the point of injection and drawal at 11 KV or below voltage level lies within the same distribution area, the user shall bear wheeling loss at 6% and pay wheeling charges at 5 paise per unit.

## **9.2 Security Deposit**

The objective of the order is to promote development of renewable energy in the state connectivity to the generating stations is granted by GETCO after carrying necessary load-flow studies. The proposed evacuation system from the switchyard of biomass based power generation projects forms part of the overall GETCO System. While timely completion of power evacuation system of such biomass based co-generation project is essential, timely execution of biomass based co-generation project is also equally important. Non-completion of projects leads to idling of transmission resources. Thus, to assure GETCO about seriousness of the biomass based generator projects, the project Developer shall be required to furnish a Bank Guarantee of Rs. 5 lakhs/MW to GETCO. The Bank guarantee shall be forfeited if the project is not commissioned within four years.

## **9.3 Sharing of CDM benefit**

The Commission had in its earlier order No.1 of 2007 dated 3.1.2007 specified that 25% of the gross benefits received from the CDM projects are to be shared by the Project developer with the distribution licensee. The Forum of Regulators had constituted a Working Group for Renewable Energy Generation. The Group has recommended as under:

*“The CDM benefits should be shared on a gross basis, starting from 100% to developers in the first year after commissioning, and thereafter reducing by 10% every year till the sharing becomes equal*



*(50:50) between the developers and the consumers, in the sixth year. Thereafter, the sharing of CDM benefits should remain equal till the time that benefits accrue.”*

The CERC had also, in its regulations on determination of tariff for renewable energy sources, adopted the same principle. It is, therefore, proposed to adopt the above principle for sharing of CDM benefits in case of biomass based co-generation projects also.

#### **9.4 Pricing of Reactive Power**

The Commission proposes the same reactive energy pricing as specified for Wind Energy generation and Solar Energy Generation Tariff for the Biomass based energy generation tariff i.e..

10 paise/ KVARH	For the drawal of reactive energy at 10% or less of the net energy exported.
25 paise/kVARH	For the drawal of reactive energy at more than 10% of the net active energy exported.

#### **9.5 Third- Party Sale and Cross-subsidy Surcharge**

Third-Party Sale under Open access transactions carried out using generation from renewable sources shall be exempted from levy of cross-subsidy surcharge under section 42 (2) of the Electricity Act, 2003. However, no banking facility shall be provided for third party sales. Further, Availability Based Tariff (ABT) compatible interface metering system capable of energy accounting for each block of 15 minutes shall be provided at both supply as well as drawal points. Energy generation from renewable sources such as Wind and mini hydro are exempted from the requirement of scheduling, due to their infirm nature, while in case of biomass based power generation, it is possible to forecast the availability of plant and generation



capacity. Hence, the biomass based power generators are covered under the ambit of provisions of the Intra-state ABT. In case of biomass based power generators opting for third party sale, the generation from such sources in each 15-minute time block shall be set off against the open access consumer's consumption in the same 15-minute time block. Any deviation in schedule and drawal of energy should be treated under UI mechanism. The transmission/wheeling charges payable for third party sales are same as stipulated for captive users as indicated in section 8.1 above.

## **9.6 Metering**

Metering and communication facilities shall be provided by the project developers in accordance with the following provisions:

1. Central Electricity Authority (Installation and Operation of Meters) Regulations 2006.
2. Intra-State ABT Order dt.11<sup>th</sup> August, 2006 and subsequent amendments, if any.
3. State Grid Code, 2005 of GERC.
4. Distribution Code, 2005 of GERC
5. Open Access Regulations, of 2005.

ABT compatible energy meter are to be installed at generator's end and if the power is to be wheeled to consumer premises, then ABT compatible meters are to be installed at the consumer premises.

## **9.7 Applicability of Intra-State ABT**

Biomass based power generating plants are covered under the ambit of Intra-State ABT order. They are governed by the provisions of the Intra-State ABT Order of the Commission. Such plants have to install Intra-state ABT Compliant meters at their place for energy accounting and Remote Terminal Unit (RTU) to facilitate SLDC in real time monitoring



## **9.8 Merit Order Dispatch/ Must Run Status**

The Commission has considered that although biomass based co-generation projects will be required to give the scheduling and dispatch instructions as per the Intra-State ABT order of the Commission, Merit Order Dispatch principles will not be applied to such projects on account of the small size of these plants.

## **9.9 Monitoring Mechanism for the use of Fossil and Non-fossil fuel**

In order to ensure that the use of fossil fuel is within the prescribed limit, it is essential to create necessary mechanism for monitoring the usage of fossil and non-fossil fuel utilized by the biomass based power project developer.

### **Fuel usage statement**

[A] The Commission proposes to nominate the Gujarat Energy Development Agency (GEDA) as the nodal agency for the monitoring the usage of fossil and non-fossil fuel. The project developer shall furnish to the nodal agency the details of monthly fuel usage and fuel procurement statement duly certified by Chartered Accountant. He should also provide a copy of this statement to the distribution licensee/procurers along with the monthly energy bill. The statement should cover details, such as:



- i. Quantity of fuel (in tonnes) for each fuel type (biomass fuel and fossil fuel) consumed and procured during the month for power generation purposes,
- ii. Cumulative quantity (in tonnes) of each fuel type (biomass fuel and fossil fuel) consumed and procured till the end of that month during the year,
- iii. Actual (gross and net) energy generation (denominated in units) during the month,
- iv. Cumulative actual (gross and net) energy generation (denominated in units) until the end of that month during the year,
- v. Opening fuel stock quantity (in tonnes),
- vi. Receipt of fuel quantity (in tonnes) at the power plant site and,
- vii. Closing fuel stock quantity (in tonnes) for each fuel type (biomass fuel and fossil fuel) available at the power plant site.

Non-compliance of the condition regarding limited use of fossil fuel, during any financial year, will result in withdrawal of “Preferential tariff” or actions as deemed fit by the Commission in accordance with provision of the Act.

#### **[B] Information system for creation of Database**

It is necessary to create data-base for further review of the technical/ financial parameters for the next tariff order. Therefore, the project developers shall keep records of the following and provide the same to GEDA and the Commission annually to create data-base for future.

- i. Number and categories of employees for different purposes.
- ii. Administrative and General Expenses.
- iii. Repair and Maintenance work carried out during the year specifying activities carried out with time period and spare/ material replaced and its cost.



- iv. Details of Spare parts of the plant / machines replaced during the year with justification and cost.

## **10. Applicability of proposed Order**

The proposed order shall be in force for 3 years from the date of the final order. The tariff fixed in the final order shall be applicable to all the Biomass based power projects commissioned after the final order. The existing contracts and agreements between the biomass based power generators and Distribution Licensees signed prior to the final order would continue to remain in force.

Sd/-  
[Sanjay Nandan Agrawal]  
**SECRETARY**

Place: Ahmedabad  
Date: 10/02/2010

