ORISSA ELECTRICITY REGULATORY COMMISSION
BIDYUT NIYAMAK BHAVAN
UNIT-VIII, BHUBANESWAR-751012

Present : Shri S.P. Nanda, Chairperson
Shri B.K. Misra, Member
Shri S.P. Swain, Member

Case No. 80 of 2013

IN THE MATTER OF: **Suo-motu proceeding for finalization of Generic Tariff of Renewable Energy Sources including Co-generation for the Second Control Period from 2013-14 to 2017-18.**

AND

IN THE MATTER OF:

OERC represented by Director (Tariff) …….**Petitioner**

Vrs.

1. Commissioner-cum-Secretary, Department of Energy, Govt of Odisha
2. Odisha Power Generation Corporation
3. Grid Corporation of Odisha Ltd.
4. Odisha Renewable Energy Development Agency (OREDA)
5. Odisha Power Transmission Corporation Ltd.(OPTCL)
6. Odisha Hydro Power Corporation Ltd(OHPC)
7. Chief Executive Officer, CESU
8. MD, NESCO
9. MD, WESCO
10. MD, SOUTHCO
11. Sr. G.M.(PS), SLDC
12. Green Energy Corporation of Odisha Ltd

…….**Respondents**

Date of Hearing 10.12.2013 **Date of Order. 15.01.2014**

ORDER

In exercise of the powers vested under Section 86(1)(e), 61(h) and 62(a) of the Electricity Act 2003 (Act 36 of 2003), read with National Electricity Policy and the Tariff Policy the Commission passed the following:-

1. This Order is applicable to the Renewable Power Projects to be set up in the State of Odisha for the Second Control Period from 2013-14 to 2017-18.

2. The Commission in its earlier Order No. 37/2008 (Suo Motu) dated 14.09.2010 approved the levelised Generic Tariffs applicable to the projects commissioned during the control period 2010-11 to 2012-13 which would not undergo any change for the entire tariff period of that project (except for variable component as in case of Biomass and baggasse based co-generation). The Generic Tariff of these renewable technologies was of ceiling in nature and GRIDCO and Developer could negotiate lower tariff for their bilateral agreement. Subsequently, Commission revised the Generic Tariff of following two technologies during the Control Period:

   - Biomass vide case No.151-155/2010 dated 23.09.2011
   - Solar PV and Thermal vide case No.1/2012 dated 20.06.2012 (Suo Motu)

3. The Commission in the Petition No. 37/2008 (Suo Motu) dated 14.09.2010 approved the levelised generic tariffs, to be made applicable for the projects commissioned during the control period 2010-11 to 2012-13 and defined General principles, Financial parameters, and technology-wise specific parameters.

4. The Commission initiated the said suo-motu proceedings to finalise this generic tariff order in respect of the following Renewable Energy (RE) power projects in the State of Odisha for the Second Control Period from 2013-14 to 2017-18:

   - Wind Power Projects
   - Solar PV Projects
   - Solar Thermal Power projects
   - Small hydro projects
   - Biomass projects
   - Non-fossil fuel based cogeneration projects

   The Commission placed the consultative paper (draft suo-motu petition) in the commission's website and invited comments/suggestions from the interested persons, organizations, stakeholders and respondents on such suo-motu petition on or before 8th November, 2013. The hearing on the petition was conducted on 10th December, 2013 and parties were heard at length. The following objections / comments/ suggestions were received by the Commission which have been summarized below:-

5. **OPTCL**

   Inter connection point – The proposal regarding establishing dedicated line from the project sites to the nearest point of interconnection with OPTCL by Project Developer is not acceptable. OPTCL suggests that it should be reimbursed the share of 50% Capital Cost

incurred by it by the Project Developer(s) on production of relevant supporting documents or the estimated amount whichever is lower.

The Project Developer should pay 6% supervision charges on 100% estimated cost of the line to OPTCL towards supervising of the construction of the dedicated line.

6. **East Coast Powers Limited**

The words "within the ceiling tariff" should be deleted since the project specific tariff, if fixed within the ceiling tariff, will be disincentive for the Project Developer.

Inter connection point – This should be as per the earlier tariff order mentioned as "interconnection point shall be the line isolator on outgoing feeder on HV side of generator transformer" which is as per CERC Tariff Regulation and it may be continued.

Capital Cost – For SHEP Projects between 5-25 MW the capital cost should be Rs.7 crore per MW with PLF (Capacity Utilisation Factor) of 40%.

Levellised Tariff for SHEP Projects - It should be considered @Rs.4.20/Kwh as notified by Maharashtra.

7. **Shri Ajoy Kumar Choudhury**

Levellised Tariff for Wind Projects- The generic tariff should be increased from Rs.5.40 to Rs.6.10 per KWH.

8. **OHPC/ Green Energy Development Corporation of Odisha Ltd.**

Return on Equity (ROE) – ROE may be kept at 16% per annum post tax.

Capital Cost – As per the pre-feasibility report prepared by GEDCOL for four nos. of SHEP projects through WAPCOS the capital cost has been calculated. The capital cost is suggested to be kept at Rs.7.00 crore per MW instead of Rs.6.00 crore/MW proposed in the petition.

Capacity Utilisation Factor (CUF)- As per the DPR for installation of Solar PV Projects at 3 locations, namely Rengali, Bural and Mathiguda, it is suggested that the CUF may be kept at 17% instead of 19% as proposed in the suo-motu petition.

De-ration Factor – As per the international guarantees/warranty given by the manufacturer de-ration upto 1% from 2^{nd} year onwards to 10^{th} year and 0.7% thereafter till 25^{th} year for Solar PV may be considered.

9. **Power Tech Consultants**

Eligibility Criteria – (a) The fertilizer plant in Paradeep area uses Sulpher Rock to produce SO2 and then sulphuric acid which is an exothermic reaction, because of the same a large amount of heat energy generated which is utilized to generate steam and power, hence these type of technology needs to be considered also as cogeneration as per the definition of Co-generation in the Electricity Act.

(b) Bottoming cycle mode of cogeneration using non-fossil fuel need to be considered in the category of non-fossil fuel cogeneration.

Return on Equity (ROE) – Considering RE Project requires long term equity commitment, high payback period and risk of operation in remote areas; the ROE may be considered 24%.

Interest on Working Capital – Receivables equivalent to 3 months of energy charges for sale of electricity may be considered while computing interest on working capital.

Net metering concept for Roof Top Solar Projects - OERC in its Tariff order FY 2012-13 at Para 297 have mentioned that the detailed scheme and associated metering arrangement and commercial mechanism for different consumers, DISCOMs and GRIDCO would be approved through a consultative paper and public hearing. Since there is lot of potential for Roof Top solar power projects the net metering concept is to be adopted by DISCOMs and Roof Top owners may be notified.

10. **Indian Wind Energy Association**

Selection of RE projects through bidding – The bidding in RE Project selection has not been introduced and the same has also been stayed by the Hon'ble Supreme Court. The Govt. of India has also not issued bidding guidelines as required under Section 63 of E.A. Act, 2003. In view of this the tariff for wind power projects may be determined under Section 62 of E.A. Act, 2003 and not ceiling tariff where the actual tariff is determined by bidding process.

Subsidy by Govt. - The GBI given to Wind Projects by Govt. of India is over and above the tariff announced by the State Commission. Thus, GBI should not be considered while determining tariff for wind power projects.

Interconnection point - In line with the CERC Regulation the interconnection point should be specified as the line isolator on outgoing feeder on HV side of the pooling station. Also the Developer shall be responsible for creation of evacuation infrastructure only upto interconnection point beyond which it will be licensee's responsibility.

Capital Cost - CERC determined capital cost of wind projects at Rs.575 lakh/MW for FY 2012-13 and after indexing mechanism the same is revised to Rs.597.72 lakh/MW. Importantly in order to harness wind sites offering WPD of less than 200 W/m^2, wind turbines of class III or lower are employed the capital cost of which has increased in recent times. The capital cost also increases due to taller hub height owing to up scaling of rotor diameter. The capital cost therefore may be considered at Rs.6.25 crore/MW for Wind Turbines falling in WPD zone of less than 200 W/m^2.

CUF – The wind power project is subjected to wear and tear due to heavy rotating equipment and de-ration in output of WTG over the period. Also there exists internal consumption to cater to during startup / stop, no load operations, plant illumination, maintenance activities etc. It is suggested to specify normative auxiliary consumption factor of at least 0.5% and annual de-ration of 0.25% after 5 years of operation.

Interest on Loan and Working Capital – The normative interest rates for Long Term Loan should be SBI base rate plus 350 basis points and for working capital requirement it should be SBI base rate plus 300 basis points.

Depreciation – The useful life for wind power plant shall be considered as 20 years for determination of tariff and reconsider a higher depreciation component according to project life of 20 years.

CDM Sharing – The Developer has to incur transaction cost during the CDM project cycle such as consultant fees, cost for validation and verification, adoption fees for the host country, registration charges etc. In view of such and the risk borne by CDM proponent, the sharing mechanism shall be completely done away with.

Benefit of Accelerated Depreciation - The Accelerated Depreciation benefit extended to wind power projects under the Income Tax Act has been withdrawn by Govt. of India w.e.f. 01.04.2012 in their Notification No.15/2012 dated 30.03.2012. Therefore, the Accelerated Depreciation Benefit of 80% which is not available to the wind generators should not be factored in while determination of tariff.

11. **VEN Power Private Limited**

Capital Cost – For SHE projects **t**he effect of indexation mechanism may be factored during the control period to arrive the inputs for tariff determination as provided in CERC Regulation, 2012. Considering of same capital cost in the entire controlling period of 5 years is not prudent and unjustified.

The levellised tariff for SHEP projects may therefore be determined for each year of the control period in which the SHEP commence generation.

Tariff Period – The tariff period proposed for SHEP projects below 5 MW of 25 years may be considered in same line with CERC Regulation, 2012.

ROE – The normative ROE shall be same as per CERC Tariff norms i.e. ROE at 20% p.a. for 1st 10 years and 24% p.a. for 11th year onwards.

Interest on Term Loan – It should be considered at 13%.

Interest on Working Capital – It should be considered at 13.5%.

O & M Expenses – It should be considered as per CERC Regulation 2012 which is 21.14 laksh per MW for SHEP projects below 5 MW and Rs.14.80 lakhs per MW for SHEP Projects between 5-25 MW.

CUF – CUF of 35% considered for SHEP Projects in Odisha seems to be higher side as these projects in the State are river/stream based which are just expected to operate only during rainy /monsoon season of 3-4 months. The normative CUF for SHEP projects in Odisha shall be considered as 30% in line with CERC Regulation.

Discount Rate – The discount rate shall be considered 10.95% in line with CERC Regulation.

Levellised Tariff – The levellised tariff for SHEP projects between 5 MW to 25 MW shall accordingly be considered at Rs.4.42/KWH (benefit of accelerated depreciation if availed Rs.0.27/KWH) and after accelerated depreciation Rs.4.15/KWH.

The levellised tariff for SHEP projects below 5 MW shall be considered at Rs.5.19/KWH (benefit of accelerated depreciation if availed Rs.0.30/KWH) and after accelerated depreciation Rs.4.89/KWH.

12. **Baitarani Power Project Pvt. Ltd.**

The sentence **"within the ceiling tariff"** mentioned to determine project specific tariff will be a disincentive and may be deleted.

Inter connection point – This should be as per the earlier tariff order mentioned as "interconnection point shall be line isolator on outgoing feeder on HV side of generator transformer" which is as per CERC Tariff Regulation and it may be continued.

Capital Cost – For SHEP projects between 5-25 MW the capital cost should be considered Rs.10.00 crore/MW.

Levellised Tariff – The levellised tariff of Rs.4.50 KWH may be considered for SHEP Projects between 5-25 MW in line with Madhya Pradesh (Rs.6.25 /KWH) and Maharashtra (Rs.4.20/KWH).

The benefit under accelerated depreciation may be calculated as per the formula for last control period.

13. **Shri Jangam Ramu**

Interest on Term Loan – It is suggested to consider interest in the range of 13.50 % to 14% per annum in case of Solar PV Projects in line with current lending rates of PFC, REC and SBI for Solar PV Projects.

Interest on Working Capital Loan - This should be considered between 14-15% for Solar PV Projects.

Auxiliary Consumption – For Solar PV Projects this should be considered as 1% of total generation along with de-ration of 0.5% per year over the life of modules.

CUF – It should be considered at 18% for Solar PV Projects.

14. **Indravati Power Pvt. Ltd.**

CUF – For SHEP projects the CUF **s**hould be considered 30% and not 35% as proposed in the petition.

Capital Cost - The normative capital cost for SHEP projects of less than 5 MW capacities should be considered as Rs.623.706 lakhs/MW in line with CERC provisions.

Interest on Term Loan and Working Capital – The both shall be allowed at the interest rate of 13.50%.

Operation and Maintenance Cost – The levellised tariff of SHEP Projects of less than 5 MW capacities may be determined assuming O & M cost of Rs.21.14 lakhs/MW with annual escalation of 5.72%

Return of Equity (ROE) – The ROE should be allowed in line with the CERC Regulation 2012 i.e. ROE at 20% p.a. for 1st 10 years and 24% p.a. for 11th year onwards.

Benefit of Accelerated Depreciation – This should not be made mandatory and shall be deducted if availed by the Developer.

Interconnection Point – For SHEP Projects the power should be evacuated by DISCOMs / OPTCL from HV side of generator transformer as provided in CERC Regulation, 2012 and earlier OERC Order dated 14.09.2010.

15. **Shri R. P. Mohapatra**

CUF – For SHEP Projects should be considered 30% only.

Capital Cost – For Wind projects capital cost considered at Rs.575.00 lakh/MW for FY 2012-13 by CERC should be indexed to arrive at capital cost for FY 2013-14.

For SHEP Projects the capital cost assumed by CERC should be indexed for FY 2013-14. For solar PV projects and Solar Thermal Projects the capital cost may be assumed at Rs.800 lakhs/MW and Rs.1200 lakh/MW respectively.

Interest on Term Loan and Working Capital - For both types of loans the interest rate may be allowed at 13.50%.

Operation and Maintenance Cost – The O & M Cost for SHEP projects below 5 MW shall be considered at Rs.21.14 lakhs/MW and for SHEP projects of 5-25 MW shall be considered at Rs.14.80 lakh/MW with annual escalation @ 5.72% in line with CERC Regulation, 2012.

For Wind projects it should be allowed in line with CERC Regulation, 2012.

For Solar PV projects it should be allowed @ Rs.11.63 lakh/MW for FY 2013-14 in line with CERC Regulation.

ROE - This should be allowed in line with CERC Regulation 2012 i.e. ROE at 20% p.a. for 1st 10 years and 24% p.a. for 11th year onwards.

Biomass Fuel - The cost of biomass fuel shall be allowed at Rs.2542.36/MT for FY 2012-13 which may be escalated @ 5% to arrive at Biomass fuel for FY 2013-14.

For Non-fossil fuel (Bagasse) it should be adopted at Rs.1696.20/ MT in line with CERC Regulation 2012.

Station Heat Rate – For Biomass project the SHR shall be allowed at 4000 Kcal/Kwh in line with CERC Regulation.

Benefit of Accelerated Depreciation – This should not be made mandatory and shall be deducted if availed by the Developer.

Interconnection Point – For SHEP Projects the power should be evacuated by DISCOMs / OPTCL from HV side of generator transformer as provided in CERC Regulation and earlier OERC Order dated 14.09.2010.

16. **M/s Avantika Power Projects Pvt. Ltd**

Interconnection Point – For SH Projects the power should be evacuated by DISCOMs / OPTCL from HV side of generator transformer as provided in CERC Regulation and earlier OERC Order dated 14.09.2010.

Capital Cost – For SH Projects below 5 MW the capital cost should be considered Rs.800 lakhs/MW and for projects between 5 MW-25 MW capacity Rs.700 lakhs/MW.

Interest Rate on Term Loan – It should be considered from 13.50% to 14%.

Interest on Working Capital Loan – It should be considered from 14% to 15% per annum.

Levellised Tariff – The levellised tariff of Rs.4.50 KWH may be considered for SHEP Projects between 5-25 MW in line with Madhya Pradesh (Rs.6.25 /KWH) and Maharashtra (Rs.4.20/KWH).

Promulgation of New Land Acquisition Act and related impacts – The Govt. of India has notified a new Land Acquisition Act which will come into effect from 1st January, 2014. The impact if any, of such Act may be considered for revision of tariff in the event of any increase in the capital cost by the generating company.

17. **Shalivahana Green Energy Limited**

Capital Cost – The capital cost for Biomass project based on Rankine Cycle Technology at Rs.540.00 lakh based on water cooled condenser and Rs.580.00 lakh for those projects based on air cooled condenser.

Operation & Maintenance Expenses – The O & M expenses may be considered at Rs.40.00 lakh/MW with annual escalation of 5.72% instead of Rs.24 lakh/MW considered in the petition.

Station Heat Rate - The SHR may be considered as 4200 Kcal/Kwh instead of 3800 Kcal/Kwh considered in the petition.

Gross Calorific value - In line with the recommendation of the Central Commission for determination of tariff the GCV may be considered of 3100 Kcal/Kg instead of 3300 Kcal/Kg in suomotu petition.

Fuel Cost – In view of the operational experience of running biomass project at Dhenkanal the biomass fuel rate may be considered at Rs.3000/MT instead of Rs.2316/MT considered in the petition.

Auxiliary Consumption – The Auxiliary Consumption may be considered at about 12% of the gross generation.

CDM Sharing – The Developer should be adequately compensated the way of availing CDM benefits exclusively without sharing with any agency/beneficiary.

Evacuation Expenses – The present availability of State grid at high voltage network (132 KV and 220 KV) is as low as 50%. This has larger impact on RE projects wherein the projective size is relatively small. To achieve 99% of grid availability the promoters are forced to opt higher voltage level. The Commission may therefore notify regulations regarding cost implication for 132 KV or higher voltage levels for such grid connectivity including the cost of supervision charges fixed by State Utilities.

Return on Equity (ROE) – The ROE should be allowed in line with the CERC Regulation 2012 i.e. ROE at 20% p.a. for 1st 10 years and 24% p.a. for 11th year onwards.

Interest on Working Capital – This may be considered as 14% p.a. in view of the present relevant Benchmark Prime Lending Rate (BPLR) of SBI which is 14.55% w.e.f. 19.09.2013 and 14.75% w.e.f. 07.11.2013.

RPO Obligation – The Commission may direct the concerned obligated entity to strictly adhere to the RPO norms and impose penalties for not complying their obligations. The choice for obligated entities in Odisha is to fulfill the non-solar obligation through one 20

MW biomass project (Shalivahana Green Energy Ltd) and three SHEP projects. The other choice is to buy Renewable Energy Certificates which will result in incurring additional cost to procure equivalent power and in turn would not result in actual procurement of power. The 20 MW biomass project will be able to supply about 110 MU to the obligated entities to fulfill the non-solar obligation.

18. **Project Development Consultants and CoolRocks Energy Ltd.**

The petition mentions that project specific tariff shall be determined on case to case basis within the ceiling tariff which not stipulated in the previous order. If the project specific tariff is fixed within ceiling tariff it will be a disincentive, hence may be deleted. For Small Hydro Projects the inter connection point shall be the same as mentioned in the previous order i.e., the interconnection point shall be line isolator on outgoing feeder on HV side of generator transformer which is as per the CERC Tariff Regulations and this may be continued. The capital cost of Small Hydro Projects shall be considered at Rs.8 crore/MW as M/s WAPCOS has prepared a PFR for 27MW Baigundi Power Project on river Baitarani with total cost of around Rs.12.13 crore/MW. The interest rate on term loan and working capital loan shall be considered between 13.50% to14% and between 14% to 15% respectively. For Small Hydro Projects the proposed tariff period of 25 years shall be increased to 35 years equal to useful life of such projects. The levelised tariff may accordingly be revised for Small Hydro Projects.

19. **R.P. Mahapatra comments after hearing**

The Commission may frame regulations specifying the terms and conditions for Tariff Determination from RE sources. As regards the tariff of Biomass, CERC undertook a detailed study on the performance / viability of Biomass based plants operating in the country including the prevailing Biomass prices. The report was submitted in July, 2013 and assessed various parameters for determination of tariff for Biomass power plants including heat rate, auxiliary consumption, O & M cost, Capital Cost, GCV etc. The tariff of Biomass Power Plant in Odisha needs to be amended in line with the recommendations of such Committee. The CUF may be considered between 65-70%, auxiliary consumption to 12%, Capital Cost to 540 lakh/MW, interest charges @14% for both Term Loan as well as Working Capital ROE of 20 & 24% in line with CERC Regulation, O&M cost @ 40 lakhs/MW for FY 2013-14 with escalation @ 5.72% per year, station heat rate of 4200 KCal/Kwh, GCV of 3100 KCal/Kg and price of Biomass fuel at Rs.3200/MT. The benefit of accelerated depreciation shall be optional and the voltage of the evacuation system beyond the interconnection point shall be as follows:-

- RE projects of more than 100 KW and less than 5 MW: At 11KV or 33 KV at the 33/11 KV substation of DISCOM network.

- RE Projects of 5 MW upto 15 MW: At 33 KV of either the 33/11 KV substation of DISCOM or 132/33KV substation of OPTCL whichever is nearer.
- RE projects of more than 15 MW: At 132 KV of 132/33 KV or 220/132 KV substation of OPTCL whichever is nearer.
- The metering should be at the outgoing feeder from the RE generating plant.

Commission has taken into consideration all the suggestions before finalizing this Order based on the facts and factors which are unique to the state of Odisha.

General principles

Control Period and Review period

20. The Control Period or Review Period shall be of three (3) financial years for all the RE technology projects except for Small Hydro Electric Projects (SHEP) for which the control period shall be of five (5) years. First year of the Control Period shall commence from the beginning of FY 2013-14 and the Control Period shall continue up to the end of financial year 2015-16. In case of SHEP the first year of the Control Period shall commence from the beginning of FY 2013-14 and the Control Period shall continue up to the end of financial year 2017-18.

The tariff determined for the RE projects, commissioned during the Control Period, shall continue to be applicable for the RE projects for the entire duration of the Tariff Period.

In case of Solar PV and Solar thermal projects the benchmark cost may be reviewed by the Commission annually.

Tariff Period

21. Tariff determined based on the principles enumerated in this order shall be applicable for Renewable Energy power projects commissioned during the control period and shall continue for the entire duration of the Tariff Period as stipulated below:

The Tariff Period for Renewable Energy power projects such as Wind, Biomass and Non Fossil Cogeneration shall be for thirteen (13) years

In case of Small hydro projects, the Tariff Period shall be thirty five (25) years to be extended upto another ten years as agreed to by the parties of PPA.

In case of Solar PV and Solar thermal power projects, the Tariff Period shall be twenty five (25) years split into two periods of Twelve (12) years and thirteen (13) years respectively .

Tariff Period shall be considered from the date of commercial operation of the renewable energy generating stations.

Project Specific Tariff

22. The preferred route for selection of the RE project in the control period shall be through the bidding route. However the project being developed under MOU route the generic tariff so

fixed by this order shall be the ceiling rate and the GRIDCO/ DISCOM and the project developer could negotiate lower tariff for their bilateral agreement. However, the project specific tariff, on case to case basis, within the ceiling tariff shall be determined for the following types of projects in case there is any filing before the Commission:

- Small Hydro Projects
- Municipal Solid Waste Energy Projects
- Wind Power Projects
- 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 projects shall be guided by the provisions enumerated in paragraph 28 and 29 of this order.
- Hybrid Solar Thermal Power plants;
- Any other new renewable energy technologies approved by MNRE in future.

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 paragraph 34 to 37 of this order, except for capital cost, shall be ceiling norms while determining the project specific tariff. However, the parties are free to agree in the PPA for any relaxed norms.

However, in order to promote the first batches of Renewable projects like Wind projects, Municipal Solid waste projects, Small Hydro projects for Commissioning during subject control period, purchaser (M/s GRIDCO/GEDCOL/DISCOMs) and project developer may sign power purchase agreement at the levelised generic tariff as determined by the Commission and combinedly take all necessary pro-active actions for development of the renewable projects.

Petition and Proceedings for Determination of Tariff

23. A petition for determination of project specific tariff shall be accompanied by such fee as may be determined under the relevant Notification following OERC (Conduct of Business) Regulation, 2004 and shall be accompanied by:

- Information regarding financial parameters and technology specific parameters as the case may be;
- Detailed project report outlining technical and operational details, site specific aspects, premise for capital cost and financing plan, etc.
- A Statement of all applicable terms and conditions and expected expenditure for the period for which tariff is to be determined.

- 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.
- Any other information that the Commission requires the Petitioner to submit.
- The proceedings for determination of tariff shall be in accordance with the OERC (Conduct of Business) Regulations, 2004.

Tariff Structure

24. The tariff structure for renewable energy technologies shall be "Single part tariff". The tariff for renewable energy technologies, viz. wind, solar, SHP having no fuel component, shall be single-part tariff with one component consisting of the following fixed components:

- Return on equity,
- Interest on loan capital,
- Depreciation,
- Interest on working capital,
- Operation and maintenance expenses.

Provided that for renewable energy technologies viz. biomass power projects and non-fossil fuel based co-generation projects having fuel cost component, there shall be single-part tariff with two components, i.e. fixed cost component and fuel cost component.

Taxes shall be reimbursed at actual as per audit report.

Tariff Design

25. The generic tariff shall be determined on levellised basis, except for biomass and non-fossil fuel based co-generation technologies, for the useful life of the plant, as specified in this order.

Provided that for renewable energy technologies like biomass and non-fossil fuel based co-generation having single-part tariff with two components, levellised tariff is calculated by carrying out levellisation over useful life of each technology considering the discount factor only for the fixed component of the tariff.

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'.**

Subsidy/ Incentive by the Government of India/State Govt.

26. The Commission shall take into consideration any incentive or subsidy offered by the Government of India/State Govt. including accelerated depreciation benefit if to be availed by the developer for the renewable energy power plants while determining tariff.

Dispatch principles for electricity generated from Renewable Energy Sources

27. All renewable energy power plants except biomass power plants and non-fossil fuel based co-generation plants with installed capacity upto 25 MW, shall be treated as 'MUST RUN' power plants and shall not be subject to 'merit order dispatch' principles.

However, the renewable energy power projects of 5 MW and above, shall be subject to scheduling procedure as specified under the Orissa Grid Code (OGC) / Indian Electricity Grid Code (IEGC) as the case may be including amendments thereto.

Interconnection Point

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

The interconnection point for different voltage level shall be as follows:

- For Rooftop based Solar installations upto 100 KW projects, the point of interconnection should be at 230 volts/400 volts of DISCOM network.
- For all renewable generations of more than 100 KW and less than 5 MW projects the point of interconnection should be at 11 KV of 33/11 Kv sub-station of DISCOM network.
- For all renewable generations of 5 MW and upto 25 MW projects, the point of interconnection should be at 33 KV of either 33/11Kv substation of DISCOM or 132/33 Kv substation of OPTCL whichever is nearer.
- For all renewable generations of more than 25 MW projects the point of interconnection should be at 132 KV of 132/33 or 220/132 Kv substation of OPTCL network whichever is nearer.

The project developer may construct the dedicated line upto the nearest point of DISCOM or OPTCL network as the case may be and such line would be treated as deemed transmission line or deemed distribution line. The line is to be developed by the Developer including 6% supervision charges as decided by the Commission from time to time to be paid to the DISCOMs/OPTCL as the case may be. The metering should be at both ends of generation and Licensee side. The billing point shall be the meter at the Generating Bus Bar.

Commission has also considered the suggestions of some of the objectors regarding net metering arrangement for Solar Roof Top Projects developed by any consumer of the

DISCOM. Accordingly, the net metering by the DISCOMs shall be on the following basis:-

Net Metering

Metering Arrangement:

1. The metering standards will be as per the Central Electricity Authority (Installation and Operation of Meters) regulation 2006 and its Amendment Regulation 2010.
2. The special Energy Meters (ABT Compliant) shall be provided to all the feeders whose data is required for Energy Injection Report.
3. In case of Solar Projects developed by any Industrial consumer as Captive Generation Plant (CGP) for self consumption and/ or for Renewable Energy Certificate (REC) mechanism, the generation and aux. consumption should be recorded separately and metered, as the auxiliary consumption is not eligible for REC.
4. The cost of meters, cost of connectivity and all other related cost for setting up the meters etc. have to be borne by the developer under guidance of the concerned DISTCOM.
5. Two meters have to be installed by the solar power generator. One is for measuring solar power generation and the other is for import/export measurement. The first meter, the solar generation meter, has to be installed at the generator end after the inverter at the ground floor of the premises to facilitate easy access for meter reading. The second meter is a bi-directional meter which will replace the existing consumer meter (Single phase or three phases as per requirement) and is used for commercial settlements. If the consumer wishes to have a record of the readings taken, he shall be allowed to do so by the licensee. The first and the second meter have to be installed at the same location where the present meter for consumption is installed.
6. The Distribution Licensee shall host the list of approved manufacturers of such meters in their website. The solar check meters shall be mandatory for solar installations having capacity more than 20 KW. For installation size of less than or equal to 20 KW, the solar check meters would be optional. The cost of new/additional meter(s) provided for the net metering and the installation and testing charges shall be borne by the eligible consumers. The distribution licensee shall procure, test and install the meters. The eligible consumers may supply the meters at their option. Position & sealing of meters will be guided by the same provisions as applicable to consumer meters in the Central electricity Authority's Metering Regulations. For hybrid generators, separate sets of meters shall be installed and readings taken for each generator following similar procedure.
7. The meter reading taken by the distribution licensee shall form the basis for commercial settlement. Billing of consumers shall be on "Net" basis. At the end of every monthly/bi-monthly reading, the solar energy generation will be communicated to GEDCOL by the distribution licensee through e-mail with a copy to the consumer. Net-metering configuration diagram is shown in the Annexure**.**

Commercial arrangement & Billing:

1. The Solar Photo Voltaic Generator shall pay for the net energy in a billing month as per applicable retail supply tariff decided by OERC to the concerned DISCOM, if the supplied energy by the licensee is more than the injected energy by the Solar PV sources of the consumer (s).

2. Any excess/surplus energy injected in to grid in a billing month (i.e. there is less or no consumption and net energy is exported to the grid) will be treated as nil and no payment will be paid for such energy. However, this will be accounted for in the subsequent month when there is net flow of energy from the grid in to the consumer's premises.

29. **Eligibility criteria for RE projects**

a) Wind Projects:

The wind power projects set up at the site approved by Centre for Wind Technology , Government of India / Orissa Renewable Energy Development Agency(OREDA) and have not opted for the pricing mechanism under the REC mechanism are eligible for getting the generic tariff under these norms.

b) **Small Hydro Projects**:

The SH projects identified / approved by the Engineer in Chief, Electricity –cum Principal Chief Electrical Inspector, Government of Odisha with installed capacity of 25 MW or below which are commissioned during the control period and have not opted for the tariff under the REC mechanism are eligible for getting the generic tariff under these norms.

c) Biomass Power projects

The biomass power projects based on Rankine cycle technology application using water cooled condenser using biomass fuel sources are eligible for getting the generic tariff under these norms. Provided that the use of fossil fuel in such projects is restricted to 15% of total fuel consumption on annual basis as proposed by Ministry of New and Renewable Energy (MNRE), Government of India and the projects should not have opted for the pricing mechanism under the REC mechanism

d) Non-fossil fuel based cogeneration projects

A project shall qualify to be termed as a co-generation project, if it is in accordance with the definition specified by the Ministry of Power, Government of India 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. For the co-generation facility to qualify under topping cycle mode, the sum of useful power output and one half the useful thermal

outputs is greater than 45% of the facility's energy consumption, during season**.**

Provided such projects should not have opted for the pricing mechanism under the REC mechanism.

e) Solar PV and Solar Thermal projects

The solar power technologies (PV & Thermal) approved by MNRE and connected to 33 KV or above voltage level shall be eligible for getting the generic tariff under these norms.

Water Royalty Charges (in case of SHP)

30. Water royalty charges shall not be internalised in tariff. However, the actual amount of water royalty charges as levied by the Govt. of Orissa shall be allowed as pass through component.

RE Technology-wise Project Life/ Tariff Period

31. Details of RE Technology-wise Useful life/ Tariff period considered for levellised Tariff calculation is given in the following table:

Table -1

S.No.	Technology	Useful Life (Years)	Tariff period (Years)
1	Wind	**25**	**13**
2	SHP a. Below 5MW b. 5 to 25 MW	 **35** **35**	 **25** **25**
3	Biomass	**20**	**13**
4	Non-fossil fuel based Co-generation	**20**	**13**
5	Solar PV	**25**	**25 (split for 12 and 13 yrs)**
6	Solar Thermal	**25**	**25 (split for 12 and 13 yrs)**

Monitoring Mechanism for the use of fossil fuel (in case of Biomass & non- fossil fuel based co-generation power projects)

32. The Project developer shall furnish a monthly fuel usage statement and monthly fuel procurement statement duly certified by a (registered) 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 –

- Quantity of fuel (in tonnes) for each fuel type (biomass/ Non-fossil fuel based co-generation fuels and fossil fuels)consumed and procured during the month for power generation purposes,
- Cumulative quantity (in tonnes) of each fuel type consumed and procured till the end of that month during the year,
- Actual (gross and net) energy generation (denominated in units) during the month,
- Cumulative actual (gross and net) energy generation (denominated in units) until the end of that month during the year,
- Opening fuel stock quantity (in tonnes),
- Receipt of fuel quantity (in tonnes) at the power plant site during the period under consideration and
- Closing fuel stock quantity (in tonnes) for each fuel type (biomass/ Non-fossil fuel based co-generation fuels and fossil fuels) available at the power plant site.

Non-compliance with the condition of fossil fuel usage by the project developer, during any financial year, shall render such biomass/non-fossil fuel based co-generation projects to be ineligible for preferential tariff determined from the date of default

33. **Compliance Monitoring**

- OREDA/GEDCOL shall be responsible for monitoring compliance of Biomass/non-fossil fuel based co-generation projects with the norm specified.

  AND/OR

- OREDA/GEDCOL shall maintain such data including technical and commercial details of Biomass/Non-fossil fuel based co-generation projects in the State and shall make the data available in the public domain by publishing the same on its website with quarterly updation.

Parameters for Tariff Determination:

34. **Financial Parameters**

The financial parameters specified hereunder shall be applicable to all RE technology covered in this paper.

i) **Capital Cost**

The norms for the Capital Cost as specified in the subsequent technology specific sections 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.

ii) **Capital Cost Indexation Mechanism**

Capital cost indexation mechanism was not made applicable during the first control period. Commission in its order No. 37/2008 (Suo Motu) dt 14.09.2010 observed that after gaining the requisite experience in the first control period, the Commission may implement the capital cost indexation mechanism in current control period beginning from FY 2013-14. Commission therefore in the second control period from FY 2013-14 to 2017-18 would follow the Capital cost indexation mechanism for respective technology as provided in the CERC (Terms and conditions for tariff determination for electricity generated from Renewable Energy Sources) Regulations, 2012 dated 06.02.2012.

iii) **Debt-Equity ratio**

For determination of generic tariff, the debt-equity ratio shall be 70: 30.

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 denominated/ designated in Indian rupees on the date of each investment.

iv) **Loan and Finance charges**

a) **Loan Tenure**: For the purpose of determination of tariff, loan tenure of 12 years is considered.

b) **Interest Rate**

The loans arrived at in the manner indicated above shall be considered as gross normative loan for calculation of 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.

The normative interest rate considered for the purpose of computation of tariff in this order is based on the Base Rate (Advance rate) specified by State Bank of India (SBI) during the first six months of the previous year plus 300 basis points.

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.

v) **Depreciation**

The value base (Capital Base/ Rate 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.

Annual Depreciation shall be based on 'Differential Depreciation Approach' using 'Straight Line Method' over two distinct periods comprising loan tenure and period beyond loan tenure over useful life. 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 13th year onwards.

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.

vi) **Return on Equity**

The value base for the equity shall be 30% of the capital cost or actual equity (in case of project specific tariff determination) as specified under Debt-Equity Ratio provisions.

The normative Return on Equity (RoE) shall be 18% (Pre-tax) for the 1st five years of the tariff period and for remaining tariff period from 6th years onward the normative Return on Equity shall be 16% (Pre-tax). The purchasers shall reimburse Income Tax to the generating company as per actuals on ROE component only on production of proof of such payment (eg. copy of challans from Designated Banks).

vii) **Interest on Working Capital**

The Working Capital requirement in respect of wind energy projects, small hydro power projects, Solar PV and Solar thermal power projects shall be computed as under:

- Operation & Maintenance expenses for one month;
- Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative Capacity Utilisation Factor (CUF);
- Maintenance spare @ 15% of operation and maintenance expenses

The Working Capital requirement in respect of biomass power projects and non-fossil fuel based co-generation projects shall be computed as under:

- Fuel costs for four months equivalent to normative Plant Load Factor (PLF);
- Operation & Maintenance expense for one month;
- Receivables equivalent to 2 (Two) months of fixed and variable charges for sale of electricity calculated on the target PLF;
- Maintenance spare @ 15% of operation and maintenance expenses

Interest on Working Capital is determined on the basis of Base Rate specified by State Bank of India prevalent during the first six months of the previous year plus 350 basis points.

Operation & maintenance Expenses

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

Operation and maintenance expenses shall be determined for the Tariff Period based on normative O&M expenses specified under this tariff order for the first Year of Control Period.

Normative O&M expenses allowed during first year of the Control Period (i.e. FY 2013-14) under this Tariff Order shall be escalated at the rate of 5.72% per annum over the Tariff Period.

Sharing of CDM Benefits

36. The entire proceeds of carbon credit from approved CDM projects shall be retained by the generating company.

Benefit under Income Tax Act

37. For the purpose of tariff determination of RE sources, assessment of benefit towards accelerated depreciation as per relevant provisions under Income Tax Act and Corporate Income Tax rate has been calculated on the normative capital cost approved in this order for each RE technology. Accelerated depreciation has been calculated for each RE technology based on the existing corporate tax rate, surcharge and education cess. The benefit of accelerated depreciation shall be taken into consideration for Project Developers opting for the scheme and such benefits shall be internalized in the applicable generic tariff i.e. the effective tariff in such cases shall be equal to the difference between the applicable generic tariff and the benefit accruing on account of accelerated depreciation if availed by the generating company.

The net depreciation benefit has been derived as per the following method:

- For the projects availing benefits of accelerated depreciation as per applicable Income Tax rate @32.455% has been considered.
- For the purpose of determining net depreciation benefits, depreciation @5.28% as per straight line method (Book depreciation as per Companies Act, 1956) has been compared with depreciation as per Income Tax rate i.e. 80% of the written down value method.
- Depreciation for the 1st year i.e. FY 2013-14 has been calculated @50% of 80% i.e. 40% as the projects are expected to be capitalized during the second half of the financial year.
- The per unit levellised accelerated depreciation benefit has been computed considering the weighted average cost of capital as discount factor.
- Due to amendment in the Income Tax Act for the Wind Power Projects, depreciation is now restricted to 15% for the wind mills installed after 31st March, 2012 vide Income Tax Notification No.15/2012 (F No.149/21/2010-SO (TPL) SO 694, E dated 30th March, 2012. This rate has been considered while calculating levellised benefit of accelerated depreciation for wind technology.

RE Technology Specific Parameters

38. **Technology specific parameters for Wind Power Projects**

(A) Capital cost

i) The capital cost for wind energy projects 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 Interest during Construction (IDC).

ii) The capital cost for wind energy projects shall be Rs.**575** Lakhs/MW during the first year of the control period (2013-14)

(B) Capacity Utilization Factor

i) The annual wind power density (Watt per Sq.m.) at C-WET certified six locations (Chandipur, Chatrapur, Damanjodi, Gopalpur, Paradip and Puri) in the State is below 200 Watt per sq.m.

ii) The normative Capacity Utilization Factor (CUF) considered for determination of generic tariff for procurement of electricity from the wind power project in the State of Orissa shall be 18 %. The normative CUF arrived is based on simulation carried out for CUF determination for the range of different wind turbines at the above six locations in the State of Orissa.

(C) Operation and Maintenance Expenses

i) O&M expenses for the first year of the Control Period (FY 2013-14) shall be Rs.9 Lakh per MW.

ii) O&M expenses allowed subsequently shall be escalated at the rate of 5.72% per annum.

(D) Levellized tariff for Wind Power Projects

i) The levellized tariff over the useful life is determined based on the financial parameters and operating parameters as discussed above and be applicable for a period of 13 years from the date of commercial operation.

Table -2

Levellized Tariff (Rs./kWh)	Benefit of Accelerated depreciation (Rs./kWh)	Net Levellized Tariff (Rs./kWh)	Tariff Period (Years)
6.24	(0.45)	5.79	13

The Input Technical and Financial parameters for tariff computation are attached to this order at Appendix - 1

39. **Technology specific parameters for Small Hydro projects (SHP)**

(A) Capital Cost

The capital cost considered for small hydro projects for FY 2013-14 shall be Rs.**650** Lakhs/MW for the projects below 5 MW and Rs.600 Lakhs/MW for the projects between 5 MW to 25 MW.

(B) Capacity Utilisation Factor

The normative Capacity Utilization Factor of **30%** for the generic tariff determination in case of SHP considering the ongoing projects and projects for which DPR have been filed in the State.

The normative CUF as mentioned above is net of free power to the home State if any, and any quantum of the power if committed by the developer over and above the normative CUF shall not be factored into the tariff.

(C) Auxiliary Consumption

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

(D) Operation and Maintenance Expenses

i) O&M expenses for the first year of the Control Period (FY 2013-14) shall be Rs.20 Lakh per MW for projects below 5 MW and Rs. 14 lakh for projects between 5 MW to 25 MW.

ii) O&M expenses allowed subsequently shall be escalated at the rate of 5.72% per annum.

(E) Levellized tariff for SHP Projects

The levellized tariff over the useful life is determined based on the financial and operating parameters as discussed above and will be applicable for a period of 25 years both kind of SHEP Projects and projects 5 MW capacity. The Project Developer and the GRIDCO would be free to negotiate for tariff for additional 10 years upto 35 years i.e the useful life of the project.

Table -3

Particular	Levellized Tariff (Rs./kWh)	Benefit of Accelerated depreciation (Rs./kWh)	Net Levellized Tariff Rs./kWh)	Tariff Period (Years)
SHP projects below 5 MW capacity	4.89	(0.52)	4.37	25
SHP projects of 5 to 25 MW capacity	4.26	(0.48)	3.78	25

The Input Technical and Financial parameters for tariff computation are attached to this order at Appendix–2

40. **Technology specific parameters for Biomass based projects**

(A) Capital Cost

The capital cost for Biomass projects based on Rankine Cycle Technology application using water cooled condenser for FY 2013-14 shall be Rs.500 Lakhs/MW.

(B) Plant Load Factor

The Plant Load Factor for determining generic tariff shall be

i) During stabilization 60%

ii) During the remaining period of the 1st year (after stabilization) 70%

iii) From 2nd year onwards 80%

(C) Auxiliary Consumption

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

(D) Operation and Maintenance Expenses

i) O&M expenses for the first year of the Control Period (FY 2013-14) shall be Rs.24 Lakh per MW.

ii) O&M expenses allowed subsequently shall be escalated at the rate of 5.72% per annum.

(E) Station Heat Rate

The Station Heat Rate for biomass power projects shall be 3800 kcal/kWh.

(F) Gross Calorific Value

The gross calorific value for biomass in a particular state depends upon the type and quality of the surplus biomass available in that State. Before arriving at the normative calorific value of biomass for Orissa, the availability and characteristics of surplus biomass in the State has been taken into consideration. The normative gross calorific value is computed at 3300 kcal/kg and the same is used for generic tariff determination in case of biomass power projects.

(G) Fuel Price

i) Biomass fuel price during first year of the Control Period (FY 2013-14 to 2015-16) shall be Rs.**2500**/ MT (average) which would be escalated @ 3% every year during the control period.

ii) The Fuel price shall be revised after the control period i.e 2016-17 onwards.

(H) Fuel Mix

i) 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.

ii) The biomass power generating companies shall ensure fuel management plan to ensure adequate availability of fuel to meet the respective project requirements.

(I) Use of Fossil Fuel

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

(J) Tariff for Biomass Power Projects

In case of Biomass Project, the fixed component of tariff is levellised over the useful life and paid accordingly year-wise, whereas the fuel component of tariff will be paid on the basis of financial year of operation.

Table - 4

Levellized fixed component of Tariff (Rs./kWh)	Variable(Fuel) Component of tariff for FY 2013-14	Effective tariff for FY 2013-14	Benefit of Accelerated depreciation (Rs./kWh)	Net Tariff (Rs./kWh)
2.13	3.20	5.33	(0.15)	5.18

Note: The levellised fixed component of tariff shall be applicable for the entire tariff period. The variable component as fixed shall be reviewed after the current control period is over i.e after 2016-17.

The Input Technical and Financial parameters for tariff computation are attached to this order at Appendix -3

41. **Technology specific parameters for Non-fossil fuel based Co-generation Projects**

(i) Capital Cost

The normative capital cost for the non-fossil fuel based co-generation projects shall be Rs.420 Lakh/MW for FY 2013-14 during the control period (FY 2013-14 to 2015-16). The benchmark capital cost for the generic Non-fossil fuel based Co-generation tariff for Odisha is same as that of CERC Renewable Regulation, 2012.

(ii) Plant Load Factor

i) For the purpose of determination of tariff, the Plant Load Factor for non-fossil fuel based co-generation 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 below and load factor of 92%.

ii) The number of operating days shall be as follows:

Table - 5

Sr. No.	Operating Days	Plant Load factor
1.	150 days (crushing) + 60 days (off season) = 210 operating days	53%

(iii) Auxiliary Consumption

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

(iv) Operation and Maintenance Expenses

(i) O&M expenses for the first year of the Control Period (FY 2013-14) shall be Rs.16 Lakh per MW.

(ii) O&M expenses for subsequent period shall be escalated at the rate of 5.72% per annum.

(v) Station Heat Rate

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

(vi) Gross Calorific Value

The gross calorific value for baggase shall be 2250 kcal/kg which is used for bagasse based co-generation tariff determination.

(vii) Fuel Price

(i) Baggase fuel price during first year (FY 2013-14) of the Control Period (FY 2013-14 to 2015-16) shall be Rs.1583/MT which would be escalated @ 3% every year during the control period.

(ii) The Fuel price shall be revised after the control period i.e 2016-17 onwards.

(viii) Use of Fossil Fuel

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

(ix) Tariff for Non-fossil fuel based Co-generation Projects

In case of Non-fossil fuel based Co-generation Projects the fixed component of tariff is levellised over the useful life and paid accordingly year-wise, whereas the fuel component of tariff will be paid on the basis of financial year of operation.

Table -6

Levellized fixed component of Tariff (Rs./kWh)	Variable(Fuel) Component of tariff for FY 2013-14	Effective tariff for FY 2013-14	Benefit of Accelerated Depreciation (if availed) (Rs./kWh)	Net Tariff (Rs./kWh)
2.34	2.77	5.11	(0.28)	4.83

The Input Technical and Financial parameters for tariff computation are attached to this order at Appendix-4.

42. **Technology specific parameters for Solar PV Power Projects**

(A) Capital Cost

The normative capital cost for setting up Solar PV power projects shall be Rs.800 Lakh/MW for the first year of Control Period (FY 2013-14). In subsequent years of control period the Commission may review the capital cost annually based on operational experience of previous year of control period.

(B) Capacity Utilisation Factor

The normative capacity utilization factor considered for generic tariff determination for Solar PV power project shall be 17%. The normative CUF is determined on the basis of solar radiation data from the present operational solar power projects in the state of Odisha.

(C) Operation and Maintenance Expenses

(i) O&M expenses for the first year of the Control Period (FY 2013-14) shall be Rs10 Lakh per MW.

(ii) O&M expenses for the subsequent year shall be escalated at the rate of 5.72% per annum.

(D) Levellized tariff for Solar PV Power Projects

The levellized tariff over the useful life is determined based on the financial and operating parameters as discussed above and will be applicable for a periods of 12 and 13 years from the date of commercial operation as given below:-

Table - 7

Levellized Tariff (Rs./kWh)	Benefit of Accelerated Depreciation (if availed) (Rs./kWh)	Net Levellized Tariff (Rs./kWh)	Tariff Period (Years)
11.44	(1.12)	10.32	First 12 yrs
6.78	-	6.78	Next 13 yrs

The Input Technical and Financial parameters for tariff computation are attached to this order at Appendix-5

43. **Technology specific parameters for Solar Thermal Power Projects**

(A) **Capital Cost**

The normative capital cost for setting up Solar Thermal power projects shall be Rs.1200 Lakh/MW for the first year of Control Period (FY 2013-14). The Commission may review the capital cost annually based on operational experience of previous year of control period.

(B) **Capacity Utilisation Factor**

The normative capacity utilization factor considered for generic tariff determination for Solar Thermal power project shall be 23%. The normative CUF is determined on the basis of solar radiation data at five potential locations in the State namely Angul, Dhenkanal, Jharsuguda, Talcher and Titlagarh and taking into account the possible solar thermal technology.

(C) **Operation and Maintenance Expenses**

i. O&M expenses for the first year of the Control Period (FY 2013-14) shall be Rs.15 Lakh per MW.

ii. O&M expenses for subsequent years shall be escalated at the rate of 5.72% per annum.

(D) **Auxiliary Consumption**

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

(E) **Levellized tariff for Solar Thermal Power Projects**

The levellized tariff over the useful life is determined based on the financial and operating parameters as discussed above and the tariff will be applicable for two periods of 12 and 13years from the date of commercial operation as given below:-

Table - 8

Levellized Tariff (Rs./kWh)	Benefit of Accelerated Depreciation (if availed) (Rs./kWh)	Net Levellized Tariff (Rs./kWh)	Tariff Period (Years)
9.52	(1.70)	7.82	First 12yrs
5.26	-	5.26	Next 13 yrs

The Input Technical and Financial parameters for tariff computation are attached to this order at Appendix – 6.

44. Based on the above observations, the summary of the Generic tariff for renewable technologies for the second control period from 2013-14 to 2017-18 is as follows:

(i) The levellized generic tariff for various renewable sources of energy having "Single part tariff' is approved as in the following table:

Table - 9

Particular	Levellised Total Tariff (for the 1st year of current control period (Rs./kWh)	Benefit of Accelerated Depreciation (Rs./kWh)	Net Levellised Tariff (upon adjusting for Accelerated Depreciation benefit) (Rs./kWh)	Tariff Period (Years)
Wind Energy	6.24	(0.45)	5.79	13
SHP projects of 5 to 25 MW capacity	4.26	(0.48)	3.78	25
SHP projects below 5 MW capacity	4.89	(0.52)	4.37	25
Solar PV	11.44	(1.12)	10.32	First 12 yrs
	6.78	-	6.78	Next 13 yrs
Solar Thermal	9.52	(1.70)	7.82	First 12 yrs
	5.26	-	5.26	Next13 yrs

(ii) The levellized generic tariff for various renewable sources of energy having "Single part tariff with two components " is approved as in the following table:

Table - 10

Particular	Levellized fixed component of Tariff (Rs./kWh)	Variable(Fuel) Component of tariff	Effective tariff	Benefit of Accelerated depreciation (Rs./kWh)	Net Tariff (Rs./kWh)
Biomass	2.13	3.20	5.33	(0.15)	5.18
Non-fossil fuel based co-generation	2.34	2.77	5.11	(0.28)	4.83

Note: *1. For Biomass projects, the tariff approved above including levellized fixed component and variable (fuel component) for FY 2013-14 has been shown. The approved tariff year-wise for entire tariff period i.e.13 years is shown in the output table at Appendix-3.*

2. For Non-fossil fuel based co-generation projects the above approved tariff including levellized fixed component and variable (fuel component) for FY 2013-14 has been shown. The approved tariff year-wise for entire tariff period i.e.13 years is shown in the output table at Appendix-4.

45. The impact of additional power purchase cost arising out of meeting the RPO obligation shall be factored in to the ARR of GRIDCO each year.

46. The Commission shall take into consideration any incentive or subsidy offered by the Government of India/State Govt. including accelerated depreciation benefit if to be availed by the developer for the renewable energy power plants and such benefits shall be passed on to the consumers of the State.

47. **Rebate:** For payment of bills of the RE Power Projects through letter of credit or by cash within two working days (except holidays under N.I. Act), a rebate of 2% shall be allowed. 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.

48. **Late Payment Surcharge:** In case the payment of any bill for charges payable under these Guidelines 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.

Sd/-	**Sd/-**	**Sd/-**
(S.P. Swain)	**(B.K. Misra)**	**(S. P. Nanda)**
Member	**Member**	**Chairperson**

Appendix-1

WIND Power Projects

Input Technical and Financial parameters

No	*Technical Parameters*	*Value*	*Unit*
1	Capacity of the Power Project	1	MW
2	Capacity Utilization Factor	**18.00%**	%
3	Annual Net Generation	15.77	Lakh kWhs
4	Annual Deration (after 10 yrs of operation)	0	
5	Life of Plant and Machinery / Project Life	25	years

No	*Financial Parameters*	*Value*	*Unit*
1	Project Cost of 1 MW Wind Power Plant on pro-rata basis	575	Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount	517.50	lacs
4	Debt Fraction	70.00	%
5	Debt	402.50	lacs
6	Equity	172.50	lacs
7	TOTAL	575.00	lacs
8	Interest Rate on Term Loan	**13.00**	%
9	Repayment Period	12	years
10	No. of installments for Interest on Term Loan	12	Nos./annum
11	Moratorium Period	0	years
12	Term loan period for principal payment	12	years
13	Depreciation (Straight Line Method, Company Law) **(for first 12 years)**	5.83	%
14	Discount Rate	**11.24**	%
15	O&M + Insurance Cost	9.00	lacs/MW
16	O&M + Insurance Cost Escalation	5.72	%
17	Return on Equity (Pre Tax) (1 to 5th year)	**18.00**	%
18	Return on Equity (Pre Tax) (6 to 13th year)	**16.00**	%
19	Interest on working capital	**13.50**	%

Outputs - Wind power project		
Levellized tariff (13 yrs)	**6.24**	Rs/kWh
Benefit under Accelerated Depreciation (if availed)	**0.45**	Rs/kWh
Levellised tariff after Accelerated Depreciation (if availed)	**5.79**	Rs/kWh

Appendix- 2

Small Hydro Projects (Projects of 5 MW to 25 MW capacity)

Input Technical and Financial parameters

No	*Technical Parameters*	*Value*	*Unit*
1	Capacity of the Power Project	1	MW
2	Capacity Utilization Factor	**30.00**	%
3	Annual gross energy Generation	26.28	Lakh kWhs
4	Auxiliary consumption	1.00	%
5	Net energy generation	26.02	Lakh kWhs
6	Life of Plant and Machinery / Project Life	35	years
No	***Financial Parameters***	***Value***	***Unit***
1	Project Cost of 1 MW SHP plant	**600**	Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount	540.00	lacs
4	Debt Fraction	70.00	%
5	Debt	420.00	lacs
6	Equity	180.00	lacs
7	TOTAL	600.00	lacs
8	Interest Rate on Term Loan	**13.00**	%
9	Repayment Period	12	years
10	No. of installments for Interest on Term Loan	12	Nos./annum
11	Moratorium Period	0	years
12	Term loan period for principal payment	12	years
13	Depreciation (Straight Line Method, Company Law) **(for first 12 years)**	5.83	%
14	Discount Rate	**11.24**	%
15	O&M + Insurance Cost	14	lakhs /MW
16	O&M + Insurance Cost Escalation	5.72	%
17	Return on Equity (1 to 5 years)	**18.00**	%
18	Return on Equity (6^{th} year onwards)	**16.00**	%
19	Interest on working capital	**13.50**	%

Outputs - SHP below 5 MW		
Levellized tariff	**4.89**	Rs/kWh
Benefit under Accelerated Depreciation (if availed)	**0.52**	Rs/kWh
Levellised tariff after Accelerated Depreciation (if availed)	**4.37**	Rs/kWh

Outputs - SHP of size 5 MW to 25 MW		
Levellized tariff	**4.26**	Rs/kWh
Benefit under Accelerated Depreciation (if availed)	**0.48**	Rs/kWh
Levellised tariff after Accelerated Depreciation (if availed)	**3.78**	Rs/kWh

Note:The The Capital Cost and O&M expenses for SH projects below 5 MW is taken at Rs 650 lakh and as Rs. 20 lakh respectively. All other parameters as in above table (taken for projects of 5 MW to 25 MW capacity) remaining same for SH projects below 5 MW capacity for calculating tariff .

Appendix- 3

BIOMASS Power Projects

Input Technical and Financial parameters

No	*Technical Parameters*	*Value*	*Unit*
1	Capacity of the Power Project	1	MW
2	Capacity Utilization Factor (during stabalisation)	60.00	%
2a	Capacity Utilization Factor (2nd year-20 year)	80.00	%
3	Annual Gross energy Generation (during stabalisation)	52.56	Lakh kWhs
3a	Annual Gross energy generation (2nd yr-20yr)	70.08	Lakh kWhs
4	Auxiliary energy consumption	10.00	%
5	Net energy generation (during stabalisation)	47	Lakh kWhs
5a	Net energy generation (2nd year-20 year)	63.072	Lakh kWhs
6	Life of Plant and Machinery / Project Life	20	years
7	Station Heat Rate	3800	Kcal/Kwh
8	Gross Calorific Value	3300	Kcal/Kg
No	***Financial Parameters***	***Value***	***Unit***
1	Project Cost of 1 MW Biomass pro-rata basis	**500.00**	Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount	450.00	lacs
4	Debt Fraction	70.00	%
5	Debt	350.00	lacs
6	Equity	150.00	lacs
7	TOTAL	500.00	lacs
8	Interest Rate on Term Loan	**13.00**	%
9	Repayment Period	12	years
10	No. of installments for Interest on Term Loan	12	Nos./annum
11	Moratorium Period	0	years
12	Term loan period for principal payment	12	years
13	Depreciation (Straight Line Method, Company Law) **(for first 12 years)**	5.83	%
14	Discount Rate	**11.24**	%
15	O&M + Insurance Cost	24.00	lacs/MW
16	O&M + Insurance Cost Escalation	5.72	%
17	Return on Equity (1st to 5th year)	**18.00**	%
18	Return on Equity (6th to 13th year)	**16.00**	%
19	Interest on working capital	13.50	%
20	Fuel cost	**2500**	Rs /MT
21	Annual escalation factor for fuel cost	3.00	%

Outputs for Grid-Connected Biomass Power Plant

Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Variable tariff	3.20	3.36	3.53	-	-	-	-	-	-	-	-	-	-
Levellised fixed Tariff	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13
Year Wise Tariff	5.33	5.49	5.66	-	-	-	-	-	-	-	-	-	-
Benefit of Accel. Deprn	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Yearwise tariff after Accel Deprn	5.18	5.34	5.51	-	-	-	-	-	-	-	-	-	-

Appendix- 4

NON-FOSSIL FUEL BASED COGENERATION

Input Technical and Financial parameters

No	*Technical Parameters*	*Value*	*Unit*
1	Capacity of the Power Project	1	MW
2	Capacity Utilization Factor	53.00	%
3	Annual Gross energy Generation	46.43	Lakh kWhs
4	Auxiliary energy consumption	8.50	%
5	Net energy generation	42.48	Lakh kWhs
6	Life of Plant and Machinery / Project Life	20	years
7	Station Heat Rate	**3600**	Kcal/Kwh
8	Gross Calorific Value	**2250**	Kcal/Kg

No	*Financial Parameters*	*Value*	*Unit*
1	Project Cost of 1 MW Cogeneration on pro-rata basis	420.00	Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount	378.00	lacs
4	Debt Fraction	70.00	%
5	Debt	294.00	lacs
6	Equity	126.00	lacs
7	TOTAL	420.00	lacs
8	Interest Rate on Term Loan	**13.00**	%
9	Repayment Period	12	years
10	No. of installments for Interest on Term Loan	12	Nos./annum
11	Moratorium Period	0	years
12	Term loan period for principal payment	12	years
13	Depreciation (Straight Line Method, Company Law) **(for first 12 years)**	5.83	%
14	Discount Rate	**11.24**	%
15	O&M + Insurance Cost	16.00	lacs/MW
16	O&M + Insurance Cost Escalation	5.72	%
17	Return on Equity (1 to 5 years)	**18.00**	%
18	Return on Equity (6^{th} year onwards)	**16.00**	%
19	Interest on working capital	**13.50**	%
20	Fuel cost	1583	Rs /MT
21	Annual escalation factor for fuel cost	3.00	%

Outputs for Grid-Connected cogeneration (non-fossil fuel) Power Plant

Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Variable tariff	2.77	2.85	2.94	-	-	-	-	-	-	-	-	-	-
Levellised fixed Tariff	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34
Year Wise Tariff	5.11	5.19	5.28	-	-	-	-	-	-	-	-	-	-
Benefit of Accel. Deprn	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Yearwise tariff after Accel Deprn	4.83	4.91	5.00	-	-	-	-	-	-	-	-	-	-

Appendix- 5

SOLAR PV

Input technical and financial parameters

No	*Technical Parameters*	*Value*	*Unit*
1	Capacity of the Power Project	1	MW
2	Capacity Utilization Factor	**17.00**	%
3	Annual Gross Generation	14.89	Lakh kWhs
4	Auxiliary consumption	0.00	%
5	Annual Net Generation	14.89	Lakh kWhs
6	Life of Plant and Machinery / Project Life	25	years
No	***Financial Parameters***	***Value***	***Unit***
1	Cost of Solar PV Project	**800**	Rs Lacs
2	Non - Depreciable Amount	10.00	% of Capital Cost
3	Depreciable Amount (Cap Cost Less non-depreciable Cost)	720	lacs
4	Debt Fraction	70.00	%
5	Debt	560.00	lacs
6	Equity	240.00	lacs
7	TOTAL	800.00	lacs
8	Interest Rate on Term Loan	**13.00**	%
9	Repayment Period	12	years
10	No. of installments for Interest on Term Loan	12	Nos./annum
11	Moratorium Period	0	years
12	Term loan period for principal payment	12	years
13	Depreciation (Straight Line Method,Company Law) - for first 12 years	5.83	%
14	Discount Rate	**11.24**	%
15	O&M and insurance cost	10.000	Rs. Lakhs
16	O&M and insurance Cost Escalation	5.72	%
17	Return on Equity (1 to 5 years)	**18.00**	%
18	Return on Equity (6th years onwards)	**16.00**	%
19	Interest on working capital	**13.50**	%

Outputs - Solar PV			
Levellized Tariff (Rs./kWh)	**Benefit of Accelerated Depreciation (if availed) (Rs./kWh)**	**Net Levellized Tariff (Rs./kWh)**	**Tariff Period (Years)**
11.44	(1.12)	10.32	First 12 yrs
6.78	-	6.78	Next 13 yrs

Appendix- 6

SOLAR THERMAL

Input technical and financial parameters

No	*Technical Parameters*	*Value*	*Unit*
1	Capacity of the Power Project	1	MW
2	Capacity Utilization Factor	23.00	%
3	Annual Gross Generation	20.15	Lakh kWhs
4	Auxiliary consumption	10.00%	%
5	Annual net energy generation	18.13	Lakh kWhs
6	Annual Deration	0%	%
7	Life of Plant and Machinery / Project Life	25	years

No	*Financial Parameters*	*Value*	*Unit*
1	Project Cost of 1 MW Solar Thermal Plant on pro-rata basis	**1200**	Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount	1080.00	lacs
4	Debt Fraction	70.00	%
5	Debt	840.00	lacs
6	Equity	360.00	lacs
7	TOTAL	1200.00	Lacs
8	Interest Rate on Term Loan	**13.00**	%
9	Repayment Period	12	Years
10	No of installments for Interest on Term Loan	12	Nos./annum
11	Moratorium Period	0	Years
12	Term loan period for principal payment	12	Years
13	Depreciation (Straight Line Method, Company Law) **(for first 12 years)**	5.83	%
14	Discount Rate	**11.24**	%
15	O&M + Insurance Cost	15.00	Rs lakhs/MW
16	O&M + Insurance Cost Escalation	5.72	%
17	Return on Equity (1 to 5 years)	**18.00**	%
18	Return on Equity (6 th year onwards)	**16.00**	%
19	Interest on working capital	**13.50**	%

Outputs - Solar Thermal			
Levellized Tariff (Rs./kWh)	**Benefit of Accelerated Depreciation (if availed) (Rs./kWh)**	**Net Levellized Tariff (Rs./kWh)**	**Tariff Period (Years)**
9.52	(1.70)	7.82	First 12 yrs
5.26	-	5.26	Next 13yrs