

**ODISHA ELECTRICITY REGULATORY COMMISSION  
PLOT NO. 4, CHUNOKOLI, SAILASHREE VIHAR,  
BHUBANESWAR – 751 021**

**Petition No. (Suo Motu)**

**IN THE MATTER OF: Suo-Motu proceeding for finalization of tariff of Renewable Energy Sources including Co-generation for the third control period 2017-18 to 2019-20.**

**AND**

**IN THE MATTER OF:**

OERC represented by Director (Tariff)

.....**Petitioner**

Vs.

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

.....**Respondents**

Most Respectfully Showeth:                      The humble petition of above named petitioner

1. 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, the Tariff policy the Commission has initiated this tariff Order for the Renewable Power Projects to be set up in the State of Orissa for the control period 2017-18 to 2019-20.

2. Commission in its earlier Order No. 80 of 2013 (Suo Motu) dated 15.01.2014 approved the levelised generic tariffs applicable to the projects commissioned during the control period 2013-14 to 2017-18 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.

3. **Odisha RE Scenario :**

Presently, Odisha is having 215 MW of tied up RE capacity, out of which 140 MW is installed within the State. The source wise Renewable Energy installed capacity is given below;

Technology	Installed Capacity in the State (MW)	From outside the State (MW)
Solar	63	75
Wind	-	-
Small Hydro	57	-
Biomass	20	-
MSW	-	-
<b>Total</b>	<b>140</b>	<b>75</b>

The Renewable Energy installed capacity requirement as per the specified RPO notified on dated 10.09.2015 was expected to be:

FY	MU		MW		Percentage of RPO as per OERC Regulation	
	Solar	Non-Solar	Solar	Non-Solar	Solar	Non-Solar
2015- 16	119	594	91	136	0.50	2.50
2016- 17	368	737	283	168	1.50	3.00
2017 -18	765	1148	588	262	3.00	4.50
2018 -19	1193	1325	917	303	4.50	5.00
2019 -20	1513	1513	1163	345	5.50	5.50

(\*Figures given in MU and MW are indicative in nature)

Further, as per the revised National Tariff Policy 2016, the RPO percentage should reach 8% for Solar and 9% for Non-Solar Power by the year 2022 (excluding Hydro consumption). Progressing with the demand forecasting done by the STU (OPTCL), the requirement of Solar & Non-Solar Power planned to be around 1850 MW & 600 MW respectively by the year 2022. Dept. of Energy, GoO has declared following Renewable capacity addition trajectory to MNRE, GoI as part of the National target of 175 GW RE Power by the year 2022;

Technology	Target (MW)
Solar	2200
Wind	200
Small Hydro	150
Biomass	180
MSW	20
<b>Total</b>	<b>2750</b>

4. In the meantime Govt of Odisha has notified '**Odisha Renewable Energy policy 2016**' with integrated objectives of long term energy security, ecological security, encourage public and private investment in RE projects, enhance contribution of RE in total installed capacity of the state and facilitate development of manufacturing and R&D in RE sector. The

policy would remain in force till 31/03/2022 which would therefore cover the entire control period of 2017-18 to 2019-20 envisaged in this petition.

5. The applicable technologies are Solar, Wind, Small hydro, Biomass and MSW to energy based technologies. Total energy targeted to be added is 2750 MW over the policy period, including 2200 MW of solar energy, 200 MW wind energy, 150 MW of small hydro, 180MW Biomass and 20 MW MSW energy.

6. The incentives envisaged under the policy are;

- Any kind of renewable manufacturing facility and hub shall be treated as priority sector as per IPR – 2015 and
- Odisha RE Development Fund (OREDF) would be created to be utilized for creation of infrastructure for accelerated development of Renewable Energy. The state government shall provide a corpus of Rs. 250 Crore spread over 5 years for creation of OREDF and independent/private producers shall contribute 5 Paise per unit of renewable energy sold outside the state to generate financial resources for this fund. On-grid renewable energy projects involving innovative / new technologies may be given viability gap funding from OREDF.

7. The tax exemption and concessions include:

- All incentives and concessions as per Industrial Policy Resolution 2015 would be made available to all renewable energy projects.
- No stamp duty on land for solar parks being developed in government / IDCO land
- All renewable energy projects who come into commercial operation within stipulated period shall be exempted from electricity duty for self consumption for a period of five years from the date of commercial operation

8. The evacuation arrangements include

- Infrastructure required for connecting from project to grid shall be responsibility of the developer.
- STU shall be responsible for all infrastructure created beyond interconnection point in a timely manner for projects at 132 Kv and above.
- DISCOM shall be responsible for all infrastructures created **beyond interconnection point** in a timely manner for projects of 11 kv and 33 kv.
- Rooftop solar PV projects shall be allowed connectivity at LV or MV or at 11 kv of the distribution system.

## 9. Land Banks

- Government land from land bank and land of private owners willing to lease land for a period of thirty years may be allotted for renewable energy projects.
- Exemption from ceiling of land holdings as per the land reforms Act (1960) and its amendments shall be applicable to renewable energy projects.
- Land acquired for development of grid connected renewable energy projects for captive consumption or sale to third party or sale to GRIDCO or development of solar parks shall be converted to non agricultural status on payment of applicable conversion charges.

## 10. Solar Parks

- GEDCOL shall develop solar parks with infrastructure facilities. It will provide land to the interested developers for 30 years on lease rent.
- The minimum and maximum capacities allotted to any developer are 10 MW and 30% of solar park capacity respectively. However, the GEDCOL may relax the capacity norms on 'case to case' basis.
- Private developer shall procure the land from private or public source
- A maximum of 5 acre/MW of land shall be leased out for solar park development
- In case in 5 years 80% of the project capacity is not developed penalty shall be imposed by GEDCOL.

11. The Commission has reviewed developments of renewable energy technologies in Odisha during the last control period (2013-14 to 2017-18). The levellised Generic tariff and status of projects commissioned during the control period of various technologies prevalent upto 2017-18 are detailed below:

(A) **Levellized tariff for Wind Power Projects** was determined in the order No. 80 of 2013 (Suo Motu) dated 15.01.2014 for the last control period (2013-14 to 2017-18).

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

**Status:** No project was developed during last control period (2013-14 to 2017-18) nor any currently are in the development stage.

(B) **Levellized tariff for SHP Projects** were determined in Petition No. 80 of 2013 (Suo Motu) dated 15.01.2014 for last control period (2013-14 to 2017-18).

Particular	Levellized	Benefit of	Net Levellized	Tariff
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	Tariff (Rs./kWh)	Accelerated depreciation (if availed) (Rs./kWh)	Tariff Rs./kWh)	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

**Status:** Presently 3 Nos. of Small Hydro Electric Projects (SHEPs) of 2 X 12.5MW, 3 X 4 MW and 4 X 5 MW totaling 57 MW capacities are commissioned in the state supplying total power to the State through PTC, as detailed below:

Sl No.	Name of the Developer	Project Location	Installed Capacity (MW)	Date of Commercial Operation
1	Meenakshi Power Ltd.	Middle Kolab, Koraput	(2 x 12.5) = 25	14.07.2009
2	Meenakshi Power Ltd.	Lower Kolab, Malkanagiri	(3 x 4) = 12	14.07.2009
3	Orissa Power Consortium Ltd. (OPCL)	Samal Barrage, Angul	(4 x 5) = 20	12.10.2009

The small Hydro projects which are likely to be commissioned during the control period are listed below:

Sl. No.	Name of the Developer	Installed Capacity (MW)	Project Location	PPA Executed on
1	Sri Avantika Power Projects Private Limited	3 x 6 = 18	Saptadhara SHEP, Jamjhuri River, Koraput	29.10.2014
2	Baitarani Power Project Private Limited	3 x 8 = 24	Lower Baitarani SHEP, Dargarisila, Badajori, Keonjhar	18.12.2015
3	Indravati Power Pvt. Ltd.	3.5 MW Indravati- I (2 x 1MW), Indravati-II (2 x 0.75 MW)	Mahipani & Tuteuruguda, Kalahandi	27.11.2015
4	Kakatia Chemicals Pvt. Ltd.	2 x 4.5 = 9	Hirakud Dam, Sambalpur	02.12.2015
5	Sideshwari Power Generation Pvt. Ltd.	3 x 5.5 = 16.5	River Kolab, Kharagpur Village, Koraput	07.11.2016

### (C) Levellized 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 variable component of tariff will be paid on the basis of the financial year of operation. The Commission determined tariff (single part tariff with two components, fixed and variable) for biomass projects in its order 80 of 2013 (Suo Motu) dated 15.01.2014.

Levellized fixed component of Tariff (Rs./kWh)	Variable(Fuel ) Component of tariff for FY 2010-11	Effective tariff for FY 2010-11	Benefit of Accelerated Depreciation (if availed) (Rs./kWh)	Net Tariff (Rs./kWh)
2.13	3.20	5.33	(0.15)	5.18

**Status:** Presently only one Biomass plant is operational in Odisha as detailed below

Sl No.	Name of the Developer	Project Location	Installed Capacity (MW)	Date of Commercial Operation (Doco)
1	Shalivahana Green Energy Ltd.	Nimidha, Dhenkanal	(1 x 20) = 20	19.12.2011

The Biomass projects likely to be commissioned during the current control period i.e. 2017-18 to 2019-20 are listed below.

Sl. No.	Name of the Developer	Installed Capacity (MW)	Project Location	PPA Executed on
1	Kratos Transmission & Infrastructure Pvt. Ltd.	6	Dabugaon, Nabarangpur	27.06.2016
2	Octant Industries Ltd.	10	Sambalpur	21.01.2011

### (D) Levellized tariff for Non-fossil fuel based Co-generation (baggasse based) projects was determined in order No. 80 of 2013 (Suo Motu) dated 15.01.2014.

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

Levellized fixed component of Tariff (Rs./kWh)	Variable(Fuel ) Component of tariff for FY 2010-11	Effective tariff for FY 2010-11	Benefit of Accelerated Depreciation (if availed) (Rs./kWh)	Net Tariff (Rs./kWh)
2.34	2.77	5.11	(0.28)	4.83

**Status:** No project was developed during the Control period and presently no project is also under construction stage.

**(E) Levelled tariff for Solar PV Power Projects**

Commission in its order No. 80 of 2013 (Suo Motu) dated 15.01.2014 determined the generic tariff for Solar PV and Solar Thermal Projects for the control period 2013-14 to 2017-18.

Levelled Tariff of Solar PV Projects (Rs./kWh)	Benefit of Accelerated Depreciation (if availed) (Rs./kWh)	Net Levelled Tariff (Rs./kWh)	Tariff Period (Years)
11.44	(1.12)	10.32	First 12 years
6.78	-	6.78	Next 13 years

**Status:** GRIDCO currently procures 138 MW of Solar PV power from the following SPV projects:

Sl. No	Name of the Developer	Project Location	Installed Capacity (MW)	Date of CoD	PPA/ PSA	Per Unit power cost (Rs/ kWh)
1	M/s Raajratna Energy Holding Pvt. Limited	Vill: Sadeipali, Block/ Dist: Bolangir	1	13.07.2011	21.08.2010	6.28
2	M/s S. N. Mohanty	Vill: Patapur, G.P: Kundei Padaa, Block: Baranga, Dist: Cuttack	1	23.08.2011	21.08.2010	6.28
3	M/s MGM Minerals Ltd.	Vill: Patrapada, G.P.: Taqngi, Block: Tangi, Dist: Khurda	1	13.10.2011	21.08.2010	6.28
4	M/s Molisati Vinimay Pvt. Limited	Vill: Ranja, G.P.: Danara, Block: Barkote, Dist: Deogarh	1	22.12.2011	21.08.2010	6.28
5	M/s Jay Iron and Steel	Vill: Haripada, Block: Bamra, Dist: Sambalpur	1	11.03.2012	21.08.2010	6.28
6	M/s Abacus Holdings Pvt. Limited	Vill: Ainlachhat, Chadheipanka, Block: Ulunda, Dist: Sonepur	1	13.03.2012	21.08.2010	6.28
7	M/s Shri Mahavir Ferro Alloys Pvt Limited	Vill: Tankajoda, Block: Bonai, Dist: Sundergarh	1	15.03.2012	21.08.2010	6.28
8	M/s Vivacity Renewable Energy Pvt. Ltd.	Vill: Benta, G.P.: Tangi, Block: Tangi, Dist: Nayagarh	1	16.03.2012	21.08.2010	6.28
9	M/s Aftaab Solar Pvt. Ltd. (through NVVN)	Vill: Sadeipali, Block/ Dist: Bolangir	5	07.02.2012	12.01.2011 (PSA with NVVN)	10.65
10	From Rajasthan (through NVVN)	Rajasthan	15	August 2013	12.01.2011 (PSA with NVVN)	10.65
11	Dadri Solar PV Station, (developed by NTPC)	Dadri, Gaziabad, U.P.	5	30.03.2013	26.04.2011	12.94
12	Faridabad Solar PV Station, (developed by NTPC)	Faridabad, Haryana	5	31.03.2014	26.04.2011	9.35

13	M/s Alex Green Energy Pvt. Ltd.	Patnagarh, Bolangir	5	19.08.2014	26.05.2012	7.00
14	M/s ACME Odisha Solar Power Pvt. Ltd.	Deogaon, Bolangir	25	22.06.2015	06.03.2013	7.28
15	Through SECI	40 MW from Gujarat, 10 MW from Rajasthan, 20 MW GEDCOL Manamunda Project (Odisha)	70	50 MW during 2015 and 20 MW from Mar' 16	12.08.2014	5.50

During the control period 2017-18 to 2019-20 the growth of solar PV projects both ground mounted and solar rooftop in the state of Odisha is expected to grow at a rapid pace due to various incentives from MNRE and initiatives taken by the state government. A brief snap of the expected Grid Connected Solar Schemes and Solar Parks to come up during the control period is given below:

**1) 500 MW Solar Project Under VGF Scheme of MNRE :**

GRIDCO has executed the Power Sale Agreement with SECI for availing 270 MW Solar Power under VGF scheme under National Solar Mission, Phase- II, Batch- IV, to be implemented in the State by FY 2017 -18. Under the said scheme, the benchmark tariff will be Rs. 4.50 to the buying utility for next 25 years.

The balance 230 MW Solar capacities (out of the requisitioned capacity of 500 MW) under the VGF scheme Phase- II, Batch- IV, will be implemented by SECI in the 2<sup>nd</sup> Phase by FY 2018 -19.

**2) GRIDCO is to procure surplus Solar power of around 4 MW from the proposed 10 MW SPV project and 350 MW under VGF Scheme of MNRE for the Ministry of Defense by Bharat Electronics Ltd. at the Ordnance Factory Board campus, Saintala, Badmal , Balangir after the captive consumption of OFB.**

**3) 1000 MW Solar Park in Odisha :**

GEDCOL is developing Solar Park(s) for 1000 MW of Solar Power Plant in a clustered manner constituting 100 - 200 MW capacity per Park / Project under the Ultra Mega Solar Power Park (UMSPP) Scheme of Govt. of India. Out of these lands, a consolidated Detailed Project Report has been prepared for 1000 MW Solar Park on 5175 Acres land and the DPR for 1000 MW Solar Park Project has been submitted to MNRE, Govt. of India for approval by \_\_\_\_\_.

**4) GRIDCO is to procure 250 MW Solar capacity from NLC India Ltd., 200 MW from North Eastern Electric Power Corporation Ltd. (NEEPCO) and 150 MW Solar power from NALCO.**



5) GEDCOL is under process to develop Solar Plants on the un-utilized lands available inside OPTCL Grid Sub-stations at Duburi, Baripada, Bolangir, Koraput & Rairangpur including OHPC Power House at Mukhiguda.

**6) Rooftop Solar Project (4 MW):**

- MNRE has sanctioned 4 MW Solar Rooftop project on the non-residential Govt. buildings in twin city of Cuttack-Bhubaneswar through PPP mode. 199 nos. of buildings have been identified (126 in Bhubaneswar and 73 in Cuttack) for taking up Roof Top installations.
- LOA has been placed on with M/s AZURE Power Ltd. for a project cost of Rs. 8 Crore per MW and levellised tariff of Rs. 5.69/kWh for 25 years.
- GEDCOL is contemplating to replicate the Bhubaneswar-Cuttack Rooftop project to other cities in the State. GEDCOL is also looking forward to extend the Scheme to the Central Govt. buildings and State Govt. Residential Quarters in Bhubaneswar & Cuttack. The total Rooftop Project capacity is expected to be around 10 MW.

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

Commission in its order No. 80 of 2013 (Suo Motu) dated 15.01.2014 determined the generic tariff for Solar Thermal Projects for the control period 2013-14 to 2017-18. No revision of Levellised generic tariff for Solar Thermal projects has been made during the last control period. The levellized tariff over the useful life was determined based on the financial and operating parameters and the tariff was applicable for a period of 25 years from the date of commercial operation.

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

**Status:** No project was commissioned during the last control period and none of the project is also under the pipeline for this control period.

**Legal framework**

**National Tariff Policy dated 28 January 2016**

12. The Tariff Policy dated 28 January 2016, notified by the Central Government in pursuance of Section 3 of the Electricity Act, 2003 stipulates that the appropriate Commission may determine tariff for procurement of power by distribution licensees from

non-conventional sources of energy under *Section 62 of the Electricity Act, 2003*, till issuance of notification of procurement of power from renewable energy sources through competitive bidding by Central Government.

The relevant extract of para 6.4 of the Tariff Policy is given below:

*“.....(2) States shall endeavor to procure power from renewable energy sources through competitive bidding to keep the tariff low, except from the waste to energy plants. Procurement of power by Distribution Licensee from renewable energy sources from projects above the notified capacity shall be done through competitive bidding process, from the date to be notified by the Central Government.*

*However, till such notification, any such procurement of power from renewable energy sources projects may be done under Section 62 of the Electricity Act, 2003. While determining the tariff from such sources, the Appropriate Commission shall take into account the solar radiation and wind intensity which may differ from area to area to ensure that the benefits are passed on to the consumers.*

*(3) The Central Commission should lay down guidelines for pricing intermittent power, especially from renewable energy sources, where such procurement is not through competitive bidding. The tariff stipulated by CERC shall act as a ceiling for that category.”*

13. In view of the above provisions of the National Tariff Policy, 2016 lying emphasis on the procurement of RE power through competitive bidding process it is proposed that the distribution licensees may procure electricity from the RE projects (except from the waste to energy plants) at the tariff determined by the Commission under Section 62 of the Act under this order or may carry out competitive bidding for procurement of electricity from RE projects (except from the waste to energy plants) through transparent process of bidding under Section 63 of the Act. The GRIDCO/ distribution Licensee may approach the Commission for adoption of the tariff discovered through competitive bidding process. In such case, the tariff determined by the Commission in this order will act as a ceiling tariff.
14. Commission in the Petition No. 80 of 2013 (Suo Motu) dated 15.01.2014 approved the levelised generic tariffs, to be made applicable for the projects commissioned during the control period 2013-14 to 2017-18 and defined General principles, Financial parameters, operational parameters, and technology-wise specific parameters.

15. The Commission now has started this proceedings to finalise the generic tariff order in respect of the following Renewable Energy (RE) power projects in the State of Orissa for the current control period 2017-18 to 2019-20:

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

The Commission has observed that penetration of all renewable sources energy in the total mix of consumption of DISCOMs is growing rapidly across the country. There has also been rapid decline in the per unit cost of all the renewable energy sources due to investment in better technology, development of requisite infrastructure and competition. The procurement of RE power through competitive bidding route is therefore order of the day which has helped in discovering lower cost of the RE power. During the control period 2017-18 to 2019-20 no generic tariff would be determined for RE technologies such as wind, Solar PV, Solar thermal, Biomass, Non-fossil fuel based cogeneration and MSW projects. The GRIDCO/ DISCOMs must seek RE power through competitive bidding process only.

### **General principles**

#### **Control Period and Review period**

16. The Control Period or Review Period shall be of three (3) financial years for all the RE projects. First year of the Control Period shall commence from the beginning of FY 2017-18 and the Control Period shall continue up to the end of financial year 2019-20. In case of SHEP the first year of the Control Period shall commence from the beginning of FY 2017-18 and the Control Period shall continue up to the end of financial year 2019-20.

In the order No.80 of 2013 (Suo Motu) dated 15.01.2014, the Commission fixed the control period of 5 years i.e. from the year 2013-14 to 2017-18 for Small Hydro Electric Projects(SHEP) instead of 3 years for other projects. Therefore the end year of last control period i.e 2017-18 overlaps with the first year of the current control period. Therefore in order to remove such overlap the tariff determined for SHEP in this order would be applicable for the projects being commissioned during the year

2017-18 and the tariff determined for SHE projects for FY 2017-18 only in the order 80/2013 dated 15.01.2014 stands modified to that effect only.

The tariff determined for the RE projects, commissioned during this 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**

17. 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 twenty 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**

18. The preferred route for selection of the RE project in the control period shall be through the bidding route. The project specific tariff, on case to case basis, shall be determined for the following types of projects in case there is any filing before the Commission:

- Small Hydro Projects
- Wind Energy
- Municipal Solid Waste to Energy Projects;
- Solar PV and Solar Thermal Power projects:
- Hybrid Solar Thermal Power plants;

- Biomass Gasifier based projects
- 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 this order of the Commission.

Provided that the financial and operational norms as specified under paragraph 31 and 32 of this order, except for capital cost, shall be ceiling norms while determining the project specific tariff. Solar PV projects shall be guided by the provisions enumerated in paragraph 24 regarding interconnection point and paragraph 25 regarding Net metering of this order. However, the parties are free to agree in the PPA for any relaxed norms and place before the Commission for approval. The order of the Commission in such cases shall be final.

#### **Petition and Proceedings for Determination of Tariff**

19. 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**

20. The tariff structure for renewable energy technologies shall be “Single part tariff” except for Co-generation ( bagasse based) projects, biomass and MSW . 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. municipal solid waste projects, biomass power projects and non-fossil fuel based co-generation projects having fuel cost component, there shall be two components of tariff , i.e. fixed cost component and fuel cost component.

Taxes shall be reimbursed at actual as per audit report.

#### **Tariff Design**

21. 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**’.

The above principles shall also apply for project specific tariff.

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

22. 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**

23. All renewable energy power plants except biomass power plants and non-fossil fuel based co-generation plants with installed capacity of 1 MW and above, shall be treated as ‘MUST RUN’ power plants and shall not be subject to ‘merit order dispatch’ principles.

However, the renewable energy power projects shall be subject to scheduling and dispatch code as specified under the Orissa Grid Code (OGC) / Indian Electricity Grid Code (IEGC) and other regulations of the commission as the case may be including amendments thereto.

24. **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 OERC (Procurement of Energy from Renewable Sources and its Compliance) Regulations, 2015 at Regulation 2 provides definitions and interpretation of Inter-connection Point’. In such regulation at definition number ‘m’ Inter-connection Point has been defined as follows:

*(m) “Inter-connection point” shall mean the 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 of the outgoing feeder on HV side of the pooling sub-station;*

*and the Pooling Sub-station shall mean the sub-station at project site of the wind farm or Solar Photovoltaic Power plant, as the case may be, and shall constitute step-up transformer and associated switchgear, and to the LV side of which, multiple (more than one) generating unit(s) (i.e. wind turbine generators or solar PV modules/ arrays/ inverter units) are connected.*

- (ii) in relation to small hydro power, biomass power, renewable based co-generation power projects, solar thermal power projects and Municipal Solid Waste based projects the inter-connection point shall be line isolator of outgoing feeder on HV side of the generator transformer;*

- (iii) Provided that in relation to Renewable Energy Sources having installed capacity of less than 1 MW the interconnection point shall be*

*the nearest distribution system as agreed by the Licensee.*

The OERC (Procurement of Energy from Renewable Sources and its Compliance) Regulations, 2015 at Regulation 10 provides mechanism of connectivity of RE sources plant with the GRID in the following manner:

**10. Connectivity with the Grid**

10.1 *Any person generating electricity from Renewable Energy Sources, irrespective of installed capacity, shall have open access to any Licensee's transmission system and/or distribution system as the case may be.*

10.2 *On an application from such person, the transmission licensee or distribution licensee shall provide appropriate interconnection facilities before Commercial Operation Date of the Renewable Energy Project. Such interconnection shall follow the grid connectivity Standards as specified in the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 or State Grid Code as the case may be. The Transmission Licensee / Distribution Licensee shall provide meters and associated facilities at interconnection point.*

10.3 *The licensees shall be responsible for development of evacuation infrastructure beyond the inter-connection point while the developer/generating company will have to develop evacuation infrastructure from generating facility up to the inter connection point at its own expense:*

*Provided that in case of Renewable Energy Sources having installed capacity of less than 1 MW the developer shall provide evacuation infrastructure upto the interconnection point:*

*Provided that if any dispute arises regarding connectivity with the Grid the matter shall be referred to the Commission whose decision in this regard shall be final.*

10.4 *Roof-top Solar PV sources shall be allowed connectivity at LV or MV or at 11 KV of the distribution system of the licensee as considered technically and financially suitable by the licensee and the developer:*

*Provided that the Commission shall time to time issue specific order on such connections and commercial arrangement:*

*Provided further that if any dispute arises about connectivity of such sources with the grid, the matter shall be referred to the Commission whose decision in this regard shall be final.*

10.5 *Communication system, if required by SLDC, between grid sub-station and generating station shall be developed by the developer (s) at its own cost. Developers of Renewable Energy Sources shall abide by all applicable codes, rules, regulations etc. in regard to operational and commercial practices.*

10.6 *Wherever Renewable Energy Sources have already been connected to the State Grid at a voltage level lower than the voltage level specified in these Regulations and wherever such State Grid connection causes any bottleneck in capacity addition or causes avoidable discontinuance of generation or low voltage during peak hours or frequent outage of line or sufficient redundancy, such grid connection shall be converted into suitable voltage level and cost for such conversion shall be borne by the developer.*



The interconnection and the mechanism of connectivity of RE sources plant with the GRID would accordingly be guided by the provisions under The OERC (Procurement of Energy from Renewable Sources and its Compliance) Regulations, 2015 as referred above.

### **Net Metering**

25. The Commission passed order on Net metering/bi-directional metering & their connectivity with respect to solar PV projects dated 19.08.2016 which provides mechanism and other provisions pertaining to Net-metering/ Bi-Directional metering based SPV projects. The order further mandates that ‘This order applies to all solar power systems that are connected to the distribution system through an electrical service connection. The solar power system may be roof-mounted, ground-mounted, installed on an elevated structure or otherwise for captive use’. The said order also provides for type of recognized projects (Self owned and third party owned arrangement projects), interconnection arrangements, metering arrangement, energy accounting, billing and payment mechanism, LT connectivity specifications, operation and maintenance requirements and applicability RECs and renewable purchase obligation. The provisions as contained in the order on net metering/bi-directional metering & their connectivity with respect to solar PV projects dated 19.08.2016 and amendment thereof from time to time, shall accordingly be applicable to SPV projects as defined in this order.

### 26. **Eligibility criteria for RE projects**

#### **a) Wind:**

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.

#### **b) SHP:**

The SHP projects identified / approved by the Engineer in Chief, Electricity – cum Principal Chief Electrical Inspector, Government of Orissa 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. 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 that 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 11 KV or above voltage level.

**f) Municipal Solid based Projects**

The project shall qualify to be termed as a Municipal Solid based (MSW) based power project if it is using new plant and machinery based on Rankine cycle technology and using Municipal solid waste (MSW) as fuel source.

**27. Water Royalty Charges (in case of SHP)**

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.

**28. RE Technology-wise Project Life/ Tariff Period**

Details of RE Technology-wise Useful life/ Tariff period considered for levelled 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	35	35
	b. 5 to 25 MW	35	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)
7	Municipal Solid Waste	25	25

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

29. 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 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

30. **Compliance Monitoring**

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

**Applicability of Tariff Order**

31. **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. 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.

**iii. Loan and Finance charges**

a) **Loan Tenure:** For the purpose of determination of tariff, loan tenure of 13 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 average State Bank of India (SBI) Marginal Cost of Funds based on Lending Rate (MCLR) (One year tenor) prevalent during the first six months of the previous year plus 200 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.

#### iv. **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 13 years of the Tariff Period shall be 5.28% 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.

#### v. **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 shall be 14% to be grossed up by prevailing Minimum Alternate Tax (MAT) as on 1<sup>st</sup> April of previous year for the entire useful life of the project.

**vi. Interest on Working Capital**

The Working Capital requirement in respect of wind energy projects, small hydro power, 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 to be determined on the basis of the average State Bank of India (SBI) Marginal Cost of Funds based Lending Rate (MCLR) (One year tenor) prevalent during the first six months of the previous year plus 300 basis points.

**Operation & maintenance Expenses**

32. '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 2017-18) under this Tariff Order shall be escalated at the rate of 5.72% per annum over the Tariff Period.

#### **Sharing of CDM Benefits**

33. The proceeds of carbon credit from approved CDM projects shall be shared between generating company and concerned beneficiaries in the following manner:
- 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;
  - 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 between the generating company and the beneficiaries.

#### **Benefit under Income Tax Act**

34. 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.

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 1<sup>st</sup> year i.e. FY 2017-18 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 levelled accelerated depreciation benefit has been computed considering the weighted average cost of capital as discount factor.

### **RE Technology-wise Specific Parameters**

#### **35. Technology specific parameters for Wind Power Projects**

The CERC in its recently notified CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017 has done away with specifying generic capital cost for the Wind power projects and has made following provision in the regulations. ‘The Commission shall determine only project specific capital cost and tariff based on prevailing market trends for wind energy project’.

In Odisha at present no wind project is operating and also no wind based RE project is envisaged during this control period. The Commission therefore decides that procurement of power from all wind based projects be made through competitive bidding process only during the control period 2017-18 to 2019-20. However project specific tariff on the case to case basis shall be determined by the commission in contingencies. The financial and operational norms as specified under paragraph 31 to 32 of this order, except for capital cost, shall be ceiling norms while determining the project specific tariff.

##### **(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 determined on project specific basis only and based on the prevailing market trends.

**(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** shall be determined on project specific cases based on the prevailing market conditions.

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

**(A) Capital Cost**

The capital cost considered for small hydro projects during the control period ( FY 2017-18 to 2019-20) shall be Rs. 779 Lakhs/MW for all the projects below 5 MW and Rs. 707 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 is considered after studying the design energy generation quoted in detailed project reports submitted by the investors and operational experiences of similar SHPs in the country. The CUF is considered same for this control period as was considered for the last control period ended in 2012-13.

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**

- vii. O&M expenses for the first year of the Control Period (FY 2017-18) shall be Rs. 29 Lakh per MW for projects below 5 MW and Rs. 21 lakh for projects between 5 MW to 25 MW.
- viii. 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 13 years for the projects of 5 to 25 MW capacity. In case of SHP below 5 MW capacity the tariff will be applicable for 35 years from the date of commercial operation.

**Table -3**

<b>Particular</b>	<b>Levellized Tariff (Rs./kWh)</b>	<b>Benefit of Accelerated depreciation (Rs./kWh)</b>	<b>Net Levellized Tariff Rs./kWh)</b>	<b>Tariff Period (Years)</b>
SHP projects below 5 MW capacity	5.09	(0.49)	4.61	35
SHP projects of 5 to 25 MW capacity	6.00	(0.53)	5.47	35

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

**Technology specific parameters for Biomass based projects**

37. The procurement of power from all Biomass based projects shall be made through competitive bidding process only during the control period 2017-18 to 2019-20. The project specific tariff on the case to case basis shall be determined by the commission taking into account the financial and operational norms as specified under paragraph 31 to 32 and technology specific parameters as defined in succeeding paragraphs applicable for Biomass based projects.

The financial and operational norms are given in the following manner based on the CERC (Terms and conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017:

**(A) Capital Cost**

The capital cost for Biomass projects based on Rankine Cycle Technology application using water cooled condenser for FY 2017-18 shall be Rs.559.03 Lakhs/MW. No capital cost indexation would be done by the commission during the control period.

**(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 1<sup>st</sup> year (after stabilization) 70%
- iii) From 2<sup>nd</sup> year onwards 80%

**(C) Auxiliary Consumption**

The auxiliary power consumption factor shall be 13% during the first year of operation and 12% from second year onwards 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 2017-18) shall be Rs.40 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 4125 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 3100 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 2017-18 to 2019-20) shall be Rs.3073.05/ MT (average) which would be escalated @ 5% every year during the control period.

**(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**

No use of fossil fuel would be allowed for the projects commissioned during this control period 2017-18 to 2019 - 20. However those projects which were commissioned or have signed PPA with GRIDCO on or before 31.03.2017 would be allowed use of fossil fuel upto 15% of the total fuel consumption on annual basis in terms of the last generic order 80 of 2013.

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

In Odisha at present no bagasse based cogeneration project is operating and also no such project is envisaged during this control period. The procurement of power from all bagasse based cogeneration projects shall be made through competitive bidding process only during the control period 2017-18 to 2019-20. The commission is also not specifying any generic tariff for the Non-fossil fuel based Co-generation Projects. However project specific tariff on the case to case basis shall be determined by the commission. The financial and operational norms as specified under paragraph 31 to 32 of this order, except for capital cost, shall be ceiling norms while determining the project specific tariff.

The financial and operational norms are given in the following manner based on the CERC (Terms and conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017:

**(i) Capital Cost**

The normative capital cost for the non-fossil fuel based co-generation projects shall be Rs.492.5 Lakh/MW for FY 2017-18 during the control period (FY 2017-18 to 2019-20).

**(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 2017-18) shall be Rs.21.13 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 bagasse shall be 2250 kcal/kg which is used for bagasse based co-generation tariff determination.

**(vii) Fuel Price**

- (i) Bagasse fuel price during first year (FY 2017-18) of the Control Period (FY 2017-18 to 2019-20) shall be Rs.1622.16/MT which would be escalated @ 5.72% every year during the control period.

**(viii) Use of Fossil Fuel**

No use of fossil fuel would be allowed however for use of biomass as fuel the price of biomass as determined in this order shall be applicable.

**39. Solar PV Power Projects and Solar Thermal Power Projects**

The tariff of solar power is falling quite rapidly in the country and price of Solar PV is now being discovered with near parity to the price of conventional power.

The examples of such discovered price is given below:

Sl No.	Name of the Developer	Project Location	Capacity (MW)	Price ( in Rs/kwh)
1	Sunedison	AP	500	4.63
2	Softbank	AP	350	4.63
3	Shapoorji	Rajasthan	130	4.35
4	Fortum	Rajasthan	420	4.34
5	Mahindra	MP	750	3.3
6	Solairedirect	AP	250	3.15
7	SECI	Bhadla, Rajasthan	5500	2.97, 2.62

In view of the price of the solar power being discovered at much lower rate in the country through competitive bidding process, the determination of generic tariff is losing relevance. The solar potential in Odisha is little lower compared to the Northern states of the country. Simultaneously the discovered price through competitive bidding indicates falling prices of solar rate across the country. In such case, the generic tariff of Solar PV Projects if determined can only be treated as ceiling tariff, with a stipulation that the project be selected on bidding route only within the ceiling price fixed by the Commission. The govt. of Odisha through its recently notified 'Odisha Renewable Energy policy 2016' has announced several incentives under IPR-2015, Viability Gap Funding (VGF) for RE projects, tax exemptions, concessions and development of Land banks and Solar parks with requisite infrastructure for RE projects. This should give the required fillip to the development of RE projects and especially Solar PV plants in the state of Odisha. The commission therefore in the control period 2017-18 to 2019-20 decides not to determine generic tariff for Solar PV and Solar Thermal projects and stipulates that all the procurement of solar power be made through competitive bidding route only. However project specific tariff on the case to case basis shall be determined by the commission under the financial and operational norms as specified under paragraph 31 to 32 of this order. The capital cost, shall be ceiling norms while determining the project specific tariff.

**40. Technology specific parameters for Municipal Solid based projects.**

During the last control period 2013-2014 to 2017-18 a petition was filed by M/s. Essel Bhubaneswar MSW Ltd. (in short M/s. EBML) for determination of tariff for sale of power to the distribution utility/GRIDCO in the State of Odisha from its 11.5 MW Municipal solid waste (MSW) based power project located at Bhuasuni, Bhubaneswar. The proposed plant is Waste to Energy generation plant based on mass burn controlled combustion technology. The power plant would utilise municipal solid waste of twin city of Cuttack and Bhubaneswar. M/s. EBML had executed a concession agreement for 20 years with Bhubaneswar Municipal Corporation (BMC) and Cuttack Municipal Corporation (CMC) for establishment of 600 Tonnes Per Day (TPD) MSW treatment plant at Bhuasuni on Design, Build, Finance, Operate and Transfer (DBFOT) basis. According to the said agreement BMC and CMC will collect the waste from the cities concerned with the help of their own resources and deliver it at the designated transfer stations. M/s. EBML will be responsible for processing the wastes to generate green power. For the development of MSW

processing plant and SLF development, BMC and CMC have jointly provided a land area around 61.485 acre under BMC area. As per the terms of the concession agreement M/s. EBML has agreed to pay land lease rental @ Rs.1/ per acre per annum to BMC up to end of concession period as per RFP document.

The commission disposed of the related petition in case no. 22/2015 in its order dated 29.01.2016 and observed that since the plant is in concept stage and in absence of any detailed cost data supported by evidential documents the actual expenses cannot be ascertained at that stage. Considering the above and likely subsidy to be available to the Petitioner the tariff provisionally fixed at Rs.6.70 per unit upto CoD of the project and agreed to determine the final tariff after detailed deliberation basing on actual capital cost followed by prudent check of all information, parameters and norms along with response of stakeholders based on documents and records placed before the Commission as applicable in a transparent and competitive environment and independent verification report on equipments and works completed.

No further petition has been filed by the petitioner for fixing of final tariff by the commission.

The technological norms are accordingly given as below:

**(A) Capital Cost**

The normative capital cost for the Municipal Solid based projects shall be Rs.1877 Lakh/MW for FY 2017-18 during the control period (FY 2017-18 to 2019-20). There would be no indexation of the capital cost during the control period.

**(B) Plant Load Factor**

The Plant Load Factor for determining project specific tariff shall be

- i) During stabilization 65%
- ii) During the remaining period of the 1<sup>st</sup> year (after stabilization) 65%
- iii) From 2<sup>nd</sup> year onwards 75%

The stabilisation period shall not be more than 6 months from the date of commissioning of the projects.

**(C) Auxiliary Consumption**

The auxiliary power consumption factor shall be 16% of the gross energy generation for computation of tariff.

**(D) Operation and Maintenance Expenses**

6.5% of the capital cost for 1st Year and thereafter an escalation of 5% per year.

**(E) Station Heat Rate**

The Station Heat Rate for Municipal Solid based projects shall be 3587 kcal/kWh for power generation component alone and shall be considered for computation of tariff.

**(F) Gross Calorific Value**

The gross calorific value for MSW fuel shall be 1650 kcal/kg.

**(G) Fuel Price**

No fuel price is envisaged for Municipal Solid based projects

**(H) Use of Fossil Fuel**

No use of fossil fuel would be allowed however for use of biomass as fuel the price of biomass as determined in this order shall be applicable.

41. Based on the above observations, the summary of the Generic tariff for renewable technologies for the second control period from 2017-18 to 2018-19 is as follows:

- a. The levellized generic tariff for various renewable sources of energy having “Single part tariff” is approved as in the following table:

**Table - 9**

<b>Particular</b>	<b>Levellised Total Tariff (for the current control period (Rs./kWh)</b>	<b>Benefit of Accelerated Depreciation (Rs./kWh)</b>	<b>Net Levellised Tariff (upon adjusting for Accelerated Depreciation benefit) (Rs./kWh)</b>	<b>Tariff Period (Years)</b>
Wind Energy	To be procured only through competitive bidding process			
SHP projects of 5 to 25 MW capacity	5.09	(0.49)	4.61	35
SHP projects below 5 MW capacity	6.00	(0.53)	5.47	35
Solar PV	To be procured only through competitive bidding process			
Solar Thermal	To be procured only through competitive bidding process			

- b. 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**

<b>Particular</b>	<b>Levellized fixed component of Tariff (Rs./kWh)</b>	<b>Variable(Fuel ) Component of tariff</b>	<b>Effective tariff</b>	<b>Benefit of Accelerated depreciation (Rs./kWh)</b>	<b>Net Tariff (Rs./kWh)</b>
Biomass	To be procured only through competitive bidding process				
Non-fossil fuel based co-generation	To be procured only through competitive bidding process				
MSW	To be procured only through competitive bidding process				

42. 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.
43. 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.
44. **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.
45. **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.

**By the designated petitioner  
(OERC)**

**WIND**

**Input Technical and Financial parameters**

<i>No</i>	<i>Technical Parameters</i>	<i>Value</i>	<i>Unit</i>
1	Capacity of the Power Project	1	MW
2	Capacity Utilization Factor	22.00%	%
3	Annual Net Generation	17.52	Lakh kWhs
4	Specific Energy Generation		kWh/kWp
5	Annual Deration (after 10 yrs of operation)	0	
6	Life of Plant and Machinery / Project Life	25	years

<i>No</i>	<i>Financial Parameters</i>	<i>Value</i>	<i>Unit</i>
1	Project Cost of 1 MW Wind Power Plant on pro-rata basis		Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount		lacs
4	Debt Fraction	70.00	%
5	Debt		lacs
6	Equity		lacs
7	TOTAL		lacs
8	Interest Rate on Term Loan	10.66	%
9	Repayment Period	13	years
10	No of installments for Interest on Term Loan	13	years
11	Moratorium Period	0	years
12	Term loan period for principal payment	13	years
13	Depreciation (Straight Line Method, Company Law) ( <b>for first 13 years</b> )	5.28	%
14	Discount Rate	9.08	%
15	O&M + Insurance Cost		lacs/MW
16	O&M + Insurance Cost Escalation		%
17	Return on Equity	17.56	%
18	Annuity Factor (25 Years)		
19	Interest on working capital	11.66	%

**SHP**  
**Input Technical and Financial parameters**  
**(Projects of 5 MW to 25 MW capacity)**

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	Lakhs
6	Life of Plant and Machinery / Project Life	35	years
No	Financial Parameters	Value	Unit
1	Project Cost of 1 MW SHP plant	707	Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount	636.30	lacs
4	Debt Fraction	70.00	%
5	Debt	494.90	lacs
6	Equity	212.10	lacs
7	TOTAL	707.00	lacs
8	Interest Rate on Term Loan	10.66	%
9	Repayment Period	13	years
10	No of installments for Interest on Term Loan	13	years
11	Moratorium Period	0	years
12	Term loan period for principal payment	13	years
13	Depreciation (Straight Line Method, Company Law) (for first 13 yrs )	5.28	%
14	Discount Rate	9.08	%
15	O&M + Insurance Cost	21	lakhs /MW
16	O&M + Insurance Cost Escalation	5.72	%
17	Return on Equity	17.56	%
18	Annuity Factor (35 Years)		
19	Interest on working capital	11.66%	%

<b>Outputs - SHP below 5 MW to 25 MW</b>		
Levellized tariff	<b>5.09</b>	Rs/kWh
Benefit under Accelerated Depreciation (if availed)	<b>0.49</b>	Rs/kWh
Levellised tariff after Accelerated Depreciation (if availed)	<b>4.61</b>	Rs/kWh

<b>Outputs - SHP below 5 MW</b>		
Levellized tariff	<b>6.00</b>	Rs/kWh
Benefit under Accelerated Depreciation (if availed)	<b>0.53</b>	Rs/kWh
Levellised tariff after Accelerated Depreciation (if availed)	<b>5.47</b>	Rs/kWh

*Note: For projects below 5 MW the Capital cost is taken as 779 lakh/MW and the O&M expense including insurance cost is taken as Rs. 29 lakh. All other parameters as in above table ( taken for projects of 5 MW to 25 MW capacity) remaining same.*

**BIOMASS**  
**Input Technical and Financial parameters**

<b>Technical Parameters</b>	<b>Value</b>	<b>Unit</b>
Capacity of the Power Project	1	MW
Capacity Utilization Factor ( during stabilisation)	60.00	%
Capacity Utilization Factor ( 2nd year-20 year)	80.00	%
Annual Gross energy Generation (during stabilisation)		Lakh kWhs
Annual Gross energy generation (2nd yr-20yr)		Lakh kWhs
Auxiliary energy consumption (1 <sup>st</sup> yr -11% and 2 <sup>nd</sup> yr onwards -12%)	11.00	%
Net energy generation (during stabilisation)		Lakh kWhs
Net energy generation (2nd year-20 year)		Lakh kWhs
Life of Plant and Machinery / Project Life	20	years
Station Heat Rate	4125	Kcal/Kwh
Gross Calorific Value	3100	Kcal/Kg

<b>Financial Parameters</b>	<b>Value</b>	<b>Unit</b>
Project Cost of 1 MW Biomass pro-rata basis		Rs Lacs/MW
Non depreciable cost	10.00	% of Capital Cost
Depreciable Amount		lacs
Debt Fraction	70.00	%
Debt		lacs
Equity		lacs
TOTAL		lacs
Interest Rate on Term Loan	10.66	%
Repayment Period	13	years
No of instalments for Interest on Term Loan	13	years
Moratorium Period	0	years
Term loan period for principal payment	13	years
Depreciation (Straight Line Method, Company Law) <b>(for first 13 years)</b>	5.28	%
Discount Rate	9.08	%
O&M + Insurance Cost	40.00	lacs/MW
O&M + Insurance Cost Escalation	5.72	%
Return on Equity	17.56	%
Annuity Factor (20 Years)		
Interest on working capital	11.66	%
Fuel cost	3073.05	Rs /MT
Annual escalation factor for fuel cost	5.00	%

**NON-FOSSIL FUEL BASED COGENERATION****Input Technical and Financial parameters**

<i>No</i>	<i>Technical Parameters</i>	<i>Value</i>	<i>Unit</i>
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		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

<i>No</i>	<i>Financial Parameters</i>	<i>Value</i>	<i>Unit</i>
1	Project Cost of 1 MW Cogeneration on pro-rata basis	492.50	Rs Lacs/MW
2	Non depreciable cost	10.00	% of Capital Cost
3	Depreciable Amount		lacs
4	Debt Fraction	70.00	%
5	Debt		lacs
6	Equity		lacs
7	TOTAL		lacs
8	Interest Rate on Term Loan	10.66	%
9	Repayment Period	13	years
10	No of instalments for Interest on Term Loan	13	years
11	Moratorium Period	0	years
12	Term loan period for principal payment	13	years
13	Depreciation (Straight Line Method, Company Law) <b>(for first 13 years)</b>	5.28	%
14	Discount Rate	9.08	%
15	O&M + Insurance Cost	21.13	lacs/MW
16	O&M + Insurance Cost Escalation	5.72	%
17A	Return on Equity	17.56	%
18	Annuity Factor (20 Years)		
19	Interest on working capital	11.66	%
20	Fuel cost	1622.16	Rs /MT
21	Annual escalation factor for fuel cost	5.00%	%

**MUNICIPAL SOLID WASTE**  
**Input Technical and Financial parameters**

<b>Technical Parameters</b>	<b>Value</b>	<b>Unit</b>
Capacity of the Power Project	1	MW
Capacity Utilization Factor ( during stabilisation)	65.00%	%
Capacity Utilization Factor ( 2nd year-20 year)	75.00%	%
Annual Gross energy Generation (during stabilisation)		Lakh kWhs
Annual Gross energy generation (2nd yr-20yr)		Lakh kWhs
Auxiliary energy consumption (1 <sup>st</sup> yr -11% and 2 <sup>nd</sup> yr onwards -12%)	11.00%	%
Net energy generation (during stabilisation)		Lakh kWhs
Net energy generation (2nd year-20 year)		Lakh kWhs
Life of Plant and Machinery / Project Life	20	years
Station Heat Rate	3587	Kcal/Kwh
Gross Calorific Value	1650	Kcal/Kg

<b>Financial Parameters</b>	<b>Value</b>	<b>Unit</b>
Project Cost of 1 MW MSW pro-rata basis	1877	Rs Lacs/MW
Non depreciable cost	10.00%	% of Capital Cost
Depreciable Amount		lacs
Debt Fraction	70.00%	%
Debt		lacs
Equity		lacs
TOTAL		lacs
Interest Rate on Term Loan	10.66	%
Repayment Period	13	years
No of installments for Interest on Term Loan	13	years
Moratorium Period	0	years
Term loan period for principal payment	13	years
Depreciation (Straight Line Method, Company Law) (for first 13 years)	5.28%	%
Discount Rate	9.08	%
O&M + Insurance Cost	6.5% capital cost	lacs/MW
O&M + Insurance Cost Escalation	5.72%	%
Return on Equity	17.56	%
Annuity Factor (20 Years)	9	
Interest on working capital	11.66	%
Fuel cost		Rs /MT
Annual escalation factor for fuel cost	5.00%	%

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