Before the Karnataka Electricity Regulatory Commission, Bangalore

Dated 1st January, 2015

Present:

1. Sri M.R. Sreenivasa Murthy - Chairman
2. Sri H.D. Arun Kumar - Member
3. Sri D.B. Manival Raju - Member

In the matter of determination of tariff in respect of Mini-Hydel, Bagasse based Co-Generation and Rankine cycle based Bio-mass Renewable Energy Projects

Preamble:

1. In exercise of the powers conferred under the Electricity Act, 2003 and the KERC (Power Procurement from Renewable Sources by Distribution Licensees) Regulations, 2004 framed thereunder, the Karnataka Electricity Regulatory Commission (KERC) had issued an order dated 18.01.2005, determining tariff for renewable sources of energy. The tariff determined in the said order was subject to review after five years. Accordingly, at the end of the control period the Commission had issued a tariff order for the renewable energy (RE) sources on 11.12.2009. The tariff so determined was to be reviewed after five years and was due for revision from 01.01.2015.

2. Meanwhile, the Commission issued the KERC (Power Procurement from Renewable Sources by Distribution Licensees and Renewable Energy Certificate Frame work) Regulations, 2011 repealing the 2004 Regulations. The 2011 Regulations empower the Commission to determine the tariff at any time for purchase of electricity from RE Sources by Distribution licensees. Under the above provisions, the Commission revised the tariff for wind power projects in its order dated 10.10.2013 in OP No.19/2012, superseding the order

dated 11.12.2009 in so far as it related to the tariff for wind energy projects. The said order is made applicable to all the power purchase agreements signed during the period of five years from the date of the Order. Further, the Commission determined the tariff for grid interactive solar power plants, including rooftop and small solar Photo voltaic power plants, in its order dated 10.10.2013. The tariff so determined is made applicable to the solar power generators entering into PPA on or after 01.04.2013 and up to 31.03.2018.

3. The generic tariff order for RE sources issued by the Commission on 11.12.2009 did not deal with tariff for biomass based generating units with air cooled condensers. On an application being filed before the Commission in this regard, the Commission in its order dated 10.07.2014 in OP No.18/2013 has determined the tariff for Biomass projects with air-cooled condensers which is applicable to all biomass based power projects using air cooled condensers achieving commercial operation during the period from 01.04.2014 to 31.03.2018. Thus, the Commission has issued separate generic tariff orders for wind energy, solar PV and solar thermal, including solar rooftop PV units and biomass based generating units using air cooled condensers, which are currently in force. The Commission, therefore now needs to determine generic tariff for Mini-hydel projects, Rankine cycle based biomass projects with water cooled condenser and bagasse based cogeneration projects.

4. The Renewable Energy Developers Association of Karnataka (REDAK), M/s. Bhoruka Power Corporation and M/s. Ambhuthirtha Pvt. Ltd, representing Mini-Hydel projects, had filed a petition in OP No. 47/2012 seeking determination of tariff for Mini-hydel projects with information on increase in capital cost and interest on term loan and working capital. The Commission in its order dated 03.07.2014 decided to hear the above petition along with the proceedings to be taken up for review of generic tariff for renewable sources which was due before 01.01.2015.

5. In the light of the above, the Commission issued a Consultation Paper on "*The proposed norms for determining generic tariff for electricity generated from Renewable Sources of Energy for the plants commissioned during the control*

period 01.01.2015 to 31.03.2018" inviting comments/suggestions/views from interested persons on the tariff proposals relating to renewable energy projects, namely, Mini-Hydel, Co-generation and Biomass projects, vide notification No. S/01/14 dated 31.10.2014. The Commission published its notice in The Indian Express, Times of India, Samyuktha Karnataka and Prajavani newspapers on 04.11.2014, in addition to hosting the same on the Commission's website. The Commission also held a public hearing on the tariff proposals on 09.12.2014, the notice for which was published in the Deccan Herald, The Indian Express, Samyuktha Karnataka and Vijaya Karnataka newspapers on 29.11.2014 in addition to the Commission's Website. The list of persons, who have submitted written comments/views/suggestions and tariff proposals, is enclosed as Annexure-1and the list of persons who made oral submissions in the public hearing, is enclosed as Annexure-2.

6. The Commission appreciates the active participation of stakeholders in these proceedings.

7. **After considering the written and oral submissions received in the matter and in exercise of the powers conferred under Section 62(1) (a) read with Section 64 and Section 86(1)(e) of the Electricity Act,2003 and Regulation – 9 of the KERC (Power Procurement from Renewable sources by Distribution Licensee and Renewable Energy Certificate Frame work) Regulations, 2011 and all other powers enabling it in this behalf, the Commission hereby issues the following Order:**

O R D E R

The comments/views/suggestions received from stakeholders/interested persons on the various issues raised in the consultation paper and the decisions of the Commission thereon are discussed below:

A. Common Issues:

I. Applicability:

a. Comments of stakeholders/Interested Persons:

On the applicability of the proposed tariff determination, M/s. Konark Power and M/s. Punjab Renewable Energy Systems Private Limited (PRESPL) have requested that the variable component of the tariff determined in the present proceedings should be made applicable to existing plants also. M/s. Dharwad Bio Energy Pvt. Ltd, M/s. Renuka Sugars and Sri Murali Subramanyam have requested to apply the norms determined in the current proceedings as well as the tariff to existing plants under operation. M/s. South Indian Sugar Mills Association (SISMA) has requested that the new tariff should be applicable to new projects commissioned and entering into PPA between 1.1.2015 and 31.3.2018. M/s. Power Company of Karnataka Limited (PCKL) has suggested that the tariff determined should be applicable for the useful life of the project so that the capital cost could be spread over the life of the project to avoid front loading of costs.

b. Commission's Views and Decision:

The Commission is of the view that applying the norms and tariff determined in this order to all the existing plants is not appropriate, as the Project costs incurred are different at different points of time and the existing plants would have already serviced their debt partly or fully. Regarding the applicability of the variable cost determined in this order to existing plants of Bagasse based Co-generation Projects and Biomass Projects, the Commission agrees that the variable costs consisting mainly of the fuel costs are similar both for the existing units and the units which will be coming up in the future. The Commission notes that the fuel prices vary from time to time in the absence of any long term contracts regarding fuel supplies. Therefore, the Commission will consider separately extending the fuel cost norms determined in this order also to the existing biomass based units and cogeneration units using bagasse as a fuel.

The Commission decides that the norms and tariff determined in this order shall be applicable to Mini-hydel power Plants, Bagasse based Co-generation Power Plants and Rankine cycle based biomass projects with water cooled condensers, that get commissioned during the period 01.01.2015 to 31.03.2018 for which PPAs have not been entered into, prior to the date of this order. For projects commissioned prior to the date of this order, the generic tariff determined by the Commission as on the date of commissioning of the projects shall be applicable. Further, in respect of projects for which power purchase agreements have been entered into prior to the date of this order, the tariff as per the said agreement shall be applicable even if the projects are commissioned subsequently. The tariff determined in this order shall be applicable for the term of the Power Purchase Agreements.

II. Methodology:

a. Comments of stakeholders/Interested Persons:

M/s. Dharwad Bio Energy Pvt. Ltd. and Sri Murali Subramanyam have stated that levelized tariff is not suitable for biomass projects which have a short loan tenure of 7 to 10 years and the debt servicing burden is heavy during the initial years. M/s. SISMA has suggested that two part tariff may be adopted with fixed cost levelized for the life of the plant and indexed to the year of commissioning of the project within the control period. Further, the variable cost may be determined for a period of three years (similar to CERC) and fixed separately for each calendar year. M/s Hindustan Power has suggested that dynamic Weighted Average Cost of Capital (WACC) may be adopted and tax shield should not be factored in computing WACC.

b. Commission's views and Decision:

The Commission is of the view that the levelized tariff approach would take care of the time value of money and also give certainty of tariff over the life of the project to the investors. For the ESCOMs and Consumers, it avoids front loading of the tariff, as the costs would get spread over the life of the project. Further, the Hon'ble ATE in its order in Appeal No. 82, 11, 49/2014 in respect of wind generators, has also directed the Commission to determine tariff on a levelized basis. Regarding, the contentions raised by Hindustan Power, the Commission notes that the same issues had been raised before the Hon'ble ATE and the petition has been dismissed.

Therefore, the Commission decides to determine the tariff on the basis of levelized costs over the life of the project, considering the life period of the project as 35 years for Mini-hydel projects and 20 years for bagasse based cogeneration and Rankine cycle based biomass projects with water cooled condenser. Further, to compute the levelized tariff, it is decided to consider the normative weighted average cost of capital as the discount factor.

III. Single part / Two part Tariff

a. Comments of stakeholders/interested Persons:

Most of the stakeholders have welcomed the proposal to adopt two part tariff for biomass and cogeneration units. However, KPTCL has opposed the proposal to determine two part tariff for Bagasse based co-generation plant and Bio-mass plants. It has stated that as a matter of Policy so far single part tariff has been adopted, taking normative fuel cost for fixing tariff with annual escalation provided for the same. Granting two part tariff and also providing fixed tariff including fixed cost would not be in public interest and adversely affect the consumers. The Commission being the custodian of consumer interest, cannot permit such double counting of costs. During the hearing, the counsel for KPTCL has expressed serious concern on the two part tariff and suggested that if two part tariff has to be adopted, the tariff has to be determined on a case to case basis.

M/s. PCKL has suggested that for air cooled condenser based biomass plants commissioned between 1.4.2014 and 1.1.2015, for whom tariff was fixed vide order 10.7.2014, Variable Cost should be separately determined.

b. Commission's Views and Decision:

The apprehension expressed by KPTCL that the fixed cost is paid even after initial ten years during which the bulk of capital cost is allowed as pass through in tariff is not correct, as levelized tariff will not factor debt servicing beyond the tenure of loan. In case of Biomass and bagasse based power plants which use bio-fuel, there is a variable component of cost which is volatile over the life of the project and hence such cost needs to be determined for a shorter duration of two to three years and reviewed thereafter, so as to absorb the risk of fuel costs variation. Further, the Hon'ble APTEL in order dated 19.10.2014 in Appeal No. 207/2013 has also held that, it would now be necessary to determine both fixed and variable components of the tariff for biomass based co-generation plant.

Regarding the suggestion of PCKL, the Commission is not going into the question of tariff for biomass based projects with air cooled condensers and therefore the issue is not being considered.

Hence, the Commission decides to adopt Single part tariff for Mini-hydel projects on a levelized basis and two part tariff for bagasse based co-generation projects and Rankine cycle based biomass projects with water cooled condensers, with the fixed cost levelized for the life of the project and the variable cost determined for a period ending 31.03.2018. The Commission will separately determine the allowable variable cost for the subsequent years after 31.03.2018.

IV. Factoring Incentives allowed by the Government:

a. Comments of stakeholders/interested Persons:

PCKL has requested to consider the subsidy or incentives from the Government in tariff computations as the Commission proposes to allow ROE of 16% on net basis.

b. Commission's Decision

As has been the policy earlier, the Commission, as a promotional measure, decides not to factor in any incentives/subsidies currently extended by the Central or State Government for tariff Computations of RE sources.

V. Tariff for infirm power injected during stabilization period and for energy generated beyond normative PLF:

a. Comments of stakeholders/interested Persons:

BESCOM and CESC have suggested 50% of the approved tariff as the rate for infirm power for mini hydel plants, stating that the same is not on par with variable costs of co-generation and bio-mass plants. For co-gen and bio-mass plants, they have suggested considering variable costs approved by the Commission. Further, BESCOM has proposed an incentive of 10 paise per unit for energy generated beyond normative PLF keeping in view 50 paise incentive prescribed for conventional projects by CERC. Dharwad Bio energy Pvt. Ltd. has stated that biomass plants have difficulty in ensuring steady and continuous operations and therefore, power generated by such plants, infirm or otherwise, has to be paid for at full tariff. M/s Link Legal on behalf of REDAK, during the public hearing has requested to pay generic tariff for the infirm power as an incentive for RE sources.

b. Commission's views and Decision:

Keeping in view the promotional aspect and the various orders passed by this Commission, the Commission decides to allow fifty percent of the generic tariff applicable to the specific type of project for infirm-power injected during the stabilisation period. For the energy generated beyond the normative PLF, tariff as per the PPA rate shall be payable in full. In the light of the above decision, generators will not be entitled to any additional incentive which was proposed in the consultation paper.

VI. Sharing of Clean Development Mechanism (CDM) benefits-

a. Comments of stakeholders/Interested Persons:

BESCOM and CESC have stated that the CDM benefits are not being shared even though there is a clause in the PPA and the CDM sales proceeds have to be shared on completion of each fiscal year duly furnishing documentary proof. Link Legal on behalf of REDAK has stated that the proposal to share CDM benefits with ESCOMs has to be dropped as the cost involved in obtaining CDM benefits is borne by the developers. However, they have not furnished any particulars of the cost incurred as requested by the Commission. SISMA has requested that the CDM benefits be allowed to be retained by the generating company as all risks, costs and efforts are borne by the generators. Sri B.G Rudrappa has stated that there is no justification for a lower proportion of CDM benefits being allocated to ESCOMs during the first 5-years, as owners of plants are assured of 16.2% returns.

b. Commission's views and Decision:

The Commission is of the view that the sharing of CDM benefits as proposed in the discussion paper is reasonable and decides as under:

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

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

VII. Reactive power charges & Start-up Power Charges

a. Comments of the stakeholders/Interested Persons:

BESCOM and CESC have stated that the reactive power charges presently approved in the PPA is 40 paise per unit which was fixed in 1999 /

2001 and have now suggested to charge Re.1 / unit for the reactive power to all RE generators. Regarding start-up power charges it has stated that, there is no specific clause in the PPA to bill the energy imported during the period when there is no generation. As such, they have proposed HT commercial tariff being applied for such power. PCKL has also suggested to levy HT – retail supply tariff, as approved by the Commission, from time to time for other than start up power.

b. Commission's views and Decision:

The Commission notes that BESCOM and CESC have not furnished any working details to justify the suggested increase of reactive power charges. In the neighbouring states the reactive power charges are as indicated below:

Reactive energy charges		
SERC	**kVArh charges Paise/Unit**	
Karnataka	40	As per approved PPA
MPERC	27	April 2013 order
GERC*	10 & 25	August 2013 order
TNERC**	25 & 50	2009 order

*** 10Paise for drawal of kVArh at 10% of or less of net energy exported and 25 paise for drawal more than 10%.**

***** 25 paise for drawal of kVArh at 10% of or less of net energy generated and 50 paise for drawal more than 10%**

The Commission notes that the reactive power charges levied by some of the States mentioned above is in the range of 27 paise to 50 paise / kVArh and **is of the opinion that the present reactive power charges at 40 paise / kVArh is reasonable and approves the same.**

Regarding the start-up power and power drawn by the generating units for other purposes (other than during construction), the Commission decides that tariff applicable to HT industrial consumers shall be recovered from the generating units.

VIII. Merit Order Dispatch

a. Comments of stakeholders/Interested Persons:

BESCOM has stated that merit order dispatch may be made applicable for RE projects selling power to third parties through traders under STOA or MTOA as there is scheduling and dispatch clause in the standard PPA of STOA or MTOA.

b) Commission's views and Decision:

The Commission notes that merit order dispatch is not applicable to open access / captive consumption cases where the procedures for transmission is separately detailed in the Open Access Regulations.

The Commission decides to continue its earlier policy of not applying Merit order dispatch for all RE-power projects, as a promotional measure.

B. Common Financial Parameters:

I. Debt Equity Ratio (DE Ratio):

a. **Comments of stakeholders/interested Persons:**

KREDL has furnished data on one water cooled condenser based 5 MW biomass plant wherein the equity considered is 100% and for six Co-gen plants wherein the equity varies from 20 to 35%. Similarly in case of mini hydel plants the equity varies from 30 to 40%.

b. Commission's views and Decision:

Keeping in view the norms contained in the Tariff Policy issued by Government of India and the norms prevailing in the Industry, the Commission decides to continue a normative Debt-Equity Ratio of 70:30.

II. Return on Equity (RoE) and Tax

a. Comments of stakeholders/Interested Persons:

BESCOM and CESC have suggested to delete the proposal of allowing taxes as pass through as during the initial tariff period there is tax holiday and also RE generators avail Accelerated Depreciation Benefit. KREDL has furnished data from DPRs which assume ROE varying from 12 to 14% for mini hydel plants. KPTCL has suggested ROE at 16%, but has requested that in case the equity deployed is less than 30% of the capital, the actual equity should be considered. PCKL has suggested that tax including surcharge & Cess should be considered at actuals or on RoE whichever is lower.

b. Commission's Views and Decision:

Regarding the suggestions of BESCOM, CESC and PCKL, the Commission is of the view that the tax would be a pass through only if it is paid and claimed with documentary proof. The suggestion of KPTCL cannot be adopted for RE sources on a case to case basis, as generic tariff is being determined in view of the large number of projects of different capacities.

The Commission decides to allow RoE at 16% on the Equity. Any tax paid on RoE is allowed as a pass through which shall be claimed separately from ESCOMs furnishing proof of payments.

III. Interest on Term Loan:

a. Comments of stakeholders/Interested Persons:

BESCOM and CESC have suggested an interest rate of 12%, keeping in view 11.75% interest rate approved in the tariff order of 2009 and the present long term interest rate of 10.75%.Matrix Pvt. Ltd. has suggested 13.5% interest rate, stating that current term loan interest rate is 13.5% for biomass projects which are associated with greater risks. In its subsequent submissions it has stated that there is no difference between the interest rate charged by banks for term loan and working capital. KREDL has indicated interest on term loan varying from 12 to 15% for mini hydel plants. SISMA has requested to fix the same in line with CERC Regulation i.e. 300 basis point over the weighted average base rate of 9.7% prevailing during the first six months of FY14. KPTCL has suggested 11.75% stating that the economy and the GDP is improving and the interest rates are likely to come down in the coming years. PCKL has requested to consider the loan tenure as 12 years in line with PFC tenure to avoid front loading of costs.

b. Interest Rate adopted by CERC and other Commissions:

The interest rate adopted by CERC and a few other Commissions which was discussed in the consultation paper is reproduced below:

Regulatory Commission	Interest rate	Order dated
Andhra Pradesh	12.00%	02.09.2011 & ATE order dated 20.12.2012
Tamil Nadu	12.70%	Draft consultative paper issued in October2014
Maharashtra	12.78%	Draft order dtd. 06.05.2014
Rajasthan	12.71%	23.07.2014
Gujarat	12.86%	08.08.2013
Madhya Pradesh	12.00%	02.03.2012
CERC	12.70%	15.05.2014

Commission's Views and Decision:

The Commission notes that the interest rate suggested by the Stake holders [excluding KREDL] is in the range of 11.75% to 13.50% and those adopted by various Commissions cited above are in the range of 12% to 12.86%. As pointed out by one of the stakeholders, the Interest rate charged by the banks depends upon the credit rating of the borrowers. Since the Commission is determining generic tariff, it would be difficult to assess the credit rating of individual generating companies and a normative interest rate needs to be adopted. The Commission, in its order dated 10.10.2013 for solar power plants has considered interest on term loan as 12.30% and in its order dated 10.07.2014, in respect of air cooled biomass power projects, has considered 12.5% [250 basis points above the then prevailing base rate]. **Following the same approach, the Commission decides to allow 12.5% as the rate of interest on long-term loans i.e.250 basis points above the SBI base rate. Further, keeping in view the tenure of**

loan adopted by CERC and some of the other Commissions, the Commission decides to adopt the tenure of loan as 12 years.

IV. Depreciation:

a. Comments of stakeholders/Interested Persons:

BESCOM has suggested to consider 90% of the asset value at the rate of 7% for depreciation or to consider 85% of the asset value with salvage value at 15%. CESC has stated that 90% of assets value at the rate of 7% for initial ten years may be considered. KREDL has indicated depreciation rates for mini hydel projects varying from 2.25% to 5.28% and for Co-gen plants 11 to 13%. KPTCL has suggested that the 7% depreciation during the first ten years would fully cover the debt repayment obligation. However, the remaining value of the asset considered at 15% of the capital cost excluding salvage value could be depreciated during the balance of plant life. PCKL has stated that, the depreciation shall be on 90% of the capital cost of the asset and shall be 5.28% for first 12-years and remaining shall be spread over useful life in line with CERC Regulations. Sri. B.G. Rudrappa has stated that the depreciation of 7% over ten years enables the firm to discharge the loan fully and the tariff after 10 years needs to be reviewed as there is no interest liability.

b. Commission's Views and Decision:

The Commission, in the consultation paper had proposed to consider 85% of the capital cost of the project as the asset value for the purpose of depreciation. As per data from various DPRs received from KREDL the cost of land in the capital cost of the project ranges between 3.6 % to 8.2 %. Further, it is decided to adopt a normative debt equity ratio of 70:30 with tenure of 12 years for the loan component. Thus, the debt servicing liability needs to be adequately provided for by depreciation during the first 12 years. The Commission notes that CERC has considered the depreciation rate for the first 12 years of the Tariff Period at 5.83% per annum and the balance depreciation is spread over the remaining useful life of the project from 13th year onwards. Further, in its order dated

25.11.2014, in Appeal No.11,49 & 82 of 2014, the Hon'ble APTEL has upheld the Commission's decision of adopting 5.83% as the rate of depreciation.

Accordingly, the Commission decides to adopt 5.83% as the depreciation rate per annum on straight-line method for the first twelve years. For this purpose 95% of the capital cost is considered as asset value after deducting the cost of land at 5% of the capital cost and taking 10% of the asset value as salvage value.

V. Interest on working capital (IWC):

a. Comments of stakeholders/Interested Persons:

BESCOM has suggested IWC of 13% keeping in view the average rate adopted by CERC and other SERCs at 12.82%. BESCOM has suggested the following components:

For Mini Hydel projects: O & M expenses for one month, Receivable equivalent to 2 (two) months' energy charges for sale of electricity at normative PLF and Maintenance spare's cost @15% of O&M expenses.

For Biomass & Co-generation projects: Fuel costs for two (2) months equivalent to normative PLF, O&M expenses for one month, Receivable equivalent to 2 months' fixed charges and variable charges for sale of electricity calculated on target PLF and cost of Maintenance spares at 15% of O&M expenses.

Matrix Agro Pvt. Ltd. has suggested IWC at 13.5%, considering the present base lending rate of 10.25%.

KREDL has indicated interest on working capital for mini hydel plants varying from 12 to 15%.

SISMA has requested to consider O & M expenses of one month, cost of maintenance spares at 15% of O & M expenses and two months' energy charges on normative CUF for the purpose of working capital. Further, it has requested to consider an interest rate of 13.33%, considering interest on WC at 350 basis point over and above the average SBI base rate prevailing during the previous year.

KPTCL has suggested that the IWC should be 1 to 1.5% over and above the term loan interest rate and has proposed a rate of 13%, keeping in view the weighted average SBI base rate during the first six months of previous year plus 300 basis points.

b. IWC adopted by CERC & some of the SERCs:

The interest rate proposed/adopted by CERC and some of the State Regulatory Commissions is indicated below:

Regulatory Commission	Rate of Interest	Reference
Andhra Pradesh	12.00%	02.09.2011 & ATE order dated 20.12.2012
Tamil Nadu	13.20%	Draft consultative paper issued in October 2014
Maharashtra	13.28%	Draft order dated 06.05.2014
Rajasthan	12.21%	23.07.2014
Gujarat	12.86%	Order dated 08.08.2013
Madhya Pradesh	13.00%	Order dated 02.03.2012
CERC	13.20%	Order dated 15.5.2014

c. Commission's Views and Decision:

The Commission notes that stakeholders have suggested interest on working capital in the range of 13.00% to 13.50% [excluding KREDL data] and that the interest rate adopted by various Commissions is in the range of 12% to 13.28%.The Commission in its order dated 10.10.2013 for solar power plants has considered interest on working capital as 13.00% and in its order dated 10.07.2014 for air cooled biomass power projects as 13.25%. **Keeping in view the above facts, the Commission decides to adopt 13.25% per annum as the interest on working capital.**

The Commission had proposed the quantum of working capital as equal to two months receivables. The stakeholders have generally accepted the proposed norm in this respect. The Commission notes that the CERC

Regulations in this regard provide for fuel costs for four months, O&M expenses for one month and spares at 15% of the O&M expenses in addition to two months receivables in respect of biomass and bagasse based projects. For mini-hydel projects the CERC Regulations provide for O&M expenses for one month, maintenance spares at 15% of O&M expenses in addition to receivables for two months. It is the Commission's view that the provision for two months receivables as working capital includes all the costs incurred by a generator including O&M expenses, maintenance spares, fuel costs, etc. Therefore, making a separate provision for consumables and spares, etc., will amount to providing for the same expenditure twice. However, keeping in view the need of biomass based RE projects to store fuel over an extended period, the Commission decides to allow additional variable cost of two months for such units.

Therefore, the Commission as per the earlier practice decides to allow two months' receivables as the component for WC for mini-hydel and bagasse based cogeneration units and two months receivables plus two months variable costs for biomass based RE projects.

C. Issues applicable to specific RE projects:

1. Mini-Hydel Projects

i. Capital cost

a. Comments of stakeholders/ Interested Persons:

BESCOM and CESC have suggested Rs.5 Crores per MW as capital cost for mini-hydel projects. KREDL has furnished the data of seven mini hydel projects based on DPRs, wherein the cost has varied from Rs.4.18 Crores per MW to Rs.8.13 Crores per MW. KPTCL, has worked out Rs.5.69 Crores/MW as the capital cost based on CERC indexation formula, but it has supported adoption of Rs.5.50 Crores/MW as proposed by the Commission. REDAK in OP No.47/2012 had sought capital cost of Rs.5.8 Crores per MW stating that the cost of Steel, Cement and electrical machinery and other items has changed and has furnished the various indices for 2009 and 2012. Further, REDAK has submitted that the latest order of CERC dated 15.05.2014 may be the guiding factor. *As per the latest order the tariff approved by CERC is : Less than 5 MW Rs.5.25/unit and 5 MW to 25MW Rs.4.45/unit.* During the public hearing REDAK has also suggested to adopt the indexation for capital cost as done by CERC. It has also suggested annual truing up of initial capital costs of mini-hydel projects.

b. Commission's Views and Decision:

In the 2009 Order, the Commission had approved Capital Cost of Rs.4.75 Crores/MW, which was 21.79% more than the cost approved in 2005. If the same percentage increase is applied, the current Capital Cost works out to Rs.5.79 Crores/MW. The capital cost for mini-hydel plants as approved by the Southern State SERCs has varied from Rs.4.5 Crores to Rs.6.0 Crores per MW. ESCOMs and KPTCL have sought the capital cost in the range of Rs.5.0 Crs to Rs.5.5 Crs/MW. While the CERC has not specifically indicated the cost of mini-hydel projects for Karnataka or any of the southern states, the indexed capital costs in other states is determined by them at Rs.577.67 lakhs for projects of 5 MW to 25 MW capacity and Rs.630.186 lakhs for projects of less than 5 MW capacity. The Commission considers it appropriate to adopt the capital cost close to the average indexed cost as determined by CERC in the context of mini-hydel projects in Karnataka. Considering the average of the Cost approved by CERC in its Order of May 2014, the Cost works out to Rs.6.03 Crs/MW.

The Commission does not consider it feasible to undertake truing up of the initial project cost on an annual basis as suggested by REDAK. Also, in order to provide certainty in respect of the investments required for mini-hydel projects which have a gestation period of more than one year, the Commission would like to fix the project cost for the period covered by this order i.e., up to 31.03.2018.

Hence, the Commission decides to adopt Rs.6.20 Crs/MW towards the capital cost of Mini-Hydel Projects including the evacuation costs without indexation for the control period up to 31.03.2018.

ii. Plant Load factor (PLF)

a. Comments of stakeholders/ Interested Persons:

On the PLF of mini-hydel projects, Link Legal during the public hearing has requested to obtain generation data from the utilities to arrive at a reasonable PLF. Sri B.G.Rudrappa has stated that the PLF depends on the availability of water and a study of the PLF of several existing plants can give an idea as hypothetical PLF impose burden on the common man while giving additional benefits to the developer. As per the data furnished by KREDL the PLF varies from 18.9% to 60% with a weighted average of 35.03%. BESCOM has suggested a PLF of 32% to 35%. Substantiating the stand, BESCOM has furnished data for three years from FY12 to FY14 wherein the PLF of certain mini-hydel projects has varied from 33.5% to 68.2%. BESCOM has also relied upon the PLF of 32% approved by APTEL in the case of Andhra Pradesh. The data obtained from MESCOM for 2013-14 in respect of 16 projects shows an average PLF of 28.86%.

b. Commission's Views and Decision:

Based on the above inputs, the Commission decides to adopt PLF of 30% for mini-hydel projects which is also in line with the PLF adopted in CERC's Order.

iii. Auxiliary Consumption

a) Comments of stakeholders/Interested Persons:

On the Commission's proposal to continue the existing norm for auxiliary consumption at 1%, KREDL has furnished data, which indicates auxiliary consumption in the range of 1 to 1.5%.

b) Commission's Views and decision:

The Commission notes that APERC, KSERC as well as CERC have approved auxiliary consumption of 1% for mini-hydel plants. **As such the Commission approves auxiliary consumption at 1% of the annual generation.**

iv. O & M expenses and annual escalation rate:

a. Comments of stakeholders/Interested Persons:

On O&M expenses, KREDL has furnished data indicating O & M expenses in the range of 1.5% to 2% of the capital cost. KPTCL has requested to continue the existing 1.5% of capital cost with 5% escalation as there will be minimum repair and maintenance in small hydro plants utilizing turbo generator manufactured by standard manufacturers and with installation of SCADA minimum personnel are required to operate the plant. PCKL has stated that the rate of O & M expenses should be different for higher and smaller capacity plants as cost of manpower and other costs decrease with large scale of operation.

b. Commission's Views and Decision:

The Commission notes that the weighted average percentage of O & M expenses as per data furnished by KREDL works out to 1.6%. The O & M expenses considered by various Commissions are indicated below:

Regulatory Commission	O & M expenses	Order dated
Andhra Pradesh	3.5% of capital cost with 6.69% annual escalation.	June 2013 order based on APTEL norms
Kerala	14 lakhs/MW for 5 MW to 25 MW with annual escalation of 5.72% 20 lakhs/MW for less than 5 MW with annual escalation of 5.72%	KSERC (Power Procurement from Renewable Sources by Distribution Licensee) Regulations, 2013
CERC	15.65 lakhs/MW for 5 MW to 25 MW with annual escalation of 5.72% 22.35 lakhs/MW for less than 5 MW with annual escalation of 5.72%	15th May 2014

Keeping in view the above factors, the Commission decides to allow O & M expenses at 2.0% of the capital costs for Mini-hydel projects, with an escalation of 5.72% per annum.

2. Bagasse based Co-Generation Projects

i. Capital cost

a. Comments of stakeholders/Interested Persons

On the capital cost of cogeneration projects, Renuka Sugars has suggested Rs.4.75 Crores / MW considering annual escalation of 5% over 2 years on the approved figures of Rs.4.30 Crores / MW. SISMA has stated that, KERC in its order dated 29.3.2012 approved capital cost of Rs.4.34 Crores per MW by indexing the cost to WPI for steel and electrical machinery in line with CERC Regulation. Applying the same logic the cost for FY 15 will be Rs.5.43 Crores per MW and has requested to adopt the same. During the hearing it was submitted that the capital cost varies between Rs.5.50 Crores to Rs.6.00 Crores per MW, with smaller units costing more than the normal projects. It was also submitted that the plant & machinery cost would be around Rs.4.08 Crores. KREDL has submitted data of six plants out of which two are for capacity enhancement. As per the data furnished the cost per MW varies from Rs.5.21 Crores per MW to Rs.14.03 Crores per MW for green field projects and between Rs.2.65 Crores to Rs.3.56 Crores per MW for capacity enhancement projects. KPTCL, even though has worked out a capital cost of Rs.4.4 Crores/MW, it has agreed for the proposed Rs.4.50 Crores/MW including evacuation cost. Sri Dharmalingam of Chamundeshwari Sugars has stated that, the parameters specified by the Commission could be achieved only by adopting energy conservation measures which involves higher cost. For this purpose, he has suggested that a Capital Cost of Rs.5.5 Crores per MW need to be considered for Cogeneration Plants.

b. Commission's Views and Decision:

The Commission notes that the capital cost adopted by some of the Commissions referred in the Consultation Paper is in the range of Rs.3.25 Crs/MW to 4.75 Crs/MW. Further, in the 2009 Order, Capital Cost approved by this Commission was Rs.3.65 Crores/MW, which was 21.67% more than the cost approved in 2005. If the same percentage is applied, the present Capital Cost works out to Rs.4.44 Crores/MW. Further, considering the capital cost of Rs.4.30 Crs approved by this Commission in its order dated 29.03.2012 consequent to Hon'ble ATE's direction and applying 5% escalation to account for inflation, the present capital cost works out to Rs.4.73 Crs/MW. The Commission notes that, as per KREDL data, the overall weighted average capital cost is Rs.6.68 Crores per MW. The approved capital Cost by CERC is Rs.4.41 Crs/MW.

The Commission notes that, there is great variation in the capital cost norms suggested by different stakeholders which is probably due to the variation in the boiler pressure and other factors associated with the plant and machinery used by different sugar factories.

Therefore, the capital cost considered in CERC Tariff Order of 15th May 2014, acts as a guiding factor. Since the Commission has proposed to have the same capital cost norm for the entire control period without indexation, the Commission decides to adopt a Capital cost of Rs.4.75 Crs/MW including evacuation cost.

ii. Plant Load factor

a. Comments of stakeholders/interested Persons:

SISMA has submitted that the actual PLF of co-generation plants in Karnataka is around 50%, due to variation in the crushing period (140 to 160 days) on account of fluctuating rainfall and weather conditions. KPTCL has agreed with the Commission's proposal of 60% PLF. However, according to data submitted by KREDL, the PLF varies from 80 to 90%.

b. Commission's Views and Decision:

The Commission notes that the data furnished by KREDL is based on DPRs and not actuals. On the other hand SISMA has not substantiated its stand of 50% PLF based on actual data. CERC has adopted 60% PLF for Maharashtra and Tamil Nadu, and 45% for Andhra Pradesh. In the absence of any material evidence being furnished by stakeholders, **the Commission decides to continue with the existing norm of PLF of 60% for the Co-generation Plants.**

iii. Auxiliary Consumption

a. Comments of Stakeholders/interested persons:

The Commission in its Consultation paper had proposed auxiliary consumption of 8% of the co-generation. BESCOM and CESC have suggested an auxiliary consumption of 8.5% keeping in view 9% approved by Andhra Pradesh and 8.5% approved by CERC. Renuka Sugars has requested for considering auxiliary consumption of 10% stating that bagasse having 50% moisture requires extra air to have complete combustion of fuel requiring higher capacity fans for primary and secondary air supply. Further, the product of combustion is also voluminous and to evacuate the same high capacity induced draft fans are used. The firm has furnished research paper titled "Characterizing Fuels for Biomass-Coal Fired Co-generation" to substantiate the excess air requirement in case of higher moisture fuels. KREDL has indicated auxiliary consumption varying from 9 to 12%. SISMA has requested for auxiliary consumption to be fixed at 8.5% stating that the actual is 10% plus and other States have allowed auxiliary consumption in the range of 8.5% to 9%.

b. Commission's Views and Decision:

In justifying its stand Renuka Sugars has referred to a research paper on excess air requirements. Perusal of paper indicates that the excess air requirement is a function of moisture and primary air temperature. The firm has not furnished any details with respect to primary air temperature and moisture for the co-gen plants in Karnataka, to justify its stand.

The Commission notes that various State Commissions have approved the auxiliary consumption in the range of 8.5% to 9% and CERC has approved the same at 8.5%. **Hence, the Commission decides to allow auxiliary consumption at 9%.**

iv. O& M expenses and annual escalation rate:

a. Comments of stakeholders/Interested Persons:

Regarding the O&M expenses, Renuka Sugars has suggested 4% of the capital cost with annual escalation at 5.72%. Alternatively it has suggested to adopt CERC norms, as per the order dated 15.05.2014. During the public hearing, it was requested to consider O & M expenses at Rs.18 to Rs. 20 lakhs per MW per annum. SISMA has suggested considering 3% of capital cost as the O & M expense with 5.72% escalation. KREDL has furnished data according to which the O & M expenses varies from 2% to 10% of the capital cost. Sri Dharmalingam, Chamundeshwari Sugars has requested to include AMC costs in O & M expenses.

b. Commission's Views and Decision:

The Commission notes that except Andhra Pradesh [4%], the State Commissions of Tamil Nadu, Gujarat and Madhya Pradesh have adopted 3% of capital cost and SISMA has also suggested 3% of capital cost as O &M expense. Regarding SISMA's suggestion for annual escalation of 5.72% the Commission notes that the same is in line with CERC's Order.

Based on the above, the Commission decides to allow 3% of the Capital Cost as O & M expense with 5.72% as the escalation rate per annum.

v. Specific Fuel Consumption:

a. Comments of stakeholders/Interested Persons:

The Commission, in its consultation paper had proposed Specific fuel consumption at 1.6 kg/kWh. KPTCL has accepted the Commission's proposal and no other stakeholders have furnished any comments.

b. Commission's Views and Comments:

In view of the above, the Commission decides to continue the existing specific fuel consumption of 1.60 kg/kWh.

vi. Fuel cost:

a. Comments of stakeholders/Interested Persons:

With regard to the fuel cost, BESCOM has suggested a fuel price of Rs.1500/ MT for FY15 with 5% escalation, quoting the CERC order of May 2014 wherein the cost for different States are in the range of Rs.1553 to Rs.2209/ MT. CESC has concurred with the rate proposed by the Commission. Renuka Sugars has proposed landed cost of fuel as Rs.2000/tonne. It is stated that the average cost of purchase of bagasse in 2013-14 was Rs.2252/MT and has furnished details of the bagasse purchased. The firm has also referred to the CERC order dated 15th May 2014, wherein the cost of bagasse for other States including Karnataka is estimated at Rs.1881.27/MT and also MERC order dated 7th July 2014, wherein the bagasse priced is considered as Rs.2177/tonne. During the hearing it has requested to consider the landed cost of bagasse at Rs.2250/MT as the basic cost is about Rs.1800/MT. It has also stated that at present the cane price is about Rs.2500/MT and 30% of bagasse is generated for every tonne of cane crushed. SISMA has stated that cane price has escalated by 63% between 2009 and 2014 (Rs.1350/MT in 2009 to Rs.2200/MT in 2014). Based on this, the bagasse price works out to Rs.1670.37/MT. Therefore, SISMA has requested for a price of Rs.2,174/MT or atleast Rs.1878.81/MT. During the Public hearing it has also suggested to link the bagasse price to the FRP for cane published by GoI.

Commission's Views and Decision:

The Commission had proposed fuel cost at Rs.1281/MT in the discussion paper. The Commission notes that, Renuka Sugars has furnished bills for selective months, based on which average for the entire year cannot be arrived. Regarding the suggestion of SISMA to link the bagasse price to the cane price, the Commission notes that SISMA has not demonstrated convincingly that correlation exists between bagasse price and cane price. Further, the Commission notes that bagasse is a by-product in sugar industry and does not cost anything to the company in terms of revenue outflow. The sugar mills would purchase bagasse/biomass only to the extent of shortfall.

Keeping in view the price of Rs.1500/MT suggested by BESCOM, CERC's price of Rs.1879/MT and SISMA's own estimate of 1674/MT based on cane price and considering the fact that in-house bagasse is available at free of cost, **the Commission decides to allow Rs.1600/ MT as the Fuel cost for bagasse.**

3. Rankine cycle based Biomass projects with water cooled condenser:

i. Capital cost:

a. Comments of Stakeholders/Interested Persons:

Against the Commission's proposal of Rs.5.25 Crores per MW, Matrix Agro Pvt. Ltd has suggested Rs.7.40 Crores/MW as capital cost. KREDL has furnished data for one water cooled 5 MW plant indicating a cost of Rs.975 lakhs, the cost per MW working out to Rs.1.95 Crore per MW. PRESPL has stated that the capital cost is much higher than the cost of Rs.5.44 Crores/MW approved by CERC order dated 15.5.2014 for FY15. During the hearing PRESPL has however informed that the difference in capital cost between air cooled and water cooled biomass plant is about Rs.40 lakhs/MW as per the latest CERC's order and suggested to maintain this difference in the Capital Cost. KPTCL, has worked out capital cost at Rs.5.92 Crores/MW. During the hearing, Sri Yugesh representing Bank of India, submitted the Commission that Bank of India along with Bank of Baroda has extended loan to an extent of Rs.38.50 Crores for the 10 MW Plant at Haveri and Dharwad. He submitted that the estimated cost of the Project was Rs.55 Crores for 10 MW Plant and the actual cost reported is about Rs.62 Crores.

b. Commission's Views and Decision:

The Commission had proposed a capital cost of Rs.5.25 Crores per MW in its consultation paper.

The Stakeholders have indicated capital cost varying from Rs.5.25 Crs/MW to Rs.7.40 Crs/MW. The capital cost adopted by some of the Commissions referred to in the Consultation Paper is in the range of Rs.4 to Rs.5.26 Crs/MW. As per CERC tariff order dated 15.5.2014, the capital cost is determined at Rs.5.44 Crores for projects using fuels other than rice husk and juliflora and Rs.5.95 Crores/MW for those using rice husk and juliflora (CERC average cost works out to Rs.5.69 Crs/MW). In the order dated 10.07.2014, this Commission had approved a capital cost of Rs.5.80 Crs/MW for air cooled condenser based biomass projects and considering the cost differential between air-cooled and water-cooled biomass plants, the Capital cost may be fixed at about Rs.5.50 Crs/MW. Since the Commission proposes to fix a uniform capital cost norm without indexation for the control period, a higher amount needs to be approved as capital cost for biomass based projects.

In the light of the above, the Commission approves capital cost of Rs.5.70 Crs/MW for Biomass based power plants with water cooled condensers including the cost of evacuation.

ii. Plant Load factor:

a. Comments of stakeholders/Interested Persons:

The Commission, in its consultation paper had proposed PLF of 75% for biomass projects. Konark Power has suggested a PLF of 70%. KREDL has furnished a PLF of 80% pertaining to 5 MW plant of Gujarat Ambuja Export Ltd.

b. Commission's views and Decision:

The Commission notes that stakeholders have suggested PLF in the range of 70% to 75% and KREDL's data for a single plant indicates PLF of 80%. The PLF adopted by CERC and some of the State Commissions discussed in the consultation paper is in the range of 75% to 80% (after the stabilisation period).

The Commission is of the view that the PLF at 75% is reasonable and hence approves the same.

iii. Auxiliary Consumption:

a. Comments of stakeholders/Interested Persons:

The Commission, in its consultation paper had proposed auxiliary consumption of 9% of the generation. BESCOM and CESC have suggested 10% auxiliary consumption. Matrix Agro Pvt. Ltd. has suggested 12% stating that the auxiliary consumption allowed by other SERCs is in the range of 10% to 13% and that in their plant they are using heavy biomass shredder, lighting of biomass stockyard, pumping water from nearby river which has increased the auxiliary consumption. KREDL has furnished Auxiliary consumption of 10% pertaining to 5 MW plant of Gujarat Ambuja Export Ltd. PRESPL has submitted that for water cooled condenser based projects CERC has fixed 12% for first year, 11% afterwards and have prayed for 12% in first year and 11% afterwards. KPTCL has agreed to the Commission's proposal.

b. Commission's Views and Decision:

The auxiliary consumption approved by various States referred to in the consultation paper is in the range of 10 to 10.5% and CERC has approved 11% during 1st year of operation and 10% from 2nd year onwards.

Considering the above, **the Commission decides to adopt 10% of energy generated towards auxiliary consumption.**

IV. O & M expenses:

a. Comments of Stakeholders/interested persons:

M/s. Konark Power has stated that the O & M expenses have gone up and has suggested Rs.45 lakhs /MW. PRESPL has stated that CERC in its order has fixed normative O & M expenses of Rs.42.29 lakhs/MW as against Commission's proposal of Rs.23.20 lakhs/MW and that the growth of technical man power in such plants in Karnataka is hampered due to inadequate salary and persons are not available to operate such plants resulting in technical man power moving out of the State. Therefore, PRESPL has prayed for O & M expenses at Rs.42.29 lakhs/MW for FY15. Further during the hearing it has been submitted that O & M cost need to be determined independent of the capital cost instead of being considered as a percentage of the same. Dharwad Bio energy Pvt. Ltd. has suggested O & M expenses of Rs.44.2 lakhs /MW and has furnished break up of costs for 10 MW plant. M/s. Matrix Power Pvt. Ltd. has proposed Rs.37 lakhs/MW or 5% of the capex with 6% annual escalation. In subsequent submissions, has requested to consider O &M expenses at 5.25% to 5.50 % of Capital cost with 10% escalation per annum, stating that O& M contract does not include supply of spares, personnel for fuel & ash handling and raw water handling and admin staff including plant manager. GE Power & Water has suggested O & M expenses in the range of 50 paise to Rs.1 per unit depending on the technology. Sri Murali Subramanyam has stated that O & M expenses should be determined independent of capital cost. Storage and handling cost should also be factored in the tariff. Sri Vijaya Bhaskar, Operational Energy Group, has stated that Operational Energy Group is carrying out O&M for Dharwar Bio-Energy Project at a cost of Rs.18.5 lakhs per month. He has submitted that the O&M expenses includes the cost of labour for fuel feeding, engineers and supervisors and does not include spares and consumables.

b. Commission's Views and Decision:

The Commission had proposed to continue 4.0% of the Capital cost as the allowable O & M expenses in the base year with 5% annual escalation for the biomass plants.

The Commission notes that M/s Matrix Agro and Konark Power have not justified their suggested norm with working details. PRESPL has relied on CERC's order which is only a guiding factor for the Commission and not binding. M/s Dharwad Bio Energy has furnished a copy of O & M agreement with Thermax, which indicates the first year cost as Rs.226.80 lakhs [which works out to Rs.22.68 lakhs/MW for 10 MW plant of the firm] with 10% annual escalation. The Commission notes that CERC has approved O & M expenses at Rs.42.29 lakhs per MW based on the report of a Committee constituted by them which had recommended Rs.40 lakhs per MW. This Committee's recommendation was itself based on figures given by the Biomass Association which projected O&M expenses between Rs.35 lakhs per MW and Rs.72.44 lakh per MW. The Committee has clearly indicated that it was not very comfortable to rely upon the figures given by the Biomass Association.

We have taken into account the fact that the maintenance contract for biomass plants of about 10 MW capacity are given in the range of Rs.20 lakhs per MW per year. **Allowing another Rs.10 lakhs per MW for spares and consumables, the Commission decides to allow O&M expenses of Rs.30 lakhs per MW with escalation of 5.72% per annum.**

c. Specific Fuel Consumption

i. Comments of stakeholders/Interested Persons:

Konark Power Ltd. has requested to adopt GCV of 3100 kcal/kg and SHR of 4200 kcal/unit for travelling grate boilers and 4125 kcal/unit for AFBC boilers in line with CERC's order. It has also suggested to have a SHR of 4500 kcal/unit for projects which have completed ten years. The firm has also referred to APTEL order in Appeal No.150/2011 wherein the APTEL has arrived at SFC of 1.36 kg/unit with a station heat rate of 4500 kcal/unit.

Dharwad Bio energy Pvt. Ltd has stated that the actual moisture content of biomass ranges between 30% to 40% and the calorific value varies between 2600 kcal/kg to 3000 kcal/kg resulting in specific consumption of 1.25 to 1.45 kg/kwh. The firm has furnished certificates of fuel analysis in support of the above and has requested a specific fuel consumption of 1.35 kg/unit. During the hearing it has stated that, unlike rice husk, cotton stalks have high moisture content of about 50% and need processing before use. As such, higher specific consumption of 1.6 Kg per Unit needs to be considered.

PRESPL has stated that Station Heat Rate proposed by the Commission is substantially different from that of CERC at 4200 k.Cal/kWh and Rajasthan at 4300 k.Cal/kWh and has prayed for 4200 K.Cal/kWh. Further, it has stated that KERC has proposed GCV of 3300 k.Cal/kg against CERC's 3100k.Cal/kg and has prayed for 3000 k.Cal/kg. In Karnataka Cotton stalks are collected once a year and stored in open for consumption, which leads to 20% loss and prone to accumulation of excessive moisture. During the public hearing it has submitted that a 10 MW plant requires about 300 tonnes/day of biomass.

Matrix Agro Pvt. Ltd. has suggested Station Heat rate (SHR) of 3900 Kcal/kwh stating that SHR considered by other States is in the range of 3800 – 4440 kcal/kwh. In the public hearing it has stated that the SHR varies between 3900 to 4000 kcal/unit. The gross Calorific value of fuel is suggested at 3200 kcal/kg. During the public hearing GCV of 3000 kcal/kg has been suggested. Hence, they have suggested Specific fuel consumption of 1.22 kg/kwh

Sri Murali Subramanyam has stated that the specific fuel consumption (SFC) of 1.18 kg per unit proposed by the Commission would be suitable for rice husk projects having moisture less than 20%. However, specific fuel consumption 1.3 to 1.45 is required for agro residue based Biomass having moisture content in the range 40-50%.

Sri Vijaya Bhaskar, Operational Energy Group submitted that the SFC for the plant varies from 1.28 to 1.7 Kg/unit.

ii. Commission's Views and Decision

The Commission, in the consultation paper had proposed specific fuel consumption of 1.18 kg/kWh considering SHR of 3900 kcal/kWh and GCV of 3300 kacl/kg.

Konark Power and PRESPL have not furnished any documentary evidence to substantiate its claim except for relying on CERC's order. CERC norms are guiding and not binding on SERCs. Regarding the fuel analysis certificates furnished by Dharwad Bio energy Pvt. Ltd, it is noted that the test report furnished by AGNI clearly specifies that the analysis is for a single sample and is in no way representative of fuel as a whole. Thus relying on a single sample to decide about GCV would not be appropriate. Though the firm was requested during the public hearing to furnish the log book extract to support their contention, the same has not been furnished. Matrix Agro Pvt. Ltd. has not justified its stand with documentary evidence.

In the light of the above, the Commission has to rely on the available material on hand. In this context the Commission notes that various SERC's and CERC have adopted the following norms:

Regulatory Commission	SHR kcal/kWh	GCV kcal/kg	Specific fuel consumption kg/kWh	Order
Andhra Pradesh	4200	3100	1.35	Dated 16.05.2014
Tamil Nadu	3840	3200	1.20	Draft consultative paper issued in october2014
Maharashtra	3800	3611	1.05	Draft order dated 06.05.2014
Gujarat	3950	3400	1.18	Dated 08.08.2013
Madhya Pradesh	3800	3600	1.05	Dated 03.05.2013
Rajasthan	4300 during stabilisation and 4200 thereafter	3400	1.27 during stabilisation and 1.24 thereafter	Dated 23.07.2014

CERC	4200 for travelling grate boiler 4125 for AFBC boiler	3100	1.35 for travelling grate boiler 1.33 for AFBC boiler	Dated 15.05.2014

The Commission notes that the SHR varies from 3800 kcal/kWh to 4300 kcal/kWh with an average of 3996 kcal/kWh. The GCV varies from 3100 kcal/kg to 3611 kcal/kg with an average of 3314 kcal/kg. The norms adopted by CERC are 4200 kcal/kWh for travelling grate boiler and 4125 kcal/kWh for AFDC boilers. In respect of GCV, CERC have adopted a norm of 3100 kcal/kg. According to the Indian Institute of Science, Bangalore as cited in the Report of the Committee constituted by CERC, the weighted average GCV of biomass in Karnataka is 3576 kcal/kg. The Commission in its recent order dated 10.7.2014 has approved SHR of 3900 kcal/kWh and GCV of 3300 kcal/kg for air cooled condenser based biomass projects. Further, the TERI Study commissioned by this Commission in 2012-13 had indicated a GCV of 3040 kcal/kg and SHR of 3740 kcal/kWh to 4300 kcal/kWh in respect of fuel used by two plants in Karnataka.

Thus, the Commission is of the view that the SHR mainly depends upon the turbine and boiler efficiencies, which in turn vary with the capacity of the plant with higher capacity plants having better efficiencies. However, while determining generic tariff the Commission has to follow a normative SHR and based on the data available, the Commission is of the view that SHR of 4000 kcal/kWh is reasonable**. Hence, the Commission approves a SHR of 4000 kcal/kWh**

Regarding the GCV, the Commission notes that the average of GCV considered by SERCs is 3314 kcal/kg. **The Commission, therefore considers GCV of 3,300 kcal/kg as reasonable and approves the same.**

Thus, considering SHR of 4000 kcal/kWh and GCV of 3300kcal/kg the Commission approves SFC at 1.21 kg/unit.

V. Fuel cost:

a. Comments of interested persons:

In response to the Commission's consultation paper, the Ministry of New and Renewable Energy (MNRE) have suggested that the Commission may take cognizance of the values notified by the CERC while determining the tariff for FY15, so that existing biomass plants be put back into operation. They have further stated that the estimated cost of fuel for 1 MW biomass power plants requiring about 10,000 tonnes of biomass per year will be about Rs.1 crore (this works out to about Rs.1,000 per MT of biomass), which would benefit people residing in the vicinity of the biomass based units.

Konark Power has submitted that the base price of fuel cost and other variable cost parameters should be considered as per the CERC order dated 15.05.2014 and amended Regulations. It has also suggested to constitute a Committee or an independent agency to furnish the market prices on a yearly basis and fix the price accordingly. It has requested that a fuel price of Rs.3,600/MT as approved by MERC in the order dated 7.7.2014.

Dharwad Bio Energy Pvt. Ltd. has stated that the Commission has not considered the processing cost of raw fuel and therefore has requested to add Rs.500/tonne to the cost of the biomass. During the public hearing, it has also requested to index the fuel cost with imported coal on energy content basis.

Matrix agro Pvt. Ltd. has suggested Rs.2500/tonne with 5% annual escalation and has stated that storage and handling cost of Rs.400 to 500 per tonne which includes lease rentals for storage, cost of transporting from storage from fuel handling system and wastage needs to be considered.

GE Power & Water has suggested fuel cost in the range of Rs.2 per kg to Rs.3 per kg

PRESPL has stated that as per their interaction with the farmers of Karnataka, the actual Bio-mass cost is Rs.3000/MT in FY15 as delivered at boiler tip. Further as per a study report 30% of the Bio-mass is exported from Karnataka to neighbouring States and the State will lose the resource from agricultural waste available within the State. Thus it has prayed for Rs.3000/MT. Further, it has suggested escalation in the range of 7 to 10% p.a. as against 5% proposed. Further, PRESPl during the public hearing have stated that within a radius of 25 Kms from the plant the biomass cost is in the range of Rs.1950 to Rs.2100/MT and an additional cost of bailing and chipping equipment of about Rs.150 to Rs.200/tonne is required. Further it has stated that at the boiler tip the cost of the fuel would be Rs.4000/MT.

Mr. Dinesh J.Kagathi has requested to index the Bio-mass price to the price of imported Coal or e-auction Coal from time to time. Further he has stated that based on the average cost of e-auction of coal for the month of August 2014, the cost for 1000 K.Cal. including taxes and transportation to factory would be Rs.1.14 which translates to Rs.3762/ton. Hence, he has requested to fix the price at Rs.3762/ton for FY 15.

Representatives of farmers from Navalgund made the following submissions:

a. At present, they are getting Rs.2500/- per MT from the Company for the raw fuel delivered at the gate of the Company.
b. Fuel price should be increased to Rs.3500 to Rs.4000 per MT for cotton stalks as the present price is not economical.
c. While one of the farmers submitted that the tractor hire charges would be Rs.2000 to Rs.2500 (around Rs.100/- per KM) and that the labour cost would be around Rs.1500 for 7 to 8 workers for collecting the fuel, another farmer informed that it would be around Rs.1200 per load including labour charges;
d. Fuel is supplied from a distance of about 20 KMs from the factory.
e. Prior to the commissioning of the Plant, the Biomass was being burnt.

Representatives of farmers from Haveri made the following submissions:

a. One of the farmers submitted informed that they are paid Rs.3500 per MT for jowar stalks, Rs.2500 for jowar leaves and grass and Rs.2500 for cotton stalks and that the farmers at present are saving about Rs.700 – Rs.800 per ton. Another farmer submitted that maize stalks and cotton stalks are paid at Rs.2500 per MT and prosopis juliflora is paid at Rs.3500 per MT and requested for a fuel price of Rs.4000 – Rs.5000 per MT. Yet another farmer submitted that the maize stalks would cost Rs.3500 per MT and cotton stalk at Rs.2500 per MT and the present price would benefit farmers who are in the radium of 5 – 10 KMs from the Plant.

b. Per acre, 2.5 to 3 tons of cotton stalks is available.

c. The hiring cost of tractor would be about Rs.2000 per load and each tractor would carry a load of 1.5 tons.

d. Biomass prices depend upon rainfall and other climatic conditions.

Sri Murali Subramanyam has stated that the variable cost should be indexed and for this purpose labour wage index, retail price index, coal parity, etc, could be considered.

Commission's Views and Decision:

The suggestions of MNRE, Konark Power and PRESPL to adopt CERC norms for bio-mass plants are noted. It is seen that the Committee appointed by CERC was unable to come to any conclusion on the price of biomass in the absence of reliable data. They had therefore recommended that the fuel pricing mechanism for the biomass power plants should be based on an independent survey to be conducted by the concerned state nodal agencies at the beginning of every year. Further, the Commission appreciates the position that the cost of biomass varies from state to state and within each state from district to district. The CERC norms, therefore, can only be a guiding factor in matters like biomass prices.

Regarding the suggestion of linking the price of biomass to the e-auction price of coal, the Commission is of the view that at the present juncture this is not a feasible suggestion in view of the major changes contemplated in the coal sector which would have a bearing on the availability and price of coal for the power sector. Alternatively, the suggestion for linking the cost of biomass to the prices of agricultural produce needs detailed analysis to establish the correlation between the price of biomass and the price of different kinds of agricultural produce. It also requires assigning weights to various agro products, as biomass plants use fuels of various types, which is a complex exercise and cannot be taken up immediately.

In the light of the above, the Commission has to arrive at a normative price of the fuel with the available information. The Commission notes that representatives of farmers who had participated in the earlier public hearing held on 15.5.2014, had stated that they were being paid Rs.1800/- to Rs.2000/- per ton for the fuel delivered at the site of the RE projects. The farmers who participated in the present proceedings from the same project areas have claimed that they are being paid Rs.2500/- per MT for the delivered fuel and requested the Commission to increase the same to Rs.3500/- to Rs.5000/- per MT. There were other statements made by them which revealed their desire to have higher prices determined for biomass rather than the actual price being paid to them. The farmers also could not produce any vouchers or receipts in proof of their having received the amounts paid to them. **In the above circumstances, the Commission is of the view that there is no substantial change in the business environment in the past 5 months, after the issue of the Order dated 10.7.2014, which calls for any major revision of the fuel price fixed by the Commission at Rs.2000/- per MT. However, the Commission decides to adopt the fuel price of Rs.2000/- per MT fixed in its order dated 10.07.2014 with an increase of Rs.100/- for the base year FY-15. Further, the Commission, keeping in view the requests made by the Stakeholders proposes to provide an escalation of 5.72% per annum for the fuel cost.**

In the light of the above discussions and considering the approved parameters, the Commission hereby approves the tariff in respect of Mini-Hydel, Bagasse based Co-generation and Rankine cycle based Biomass Power Plants with water cooled condenser as follows:

Parameter	Mini-Hydel	Bagasse based Co-generation	Rankine cycle based Biomass
Debt: Equity	70:30	70:30	70:30
RoE	16%	16%	16%
Income Tax on RoE	Pass through	Pass through	Pass through
Interest on term loan	12.50%	12.50%	12.50%
Depreciation	5.83% for first 12 years and balance spread over the life of the plant	5.83% for first 12 years and balance spread over the life of the plant	5.83% for first 12 years and balance spread over the life of the plant
Interest on WC	13.25%	13.25%	13.25%
Capital Cost[CC] - RsCrs/MW	6.20	4.75	5.70
O& M as percentage of CC for base year	2.0%	3.0%	Rs.30 lakhs /MW for base year
O & M annual escalation	5.72%	5.72%	5.72%
PLF	30%	60%	75%
Auxiliary	1%	9%	10%
Specific Fuel consumption-Kg/kWh	Not applicable	1.60	1.21
Fuel Cost-Rs/MT	Not applicable	1600	2100
Discount Factor (WACC)	13.55%	13.55%	13.55%
Tariff	Levelized for life of the Projects: Rs.4.16/unit	Fixed cost Levelized for life of the Projects: Rs.2.02/unit Variable cost [Rs/Unit] applicable to the relevant year: FY-15 : Rs.2.81 (Base year) FY-16 : Rs.2.97 FY-17 : Rs.3.14 FY-18 : Rs.3.32	Fixed cost Levelized for life of the Projects: Rs.2.37/unit Variable cost [Rs/Unit] applicable to the relevant year: FY-15 : Rs.2.82 (Base year) FY-16 : Rs.2.98 FY-17 : Rs.3.16 FY-18 : Rs.3.34

10. Date of effect of this order:

i) The tariff as determined by the Commission in the present order shall be applicable to all the Mini-hydel, Bagasse based co-generation and Rankine cycle based Biomass power projects with water cooled condenser that get commissioned during the period between 01.01.2015 and 31.03.2018 for which PPAs have not been entered into prior to the date of this order. This tariff shall be applicable for the term of the PPA.

ii) The variable tariff determined by the Commission in this order for Bagasse based co-generation and Rankine cycle based Biomass power plants with water cooled condenser will be reviewed after 31.03.2018.

11. Regarding tariff determination for waste heat recovery co-gen projects, Waste to energy projects, Bio-gasification and bio-methanization projects, the Commission will determine tariff on a case to case basis as and when appropriate petitions are filed before the Commission.

12. The petition OP No.47/2012 filed by REDAK stands disposed of in accordance with this order.

This order is signed, dated and issued by Karnataka Electricity Regulatory Commission on this 1st day of January 2015.

Sd/-	Sd/-	Sd/-
M.R. SREENIVASA MURTHY	**H.D. ARUN KUMAR**	**D.B. MANIVAL RAJU**
CHAIRMAN	**MEMBER**	**MEMBER**

Annexure – I

LIST OF PERSONS WHO HAVE SUBMITTED WRITTEN COMMENTS / VIEWS / SUGGESTIONS

1. **Karnataka Power Transmission Corporation Ltd.,**
2. **Power Company of Karnataka Ltd.,**
3. **Bangalore Electricity Supply Company**
4. **Mangalore Electricity Supply Company**
5. **Chamundeshwari Electricity Supply Corporation Ltd.,**
6. **Ministry of New and Renewable Energy, New Delhi**
7. **Karnataka Renewable Energy Development Ltd.,**
8. **M/s JITF Ecopolis**
9. **M/s Link Legal – representing REDAK**
10. **M/s Sunvik Steels Pvt. Ltd,.**
11. **M/s SISMA**
12. **M/s PRESPL**
13. **M/s Renuka Sugars**
14. **M/s Konark Power**
15. **M/s Dharwad Bio-Energy Pvt. Ltd.,**
16. **M/s Matrix Agro Pvt. Ltd.,**
17. **M/s G.E.Power & Water**
18. **M/s Hindustan Power**
19. **Sri A.Raja Rao**
20. **Sri B.G.Rudrappa**
21. **Sri Dinesh J Kagathi**

ANNEXURE – II

LIST OF PERSONS WHO MADE ORAL SUBMISSIONS TO PUBLIC HEARING

1. **Sri Sridhar Prabhu, Counsel for REDAK**
2. **Sri Sirasingi A.B. Sharanappa Shirol, Sri Chennappa Hosamane - representing farmers from Navalgund**
3. **Sri Zulfikar – Plant Head – Dharwad Bio Energy**
4. **Sri Venkat, CFO, Matrix Agro Pvt. Ltd.,**
5. **Sri Murali Subramanyam**
6. **Lt.Col.Monish Ahuja, Director, PRESPL**
7. **Sri Hotteppanavar, Banaakar Bandi, Basavaraj Bulla, H.L.Lamani, Farmers from Haveri**
8. **Sri S.Kumaraswamy, Social Activist**
9. **Sri Gopinath – representing Dharwd – Haveri Biomass**
10. **Sri Yugesh – representing Bank of India**
11. **Sri Dinesh J. Kagathi**
12. **Sri Vijay Bhaskar, Operational Energy Group, Dharwad**
13. **Sri Vaibhav Kalkuta and Sri Kuldeep Kulkarni – representing Sree Renuka Sugar**
14. **Sri P.R.Raheja, SISMA**
15. **Sri Dharmalingam – representing Chamundeswari Sugars**
16. **Sri Sriranga – representing KPTCL**