CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

No.: L-1/94/CERC/2011 **Dated: 18.11.2011**

NOTIFICATION

In exercise of powers conferred under Section 61 read with Section 178 (2) (s) of the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, and after previous publication, the Central Electricity Regulatory Commission hereby makes the following regulations, namely:

1. **Short title and commencement**

1) These regulations may be called the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2012.

2) These regulations shall come into force on 1.4.2012, and unless reviewed earlier or extended by the Commission, shall remain in force for a period of 5 years from the date of commencement.

2. **Definitions and Interpretation**

1) In these regulations, unless the context otherwise requires,

a) **'Act'** means the Electricity Act, 2003 (36 of 2003);

b) **'Auxiliary energy consumption'** or 'AUX' in relation to a period in case of a generating station means the quantum of energy consumed by auxiliary equipment of the generating station, and transformer losses within the generating station, expressed as a

percentage of the sum of gross energy generated at the generator terminals of all the units of the generating station;

c) **'Biomass'** means wastes produced during agricultural and forestry operations (for example straws and stalks) or produced as a by-product of processing operations of agricultural produce (e.g., husks, shells, deoiled cakes, etc); wood produced in dedicated energy plantations or recovered from wild bushes/weeds; and the wood waste produced in some industrial operations;

d) **'Biomass gasification'** means a process of incomplete combustion of biomass resulting in production of combustible gases consisting of a mixture of Carbon monoxide (CO), Hydrogen (H2) and traces of Methane (CH4), which is called producer gas;

e) **'Biogas'** means a gas created when organic matter like crop residues, sewage and manure breaks down in an oxygen-free environment (ferments);

f) **'Capital cost'** means the capital cost as defined in regulations 12, 24, 28, 34, 47, 57, 61, 66 and 76;

g) **'Commission'** means the Central Electricity Regulatory Commission referred to in sub-section (1) of section 76 of the Act;

h) **'Conduct of Business Regulations' means** the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 1999 as amended from time to time;

i) **'Control Period or Review Period'** means the period during which the norms for determination of tariff specified in these regulations shall remain valid;

j) **'Gross calorific value'** or 'GCV' in relation to a fuel used in generating station means the heat produced in kCal by complete combustion of one kilogram of solid fuel or one liter of liquid fuel or one standard cubic meter of gaseous fuel, as the case may be;

k) **'Gross station heat rate'** or 'GHR' means the heat energy input in

kCal required to generate one kWh of electrical energy at generator terminals of a thermal generating station;

l) **'Hybrid Solar Thermal Power Plant'** means the solar thermal power plant that uses other forms of energy input sources along with solar thermal energy for electricity generation, and wherein not less than 75% of electricity is generated from solar energy component;

m) **'Installed capacity'** or 'IC' means the summation of the name plate capacities of all the units of the generating station or the capacity of the generating station (reckoned at the generator terminals), approved by the Commission from time to time;

n) **'Inter-connection Point'** shall mean interface point of renewable energy generating facility with the transmission system or distribution system, as the case may be:

   i. in relation to wind energy projects and Solar Photovoltaic Projects, inter-connection point shall be line isolator on outgoing feeder on HV side of the pooling sub-station;

   ii. in relation to small hydro power, biomass power and non fossil fuel based cogeneration power projects and Solar Thermal Power Projects the, inter-connection point shall be line isolator on outgoing feeder on HV side of generator transformer;

o) **'MNRE' means the Ministry of New and Renewable Energy of the Government of India;**

p) **'Non-firm power'** means the power generated from renewable sources, the hourly variation of which is dependent upon nature's phenomenon like sun, cloud, wind, etc., that cannot be accurately predicted;

q) **'Non fossil fuel based co-generation'** means the process in which more than one form of energy (such as steam and electricity) are produced in a sequential manner by use of biomass

provided the project may qualify to be a co-generation project if it fulfills the eligibility criteria as specified in clause (4) of Regulation 4;

r) **'Operation and maintenance expenses'** or 'O&M expenses' means the expenditure incurred on operation and maintenance of the project, or part thereof, and includes the expenditure on manpower, repairs, spares, consumables, insurance and overheads;

s) **'Project'** means a generating station or the evacuation system upto inter-connection point, as the case may be, and in case of a small hydro generating station includes all components of generating facility such as dam, intake water conductor system, power generating station and generating units of the scheme, as apportioned to power generation;

t) **'Renewable Energy'** means the grid quality electricity generated from renewable energy sources;

u) **'Renewable Energy Power Plants'** means the power plants other than the conventional power plants generating grid quality electricity from renewable energy sources;

v) **'Renewable Energy Sources'** means renewable sources such as small hydro, wind, solar including its integration with combined cycle, biomass, bio fuel cogeneration, urban or municipal waste and other such sources as approved by the MNRE;

w) **'Small Hydro'** means Hydro Power projects with a station capacity up to and including 25 MW;

x) **'Solar PV power'** means the Solar Photo Voltaic power project that uses sunlight for direct conversion into electricity through Photo Voltaic technology;

y) **'Solar Thermal power'** means the Solar Thermal power project that uses sunlight for direct conversion into electricity through Concentrated Solar Power technology based on either line focus or point focus principle;

z) **'Tariff period' means** the period for which tariff is to be determined by the Commission on the basis of norms specified under these Regulations;

aa) **'Useful Life'** in relation to a unit of a generating station including evacuation system shall mean the following duration from the date of commercial operation (COD) of such generation facility, namely:-

(a) Wind energy power project	25 years
(b) Biomass power project with Rankine cycle technology	20 years
(c) Non-fossil fuel cogeneration project	20 years
(d) Small Hydro Plant	35 years
(e) Solar PV/Solar thermal power project	25 years
(f) Biomass Gasifier based power project	20 years
(g) Biogas based power project	20 years

ab) **'Year'** means a financial year.

(2) Save as aforesaid and unless repugnant to the context or if the subject- matter otherwise requires, words and expressions used in these regulations and not defined, but defined in the Act, or the Indian Electricity Grid Code or the Central Electricity Regulatory Commission (Terms and conditions of Tariff) Regulations, 2009 shall have the meanings assigned to them respectively in the Act or the Indian Electricity Grid Code or the Central Electricity Regulatory Commission (Terms and conditions of Tariff) Regulations, 2009.

3. Scope and extent of application

These regulations shall apply in all cases where tariff, for a generating station or a unit thereof based on renewable sources of energy, is to be

determined by the Commission under Section 62 read with Section 79 of the Act.

Provided that in cases of wind, Small Hydro projects, Biomass power based on Rankine cycle, non-fossil fuel based cogeneration projects, Solar PV , Solar Thermal power projects, Biomass gasifier and Biogas power project these regulations shall apply subject to the fulfillment of eligibility criteria specified in regulation 4 of these Regulations.

4. **Eligibility Criteria**

a) **Wind power project** – using new wind turbine generators, located at the sites approved by State Nodal Agency/ State Government (only for zoning purpose).

b) **Small hydro project** – located at the sites approved by State Nodal Agency/ State Government using new plant and machinery, and installed power plant capacity to be lower than or equal to 25 MW at single location.

c) **Biomass power project based on Rankine cycle technology –** Biomass power projects using new plant and machinery based on Rankine cycle technology and using biomass fuel sources, provided use of fossil fuel is restricted only up to 15% of total fuel consumption on annual basis.

d) **Non-fossil fuel based co-generation project**: The project shall qualify to be termed as a non-fossil fuel based co-generation project, if it is using new plant and machinery and is in accordance with the definition and also meets the qualifying requirement outlined below:

Topping cycle mode of co-generation – Any facility that uses non-fossil fuel input for the power generation and also utilizes the thermal energy generated for useful heat applications in other industrial activities simultaneously.

Provided that for the co-generation facility to qualify under topping cycle mode, the sum of useful power output and one half the useful thermal output be greater than 45% of the facility's energy consumption, during season.

Explanation- For the purposes of this clause,

(a) 'Useful power output' is the gross electrical output from the generator. There will be an auxiliary consumption in the cogeneration plant itself (e.g. the boiler feed pump and the FD/ID fans). In order to compute the net power output it would be necessary to subtract the auxiliary consumption from the gross output. For simplicity of calculation, the useful power output is defined as the gross electricity (kWh) output from the generator.

(b) 'Useful Thermal Output' is the useful heat (steam) that is provided to the process by the cogeneration facility.

(c) 'Energy Consumption' of the facility is the useful energy input that is supplied by the fuel (normally bagasse or other such biomass fuel).

e) **Solar PV and Solar Thermal Power Project** – Based on Technologies approved by MNRE.

f) **Biomass Gasifier based Power Project** – The project shall qualify to be termed as a biomass gasifier based power project, if it is using new plant and machinery and having a Grid connected system that uses 100% producer gas engine, coupled with gasifier technologies approved by MNRE.

g) **Biogas based Power Project** – The project shall qualify to be termed as a biogas based power project, if it is using new plant and machinery and having grid connected system that uses 100% Biogas fired engine, coupled with Biogas technology for co-digesting agriculture residues, manure and other bio waste as may be approved by MNRE.

Chapter 1: General Principles

5. Control Period or Review Period

The Control Period or Review Period under these Regulations shall be of five years, of which the first year shall be the financial year 2012-13.

Provided that the benchmark capital cost for Solar PV and Solar thermal projects may be reviewed annually by the Commission.

Provided further that the tariff determined as per these Regulations for the RE projects commissioned during the Control Period, shall continue to be applicable for the entire duration of the Tariff Period as specified in Regulation 6 below.

Provided also that the revision in Regulations for next Control Period shall be undertaken at least six months prior to the end of the first Control Period and in case Regulations for the next Control Period are not notified until commencement of next Control Period, the tariff norms as per these Regulations shall continue to remain applicable until notification of the revised Regulations subject to adjustments as per revised Regulations.

6. Tariff Period

a) The Tariff Period for Renewable Energy power projects except in case of Small hydro projects below 5 MW, Solar PV, Solar thermal, Biomass Gasifier and Biogas based power projects shall be thirteen (13) years.

b) In case of Small hydro projects below 5 MW, the tariff period shall be thirty five (35) years.

c) In case of Solar PV and Solar thermal power projects the Tariff Period shall be twenty five years (25) years.

d) In case of Biomass gasifier and Biogas based power projects the Tariff Period shall be twenty years (20) years.

e) Tariff period under these Regulations shall be considered from the date of commercial operation of the renewable energy generating stations.

f) Tariff determined as per these Regulations shall be applicable for Renewable Energy power projects, only for the duration of the Tariff Period as stipulated under Regulation 6 (a), (b), (c), (d) and (e).

7. Project Specific tariff

a) Project specific tariff, on case to case basis, shall be determined by the Commission for the following types of projects:

i. Municipal Solid Waste Projects;

ii. Solar PV and Solar Thermal Power projects, if a project developer opts for project specific tariff:

Provided that the Commission while determining the project specific tariff for Solar PV and Solar Thermal shall be guided by the provisions of Chapters 7 & 8 of these Regulations.

b) Hybrid Solar Thermal Power plants;

c) Other hybrid projects include renewable–renewable or renewable–conventional sources, for which renewable technology is approved by MNRE;

d) Biomass project other than that based on Rankine Cycle technology application with water cooled condenser;

e) Any other new renewable energy technologies approved by MNRE.

f) Determination of Project specific Tariff for generation of electricity from such renewable energy sources shall be in accordance with such terms and conditions as stipulated under relevant Orders of the Commission.

Provided that the financial norms as specified under Chapter-2 of these Regulations, except for capital cost, shall be ceiling norms while determining the project specific tariff.

8. **Petition and proceedings for determination of tariff**

(1) The Commission shall determine the generic tariff on the basis of suo-motu petition at least six months in advance at the beginning of each year of the Control period for renewable energy technologies for which norms have been specified under the Regulations.

(2) Notwithstanding anything contained in these regulations,

a) the generic tariff determined for Solar PV projects based on the capital cost and other norms applicable for any year of the control period shall also apply for such projects during the next year; and

b) the generic tariff determined for Solar thermal projects based on the capital cost and other norms for the any year of the control period shall also apply for such projects during the next two years,

Provided that (i) the Power Purchase Agreements in respect of the Solar PV projects and Solar thermal projects as mentioned in this clause are signed on or before last day of the year for which generic tariff is determined and (ii) the entire capacity covered by the Power Purchase Agreements is commissioned on or before 31st March of the next year in respect of Solar PV projects and on or before 31st March of subsequent two years in respect of Solar thermal projects.

(3) A petition for determination of project specific tariff shall be accompanied by such fee as may be determined by regulations and shall be accompanied by:

a) Information in forms 1.1, 1.2, 2.1 and 2.2 as the case may be, and as appended in these regulations;

b) Detailed project report outlining technical and operational details, site

specific aspects, premise for capital cost and financing plan etc.

c) A Statement of all applicable terms and conditions and expected expenditure for the period for which tariff is to be determined.

d) A statement containing full details of calculation of any subsidy and incentive received, due or assumed to be due from the Central Government and/or State Government. This statement shall also include the proposed tariff calculated without consideration of the subsidy and incentive.

e) Any other information that the Commission requires the petitioner to submit.

(4) The proceedings for determination of tariff shall be in accordance with the Conduct of Business Regulations.

9. Tariff Structure

(1) The tariff for renewable energy technologies shall be single part tariff consisting of the following fixed cost components:

(a) Return on equity;

(b) Interest on loan capital;

(c) Depreciation;

(d) Interest on working capital;

(e) Operation and maintenance expenses;

Provided that for renewable energy technologies having fuel cost component, like biomass power projects and non-fossil fuel based cogeneration, single part tariff with two components, fixed cost component and fuel cost component, shall be determined.

9. Tariff Design

(1) The generic tariff shall be determined on levellised basis for the Tariff Period.

Provided that for renewable energy technologies having single part tariff with two components, tariff shall be determined on levellised basis considering the year of commissioning of the project for fixed cost component while the fuel cost component shall be specified on year of operation basis.

(2) For the purpose of levellised tariff computation, the discount factor equivalent to Post Tax weighted average cost of capital shall be considered.

(3) Levellisation shall be carried out for the 'useful life' of the Renewable Energy project while Tariff shall be specified for the period equivalent to 'Tariff Period'.

11. Despatch principles for electricity generated from Renewable Energy Sources:

(1) All renewable energy power plants except for biomass power plants with installed capacity of 10 MW and above, and non-fossil fuel based cogeneration plants shall be treated as 'MUST RUN' power plants and shall not be subjected to 'merit order despatch' principles.

(2) The biomass power generating station with an installed capacity of 10 MW and above and non-fossil fuel based co-generation projects shall be subjected to scheduling and despatch code as specified under Indian Electricity Grid Code (IEGC) and Central Electricity Regulatory Commission (Unscheduled Interchange and related matters) Regulations, 2009 including amendments thereto.

(3) Wind power generation plants where the sum of generation capacity of such plants connected at the connection point to the transmission or distribution system is 10 MW and above and connection point is 33 KV and above shall be subjected to scheduling and despatch code as specified under Indian Electricity Grid Code (IEGC) -2010.

(4) Solar generation shall be given by the generator based on availability of the generator, weather forecasting, solar insolation, season and normal solar generation curve and shall be vetted by the RLDC in which the generator is located and incorporated in the inter-state schedule. If RLDC is of the opinion that the schedule is not realistic, it may ask the solar generator to modify the schedule.

Chapter 2: Financial Principles

12. Capital Cost

The norms for the Capital cost as specified in the subsequent technology specific chapters shall be inclusive of all capital work including plant and machinery, civil work, erection and commissioning, financing and interest during construction, and evacuation infrastructure up to inter-connection point.

Provided that for project specific tariff determination, the generating company shall submit the break-up of capital cost items along with its petition in the manner specified under Regulation 8.

13. Debt Equity Ratio

(1) For generic tariff to be determined based on suo motu petition, the debt equity ratio shall be 70:30.

(2) For Project specific tariff, the following provisions shall apply:-

If the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan.

Provided that where equity actually deployed is less than 30% of the capital cost, the actual equity shall be considered for determination of tariff:

Provided further that the equity invested in foreign currency shall be designated in Indian rupees on the date of each investment.

14. Loan and Finance Charges

(1) Loan Tenure

For the purpose of determination of tariff, loan tenure of 12 years shall be considered.

(2) Interest Rate

(a) The loans arrived at in the manner indicated in the Regulation 13 shall be considered as gross normative loan for calculation for interest on loan. The normative loan outstanding as on April 1st of every year shall be worked out by deducting the cumulative repayment up to March 31st of previous year from the gross normative loan.

(b) For the purpose of computation of tariff, the normative interest rate shall be considered as average State Bank of India (SBI) Base rate prevalent during the first six months of the previous year plus 300 basis points.

(c) Notwithstanding any moratorium period availed by the generating company, the repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the annual depreciation allowed.

15. Depreciation

(1) The value base for the purpose of depreciation shall be the Capital Cost of the asset admitted by the Commission. The Salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset.

(2) Depreciation per annum shall be based on 'Differential Depreciation Approach' over loan period beyond loan tenure over useful life computed on 'Straight Line Method'. The depreciation rate for the first 12 years of the Tariff Period shall be 5.83% per annum and the remaining depreciation shall be spread over the remaining useful life of the project from 11th year onwards.

(3) Depreciation shall be chargeable from the first year of commercial operation.

Provided that in case of commercial operation of the asset for part of the year, depreciation shall be charged on pro rata basis.

16. Return on Equity

(1) The value base for the equity shall be 30% of the capital cost or actual equity (in case of project specific tariff determination) as determined under Regulation 13.

(2) The normative Return on Equity shall be:

a) 20% per annum for the first 10 years.

b) 24% per annum 11th years onwards.

17. Interest on Working Capital

(1) The Working Capital requirement in respect of wind energy projects, Small Hydro Power, Solar PV and Solar thermal power projects shall be computed in accordance with the following:

Wind Energy / Small Hydro Power /Solar PV / Solar thermal

a) Operation & Maintenance expenses for one month;

b) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF;

c) Maintenance spare @ 15% of operation and maintenance expenses

(2) The Working Capital requirement in respect of biomass power projects and non-fossil fuel based co-generation projects shall be computed in accordance with the following clause :

Biomass, Biogas Power and Non-fossil fuel Co-generation

a) Fuel costs for four months equivalent to normative PLF;

b) Operation & Maintenance expense for one month;

c) Receivables equivalent to 2 (Two) months of fixed and variable charges for sale of electricity calculated on the target PLF;

d) Maintenance spare @ 15% of operation and maintenance expenses

(3) Interest on Working Capital shall be at interest rate equivalent to the average State Bank of India Base Rate prevalent during the first six months of the previous year plus 350 basis points.

18. Operation and Maintenance Expenses

(1) 'Operation and Maintenance or O&M expenses' shall comprise repair and maintenance (R&M), establishment including employee expenses, and administrative and general expenses.

(2) Operation and maintenance expenses shall be determined for the Tariff Period based on normative O&M expenses specified by the Commission subsequently in these Regulations for the first Year of Control Period.

(3) Normative O&M expenses allowed during first year of the Control Period (i.e. FY 2012-13) under these Regulations shall be escalated at the rate of 5.72% per annum over the Tariff Period.

19. Rebate.

(1) For payment of bills of the generating company through letter of credit, a rebate of 2% shall be allowed.

(2) Where payments are made other than through letter of credit within a period of one month of presentation of bills by the generating company, a rebate of 1% shall be allowed.

20. Late payment surcharge.

In case the payment of any bill for charges payable under these regulations is delayed beyond a period of 60 days from the date of billing, a late payment surcharge at the rate of 1.25% per month shall be levied by the generating company.

21. Sharing of CDM Benefits

(1) The proceeds of carbon credit from approved CDM project shall be shared between generating company and concerned beneficiaries in the following manner, namely-

a) 100% of the gross proceeds on account of CDM benefit to be retained by the project developer in the first year after the date of commercial operation of the generating station;

b) In the second year, the share of the beneficiaries shall be 10% which shall be progressively increased by 10% every year till it reaches 50%, where after the proceeds shall be shared in equal proportion, by the generating company and
the beneficiaries.

22. Subsidy or incentive by the Central / State Government

The Commission shall take into consideration any incentive or subsidy offered by the Central or State Government, including accelerated

depreciation benefit if availed by the generating company, for the renewable energy power plants while determining the tariff under these Regulations.

Provided that the following principles shall be considered for ascertaining income tax benefit on account of accelerated depreciation, if availed, for the purpose of tariff determination:

i) Assessment of benefit shall be based on normative capital cost, accelerated depreciation rate as per relevant provisions under Income Tax Act and corporate income tax rate.

ii) Capitalization of RE projects during second half of the fiscal year. Per unit benefit shall be derived on levellised basis at discount factor equivalent to weighted average cost of capital.

23. Taxes and Duties

Tariff determined under these regulations shall be exclusive of taxes and duties as may be levied by the appropriate Government:

Provided that the taxes and duties levied by the appropriate Government shall be allowed as pass through on actual incurred basis.

Chapter 3: Technology specific parameters for Wind Energy

24. Capital Cost

(1) The capital cost for wind energy project shall include Wind turbine generator including its auxiliaries, land cost, site development charges and other civil works, transportation charges, evacuation cost up to inter-connection point, financing charges and IDC.

(2) The capital cost for wind energy projects shall be ₹ 525 Lakhs/MW (FY 2012-13 during first year of Control Period) and shall be linked to indexation formula as outlined under Regulation 25.

25. Capital Cost Indexation Mechanism

(1) The following indexation mechanism shall be applicable in case of wind energy projects for adjustments in capital cost over the Control Period with the changes in Wholesale Price Index for Steel and Electrical Machinery.

$$CC_{(n)} = P\&M_{(n)} * (1+F_1+F_2+F_3)$$

$$P\&M_{(n)} = P\&M_{(0)} * (1+d_{(n)})$$

$$d_{(n)} = [a*\{(SI_{(n-1)}/SI_{(0)}) - 1\} + b*\{(EI_{(n-1)}/EI_{(0)}) - 1\}]/(a+b)$$

Where,

$CC_{(n)}$ = Capital Cost for n^{th} year

$P\&M_{(n)}$ = Plant and Machinery Cost for n^{th} year

$P\&M_{(0)}$ = Plant and Machinery Cost for the base year

Note. $P\&M_{(0)}$ is to be computed by dividing the base capital cost (for the

first year of the control period) by $(1+F_1+F_2+F_3)$

$d_{(n)}$ = Capital Cost escalation factor for year (n) of Control Period

$SI_{(n-1)}$ = Average WPI Steel Index prevalent for calendar year (n-1) of the Control Period

$SI_{(0)}$ = Average WPI Steel Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

$EI_{(n-1)}$ = Average WPI Electrical Machinery Index prevalent for calendar year (n-1) of the Control Period

$EI_{(0)}$ = Average WPI Electrical and Machinery Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

a = Constant to be determined by Commission from time to time, (In default it is 0.6), for weightage to Steel Index

b = Constant to be determined by Commission from time to time, (In default it is 0.4), for weightage to Electrical Machinery Index

F_1 = Factor for Land and Civil Works (0.08)

F_2 = Factor for Erection and Commissioning (0.07)

F_3 = Factor for IDC and Financing Cost (0.10)

26. Capacity Utilisation Factor (CUF)

(1) CUF norms for this control period shall be as follows:

Annual Mean Wind Power Density (W/m^2)	CUF
Upto 200	20%
200-250	22%
250-300	25%
300-400	30%
> 400	32%

(2) The annual mean wind power density specified in sub-regulation (1) above shall be measured at 80 meter hub-height.

(3) For the purpose of classification of wind energy project into particular wind zone class, as per MNRE guidelines for wind measurement, wind mast either put-up by C-WET or a private developer and validated by C-WET would be normally extended 10 km from the mast point to all directions for uniform terrain and limited to appropriate distant in complex terrain with regard to complexity of the site. Based on such validation by C-WET, state nodal agency should certify zoning of the proposed wind farm complex.

27. Operation and Maintenance (O & M) Expenses

(1) Normative O&M expenses for the first year of the Control Period (i.e. FY 2012-13) shall be Rs 9 Lakh per MW.

(2) Normative O&M expenses allowed under these Regulations shall be escalated at the rate of 5.72% per annum over the tariff period to compute the levellised tariff.

Chapter 4: Technology specific parameters for Small Hydro Project

28. Capital Cost

(1) The normative capital cost for small hydro projects during first year of Control Period (FY 2012-13) shall be as follows:

Region	Project Size	Capital Cost (₹ Lakh/ MW)
Himanchal Pradesh, Uttarakhand and North Eastern States	Below 5 MW	700
	5 MW to 25 MW	630
Other States	Below 5 MW	550
	5 MW to 25 MW	500

(2) The capital cost for subsequent years shall be determined on the basis of indexation formula as outlined under Regulation 29.

29. Capital Cost Indexation Mechanism

(1) The following indexation mechanism shall be applicable in case of small hydro power projects for adjustments in capital cost over the Control Period with the changes in Wholesale Price Index for Steel and Electrical Machinery.

$CC_{(n)} = P\&M_{(n)} * (1+F_1+F_2+F_3)$ $P\&M_{(n)} = P\&M_{(0)} * (1+d_{(n)})$

$d_{(n)} = [a*\{(SI_{(n-1)}/SI_{(0)}) - 1\} + b*\{(EI_{(n-1)}/EI_{(0)}) - 1\}]/(a+b)$ Where,

$CC_{(n)}$ = Capital Cost for n^{th} year

$P\&M_{(n)}$ = Plant and Machinery Cost for n^{th} year

$P\&M_{(0)}$ = Plant and Machinery Cost for the base year

Note. $P\&M_{(0)}$ is to be computed by dividing the base capital cost (for the first year of the control period) by $(1+F_1+F_2+F_3)$

Small Hydro Project	Base Capital Cost (₹ Lakh/MW)	Factor $(1+F_1+F_2+F_3)$	$P\&M_{(0)}$ (₹ Lakh/MW)
SHP (< 5 MW) (HP, Uttarakhand, NE states)	700	1.40	500
SHP (5 - 25 MW) (HP, Uttarakhand, NE states)	630	1.40	450
SHP (< 5 MW) (other states)	550	1.40	393
SHP (5 - 25 MW) (other states)	500	1.40	357

$d_{(n)}$ = Capital Cost escalation factor for year (n) of Control Period

$SI_{(n-1)}$ = Average WPI Steel Index prevalent for calendar year (n-1) of the Control Period

$SI_{(0)}$ = Average WPI Steel Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

$EI_{(n-1)}$ = Average WPI Electrical Machinery Index prevalent for calendar year

(n-1) of the Control Period

$EI_{(0)}$ = Average WPI Electrical and Machinery Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

a = Constant to be determined by Commission from time to time, (In default it is 0.6), for weightage to Steel Index

b = Constant to be determined by Commission from time to time, (In default it is 0.4), for weightage to Electrical Machinery Index

F_1 = Factor for Land and Civil Work (0.16)

F_2 = Factor for Erection and Commissioning (0.10)

F_3 = Factor for IDC and Financing Cost (0.14)

30. Capacity Utilisation Factor

Capacity Utilisation factor for the small hydro projects located in Himachal Pradesh, Uttarakhand and North Eastern States shall be 45% and for other States, CUF shall be 30%.

Explanation: For the purpose of this Regulation normative CUF is net of free power to the home state if any, and any quantum of free power if committed by the developer over and above the normative CUF shall not be factored into the tariff.

31. Auxiliary Consumption

Normative Auxiliary Consumption for the small hydro projects shall be 1.0%.

32. Operation and Maintenance Expenses

(1) Normative O&M expenses for the first year of the Control period (i.e. FY 2012-13 shall be as follows.

Region	Project Size	O&M Expense (₹ Lakh/ MW)
Himachal Pradesh, Uttarakhand and North Eastern States	Below 5 MW	25
	5 MW to 25 MW	18
Other States	Below 5 MW	20
	5 MW to 25 MW	14

(2) Normative O&M expenses allowed under these Regulations shall be escalated at the rate of 5.72% per annum for the Tariff Period for the purpose of determination of levellised tariff.

Chapter 5: Technology specific parameters for Biomass Power Projects based on Rankine Cycle Technology

33. Technology Aspect

The norms for tariff determination specified hereunder are for biomass power projects based on Rankine cycle technology application using water cooled condenser.

34. Capital Cost

The normative capital cost for the biomass power projects based on Rankine cycle shall be ₹ 445 Lakh/MW (FY 2012-13 during first year of Control Period) and shall be linked to indexation formula as outlined under Regulation 35.

35. Capital Cost Indexation Mechanism

(1) The following indexation mechanism shall be applicable in case of biomass power projects for adjustment in capital cost over the Control Period with the changes in Wholesale Price Index for Steel and Electrical Machinery,

$$CC_{(n)} = P\&M_{(n)} * (1+F_1+F_2+F_3)\ P\&M_{(n)} = P\&M_{(0)} * (1+d_{(n)})$$

$$d_{(n)} = [a*\{(SI_{(n-1)}/SI_{(0)}) - 1\} + b*\{(EI_{(n-1)}/EI_{(0)}) - 1\}]/(a+b)$$

Where,

$CC_{(n)}$ = Capital Cost for n^{th} year

$P\&M_{(n)}$ = Plant and Machinery Cost for n^{th} year

$P\&M_{(0)}$ = Plant and Machinery Cost for the base year

Note. $P\&M_{(0)}$ is to be computed by dividing the base capital cost (for the first year of the control period) by $(1+F_1+F_2+F_3)$

$d_{(n)}$ = Capital Cost escalation factor for year (n) of Control Period

$SI_{(n-1)}$ = Average WPI Steel Index prevalent for calendar year (n-1) of the Control Period

$SI_{(0)}$ = Average WPI Steel Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

$EI_{(n-1)}$ = Average WPI Electrical Machinery Index prevalent for calendar year (n-1) of the Control Period

$EI_{(0)}$ = Average WPI Electrical and Machinery Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

a = Constant to be determined by Commission from time to time, (In default it is 0.7), for weightages to Steel Index

b = Constant to be determined by Commission from time to time, (In default it is 0.3), for weightages to Electrical Machinery Index

F_1 = Factor for Land and Civil Works (0.10)

F_2 = Factor for Erection and Commissioning (0.09)

F_3 = Factor for IDC and Financing Cost (0.14)

36. Plant Load Factor

(1) Threshold Plant Load Factor for determining fixed charge component of Tariff shall be:

a) During Stabilisation: 60%

b) During the remaining period of the first year (after stabilization): 70%

c) From 2nd Year onwards: 80 %

(2) The stabilisation period shall not be more than 6 months from the date of commissioning of the project.

37. Auxiliary Consumption

The auxiliary power consumption factor shall be 10% for the determination of tariff.

38. Station Heat Rate

The Station Heat Rate for biomass power projects shall be 4000 kCal/ kWh

39. Operation and Maintenance Expenses

(1) Normative O&M expenses for the first year of the Control period (i.e. FY 2012-13 shall be ₹ 24 Lakh per MW.

(2) Normative O&M expenses allowed at the commencement of the Control Period (i.e. FY 2012-13) under these Regulations shall be escalated at the rate of 5.72% per annum.

40. Fuel Mix

(1) The biomass power plant shall be designed in such a way that it uses different types of non-fossil fuels available within the vicinity of biomass power project such as crop residues, agro-industrial residues, forest residues etc. and other biomass fuels as may be approved by MNRE.

(2) The Biomass Power Generating Companies shall ensure fuel management plan to ensure adequate availability of fuel to meet the respective project requirements.

41. Use of Fossil Fuel

The use of fossil fuels shall be limited to the extent of 15% of total fuel consumption on annual basis.

42. Monitoring Mechanism for the use of fossil fuel

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

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

(2) Non-compliance with the condition of fossil fuel usage by the project developer, during any financial year, shall result in withdrawal of applicability of tariff as per these Regulations for such biomass based power project.

43. Calorific Value

The Calorific Value of the biomass fuel used for the purpose of determination of tariff shall be at 3300 kCal/kWh.

44. Fuel Cost

Biomass fuel price during first year of the Control Period (i.e. FY 2012-13) shall be as specified in the table below and shall be linked to index formulae as specified under Regulation 45. Alternatively, for each subsequent year of the Tariff Period, the normative escalation factor of 5% per annum shall be applicable at the option of the biomass project developer.

State	FY2012-13 (₹ /MT)
Andhra Pradesh	2315
Haryana	2635
Maharashtra	2116
Madhya Pradesh	1507
Punjab	2756
Rajasthan	2300
Tamil Nadu	2277
Uttar Pradesh	2355
Other States	2283

45. Fuel Price Indexation Mechanism

(1) In case of biomass power projects, the following indexing mechanism for adjustment of fuel prices for each year of

operation will be applicable for determination of applicable variable charge component of tariff, in case developer wishes to opt for indexing mechanism:

$$P_{(n)} = P_{(n-1)} * \{a * (WPI_{(n)}/WPI_{(n-1)}) + b * (1+IRC)_{(n-1)} + c * (Pd_{(n)}/Pd_{(n-1)})\}$$

Where,

$P_{(n)}$ = Price per ton of biomass for the n^{th} year to be considered for tariff determination

$P_{(n-1)}$ = Price per ton of biomass for the $(n-1)^{th}$ year to be considered for tariff determination. P_1 shall be Biomass price for FY 2012-13 as specified under Regulation 44.

a = Factor representing fuel handling cost

b =Factor representing fuel cost

c = Factor representing transportation cost

$IRC_{(n-1)}$ = Average Annual Inflation Rate for indexed energy charge component in case of captive coal mine source (in %) to be applicable for $(n-1)^{th}$ year, as may be specified by CERC for 'Payment purpose' as per Competitive Bidding Guidelines

Pd_n = Weighted average price of HSD for nth year.

Pd_{n-1} = Weighted average price of HSD for $(n-1)^{th}$ year.

WPI_n = Whole sale price index for the month of April of n^{th} year

WPI_{n-1} = Wholesale price index for month of April of $(n-1)^{th}$ year.

Where a, b & c will be specified by the Commission from time to time. In default, these factors shall be 0.2, 0.6 & 0.2 respectively.

(2) Variable Charge for the nth year shall be determined as under:

i.e. $VC_n = VC_1 x (P_n / P_1)$ or $VC_n = VC_1 x (1.05)^{(n-1)}$ (optional)

where,

VC_1 represents the Variable Charge based on Biomass Price P_1 for FY 2012-13 as specified under Regulation 44 and shall be determined as under:

$$VC_1 = \frac{\text{Station Heat Rate (SHR)}}{\text{Gross Calorific Value (GCV)}} \times \frac{1}{(1 - \text{Aux Cons. Factor})} \times \frac{P1}{1000}$$

(3) The biomass base price shall be revised at the end of the control period for the next Control Period and same shall also be applicable to project commissioned under this Control Period.

Chapter 6: Technology specific parameters for Non-fossil fuel based Cogeneration Projects

46. Technology Aspect

A project shall qualify as a non-fossil fuel based Co-generation project, if it is in accordance with the eligibility criteria as specified under Regulation 4(d).

47. Capital Cost

The normative capital cost for the non-fossil fuel based cogeneration projects shall be ₹ 420 Lakh/MW for the first year of Control Period (i.e. FY 2012-13), and shall be linked to indexation formula as outlined under Regulation 48.

48. Capital Cost Indexation Mechanism

The following indexation mechanism shall be applicable in case of non-fossil fuel based cogeneration projects for adjustments in capital cost with the changes in Wholesale Price Index for Steel and Electrical Machinery,

$$CC_{(n)} = P\&M_{(n)} * (1+F_1+F_2+F_3)\ P\&M_{(n)} = P\&M_{(0)} * (1+d_{(n)})$$

$$d_{(n)} = [a*\{(SI_{(n-1)}/SI_{(0)}) - 1\} + b*\{(EI_{(n-1)}/EI_{(0)}) - 1\}]/(a+b)$$

Where,

$CC_{(n)}$ = Capital Cost for n^{th} year

$P\&M_{(n)}$ = Plant and Machinery Cost for n^{th} year

$P\&M_{(0)}$ = Plant and Machinery Cost for the base year

Note: $P\&M_{(0)}$ is to be computed by dividing the base capital cost (for the first year of the control period) by $(1+F_1+F_2+F_3)$

$d_{(n)}$ = Capital Cost escalation factor for year (n) of Control Period

$SI_{(n-1)}$ = Average WPI Steel Index prevalent for fiscal year (n-1) of the Control Period

$SI_{(0)}$ = Average WPI Steel Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

$EI_{(n-1)}$ = Average WPI Electrical Machinery Index prevalent for calendar year (n-1) of the Control Period

$EI_{(0)}$ = Average WPI Electrical and Machinery Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

a = Constant to be determined by Commission from time to time, (In default it is 0.7), for weightages to Steel Index

b = Constant to be determined by Commission from time to time, (In default it is 0.3), for weightages to Electrical Machinery Index

F_1 = Factor for Land and Civil Work (0.10)

F_2 = Factor for Erection and Commissioning (0.09)

F_3 = Factor for IDC and Financing Cost (0.14)

49. Plant Load Factor

(1) For the purpose of determining fixed charge, the plant load factor for non- fossil fuel based cogeneration projects shall be computed on the basis of plant availability for number of operating days considering operations during crushing season and off-season as specified under clause (2) below and load factor of 92%.

(2) The number of operating days for different States shall be as follows:

State	Operating Days	Plant Load Factor (%)
Uttar Pradesh and Andhra Pradesh	120 days (crushing) + 60 days (off-season) = 180 days operating days	45%
Tamil Nadu and Maharashtra	180 days (crushing) + 60 days (off-season) = 240 days operating days	60%
Other States	150 days (crushing) + 60 days (off-season) = 210 days operating days	53%

50. Auxiliary Consumption

The auxiliary power consumption factor shall be 8.5% for the computation of tariff.

51. Station Heat Rate

The Station Heat Rate of 3600 kCal / kWh for power generation component alone shall be considered for computation of tariff for non-fossil fuel based Cogeneration projects.

52. Calorific Value

The Gross Calorific Value for Bagasse shall be considered as 2250 kCal/kg. For the use of biomass fuels other than bagasse, calorific value as specified under Regulation 43 shall be applicable.

53. Fuel Cost

(1) The price of Bagasse shall be as specified in the table below and shall be linked to indexation formula as outlined under Regulation 54. Alternatively, for each subsequent year of the Control Period, the normative escalation factor of 5% per annum shall be applicable at the option of the project developer.

State	Bagassse Price (₹ / MT)
Andhra Pradesh	1307
Haryana	1859
Maharashtra	1327
Madhya Pradesh	946
Punjab	1636
Tamilnadu	1408
Uttar Pradesh	1458
Other States	1420

(2) For use of biomass other than bagasse in co-generation projects, the biomass prices as specified under Regulation 44 shall be applicable.

54. Fuel Price Indexation Mechanism

(1) In case of non-fossil fuel based cogeneration projects, the following indexing mechanism for adjustment of fuel prices for each year of operation will be applicable for determination of applicable variable

charge component of tariff, in case developer wishes to opt for indexing mechanism:

$$P_{(n)} = P_{(n-1)} * \{a * (WPI_{(n)}/WPI_{(n-1)}) + b * (1+IRC)_{(n-1)} + c * (Pd_{(n)}/Pd_{(n-1)})\}$$

Where,

$P_{(n)}$ = Price per ton of Bagasse for the n^{th} year to be considered for tariff determination

$P_{(n-1)}$ = Price per ton of Bagasse for the $(n-1)^{th}$ year to be considered for tariff determination. P_1 shall be Biomass price for FY 2012-13 as specified under Regulation 55.

a = Factor representing fuel handling cost

b = Factor representing fuel cost

c = Factor representing transportation cost

$IRC_{(n-1)}$ = Average Annual Inflation Rate for indexed energy charge component in case of captive coal mine source (in %) to be applicable for $(n-1)^{th}$ year, as may be specified by CERC for 'Payment purpose' as per Competitive Bidding Guidelines

Pd_n = Weighted average price of HSD for nth year.

Pd_{n-1} = Weighted average price of HSD for $(n-1)^{th}$ year.

WPI_n = Whole sale price index for the month of April of n^{th} year

WPI_{n-1} = Wholesale price index for month of April of $(n-1)^{th}$ year.

Where a, b & c will be specified by the Commission from time to time. In default, these factors shall be 0.2, 0.6 & 0.2 respectively.

(2) Variable Charge for the nth year shall be determined as under:

i.e. $VC_n = VC_1 x (P_n / P_1)$ or $VC_n = VC_1 x (1.05)^{(n-1)}$ (optional)

Where,

VC_1 represents the Variable Charge based on bagasse Price P_1 for FY 2012-13 as specified under Regulation 55 and shall be determined as under:

$$VC_1 = \frac{\text{Station Heat Rate (SHR)}}{\text{Gross Calorific Value (GCV)}} \times \frac{1}{(1 - \text{Aux Cons. Factor})} \times \frac{P1}{1000}$$

55. Operation and Maintenance Expenses

(1) Normative O&M expenses during first year of the Control period (i.e. FY 2012-13) shall be ₹ 16 Lakh per MW.

(2) Normative O&M expenses allowed at the commencement of the Control Period (i.e. FY 2012-13) under these Regulations shall be escalated at the rate of 5.72% per annum.

Chapter 7: Technology specific parameters for Solar PV Power Project

56. Technology Aspects

(1) Norms for Solar Photovoltaic (PV) power under these Regulations shall be applicable for grid connected PV systems that directly convert solar energy into electricity and are based on the technologies such as crystalline silicon or thin film etc. as may be approved by MNRE.

57. Capital Cost

(1) The normative capital cost for setting up Solar Photovoltaic Power Project shall be ₹ 1000Lakh/MW for FY 2012-13.

Provided that the Commission may deviate from above norm in case of project specific tariff determination in pursuance of Regulation 7 and Regulation 8.

58. Capacity Utilisation Factor

(1) The Capacity utilisation factor for Solar PV project shall be 19%.

Provided that the Commission may deviate from above norm in case of project specific tariff determination in pursuance of Regulation 7 and Regulation 8.

59. Operation and Maintenance Expenses

(1) The O&M Expenses shall be ₹ 11 Lakhs/MW for the 1st year of operation.

(2) Normative O&M expenses allowed at the commencement of the Control Period under these Regulations shall be escalated at the rate of 5.72% per annum.

Chapter 8: Technology specific parameters for Solar Thermal Power Project

60. Technology Aspects

(1) Norms for Solar thermal power under these Regulations shall be applicable for Concentrated solar power (CSP) technologies viz. line focusing or point focusing, as may be approved by MNRE, and uses direct sunlight, concentrating it several times to reach higher energy densities and thus higher temperatures whereby the heat generated is used to operate a conventional power cycle to generate electricity.

61. Capital Cost

(1) The normative capital cost for setting up Solar Thermal Power Project shall be ₹ 1300 Lakh/MW for FY 2012-13.

Provided that the Commission may deviate from the above norm in case of project specific tariff determination in pursuance of Regulation 7 and Regulation 8.

62. Capacity Utilisation Factor (CUF)

(1) The Capacity Utilisation Factor shall be 23%.

Provided that the Commission may deviate from the above norm in case of project specific tariff determination in pursuance of Regulation 7 and Regulation 8.

63. Operation and Maintenance Expenses

(1) The O&M Expenses shall be Rs 15 Lakhs/MW for 1st year operation.

(2) Normative O&M expenses allowed at the commencement of the Control Period under these Regulations shall be escalated at the rate of 5.72% per annum.

64. Auxiliary Consumption

(1) The auxiliary consumption factor shall be 10%.

Provided that the Commission may deviate from the above norm in case of project specific tariff determination in pursuance of Regulation 7 and Regulation 8.

Chapter 9: Technology specific parameters for Biomass Gasifier Power Projects

65. Technology Aspect

The norms for tariff determination specified hereunder are for biomass gasifier power projects based.

66. Capital Cost

The normative capital cost for the biomass gasifier power projects based on Rankine cycle shall be ₹ 550 Lakh/MW (FY 2012-13 during first year of Control Period) and shall be linked to indexation formula as outlined under Regulation 67. After taking into account of capital subsidy net project cost shall be ₹ 400Lakh/MW for FY 2012-13.

67. Capital Cost Indexation Mechanism

(1) The following indexation mechanism shall be applicable in case of biomass gasifier power projects for adjustment in capital cost over the Control Period with the changes in Wholesale Price Index for Steel and Electrical Machinery,

$$CC_{(n)} = P\&M_{(n)} * (1+F_1+F_2+F_3) \quad P\&M_{(n)} = P\&M_{(0)} * (1+d_{(n)})$$

$$d_{(n)} = [a*\{(SI_{(n-1)}/SI_{(0)}) - 1\} + b*\{(EI_{(n-1)}/EI_{(0)}) - 1\}]/(a+b)$$

Where,

$CC_{(n)}$ = Capital Cost for n^{th} year

$P\&M_{(n)}$ = Plant and Machinery Cost for n^{th} year

$P\&M_{(0)}$ = Plant and Machinery Cost for the base year

Note: $P\&M_{(0)}$ is to be computed by dividing the base capital cost (for the first year of the control period) by $(1+F_1+F_2+F_3)$

$d_{(n)}$ = Capital Cost escalation factor for year (n) of Control Period

$SI_{(n-1)}$ = Average WPI Steel Index prevalent for calendar year (n-1) of the Control Period

$SI_{(0)}$ = Average WPI Steel Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

$EI_{(n-1)}$ = Average WPI Electrical Machinery Index prevalent for calendar year (n-1) of the Control Period

$EI_{(0)}$ = Average WPI Electrical and Machinery Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

a = Constant to be determined by Commission from time to time, (In default it is 0.7), for weightages to Steel Index

b = Constant to be determined by Commission from time to time,

(In default it is 0.3), for weightages to Electrical Machinery Index

F_1 = Factor for Land and Civil Works (0.10)

F_2 = Factor for Erection and Commissioning (0.09)

F_3 = Factor for IDC and Financing Cost (0.14)

68. Plant Load Factor

Threshold Plant Load Factor for determining fixed charge component of Tariff shall be 80%.

69. Auxiliary Consumption

The auxiliary power consumption factor shall be 10% for the determination of tariff.

70. Specific fuel consumption

Normative specific fuel consumption shall be 1.1 kg per kWh.

71. Operation and Maintenance Expenses

(1) Normative O&M expenses for the first year of the Control period (i.e. FY 2012-13 shall be ₹ 35 Lakh per MW.

(2) Normative O&M expenses allowed at the commencement of the Control Period (i.e. FY 2012-13) under these Regulations shall be escalated at the rate of 5.72% per annum.

72. Fuel Mix

(1) The Biomass Gasifier based power plant shall be designed in such a way that it uses different types of non-fossil fuels available within the vicinity of biomass power project such as crop residues, agro-industrial residues, forest residues etc. and other biomass fuels as may be approved by MNRE.

(2) The Biomass Gasifier based Power Generating Companies shall ensure fuel management plan to ensure adequate availability of fuel to meet the respective project requirements.

73. Fuel Cost

Biomass fuel price during first year of the Control Period (i.e. FY 2012-13) shall be as per Regulation 44 and shall be linked to indexation formula as specified under Regulation 74. Alternatively, for each subsequent year of the Tariff Period, the normative escalation factor of 5% per annum shall be applicable at the option of the Biomass Gasifier project developer.

74. Fuel Price Indexation Mechanism

(1) In case of Biomass Gasifier power projects, the following indexing mechanism for adjustment of fuel prices for each year of operation will be applicable for determination of applicable variable charge component of tariff, in case developer wishes to opt for indexing mechanism:

$$P_{(n)} = P_{(n-1)} * \{a * (WPI_{(n)}/WPI_{(n-1)}) + b * (1+IRC)_{(n-1)} + c * (Pd_{(n)}/Pd_{(n-1)})\}$$

Where,

$P_{(n)}$ = Price per ton of biomass for the n^{th} year to be considered for tariff determination

$P_{(n-1)}$ = Price per ton of biomass for the $(n-1)^{th}$ year to be considered for tariff determination. P_1 shall be Biomass price for FY 2012-13 as specified under Regulation 44.

a = Factor representing fuel handling cost

b = Factor representing fuel cost

c = Factor representing transportation cost

$IRC_{(n-1)}$ = Average Annual Inflation Rate for indexed energy charge component in case of captive coal mine source (in %) to be applicable for $(n-1)^{th}$ year, as may be specified by CERC for 'Payment purpose' as per competitive Bidding Guidelines

Pd_n = Weighted average price of HSD for nth year.

Pd_{n-1} = Weighted average price of HSD for $(n-1)^{th}$ year.

WPI_n = Whole sale price index for the month of April of n^{th} year

WPI_{n-1} = Wholesale price index for month of April of $(n-1)^{th}$ year.

Where a, b & c will be specified by the Commission from time to time. In default, these factors shall be 0.2, 0.6 & 0.2 respectively.

(2) Variable Charge for the nth year shall be determined as under:

i.e. $VC_n = VC_1 x (P_n / P_1)$ or $VC_n = VC_1 x (1.05)^{(n-1)}$ (optional)

where,

VC_1 represents the Variable Charge based on Biomass Price P_1 for FY 2012-13 as specified under Regulation 44 and shall be determined as under:

$$VC_1 = \frac{\text{Station Heat Rate (SHR)}}{\text{Gross Calorific Value (GCV)}} \times \frac{1}{(1 - \text{Aux Cons. Factor})} \times \frac{P1}{1000}$$

(3) The biomass base price shall be revised at the end of the control period for the next Control Period and same shall also be applicable to project commissioned under this Control Period.

Chapter 10: Technology specific parameters for Biogas based Power Projects

75. Technology Aspect

The norms for tariff determination specified hereunder are for grid connected biogas based power projects that uses 100% Biogas fired engine, coupled with Biogas technology for co-digesting agriculture residues, manure and other bio waste as may be approved by MNRE.

76 Capital Cost

The normative capital cost for the biogas based power shall be ₹ 1000 Lakh/MW (FY 2012-13 during first year of Control Period) and shall be linked to indexation formula as outlined under Regulation 77. After taking into account of capital subsidy net project cost shall be ₹ 700Lakh/MW for FY 2012-13.

77. Capital Cost Indexation Mechanism

(1) The following indexation mechanism shall be applicable in case of biogas based power projects for adjustment in capital cost over the Control Period with the changes in Wholesale Price Index for Steel and Electrical Machinery,

$$CC_{(n)} = P\&M_{(n)} * (1+F_1+F_2+F_3) \quad P\&M_{(n)} = P\&M_{(0)} * (1+d_{(n)})$$

$$d_{(n)} = [a*\{(SI_{(n-1)}/SI_{(0)}) - 1\} + b*\{(EI_{(n-1)}/EI_{(0)}) - 1\}]/(a+b)$$

Where,

$CC_{(n)}$ = Capital Cost for n^{th} year

$P\&M_{(n)}$ = Plant and Machinery Cost for n^{th} year

$P\&M_{(0)}$ = Plant and Machinery Cost for the base year

Note: $P\&M_{(0)}$ is to be computed by dividing the base capital cost (for the first year of the control period) by $(1+F_1+F_2+F_3)$

$d_{(n)}$ = Capital Cost escalation factor for year (n) of Control Period

$SI_{(n-1)}$ = Average WPI Steel Index prevalent for calendar year (n-1) of the Control Period

$SI_{(0)}$ = Average WPI Steel Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

$EI_{(n-1)}$ = Average WPI Electrical Machinery Index prevalent for calendar year (n-1) of the Control Period

$EI_{(0)}$ = Average WPI Electrical and Machinery Index prevalent for calendar year (0) at the beginning of the Control Period i.e. April 2011 to March 2012

a = Constant to be determined by Commission from time to time, (In default it is 0.7), for weightages to Steel Index

b = Constant to be determined by Commission from time to time, (In default it is 0.3), for weightages to Electrical Machinery Index

F_1 = Factor for Land and Civil Works (0.10)

F_2 = Factor for Erection and Commissioning (0.09)

F_3 = Factor for IDC and Financing Cost (0.14)

78. Plant Load Factor

Threshold Plant Load Factor for determining fixed charge component of Tariff shall be 90%.

79. Auxiliary Consumption

The auxiliary power consumption factor shall be 12% for the determination of tariff.

80. Operation and Maintenance Expenses

(1) Normative O&M expenses for the first year of the Control period (i.e. FY 2012-13 shall be ₹ 30 Lakh per MW.

(2) Normative O&M expenses allowed at the commencement of the Control Period (i.e. FY 2012-13) under these Regulations shall be escalated at the rate of 5.72% per annum.

81. Specific Fuel Consumption

Normative specific fuel consumption shall be 3 kg of substrate mix per kWh.

82. Fuel Cost (Feed stock Price)

Feed stock price during first year of the Control Period (i.e. FY 2012-13) shall be ₹ 990/MT for FY 2012-13.

83. Fuel Price Indexation Mechanism

(1) In case of biomass power projects, the following indexing mechanism for adjustment of fuel prices for each year of operation will be applicable for determination of applicable variable charge component of tariff, in case developer wishes to opt for indexing mechanism:

$P_{(n)} = P_{(n-1)} * \{a * (WPI_{(n)}/WPI_{(n-1)}) + b * (1+IRC)_{(n-1)} + c * (Pd_{(n)}/Pd_{(n-1)})\}$

Where,

$P_{(n)}$ = Price per ton of biomass for the n^{th} year to be considered for tariff determination

$P_{(n-1)}$ = Price per ton of biomass for the $(n-1)^{th}$ year to be considered for tariff determination.

P_1 shall be Biomass price for FY 2012-13 as specified under Regulation 82

a = Factor representing fuel handling cost

b = Factor representing fuel cost

c = Factor representing transportation cost

$IRC_{(n-1)}$ = Average Annual Inflation Rate for indexed energy charge component in case of captive coal mine source (in %) to be applicable for $(n-1)^{th}$ year, as may be specified by CERC for 'Payment purpose' as per

Competitive Bidding Guidelines

Pd_n = Weighted average price of HSD for nth year.

Pd_{n-1} = Weighted average price of HSD for $(n-1)^{th}$ year.

WPI_n = Whole sale price index for the month of April of n^{th} year

WPI_{n-1} = Wholesale price index for month of April of $(n-1)^{th}$ year.

Where a, b & c will be specified by the Commission from time to time. In default, these factors shall be 0.2, 0.6 & 0.2 respectively.

(2) Variable Charge for the nth year shall be determined as under:

i.e. $VC_n = VC_1 x (P_n / P_1)$ or $VC_n = VC_1 x (1.05)^{(n-1)}$ (optional)

where,

VC_1 represents the Variable Charge based on Biomass Price P_1 for FY 2012-13 as specified under Regulation 44 and shall be determined as under:

$$VC_1 = \frac{\text{Station Heat Rate (SHR)}}{\text{Gross Calorific Value (GCV)}} \times \frac{1}{(1 - \text{Aux Cons. Factor})} \times \frac{P1}{1000}$$

(3) The biomass base price shall be revised at the end of the control period for the next Control Period and same shall also be applicable to project commissioned under this Control Period.

Chapter 11: Miscellaneous

84. Deviation from norms

Tariff for sale of electricity generated from a generating station based on renewable energy sources, may also be agreed between a generating company and a licensee, in deviation from the norms specified in these regulations subject to the conditions that the levellised tariff over the useful life of the project on the basis of the norms in deviation does not exceed the levellised tariff calculated on the basis of the norms specified in these regulations.

85. Power to Relax

The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected may relax any of the provisions of these regulations on its own motion or on an application made before it by an interested person.

(Rajiv Bansal)
Secretary

Form-1.1: Form Template for (Wind Power or Small Hydro Project or Solar PV/Solar thermal)

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Parameter values
1	**Power Generation**				
		Capacity			
			Installed Power Generation Capacity	MW	
			Capacity Utilization Factor	%	
			Commercial Operation Date	mm/yyyy	
			Useful Life	Years	
2	**Project Cost**				
		Capital Cost/MW	Normative Capital Cost	Rs Lakh/MW	
			Capital Cost	Rs Lakh	
			Capital subsidy, if any	Rs Lakh	
			Net Capital Cost	Rs Lakh	
3	**Financial Assumptions**				
			Tariff Period	Years	
		Debt: Equity			
			Debt	%	
			Equity	%	
			Total Debt Amount	Rs Lacs	
			Total Equity Amout	Rs Lacs	
		Debt component			
			Loan Amount	Rs Lacs	
			Moratorium Period	years	
			Repayment Period(incld Moratorium)	years	
			Intrest Rate	%	
		Equity component			
			Equity amount	Rs Lacs	
			Return on Equity for first 10 years	% p.a	
			Return on Equity 11th year onwards	% p.a	
			Discount Rate	%	
		Depreciation			
			Depreciation Rate for first 12 years	%	
			Depreciation Rate 13th year onwards	%	
		Incentives	Generation Based Incentives, if any	Rs L p.a.	
			Period for GBI	Years	
4	**Operation & Maintenance**				
		Normative O&M expense		Rs Lakh/MW	
		O&M expense per annum		Rs Lakh	
		Escalation factor for O&M expense		%	
5	**Working Capital**				
		O&M expense		Months	
		Maintenance Spare	(% of O&M exepenses)	%	
		Receivables		Months	
		Interest on Working Capital		% p.a.	

Form-2.1: Form Template for (Biomass Power or Non-fossil fuel based Cogen) : Parameter Assumptions

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Parameter values
1	**Power Generation**				
		Capacity			
			Installed Power Generation Capacity	MW	
			Auxiliary Consumption factor	%	
			PLF (during stabilisation upto 6 months)	%	
			PLF (during 1st yr after stabilisation)	%	
			PLF (2nd yr onwards)	%	
			Commercial Operation Date	mm/yyyy	
			Useful Life	Years	
2	**Project Cost**				
		Capital Cost/MW	Normative Capital Cost	Rs Lakh/MW	
			Capital Cost	Rs Lakh	
			Capital subsidy, if any	Rs Lakh	
			Net Capital Cost	Rs Lakh	
3	**Financial Assumptions**				
			Tariff Period	Years	
		Debt: Equity			
			Debt	%	
			Equity	%	
			Total Debt Amount	Rs Lacs	
			Total Equity Amout	Rs Lacs	
		Debt component			
			Loan Amount	Rs Lacs	
			Moratorium Period	years	
			Repayment Period(incld Moratorium)	years	
			Intrest Rate	%	
		Equity component			
			Equity amount	Rs Lacs	
			Return on Equity for first 10 years	% p.a	
			Return on Equity 11th year onwards	% p.a	
			Discount Rate	%	
		Depreciation			
			Depreciation Rate for first 12 years	%	
			Depreciation Rate 13th year onwards	%	
		Incentives	Generation Based Incentives, if any	Rs L p.a.	
			Period for GBI	Years	
4	**Operation & Maintenance**				
		Normative O&M expense		Rs Lakh/MW	
		O&M expense per annum		Rs Lakh	
		Escalation factor for O&M expense		%	
5	**Working Capital**				
		O&M expense		Months	
		Maintenance Spare	(% of O&M exepenses)	%	
		Receivables		Months	
		Biomass stock		Months	
		Interest on Working Capital		% p.a.	
6	**Fuel related assumptions**				
		Station Heat Rate	during stabilisation	kcal/kWh	
			post stabilisation	kcal/kWh	
		Fuel types & mix	Biomass fuel type -1	%	
			Biomass fuel type -2	%	
			fossil Fuel (coal)	%	
			GCV of Biomass fuel type -1	kCal/kg	
			GCV of Biomass fuel type -2	kCal/kg	
			GCV of fossil Fuel (coal)	kCal/kg	
			Biomass Price (fuel type -1) : yr-1	Rs/MT	
			Biomass Price (fuel type -2) : yr-1	Rs/MT	
			Fossl fuel price (coal) : yr-1	Rs/MT	
			Fuel price escalation factor	% p.a.	

Form-1.2: Form Template for (Wind Power or Small Hydro Project or Solar PV/Solar thermal) : Determination of Tariff Components

Units Generation	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24
Installed Capacity	MW																								
Net Generation	MU																								

Tariff Components (Fixed charge)	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24
O&M Expenses	Rs Lakh																								
Depreciation	Rs Lakh																								
Interest on term loan	Rs Lakh																								
Interest on working Capital	Rs Lakh																								
Return on Equity	Rs Lakh																								
Total Fixed Cost	**Rs Lakh**																								

Per Unit Tariff components	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24
PU O&M Expenses	Rs/kWh																								
PU Depreciation	Rs/kWh																								
PU Interest on term loan	Rs/kWh																								
PU Interest on working Capital	Rs/kWh																								
PU Return on Equity	Rs/kWh																								
PU Tariff Components	**Rs/kWh**																								

Levellised Tariff	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24
Discount Factors																									
Discounted Tariff components	Rs/kWh																								
Levellised Tariff	**Rs/kWh**																								

Form-2.2: Form Template for (Biomass Power or Non-fossil fuel based Cogen) : Determination of Tariff Components

Units Generation	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Installed Capacity	MW																									
Net Generation	MU																									

Tariff Components (Fixed charge)	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
O&M Expenses	Rs Lakh																									
Depreciation	Rs Lakh																									
Interest on term loan	Rs Lakh																									
Interest on working Capital	Rs Lakh																									
Return on Equity	Rs Lakh																									
Total Fixed Cost	**Rs Lakh**																									

Tariff Components (Variable charge)	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Biomass fuel type-1	Rs Lakh																									
Biomass fuel type-2	Rs Lakh																									
Fossil fuel (coal)	Rs Lakh																									
Sub-total (Fuel Costs)	**Rs Lakh**																									
Fuel cost allocable to power	%																									
Total Fuel Costs	**Rs Lakh**																									

Per Unit Tariff components (fixed)	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
PU O&M Expenses	Rs/kWh																									
PU Depreciation	Rs/kWh																									
PU Interest on term loan	Rs/kWh																									
PU Interest on working Capital	Rs/kWh																									
PU Return on Equity	Rs/kWh																									
PU Tariff Components (Fixed)	**Rs/kWh**																									
PU Tariff Components (Variable)	**Rs/kWh**																									
PU Tariff Components (Total)	**Rs/kWh**																									

Levellised Tariff	Unit	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr-10	Yr-11	Yr-12	Yr-13	Yr-14	Yr-15	Yr-16	Yr-17	Yr-18	Yr-19	Yr-20	Yr-21	Yr-22	Yr-23	Yr-24	Yr-25
Discount Factors																										
Discounted Tariff components (fixed)	Rs/kWh																									
Discounted Tariff components (variable)	Rs/kWh																									
Discounted Tariff components (total)	Rs/kWh																									
Levellised Tariff (fixed)	**Rs/kWh**																									
Levellised Tariff (variable)	**Rs/kWh**																									
Levellised Tariff (total)	**Rs/kWh**																									