IN THE HARYANA ELECTRICITY REGULATORY COMMISSION
BAYS 33-36, SECTOR - 4, PANCHKULA - 134 112 HARYANA

Case No. HERC / PRO - 50 of 2014 (Suo Motu)
Date of Hearing : 25.07.2014
Date of Order : 13.08.2014

IN THE MATTER OF

Determination of levellised generic tariff for renewable energy projects to be commissioned during FY 2014-15 under regulation 7 of the Haryana Electricity Regulatory Commission (Terms and Conditions for determination of Tariff from Renewable Energy Sources, Renewable Purchase Obligation and Renewable Energy Certificate) Regulations, 2010 as amended from time to time.

QUORUM: **Shri R.N. Prasher, Chairman**
Shri Jagjeet Singh, Member
Shri M.S. Puri, Member

Objectors:

i) Association of Power Producers, New Delhi
ii) Haryana Renewable Energy Development Agency (HAREDA),
iii) M/s Starwire (India) Limited, New Delhi.
iv) M/s Kamsolar Energy Consultant, Gurgaon, Haryana.
v) M/s IL&FS Energy.
vi) Tata Power Co. Ltd.

Present:

i) Shri V.K. Sodhi, Consultant, CRPL. Mullana.

ii) Shri B.S. Yadav, National Solar Energy Federation.

iii) Shri A.K. Virdi, Tech / Advisor, Kamsolar Energy Consultant

iv) Shri D.K. Chopra, Addl. Director, HAREDA.

v) Shri Ajay Padia, Starwire (India) Limited.

vii) Shri Neetaj Sharma, SE/HPPC.

viii) M/s Seema Sidana, AE/HPPC.

ORDER

1. **Brief Background**:

The Commission initiated the present suo motu proceedings in view of the provisions in the Regulation No. HERC/23/2010 of the Commission notified on 3rd February, 2011 i.e. Haryana Electricity Regulatory Commission (Terms and Conditions for determination of Tariff from Renewable Energy Sources, Renewable Purchase Obligation and Renewable Energy Certificate) Regulations, 2010 (hereinafter referred to as "RE regulations, 2010". The relevant regulations are re – produced as under:

> *"4. Control Period or Review Period. -The first Control Period or Review Period under these Regulations shall be of three years, of which the first year shall be the period from the date of notification of these regulations to 31st March, 2011.*
>
> *Provided that the benchmark capital cost for Solar PV and Solar thermal projects may be reviewed annually by the Commission.*
>
> *Provided further that the tariff determined as per these Regulations for the RE projects commissioned during the Control*

Period, shall continue to be applicable for the entire duration of the Tariff Period as specified in Regulation 5 below.

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

Further, regulation 7 of the HERC RE Regulations, 2010, provides for determination of generic tariff for renewable energy projects in Haryana. The relevant regulations are reproduced as under:

"Regulations 7: Petition and proceedings for determination of tariff. –

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

(2) Notwithstanding anything contained in these regulations, a) the generic tariff determined for Solar PV projects based on the capital cost and other norms applicable for the year 2010-11 shall also apply for such projects during the year 2011-12; and b) the generic tariff determined for Solar thermal projects based on the capital cost and other norms for the year 2010-11 shall also apply for such projects during the years 2011-12 and 2012-13, provided that (i) the Power Purchase Agreements in respect of the Solar PV projects and Solar thermal projects

as mentioned in this clause are signed on or before 31st March, 2011; and (ii) the entire capacity covered by the Power Purchase Agreements is commissioned on or before 31st March, 2012 in respect of Solar PV projects and on or before 31st March, 2013 in respect of Solar thermal projects."

1.1 In line with the above and after taking into account the norms specified in the HERC RE regulations, 2010, the Commission determined tentative norms for tariff determination in the present case and sought comments / objections from the various stakeholders.

1.2 In order to ensure wide participation from the stakeholders / interested parties, public notice for inviting objections / suggestions as well as for intimating the date of hearing on the suo motu petition for determination of levellised generic tariff for Renewable Energy projects to be commissioned in FY 2014-15, was published in the following Newspapers:

a) Hindustan Times (English), Chandigarh Edition for circulation in Haryana, June 12, 2014.

b) Dainik Bhaskar (Hindi) (Chandigarh Edition), June 13, 2014.

c) Dainik Jagran (Hindi) (Chandigarh Edition), June 13, 2014.

The proposed norms/assumptions as appearing in the public notice were also posted on the official website of the Commission i.e. www.herc.gov.in. The last date of filing objections/suggestions was 30th June, 2014 and the hearing was scheduled for 25th July, 2014.

1.3 The public notice, including the tentative norms, on which objections/suggestions were invited from the stakeholders by 30th June, 2014, is placed at Annexure – C.

2. Public Proceedings:

In response to the public notice issued by the Commission written comments / suggestions / objections were received from the following stakeholders:

i) Association of Power Producers, New Delhi.

ii) Haryana Renewable Energy Development Agency (HAREDA).

iii) M/s Kamsolar Energy Consultant, Gurgaon, Haryana.

iv) M/s IL&FS Energy.

v) Tata Power Co. Ltd.

vi) Sri Jyoti Renewable Energy Pvt. Ltd.

Besides the above, the Principal Secretary to Govt. Haryana, Renewable Energy Department vide his D.O. No. 2611 dated 31.01.2014 also made certain observations / comments regarding determination of tariff / generic levellised tariff for projects based on renewable energy sources. Further, the proceedings of the meeting held on 16.06.2014 under the Chairmanship of Shri S.C. Chaudhary, IAS, Chief Secretary to Govt. of Haryana to discuss the issues regarding Renewable Energy Department with line Departments were also forwarded to the Commission.

The Commission, while determining RE tariff(s) for the projects to be commissioned in FY 2014-15, has taken into consideration all the observations / comments received in the Commission including the views

presented by the stakeholders, who had not filed any written objections / comments but participated in the public hearing held on 25.07.2014.

A brief summary of the objections / comments filed by the stakeholders is presented below:

2.1 HAREDA:

HAREDA, vide their memo no. DRE/HAREDA/2014/1342 dated 15.07.2014, filed their comments/suggestions and the same are as under:

a) To declare the tariff for solar PV power plants for the year 2014-15 considering the parameters adopted by CERC in its order no. SM/354/2013 (Suo-Motu) dated 15.05.2014.

b) To declare uniform tariff for film and crystalline technologies as the cost of both these technologies have achieved parity and further it shall be convenient to invite bids on single tariff.

c) To declare separate tariff for roof top solar power plants for the roofs owned by the IPP and for the roofs to be taken on lease. The tariffs for solar power plants should be applicable for at least 18 months from the date of issue of orders of tariff by HERC.

d) As per the survey in 15 districts of the State, the average cost of biomass in the State comes out to be Rs. 3436/- per metric ton. Accordingly, the tariff for biomass projects may be decided considering the cost of biomass as per survey.

2.2 Starwire (India) Vidyut Private Limited:

Shri Ajay Padia, CEO, M/s Star Wire (India) Vidyut Pvt. Ltd. in the hearing held on 25.07.2014 submitted as under:

a) The tariff for the biomass based power plant ought to be two part tariff wherein the fixed cost component will remain unchanged and variable cost (fuel cost)

component may be reviewed every year as is done in the case of coal based power plants. The biomass based power plants may be allowed a pass through of fuel cost in line with the recently amended CERC Regulations.

b) The average cost of fuel in Haryana, as per HAREDA survey, is about Rs. 3450 / MT. This cost considering the fact that fuel contains 10% moisture and 10% dust, needs to be increased to Rs. 4000 / MT for the purpose of tariff determination for biomass based power plants.

c) In line with the Hon'ble APTEL's judgement in an appeal filed by Puri Oil Mills Wheeling charges should not be levied.

d) The tariffs determined on the basis of Regulation No. HERC / 23 / 2010 dated 30.03.2011 are no longer valid as the same was valid only till 31.03.2013. Hence this Commission may first review its Regulations in the light of CERC notification and then proceed with tariff determination for the RE Power Projects to be commissioned in Haryana in FY 2014-15.

2.3 **Association of Power Producers (APP):**

Shri Abhishek Chatterjee, Asst. Director General, Association of Power Producers, 21 A , 1st Floor, Janpath, New Delhi vide letter under Ref: APP / ADG / 2014-15 / 35 dated 4th July, 2014 filed his comments. The submissions of APP on various norms for tariff determination are as under:

a) Interest Rate may be considered at 14.58%. Apart from Interest on term loan, an upfront fee of around 1.50% of debt amount may also be considered. Further Pre-Tax Return on Equity for Solar PV and Wind projects should be considered at 20% per annum for first 10 years and 24% per annum from 11th year onwards. The rationale for the same provided by APP is as under:

As per the HERC RE Regulation, 2010, the normative interest rate is to be considered at the average long term prime lending rate (LTPLR) of State Bank of India (SBI) prevalent during the previous year. SBI has issued the Prime Lending

Rate and accordingly the average interest rate for the purpose of tariff determination may be considered at about 14.58%

Further, while Interest rate reflects the current market scenario, Banks also charge a onetime (upfront)/ processing fee of around 1.50% of debt amount and the same may be considered as part of financing charges and thus part of Project Cost.

It was further submitted that the developers should be assured post-tax Return on Equity of 16% and considering change in MAT rate over past years, the pre-tax Return on Equity should at least be 20% instead of 19 %.

APP's Comments specific to Solar PV Power Projects:

b) The Capital Cost may be considered as Rs. 1296 Lacs / MW as against Rs. 612 lacs / MW for Crystalline and Rs. 578.6 Lacs / MW for Thin Film proposed by the Commission. The rationale provided by the intervener is reproduced below:

"The project cost of Rs. 612 Lacs /MW seems to be very low in comparison to the market realities. Further, CERC vide its final order on "Determination of Benchmark Capital Cost Norm for Solar PV power projects and Solar Thermal power projects applicable during FY 2014-15" dated 15th May, 2014 has considered Capital Cost of Rs. 691 Lacs/MW for solar projects.

In a nutshell, we would like to bring to the notice of Hon'ble Commission the following with respect to the Capital Cost of Solar PV Projects,

Price of Foreign modules is 1.25 USD/Wp; considering the recent trends observed, research reports by various international consultants, market prices of Tier-1 modules and including the impact of the developments wrt to the antidumping duty

Adjustment of cost against module degradation by reduction in PLF on yearly basis instead of additional CAPEX; considering the prescribed rate is not reflecting the market scenario as the warrantees by most manufactures is 1% annual degradation for the first 10 years and 0.66% for the next 15 years which comes out to be Rs. 71 laksh/MW.

Land Requirement is 6 Acres/MW considering higher land requirement for technologies like motorized trackers, seasonal tilt and thin film. Land Cost to be considered at Rs. 81 Lacs/ MW (i.e. Rs. 13.44 Lacs/Acre) considering the ground realities in various states such as Punjab, Maharashtra etc and implications of newly enacted Land Acquisition Act, 2013.

Power Conditioning Unit cost is Rs. 60 Lacs/MW considering prevailing market prices of quality products from reputed manufactures to ensure availability of the plants.

Civil & General Works cost is Rs. 115 Lacs/ MW Considering the ground realities observed in various commissioned projects and varying geographic and climatic conditions in the Country.

Ground Monitoing Structures cost is Rs. 90 Lacs/MW considering the ground realities observed in various commissioned projects and varying geographic and climatic conditions in the Country.

Cables & Trafo Costs is Rs. 110 Lacs /MW considering various necessary components omitted by Hon'ble Commission such as Earthing System for DC Plant, Early Streamer based Lightning protection, Illumination, SCADA & Telemetry, Module Cleaning, Water Sourcing & Treatment etc".

In view of the above mentioned details, the intervener requested the Commission to consider the Capital Cost of Solar PV Projects as Rs. 1296 Lacs/MW. Additionally, it was submitted by the Intervener that this Commission may also consider the current market price of the modules i.e. USD 0.64/Wp and specify a "Change in Low" (sic) provision to accommodate any possible increase in the module price on account of imposition of antidumping duty in future. The normative amount of the same may be computed and specified in the Tariff Order.

c) On the issue of O&M expenses for FY 2014-15 it was suggested by the APP that the same should be considered as Rs. 13.00 Lacs/MW. It was further submitted that

appropriate annual degradation in performance may be considered by this Commission. For solar PV, annual degradation in CUF of 3% for first year and 1% thereafter for subsequent years was proposed by the APP.

d) APP, on the issue of auxiliary energy consumption, submitted that this Commission has not considered the same in the proposed tariff norms for Solar PV Power Projects for FY 2014-15. It was suggested that generally the auxiliary energy consumption in the Solar PV Plants is around 1% to 1.5% of the Peak Capacity depending on the size of the plant. Hence requested that the same may be considered for the purpose of tariff determination for Solar PV Power projects in Haryana.

e) **APP's Comments specific to Wind**:

It was suggested that the proposed Capital Cost of Rs. 572.5 Lacs / MW may be revised upwards to Rs. 7.25 Crores / MW due to the following reasons:

i) Capital cost has increased significantly in last few years due to steep increase in cost of material (cost of copper, steel and cement), equipment, transportation and land cost

ii) Wind farm developers are now coming up with large projects at one location. Hence the power evacuation is done at EHV level, which has longer construction time as well as cost. It was submitted that generally wind farms are 15 to 40 kms away from EHV Grid so the capital cost is impacted significantly.

iii) Majority of the windy sites in different States offering good wind potential has been exhausted. In order to harness newer wind sites offering lower WPD, larger wind turbines or Class III/S wind turbines are being installed. These turbines are able to harness low wind profiles owing to larger rotor diameter and taller hub heights. However, owing to up scaling of rotor

diameter and hub heights the cost of transportation and installation has increased and this will lead to increase in total Capital Cost.

iv) Deployment of Central monitor Stations (SCADA based CMS)

v) Deployment of additional tools & instruments, communication facility, Meters and Instrumentation at S/S, Central forecast server, forecasting services from consultants etc. for forecasting and scheduling.

vi) Increase in land prices

vii) Impact of currency depreciation on imported WTG components.

viii) It was further suggested that this Commission may consider the O&M costs at Rs. 14 Lacs/MW for the following reasons:

a) *The O&M costs have shot up in last two years. The key reasons are escalations in the manpower cost and the general scenario of a higher inflation.*

b) The O&M escalation of merely 5.72% per annum, considered by the Commission, is not reflective of the actual price rise due to higher WPI and increased manpower cost. The CAGR of WPI inflation during the period FY 2009-10 to FY 2012-13 was more than 8.6%. Further, industry wide the O&M costs are being quoted between Rs. 13.5 lacs/MW to Rs. 14.5 Lacs/MW. Hence, in light above O&M Cost of Rs. 14.0 Lacs/MW may be considered by the Commission.

c) Tariff determined through the present proceedings will be applicable for Wind Projects getting commissioned in year 2014-15. It was submitted that the

tariff should be made applicable for next year as well, if the PPA with the Discom(s) has been signed during the current year.

d) Wind industry is witnessing a change these days as many more IPPs are developing Wind Projects. With this, the size of the projects is also increasing and in the range of 50MW to 150 MW. It takes about 18 to 20 months to develop projects of this size, right from inception to the Commissioning. Therefore, in order to avoid the uncertainty of tariff while the IPPs starts planning the projects, the Commission should consider extending the validity of the determined tariff for one financial year, in case the PPA is signed in the current financial year, for which the tariff is determined.

2.4. Tata Power Co. Ltd.

Preetika Singh, Lead Associate – Regulations & Advocacy, Tata Power Company Limited, NOIDA submitted as follows:

a) The Commission may adopt the parameters as determined by the CERC in its order dated 15th May, 2014 for Rankine cycle based technology.

*b) **Biomass Gasification**: The Commission may promote development of tail end biomass projects based on gasification technology. In this system gasification technology is used along with produced gas based IC engines. These systems are more adaptable for Indian scenario and have gained acceptance in Maharashtra. The Commission may also study the biomass gasification option and suitably adopt the technology and may define the parameters and tariff accordingly.*

*c) **Fuel Price Adjustment & True Up:** Due to high variability of fuel costs and resulting uncertainty, the frequency of true ups for the biomass plants may be done on a semi annual basis. In case the true ups are not done as per the schedule, a 5 % - 6% provisional adjustment may be automatically allowed subject to approval by the Commission at a later stage. This will improve the*

revenue streams of the project developers and help inspire confidence of the lenders.

2.5 IL & FS Energy:

Shri Keshav Prasad, IL&FS Energy Development Company Limited, Gurgaon vide his letter dated 30th June, 2014 submitted the following comments / suggestions for the consideration of the Commission in the present case.

a) It was submitted by the Intervener that the Commission in its Public Notice for determination of Capital Cost for Solar based power projects had proposed a benchmark capital cost of Rs. 6.12 Crore/MW which in their view is low and it was urged that the Commission may consider revising the capital cost. The reasons cited by the intervener are reproduced below:

i) Module Price-

Based on our interaction with Indian Solar PV manufactures the best quote on panels manufactured in India is currencly around 0.75 USD/Wp. The uncertainty in the policy framework with regard to Anti-Dumping Duties which are likely to be imposed on imported solar. PV cells and modules from US and China, may lead to an artificial inflation in the price of Indigenously manufactured cells and modules.

Considering the exchange rate as Rs. 60 for 1 USD, Honourable Commission is hereby suggested to consider the module price as an average of Indian and Chinese manufactured modules viz. 0.735 USD/Wp i.e. Rs. 441 Lakh/MW.

ii) Land-

It is our humble submission to the Commission that the land cost varies from Rs. 4 to 7 lakhs / Acre. In order to standardize this cost, the Commission is suggested to consider Rs. 5.5 Lakh / Acre and considering a standard land requirement of 5 Acre/MW, we would like to submit that the Commission may consider a land cost of Rs. 27.5 Lakh / MW.

iii) Power Conditioning Unit-

It is submitted with the Commission that if additional cost of metering and monitoring is considered along with remote data logging, the cost of Power Conditioning Unit (PCU) as proposed by Commission is low and the Commission may consider revising the cost of power conditioning unit as Rs. 70 Lakh / MW. CERC on 15 May 2014, has issued the Benchmark Capital Cost for Solar based power plants to be considered for FY 2014-15, which the Commission may consider while finalizing the benchmark Capital Cost.

Hence, it is our humble submission with the Commission to kindly consider the Capital Cost of Rs. 7.89 Crore / MW for Solar PV based power projects.

We bring to the notice of the Commission that as per the data available with us for our operational solar projects, auxiliary consumption is approximately 1% of the total annual generation of the plant. If we consider energy generated by 1MW Solar PV Power Plants is approximately 1.7 MUs, as per the above data, auxiliary consumption accounts for 1% of the energy generated. Hence we humbly request the Commission to revise the Auxiliary Energy Consumption norms as 1% of the energy generated.

It is our submission that the Commission may not fix O&M escalation rate for 5 years of control period instead review it annually based on changes in CPI and WPI during previous year for determining the rate of escalation for the ensuing year.

Also, recently the Central Electricity Regulatory Commission has finalized an escalation of 6.35% per annum (by considering the weighted average of 60% WPI and 40% CPI during previous 5 years) in 2014-19 Tariff Regulations for conventional projects. Hence the Commission is requested to consider the same for determination of generic levellised tariff for renewable sources for FY 2014-15

According to warranty commitments by different manufacturers the warrantee for the modules ranges from 0.9% to 2.5% in the first year, thereafter around 0.7% -1% per year, ending with approximately 80% at the end of 25 years. Hence, it is our humble submission that the Commission may take into account the degradation factor of 1% per annum for first 10 years and 0.65% for the balance 15 years (considering project life as 25 years) as the project stabilizes gradually after few years of its operation.

It is our humble submission to the Commission to consider introducing a provision of Radiation Risk i.e. if there is any irradiation abnormalities observed due to uncontrollable factors, the Commission may consider allowing tariff revision on such projects retrospectively.

2.6 Kam Solar Energy Consultants, Gurgaon:

Shri Aditya Singh, Legal Advisor, Kam Solar Energy Consultants, vide his letter no. Kamsol/HERC/01 dated 2nd July submitted as under:

a) The benchmark capital cost of Rs. 6.12 Crore per MW taken by HERC in its Public Notice on fixation of Tariff for Solar PV plants is on a very low side and the same is not based on the current cost of Solar PV modules available to the power Producers and cost of land at which this is available to the IPPs in Haryana. HERC has taken per watt cost of PV module as Rs. 33.40 whereas the current cost of Solar PV modules of most of the tier-1 companies is in the range of Rs. 38 to Rs. 42 per watt. Therefore, it is submitted that the current market price at which these modules are available should be considered as Rs. 42 per watt including taxes while working out the Capital Cost of 1 MW capacity Solar PV Plant.

b) The HERC has taken cost of 5 acre land as Rs. 15 lacs per MW which is also unrealistic and far away from ground realities of prevalent land cost at which it is available in Haryana. In Bhiwani district, land cost varies from Ra. 15 lacs to Rs. 25 lacs per acre and in Hisar, it varies from Rs. 12 lacs to Rs.

20 lacs. Whereas in Mahendragarh, it is available in the range of Rs. 20 to 30 lacs per acre. In other districts, the same ranges from Rs. 20 to 40 lacs per acre. Therefore, the cost of land needs to be considered Rs. 60 lacs as against Rs. 15 lacs taken by the HERC in its cost estimate.

c) In this regard, attention is also invited towards recent order of the Hon'ble CERC dated 15.05.2014 vide which it has notified generic tariff of Renewable Energy Power Projects including Solar PV Plants for FY- 2014-15 wherein Hon'ble CERC has taken Ra. 6.17 crore as capital cost per MW for PV plants and has given a levelised tariff of Rs. 7.72 per unit. In Haryana, this cost estimate will be comparatively higher as land cost is higher.. Thus the total cost of 1 MW project, in case of Haryana, comes to Rs. 7.51 Crore even according to CERC Capital Cost estimate. Whereas HERC in its notice has taken Rs. 6.19 crore as Capital Cost per MW which has no basis and justification.

d) HERC has considered 19 % CUF while estimating levelised tariff in its last year order on fixation of Bench mark tariff, 19% CUF is possible is States like MP, Rajasthan, Gujarat, Chhattisgarh which falls in better Solar radiation zones (Solar Irradiance level, between 9.4 to 6.50). It is wrong to prescribe similar figures of CUF for Solar Power Plants to be developed in states like Haryana, Punjab which are having lower level of Solar Radiation (below 5.4 kwh per sq. meter per day) as compared to the States of MP, Gujurat and Rajasthan etc. Hon'ble Commission is requested to take note of this and while calculating ROE and bench mark tariff, it is submitted that CUF of 17 % needs to be considered in case of Haryana.

In view of the above submissions, the Intervener had prayed that the levellised tariff of Solar PV plants may be worked out by considering Capital Cost of Rs. 7.50 Crore / MW as against Rs. 6.19 Crore / MW given by this Commission in the public notice and also the benchmark tariff of Rs. 7.72 / kWh recently notified by the CERC.

Additionally, it was prayed that the IPPs may be given a minimum time period of at least one year to commission their projects after signing the PPA.

2.7 Sri Jyoti Renewable Energy Pvt Ltd.:

Shri Suneel Divakar, Dy.Director, Sri Jyoti Renewable Energy Pvt. Ltd. vide his letter dated 23rd July, 2014 submitted that amended CERC Regulations and based on the same, the generic tariff order of CERC dated 15.05.2014 for biomass based plants for FY 2014-15 may be kept in mind by this Commission for determining tariff for the biomass based power projects to be commissioned in Haryana in FY 2014-15. Regarding project cost the intervener suggested that the latest indexation data for Fy 2013-14 may be considered. On the issue of fuel cost it was submitted that this Commission may determine the cost of fuel every year owing to the volatile nature of the fuel prices. Further, he submitted that the historical trend shows that the built in 5% escalation does not reflect the actual increase in fuel cost. Additionally, it was submitted that this Commission may make the first year tariff effective for twelve months from the date of commissioning and not linked with the financial year as despite best planning and efforts the biomass Units cannot be commissioned in tandem with the financial calendar.

2.8 **Others:**

The Principal Secretary to Govt. Haryana Renewable Energy Department, Chandigarh, brought to the notice of the Commission the following:

i) As per the clause 9.3 i.e. Operation and Maintenance expenses for Solar Power Plant has been considered as 9.51 lakhs with annual escalation of 5.72%. But in the Annexure – A sheet, wherein tariff has been determined the Operation and Maintenance expenses has been considered as Rs. 1.1 lakhs.

ii) There seems to be an anomaly in calculating the levellised tariff for Solar PV plants considering the Return on Equity (ROE) @ 19% for first 10 years and 24% in the 11th year onward.

iii) The project cost of Rs. 6.05 Crore / MW indicated in order is at DC end. But Ministry of New and Renewable Energy (MNRE) is taking cost at AC end of Jawaharlal Nehru National Solar Mission (JNNSM). Accordingly the project cost shall be considered at least 5% higher for Solar Power Plants.

iv) The Operation and Maintenance expenses shall be Rs. 9.51 lakhs / MW instead of Rs. 1.1 lakh / MW taken in Annexure – A sheet. Further, it is requested to give tariff applicable for at least 18 years from pronouncement of order so that bidding process could be initiated and projects may be commissioned within the time frame.

2.9 Decisions taken in the Meeting held on 16.06.2014 under the Chairmanship of the Chief Secretary, Government of Haryana (Memo No. DRE/2014/1430 – 37, dated 26.06.2014:

i) HAREDA may file a petition in the HERC to fix suitable tariff which is comparable to other States and may also request the HERC to consider parameters and tariff finalised by the CERC.

ii) Utility shall intimate the solar power requirement as per RPO to HAREDA so that HAREDA shall invite bids through reverse bidding route.

iii) Utility shall ensure that PPA is signed with the developers for all Renewable Energy Projects at the earliest.

iv) Utility shall introduce net metering in the Govt. buildings in a phased manner.

v) HERC was requested to take the initiative for issue of net metering regulations. The HERC shall issue the tariff orders for Renewable Energy based power projects for the year 2014-15 and RPO up to the year 2022 at the earliest.

2.10 In addition to the above the Commission has also considered the comments / suggestions including the empirical data submitted by Hindustan Power vide their letter HECL / HERC / RA / 2 dated 24.07.2014 despite the fact that the same was filed after the due date of submitting suggestions / comments.

3.0 Public Hearing:

In order to take the process forward the Commission considered it appropriate to hear the objectors and accordingly scheduled a hearing on 25.07.2014. The stakeholders / interveners mostly reiterated their written submissions which have been elaborated in the preceding paragraphs. Hence the same are not being repeated here for the sake of brevity.

4.0 Commission's Analysis and Order:

4.1 At the outset, the Commission would like to make it clear that HERC RE Regulations, 2010, as amended from time to time, specify the tariff control period, RPO, CDM sharing, REC trading etc. Further, the Regulations also provide base capital cost subject to indexation, fuel price (except biomass which has been reconsidered as per APTEL's judgment), GCV, SHR, PLF/CUF, ROE along with other normative financial and technical parameters. However, despite the fact that a large number of MOUs were signed by HAREDA with the biomass power project developers only about two biomass based power plants have been, so far, commissioned in Haryana. Further, exhaustive study has been got conducted by the CERC specifically for the biomass based power projects with special reference to cost of fuel, GCV of fuel and SHR and the fact that these parameters have not been revised by this Commission as per second proviso to regulation 4 of HERC RE Regulations, 2010. Thus the Commission, to the extent feasible, has given due weightage to the CERC studies as well as biomass fuel cost data submitted by HAREDA while determining generic tariff for the RE power projects to be commissioned in FY 2014-15.

4.2 The Commission observes that the issues raised by most of the Interveners except Association of Power Producers (AAP) are specific to either Solar Power Projects or Biomass based Power Projects. AAP has also made submissions on the Wind Power Projects. Hence, briefly stated, the interveners have submitted that the Capital Cost including indexation of the same and Interest Rates needs to be realistically assessed and allowed in order to encourage RE Projects in Haryana which has not seen much activity since the first tariff order of this Commission. Further interveners, with regard to biomass based projects, suggested that this Commission may appropriately change the tariff design in order to mitigate fuel price risk including low quality of biomass and the resultant impact on the Station Heat Rate as well as O&M expenses. Regarding Solar PV tariff the interveners suggested that realistic price of land, CUF, module and non – module prices may be considered. Additionally, they submitted that auxiliary energy consumption as well as degradation of solar panels which, so far, this Commission has not considered while determining tariff up to FY 2013-14, may be considered by the Commission in FY 2014-15 onwards as these also contribute to the cost factors. All most all interveners had suggested that this Commission may also take into consideration the amended CERC Regulations and the recent RE tariff order dated 15.05.2014 passed by the CERC. The Interveners also suggested extension in the applicability of tariff determined for FY 2014-15 to FY 2015-16 as well and bi – annual true – up of fuel cost.

4.3 The Commission appreciates the interest shown by various stakeholders including Hindustan Power who had submitted empirical data emanating from various Solar PV power plants, degradation of solar modules, solar insolation of Haryana as well as various formulations to address the same while determining tariff. Further, this Commission has considered the suggestions of the Principal Secretary to Govt. Haryana Renewable Energy Department as well as minutes of the meeting dated 16.06.2014 convened under the Chairmanship of the Chief Secretary to Govt. Haryana. **The Commission has already approved RPO trajectory (Solar as well as Non – Solar) up to FY 2020-21. Further, the**

Commission has finalised draft Regulations on Rooftop Solar Grid Interactive System based on Net Metering and has scheduled a hearing. Hence after following the due process including suggestions / comments / objections of the stakeholders the same shall be finalised and notified. The Commission has noted the anomalies pointed out by the Principal Secretary to Govt. Haryana Renewable Energy Department including the Capital Cost (at DC end) and O&M expenses and the same has been taken into consideration in the present order. All other comments / suggestions of the stakeholders and the Commission's decision on the same have been dealt with in the relevant paragraphs of this order.

The Commission has considered the submissions regarding CERC determined project cost and tariff for renewable energy power projects and observes that the HERC RE Regulations, 2010 provide the details of capital cost including indexation mechanism (except solar), hence it is appropriate for this Commission to follow its own regulations while determining generic tariff applicable for the RE projects to be commissioned in Haryana in FY 2014-15 unless certain norms , in the considered view of this Commission and based on empirical evidence and surveys, need to be relaxed in accordance with the Regulations in vogue.

4.4 The Commission has noted the contention of Tata Power Co. Ltd. regarding promoting development of tail end biomass projects based on gasification technology and the same shall be addressed / included while reviewing the RE Regulations, 2010 for the second control period.

4.5 The Commission has determined the Generic Tariff for the power projects based on renewable energy sources in the State to be commissioned in FY 2014-15 in accordance with the norms prescribed in the RE Regulations, 2010 or approved norms in the present order. It would be applicable to all such projects to be established in the State of Haryana irrespective of location, size, type of fuel used etc.

The Commission has considered the contention of HAREDA that the tariff for Solar PV Crystalline as well as Solar Thin Film technologies may be kept at par given the

fact that cost of solar modules and inverters for the two technologies are more or less similar and observes that in terms of USD / Watt there is still some difference and while converting the same to INR for a megawatt scale solar PV plants, the difference becomes significant. Hence as per past practice the Commission has determined different tariff for the two technologies i.e. Crystalline and Thin Film. Additionally, the Commission has considered the submissions of HPPC in the hearing held on 25.07.2014 that they may be allowed to sign PPA on the basis of the levellised tariff determined by the Commission and also provide the year wise tariff for the entire life of the project for which tariff has been determined. On the issue of levellised tariff the Commission is of the view that in the initial years due to higher outstanding loans and interest cost thereto and depreciation the levellised tariff will be lower than the annual tariff. Such a proposition may impair the IPP in meeting with their interest as well as re – payment of the principle loan amount to the lenders. At the same time when a major portion of term loan is paid off and plant is depreciated to the extent of about 85%, a shorter duration PPA and levellised tariff may lead to a situation where in the IPPs start looking for an exit option or neglect the maintenance of the power plants leading to accelerated degradation of the same. Hence levellised tariff which is also sensitive to the discounting factor that the Commission may use and the real time value of money for different IPPs, may not be an appropriate tariff for the purpose of PPA. However, it can be the benchmark for inviting bids. Further the Commission agrees with the contention of HPPC that the entire tariff stream for the useful life of the project may be provided, and the same has been provided as annexure to the present order.

The Commission has considered the submissions of the IPPs that the first year tariff should be made applicable for twelve months and not restrict the same to the financial year for which it was determined and is of the view that due to higher depreciation and interest cost in the first four quarters i.e. 12 months, a power plant commissioned in say last quarter of the financial year will be in a dis – advantageous position due to mismatch between loan repayment and depreciation

considered by the Commission while working out tariff for the second year and the actual position on the same for a power plant commissioned late in the financial year. Consequently**, in order to balance the equity the Commission orders that the first year tariff shall be applicable for 12 months from the COD and not from 1st of April of the financial year in which the power plant is commissioned.**

The Commission has further considered the issue of promoting RE Projects in Haryana and there is no denial of this statutory obligation cast upon the Commission by the Electricity Act, 2003. However, the same cannot be seen in isolation i.e. bereft of cost of such power and diversion of land usage in Haryana i.e. at a certain cost (tariff) the usage of land for generating power (one form of energy) will become less efficient than the usage of the same land for crop which is also another form of energy. **Hence a distinction has to be made for the RE power plants to be commissioned in Haryana in FY 2014-15 and FY 2015-16 for which PPA has been signed and others which are still in project stage and have not achieved financial closure. Thus the Commission, in the case of RE Power Plants to be commissioned in FY 2014-15 and FY 2015-16 where DPR has been approved by HAREDA and PPA signed and where fuel is involved, has determined fixed cost and fuel cost for the entire life of the project. Fuel Cost from second year onwards is subject to true – up in case the IPP claims that the cost of fuel has exceeded 5% escalation built in the tariff. In such cases the Commission, after detailed study including data on fuel cost compiled by the State Nodal Agency, shall consider additional fuel cost, if any, while passing the Generic Tariff Order(s) in the subsequent years.** However, for the eligible RE power plants for which no PPA has been signed as on date of this order the fuel price as determined for the relevant year(s) tariff including escalation of 5% per annum, shall not be re – visited. **The Commission expects that the new IPPs, based on their assessment of fuel risk for the entire life of the project, should proceed with the project only.**

The Commission has also taken into account the submissions of HAREDA / HPPC / APP that the tariff determined for the power plants to be commissioned in FY 2014-

15 may also be made applicable for FY 2015-16. The Commission observes that HPPC / HAREDA may like to invite competitive bids for solar / non – solar power and the process involves a lot of time. **Further, almost five months of the current financial year i.e. FY 2014-15 is already over, hence the Commission agrees with HPPC / HAREDA and orders that the tariff determined for FY 2014-15 shall also be applicable for the RE Projects to be commissioned in FY 2015-16**. This will facilitate availability of benchmark tariff for inviting bids / reverse bids as well as provide sufficient time to the IPPs to commission their RE Power projects.

In view of the above, the generic tariff applicable for the renewable energy projects to be commissioned in Haryana during the FY 2014-15 and FY 2015-16, shall be based on the norms discussed below:-

4.6 Solar Power Project:

4.6.1 Project Cost:

a) As per HERC RE Regulations, 2010 the normative capital cost for setting up Solar Photovoltaic Power Project was pegged at Rs. 9.84 Crores/MW for FY 2011-12 and for the projects to be commissioned in FY 2012–13 the project cost was considered as Rs. 8.63 Crore / MW (Thin film), Rs. 8.94 Crore / MW (Crystalline) and Rs. 13.0 Crore / MW (Solar thermal) and Rs. 6.05 Crore / MW (Crystalline), Rs. 5.69 Crore / MW (Thin Film), Rs. 5.64 Crore / MW (Rooftop) and Rs. 12 Crore / MW (Solar Thermal) in FY 2013-14, with a proviso that the same shall be reviewed annually.

The Commission notes that the INR / USD exchange rate considered in FY 2013 – 14 was INR 60 / USD whereas the average exchange rate in FY 2014-15 has hovered around INR 61 / USD which would add to the Capital Cost along with a host of other factors including the prevailing cost of solar modules and inverters.

The Commission observes that Kamsolar has proposed a capital cost (poly / multi – crystalline) solar PV Power plants including cost of land at Rs. 7.51 Crore / MW as against Rs. 6.19 Crore / MW proposed by this Commission. While APP has submitted that Rs. 6.12 Crore considered by this Commission seems to be very low when

compared to the market realities and Rs. 6.91 Crore / MW considered by the CERC in its order dated 15th May, 2014 and has submitted that this Commission may consider capital cost of Rs. 12.96 / MW for Solar PV projects . IL&FS has proposed capital cost of Rs. 7.8979 Crore / MW.

b) It is evident from the above that there exists a large variance in the Capital Cost per MW suggested by different Interveners. The Commission, while inviting comments / objections from the stakeholders had considered the Capital Cost and the exchange rate prevalent at the time of issuing public notice. Hence, for the purpose of determination of tariff it has relied on the most recent data available on Capital Cost of Solar PV Power Projects. The Commission, on the issue that project cost is being considered at DC end and hence the same ought to be pegged 5% higher at the AC end, observes that the project cost including cost of inverters is built in to the tariff ex – bus. – bar. Further entire cost of evacuation system up to a distance of 10 K.M. is being provided by the power utilities and no wheeling charges are being levied in the case of Solar Power projects, hence it may not be appropriate to build in further escalation of 5% on account of the tariff being determined is at the A.C. end and not at D.C. end.

c) Additionally, the Commission has considered the submissions of the Interveners regarding cost of land and is of the view that given the high cost of land in Haryana and limited availability of waste land, setting up solar power projects on land by diverting the same from Agriculture may be counter – productive in the long – term. This is primarily due to the fact that the high cost of land would lead to a comparatively higher tariff in Haryana thereby making the solar power projects unviable vis – a vis such projects being set up in a few other states where cost of land is significantly lower and from where the Discoms have the option of purchasing solar power to meet their RPO or may also meet their RPO by way of purchasing RECs (for which the Commission has already made a provision of Rs. 10 Crore in FY 2014-15) . Further by diverting land from Agriculture use to solar power projects in effect would mean switching over from an efficient use of land i.e. production of crops which is also a form of solar energy trapped in agriculture

produce to a comparatively lesser efficient form of energy generation i.e. solar power projects which is clearly un- desirable. Thus the only viable option left for solar power projects is the use of un- productive / waste land and / or solar rooftop projects both grid connected as well as off – grid.

d) The Commission observes that the sustained decline witnessed in the international prices of the solar grade polysilicon till FY 2013 – 14 is not there anymore i.e. the main raw material for solar photo – voltaic panels; and the price of solar PV modules seems to have been confined in a narrow range. The Commission further observes that APP (Intervener) had submitted that as per the trend the price of imported solar module is USD 1.25 / Wp, however, they proposed a price of USD 0.64 / Wp to be considered for the purpose of tariff determination for Solar PV power plants. The Commission has examined the price trend and observes that as per the latest available retail Solar Module Price movement (ref: pvinsights.com) per Watt prices are hovering at an average of around USD 0.65 /Watt in the case of Crystalline and USD 0.62/Watt in the case of solar thin film module. Hence considering the Rs/USD average exchange rate of Rs. 61, the per MW solar module cost works out to Rs. 3.96 Crore / MW (Crystalline) and Rs. 3.72 Crore / MW (thin film) for working out tariff for FY 2014-15 and FY 2015-16. The Commission, in line with the study report on "Concentrated Solar Power" has considered the project cost of solar thermal power project at Rs. 12 Crore / MW and Rs. 3.96 Crore / MW for solar rooftop projects (Crystalline).

e) In addition to the above the cost of Solar PV Power Plant also includes non – module cost component. This primarily includes cost of inverter, land, civil works including module mounting structures, cable, transformers, evacuation system and other pre – operating expenditure. The benchmark cost for determination of non – module cost of Solar Power Plant has been arrived at after taking into consideration the feedback available from PV project EPC contractors. The details are presented the table that follows:

Benchmark Cost Rs. Crore /MW for FY 2014-15 & FY 2015-16

Sr. No	Particulars	Crystalline	Thin Film	Rooftop SPV
1	PV Modules	3.96	3.72	3.96
2	Land Cost #	0.25	0.25	0
3	Site Development, Civil Cost including mounting structures, Inverter, cables, transformers and pre – operative expenses including IDC.	2.84	2.84	2.84
8	Total Project Cost	7.05	6.81	6.80 *

cost of waste / non – productive agriculture land.
* excluding cost of lease rent which shall be subject to prior approval of the Commission.

The total Capital Cost as per details above has been considered for arriving at FY 2014-15 & FY 2015-16 tariffs.

f) In addition to the project cost, the interveners submitted that annual derating of solar panel of 1% may also be allowed. The Commission observes that In its previous RE Tariff order it was observed that with the maturing of technology the solar module manufacturers are not only guaranteeing lifelong efficiency of the solar panels but also undertaking replacement of the same during the useful life of the modules supplied by them. The RE Regulations, 2010 also does not provide for any derating, hence the same, for the purpose of present order, has not been considered. The Commission shall examine the issue of de-rating including the methodology to account for the same while reviewing the HERC RE Regulations, 2010.

In view of the above, the Commission, for the purpose of determining Solar PV tariff, has not considered degradation in the output of Solar PV Panels.

4.6.2 The Commission further observes that as per latest available data the solar PV manufacturers are selling solar module at an average price of USD 0.65 / Watt (Crystalline) and about of USD 0.62 / Watt (Thin Film). Apart from this single

largest component of project cost in the case of Solar PV Power Plant i.e. the cost of PV modules there are also non – module cost . Further there is some difference in the project cost of two different technologies i.e crystalline PV and thin film that are being used by the solar power project developers as well as cost of land which is not applicable for rooftop solar power projects. Hence the Commission considers it appropriate to determine technology specific generic tariff.

4.6.3 Capacity Utilisation Factor (CUF): On the issue of Capacity Utilisation Factor for Solar PV Power Plants, the intervener submitted that same should be reduced from the existing 19%. The Commission observes that except for a few regions in Haryana i.e. Panchkula, Fatehabad, Rohtak and Kurushetra the solar insolation level is higher than 5 hrs / day, hence a CUF of 19% for the State as a whole is reasonable. Thus, in line with the HERC RE Regulations, 2010, CUF of 19% is retained for the purpose of tariff determination in the present case. However, the Commission shall re-visit the issue while reviewing RE Regulations, 2010.

4.6.4 Operation and Maintenance (O&M) Expenses: On the issue of O&M expenses interveners had suggested that the same may be increased in line with the CERC amended Regulations on generic tariff for RE Projects. The O&M Expenses as per HERC RE Regulations, 2010, is Rs. 9 Lakhs/MW for the 1st year of operation and the same is to be escalated at the rate of 5.72% per annum. Hence for FY 2014-15 and FY 2015-16 the O&M expenses has been considered with an annual escalation of 5.72% over the tariff period.

In the case of solar thermal projects O&M expenses as per HERC RE Regulations, 2010, is Rs. 13 lakh / MW for first year of operation to be escalated @ of 5.72% per annum, hence the Commission has considered the same in line with its Regulations.

4.6.5 **Auxiliary Energy Consumption**:

The Commission, for the Solar PV Power plants, has considered the submissions of the intervener that this Commission may also allow auxiliary energy consumption, and is of the view that for Solar PV Power plants HERC RE Regulations, 2010, have

no provision for auxiliary energy consumption. Hence the Commission, in line with the HERC RE Regulations, 2010 and its previous RE tariff orders, has not considered auxiliary energy consumption for the Solar PV power plants. However, the Commission shall revisit this issue while reviewing RE Regulations, 2010

4.6.6 Biomass / Bagasse based power projects:

4.6.7 The Commission has considered the objections and suggestions of the interveners on the issue of cost of biomass / baggase as well as project cost, PLF, GCV of biomass / bagasse based generation projects and observes as under.

While determining generic tariff it is appropriate to adopt the normative project cost as per RE Regulations, 2010 notified by the Commission. On a case to case basis the direct as well as incidental costs may vary from project to project depending upon the location and other project specific requirements. Any extra or incidental cost arising out of action of any authority / Government Department cannot be factored in to modify the normative project cost. Hence any extra expenditure that the intervener may have incurred due to availing connectivity at a higher voltage cannot be considered as part of the project cost. Accordingly the Commission has considered the base year Capital Cost as per the RE Regulations in vogue and escalated the same by using indexation formula prescribed in the Regulations except in the case of Solar Power Projects where the Capital Cost has been determined afresh based on the market trends including INR / USD exchange rate.

4.6.8 **Fuel Cost (Biomass & Baggase):**

The Commission observes that regulation 43 of RE regulations, 2010 lays down the benchmark cost for biomass mix, which is Rs. 1906 / MT for the first year of the control period i.e. FY 2010-11 and is subject to indexation formula as given in regulation 44 or normative escalation of 5% at the option of the project developers. The Commission, in its previous order, had observed that in the absence of any

organised market, the fuel cost witnessed wide fluctuation. Hence a view needs to be taken afresh on this issue.

The average fuel price of biomass as per data collected by HAREDA from all most all the districts of Haryana (Annexure – B) as of June, 2014 is Rs. 3437 / MT and the same ranges from a minimum of Rs. 3024 / MT to a maximum of Rs. 3850 / MT. The Commission observes that the details of fuel cost collected from 21 districts of Haryana covers Rice Straw, Rice Husk, Cotton Stalks, Mustard Stalks, Arhar Stalks, Saw Dust, Wood Waste and Wheat Straw. The ground realty prevailing in Haryana is that wood waste, due to poor forest coverage in Haryana is hardly available while Wheat Straw is widely used as cattle fodder. Hence after excluding Wheat Straw and Wood Waste the average cost of biomass that may be available to the IPPs in Haryana is about Rs. 3055 / MT i.e. it ranges from Rs. 2695 / MT to Rs. 3414 / MT.

The Commission observes that CERC had constituted a Committee on 11th October, 2012 to undertake a detailed study on the "Performance / Viability of Biomass based plants operating in the Country including the prevailing biomass prices". The report on this issue was submitted by the said Committee to the CERC on 16th July, 2013. The Central Commission subsequently amended its RE Regulations and in its first tariff order dated 15th May, 2014 in the matter of Determination of levellised generation tariff for FY 2014-15 (Petition No. SM/354/2013 (Suo Motu) has determined biomass fuel cost for Haryana at Rs. 3131.50 / MT.

In view of the above, the Commission observes that the average cost of biomass fuel emanating from district level data in Haryana, after excluding Wood Waste and Wheat Straw works out to Rs. 3055 / MT and as per CERC the same is Rs. 3131.50 / MT. Thus there appears to be some convergence in the data collated by HAREDA and CERC. The Commission, given the fact that HAREDA has provided district wise cost of biomass mix and no such details are available in the CERC order, has considered Rs. 3055 / MT as cost of biomass mix for the limited purpose of determining RE tariff for biomass based power projects in the present case. The Commission directs HAREDA to monitor district wise

biomass fuel cost and keep the Commission informed regarding the same on six monthly basis i.e. April and September of the financial year.

As far as cost of bagasse is concerned no data was submitted by the nodal agency i.e. HAREDA. The Commission reiterates that bagasse is available on site for co – generation. Hence no additional expenses are incurred in collection, storing, handling etc. The Commission had considered Rs. 662 / MT as cost of bagasse for FY 2012-13. Hence after considering an escalation factor of 5% as per regulation 52 of RE regulations, 2010, the bagasse cost for FY 2013-14 was pegged at Rs. 695 / MT in FY 2013-14. Consequently the same after escalating by 5% works out to Rs. 730 / MT for FY 2014-15 which has been considered for tariff determination in the present case.

4.6.9: GCV and Station Heat Rate (SHR):

On the issue of GCV & SHR the Commission observes that the HERC RE Regulations, 2010 were largely based on CERC Regulations. The data on SHR and GCV submitted by the Interveners from the already commissioned biomass based power plants establishes the fact that there is a need to look afresh at these parameters. More so, as the HERC RE Regulations, 2010 provides that "the first control period or Review Period shall be of three years, of which the first year shall the period from the date of notification of these regulations to 31st March, 2011".

In view of the data emanating from the various biomass power projects that have been commissioned in the country and the fact that the Agro Biomass Mapping, State – wise done by the Indian Institute of Science, Bangalore (Biomass Atlas) has estimate power potential from such sources at 1131.1 MWe whereas not more than about 34 MWe biomass power plants have been commissioned in Haryana since the first tariff order dated 15th May, 2007 issued by this Commission and there are not many in the pipeline. Consequently, the Commission in view of the ground reality considers it appropriate to review SHR and GCV to arrive at a realistic / rational value of SHR and GCV that can be considered by the Commission for tariff determination for biomass based power projects.

The Commission observes that the CERC Committee set up on 11th October, 2012 to undertake a detailed study on the "Performance / Viability of Biomass based plants operating in the Country including the prevailing biomass prices" after taking into consideration CEA Norms of September, 2005 based on calculations of weighted average GCV for 16 biomass based power plants, biomass Atlas prepared by the Indian Institute of Science, Bangalore, study of National Productivity Council (NPC) on GCV & Moisture Variation, MNRE letter dated 30th September, 2011, and after considering comments / views of a host of other interveners including IPPs had recommended GCV of 3100 kcal / kg for mustard husk, rice husk and other kinds of biomass fuel on as fired basis which was accepted by the CERC vide notification dated 18.03.2014

In view of the exhaustive study done by the CERC including analysis of the comments filed by different stakeholder, this Commission consider it appropriate to adopt GCV of biomass fuel as 3100 kcal / Kg. for the purpose of tariff determination in the present case instead of repeating the entire exhaustive exercise already conducted by the Central Commission.

Similarly, the CERC Committee after analysis of details submitted by the Indian Biomass Power Association including field visits to biomass power plants in various states of the country, CEA, NPC & MNRE's recommendations including data on SHR emanating from various biomass based power plants in the country and the manufacturers of boiler and turbine as well as after taking into consideration type of fuel, fuel characteristics and variation in quality from time of purchase and time of actual use, loading in the Units that have an impact on operational parameters including performance of boiler and their efficiency, recommended that **SHR of 4200 Kcal / kWh for station using travelling grate boiler and 4125 kCal / kWh for the power stations using AFBC boilers** may be considered for determination of tariff of biomass based power plants and the same was accepted by the Central Commission vide amendment of Regulation 38 of the CERC Principal Regulations i.e. Central Electricity Regulatory Commission (Terms and Conditions for Tariff

determination from Renewable Energy Sources) (First Amendment) Regulations, 2014 notified on 18.03.2014.

In view of the above mentioned exhaustive study the Commission has considered SHR of 4200 Kcal / kWh for station using travelling grate boiler as the biomass based power plants commissioned in Haryana (few others at project stage) are using travelling grate boilers only despite being less efficient vis-a-vis AFBC boilers. However, in case biomass power plants are set up in Haryana with AFBC boilers the normative SHR considered in the present order and also the tariff shall be accordingly adjusted.

4.6.10 Wind Power Projects:

The Commission has noted the contention of the intervener regarding higher capital cost for wind energy power projects and observes that given the low wind velocity in Haryana there could be a need for additional capital cost on account of larger turbine rotor diameter and hub height to make wind power projects in Haryana. However, for the purpose of tariff determination the Commission has considered the benchmark capital cost indexed as per the HERC RE Regulations, 2010. The Commission shall review the capital cost and other parameters while reviewing the HERC RE Regulations, 2010 applicable for the second control period.

5.0 Financial Parameters:

5.1 Debt Equity Ratio. - The debt equity ratio shall be 70:30, in line with the HERC RE Regulations, 2010 and its subsequent amendment. The relevant regulation 13 are reproduced below:

"Loan and Finance Charges. - (1) For the purpose of determination of tariff, loan tenure of 10 years shall be considered. The loans arrived at in the manner indicated above shall be considered as gross normative loan for calculation for interest on loan. The normative loan outstanding as on April 1st of every year shall be worked out by deducting the cumulative repayment up to March 31st of previous

year from the gross normative loan. For the purpose of computation of tariff, the normative interest rate shall be considered as average long term prime lending rate (LTPLR) / Base Rate of State Bank of India (SBI) prevalent during the previous year. 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".

The Commission observes that as per HERC RE Regulations,2010 the admissible interest rate on term loan as well as working capital loan shall be average long term prime lending rate / Short term PLR of SBI during the previous year. The Commission notes that the average benchmark prime lending rate of SBI in the previous year i.e. FY 2013-14 hovered in the range of 13.25% to 14.45% hence an average **rate of 13.75%** per annum has been considered by the Commission for determination of tariff in the present case.

The interest on working capital loan has been proposed by the interveners ranging from 13.75% to 14.5%. The Commission observes that the benchmark prime interest rate on short term / working capital loan is about 4% above the base rate. Since the average base rate during the previous year was 10%, the interest rate on working capital loan, for the purpose of tariff computation, has been considered at **14% in FY 2014-15.**

5.2 Depreciation. – The HERC RE Regulations, 2010 provides as under:

"(1) The value base for the purpose of depreciation shall be the Capital Cost of the asset admitted by the Commission. The Salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset. Depreciation per annum shall be based on 'Differential Depreciation Approach' over loan tenure and period beyond loan tenure over useful life computed on 'Straight Line Method'. The depreciation rate for the first 10 years of the Tariff Period shall be 7% per annum and the remaining depreciation shall be spread over the remaining useful life of the project from 11th 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". Hence depreciation has been considered in line with the HERC RE Regulations, 2010 as above.

5.3 Return on Equity. – As per HERC RE Regulations, 2010, the value base for the equity shall be 30% of the capital cost. However, in case project specific tariff is determined by the Commission, actual equity or 30% of the capital cost, whichever is lower shall be considered by the Commission for the purpose of tariff determination.

The normative Return on Equity shall be as HERC (Terms and Conditions for determination of Tariff from Renewable Energy Sources, Renewable Purchase Obligation and Renewable Energy Certificate) Regulations (3rd Amendment) Regulations, 2014. The same is reproduced below:

> ***"3.0 Amendment of Regulation 15 (2) (a) (b) of the Principal Regulations***
>
> *(2) The normative Return on Equity shall be:*
>
> *(a) 16% per annum on normative equity capital.*
> *(b) Applicable MAT / Corporate Tax shall be separately allowed in the tariff".*

In view of the above ROE has been considered @ 16% and MAT separately provided for while determining the tariff in the present case.

5.4 Interest on Working Capital. – The interest on working capital has been computed as per HERC Regulations, 2010, reproduced below:

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

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

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

a) Fuel costs for four months at normative PLF;

b) Operation & Maintenance expense for one month;
c) Receivables equivalent to 2 (two) months of fixed and variable charges for sale of electricity calculated on the target PLF;
d) Maintenance spare @ 15% of operation and maintenance expenses.

(3) Interest on Working Capital shall be at interest rate equivalent to average State Bank of India short term PLR / Base Rate during the previous year".

5.5 Any carbon credit earned by the project developer shall be shared in the ratio of 25:75 i.e. 25% to the distribution licensee and 75% shall be retained by the project developer. The benefits of carbon credit passed on to the distribution licensee shall be utilized to reduce their power purchase cost.

5.6 In compliance of the judgment of Hon'ble APTEL dated 1/03/2011 in Appeal No. 16 & 117 of 2010 setting aside prohibition of sale of power to third party, the Commission orders that RE Power Project developers, who have not already signed PPA with HPPC/Discoms, may sell power to a third party.

6.0 O&M Expenses & escalation thereto:

The O&M expenses and annual escalation of 5.72% has been considered in line with the HERC RE Regulations, 2010 for the purpose of tariff determination in the present case.

6.1 Wheeling Charges:

The wheeling charges shall be as per HERC RE Regulations, 2010 as amended from time to time. The Commission notes that the Hon'ble APTEL, in an appeal filed by Puri Oil Mills, has passed order setting aside the wheeling charges. However, Hon'ble APTEL's in a number of judgements has held that Regulations notified by Electricity Regulatory Commissions are not a matter of appeal and the same is a subject matter of judicial review in a court of competent jurisdiction. Nonetheless, the

Commission shall re-visit the issue of wheeling charges in the case of RE Projects while reviewing the HERC RE Regulations, 2010.

7.0 Capital Subsidy:

7.1 The Commission, while considering project cost / capital cost for the renewable energy power projects, has not taken into account any capital subsidy that may be available to the project developers. As the Commission, while determining preferential tariff, gives the benefit of higher depreciation, enhanced ROE etc. to the renewable power project developers, the developers shall pass on to the Discoms any subsidy / financial assistance received from Central / State Government agencies on actual disbursement basis.

8.0 The tariff determined by the Commission shall be the ceiling tariff and depending on the RPO of the obligated entity in Haryana, as determined by the Commission, HAREDA may invite bids and evaluate the same on the basis of discounts offered by the bidders on the tariff determined by the Commission. Consequently the Discoms / HPPC may consider signing PPA based on tariff discovered through competitive bidding. However, the tariff discovered through competitive bidding shall be submitted for adoption by the Commission and shall be subject to the condition that the energy procured in such cases would go towards meeting the Solar and Non - Solar RPO of the Discoms. Further as per Electricity Act, 2003 generation including those from renewable energy sources is a delicensed activity. Hence any IPPs, if they so desire and subject to any other statutory requirements / clearances, may set up power plants on self identified sites i.e. the site other than those identified by HAREDA. However, in case they desire to sell the power generated to the distribution licensee(s) in Haryana the same shall be at the tariff approved by the Commission or the tariff discovered through a process of transparent competitive bidding and adopted by the Commission.

9.0 The Commission directs the Discoms to purchase renewable energy as per RPO targets set in the 3rd amendment to the HERC RE Regulations, 2010. In case they can purchase the same at a tariff lower than determined by this Commission they may do so, otherwise they must purchase all such power offered to them by the renewable energy power producers at the tariff determined by this Commission. Further the Commission is of the view that it is always preferable to purchase renewable energy because of fact that such generation projects as per the statutes has to be encouraged, rather than to purchase REC wherein the amount paid for purchase of the same goes to the generator without even getting the benefit of power availability. Additionally, because of its distributed nature, RE generation is considered advantageous in terms of reduced cost of transmission network and reduced transmission losses. This advantage becomes considerably enhanced when such RE is generated and consumed locally. Therefore the Discoms should purchase RE generated in Haryana from the projects whose DPR has been approved by HAREDA and are at an advance stage of implementation. .

10. The Commission observes that in the case of biomass based RE projects availability of fuel at a reasonable cost is a critical issue. Hence HAREDA, while approving DPR for biomass based RE Projects, should ensure that a minimum distance of 50 KM is maintained between such projects. In its absence biomass based RE projects may become unviable vis-à-vis other non – solar RE projects due to the fact that the Commission has put a cap on the biomass fuel cost. The relevant order of the Commission is reproduced below:

"The fuel cost (biomass mix) decided by the Commission shall be subject to a cap of twice (2 times) the fuel cost (Rs / kWh) approved by the Commission for thermal power generation of HPGCL in Haryana. Beyond which the HPPC / Discoms shall be under no obligation to purchase power from the Company".

11.0 The tariff determined by the Commission in the present case is for the RE power plants with entirely new plant and machinery. HPPC / Discoms are directed to ensure the same i.e. the IPP shall certify that the plant and equipments are new and HPPC / Discoms shall verify the same. The tariff approved by the Commission as per Annexure – A (tariff sheets) shall be applicable for the RE projects commissioned in FY 2014–15 and FY 2015-16. Further the first year tariff shall be applicable from the COD of RE Power Projects and shall continue for 12 months from the COD and thereafter tariff for the second year shall be applicable on year to year basis i.e. for first 12 months from COD, first year tariff shall be applicable, then for next twelve months second year tariff shall be applicable and so on.

This order is signed, dated and issued by the Haryana Electricity Regulatory Commission on 13th August, 2014.

Date : 13.08.2014
Place : Panchkula.

(M.S. Puri)	(Jagjeet Singh)	(R.N.Prasher)
Member	Member	Chairman

ANNEXURE - A (1)

HERC FY 2014 -15 & FY 2015-16 TARIFF	
Table of parameters - Wind (Wind Zone - 200-250 W/m^2	
Capital cost (Rs in Million / MW)	56.23
Residual value	5.62
Total depreciation	50.61
CUF	20%
O&M (Rs Million / MW)	0.81
Depreication (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
MAT	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Discount rate	14.42%
Levellised tariff	5.81

Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M indexation	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Loan repayment																									
Outstanding Loan amount	39.36	35.43	31.49	27.55	23.62	19.68	15.75	11.81	7.87	3.94															
Loan repayment	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94															
Interest on loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27															
Working capital																									
One month O&M	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.21	0.22	0.23	0.24	0.26
2 Months receivables	2.18	2.09	2.01	1.93	1.84	1.76	1.68	1.60	1.52	1.44	0.97	0.99	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.14	1.16	1.18	1.21	1.24	1.27
Maintenance spares15% of O&M	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.41	0.44	0.46
Total	2.37	2.29	2.22	2.15	2.08	2.01	1.94	1.88	1.81	1.75	1.30	1.34	1.37	1.41	1.45	1.49	1.53	1.58	1.63	1.68	1.73	1.79	1.85	1.92	1.99
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28

Calculation of generic tariff for 1 MW wind energy power project

Unit Generation	Years																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
installed Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation (MU)	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Auxiliary consumption	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Generation	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Tariff Components Fixed Charges																									
O&M Expenses	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Depreciation	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Interest on term loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27															
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28
Return on equity	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Income tax	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Total Fixed Cost	13.06	12.56	12.06	11.56	11.06	10.57	10.08	9.59	9.11	8.63	5.85	5.93	6.02	6.12	6.22	6.32	6.44	6.56	6.68	6.82	6.96	7.11	7.26	7.43	7.61
Tariff (Rs / kWh)	7.46	7.17	6.88	6.60	6.31	6.03	5.75	5.48	5.20	4.93	3.34	3.39	3.44	3.49	3.55	3.61	3.67	3.74	3.81	3.89	3.97	4.06	4.15	4.24	4.34
Per unit O&M Expenses	0.46	0.49	0.52	0.55	0.58	0.61	0.65	0.68	0.72	0.76	0.81	0.85	0.90	0.95	1.01	1.06	1.13	1.19	1.26	1.33	1.41	1.49	1.57	1.66	1.76
Per Unit Depreciation	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
Per Unit Interest on term loan	2.93	2.63	2.32	2.01	1.70	1.39	1.08	0.77	0.46	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per Unit Interest on WC	0.19	0.18	0.18	0.17	0.17	0.16	0.16	0.15	0.14	0.14	0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.15	0.15	0.16
Per Unit Return on equity	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
Per unit Income Tax / MAT	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Levellised tariff																									
Discount factor	1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04
Discounted tariff components	7.46	6.27	5.26	4.40	3.68	3.08	2.56	2.13	1.77	1.47	0.87	0.77	0.68	0.61	0.54	0.48	0.43	0.38	0.34	0.30	0.27	0.24	0.21	0.19	0.17
Levellised tariff	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81

HERC FY 2014-15 & FY 2015-16 TARIFF **ANNEXURE A (2)**

Table of parameters - Wind (Wind Zone - 250=300 W/m^2	
Capital cost (Rs in Million / MW)	56.23
Residual value (Rs Million)	5.62
Total depreciation (Rs Million)	50.61
CUF	23%
O&M (Rs Million / MW)	0.81
Depreication (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
MAT	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Discount rate	14.42%
Levellised tariff	5.06

Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M indexation	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Loan repayment																									
Outstanding Loan amount	39.36	35.42	31.49	27.55	23.62	19.68	15.74	11.81	7.87	3.94															
Loan repayment	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94															
Interest on loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27															
Working capital																									
One month O&M	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.21	0.22	0.23	0.24	0.26
2 Months receivables	2.18	2.09	2.01	1.93	1.84	1.76	1.68	1.60	1.52	1.44	0.97	0.99	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.14	1.16	1.18	1.21	1.24	1.27
Maintenance spares15% of O&M	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.41	0.44	0.46
Total	2.37	2.29	2.22	2.15	2.08	2.01	1.94	1.88	1.81	1.75	1.30	1.34	1.37	1.41	1.45	1.49	1.53	1.58	1.63	1.68	1.73	1.79	1.85	1.92	1.99
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28

Calculation of generic tariff for 1 MW wind energy power project

Unit Generation	Years																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
installed Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation (MU)	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01
Auxiliary consumption	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Generation	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01
Tariff Components Fixed Charges																									
O&M Expenses	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Depreciation	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Interest on term loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27	0.00	0.00	0.00	0.00											
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28
Return on equity	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Income tax	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Total Fixed Cost	13.06	12.56	12.06	11.56	11.06	10.57	10.08	9.59	9.11	8.63	5.85	5.93	6.02	6.12	6.22	6.32	6.44	6.56	6.68	6.82	6.96	7.11	7.26	7.43	7.61
Tariff (Rs / kWh)	6.48	6.23	5.98	5.74	5.49	5.24	5.00	4.76	4.52	4.28	2.90	2.94	2.99	3.04	3.09	3.14	3.20	3.25	3.32	3.38	3.45	3.53	3.61	3.69	3.78
Per unit O&M Expenses	0.40	0.43	0.45	0.48	0.50	0.53	0.56	0.59	0.63	0.66	0.70	0.74	0.78	0.83	0.88	0.93	0.98	1.03	1.09	1.16	1.22	1.29	1.37	1.44	1.53
Per Unit Depreciation	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Per Unit Interest on term loan	2.55	2.28	2.01	1.75	1.48	1.21	0.94	0.67	0.40	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per Unit Interest on WC	0.16	0.16	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.12	0.09	0.09	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.14
Per Unit Return on equity	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34
Per Unit income tax	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Levellised tariff																									
Discount factor	1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04
Discounted tariff components	6.48	5.45	4.57	3.83	3.20	2.67	2.23	1.85	1.54	1.27	0.75	0.67	0.59	0.53	0.47	0.42	0.37	0.33	0.29	0.26	0.23	0.21	0.19	0.17	0.15
Levellised tariff	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06

HERC FY 2014-15 & FY 2015-16 TARIFF **ANNEXURE A (3)**

Table of parameters - Wind (Wind Zone - 300-400 W/m^2	
Capital cost (Rs in Million / MW)	56.23
Residual value (Rs Milion)	5.62
Total depreciation (Rs Million)	50.61
CUF	27%
O&M (Rs Million / MW)	0.81
Depreication (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
MAT	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Discount rate	14.42%
Levellised tariff	4.31

Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M indexation	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Loan repayment																									
Outstanding Loan amount	39.36	35.42	31.49	27.55	23.62	19.68	15.74	11.81	7.87	3.94															
Loan repayment	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94															
Interest on loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27															
Working capital																									
One month O&M	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.21	0.22	0.23	0.24	0.26
2 Months receivables	2.18	2.09	2.01	1.93	1.84	1.76	1.68	1.60	1.52	1.44	0.97	0.99	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.14	1.16	1.18	1.21	1.24	1.27
Maintenance spares15% of O&M	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.41	0.44	0.46
Total	2.37	2.29	2.22	2.15	2.08	2.01	1.94	1.88	1.81	1.75	1.30	1.34	1.37	1.41	1.45	1.49	1.53	1.58	1.63	1.68	1.73	1.79	1.85	1.92	1.99
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28

Calculation of generic tariff for 1 MW wind energy power project

Unit Generation	Years																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
installed Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation (MU)	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37
Auxiliary consumption	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Generation	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37
Tariff Components Fixed Charges																									
O&M Expenses	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Depreciation	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Interest on term loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27	0.00	0.00	0.00	0.00											
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28
Return on equity	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Income tax	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Total Fixed Cost	13.06	12.56	12.06	11.56	11.06	10.57	10.08	9.59	9.11	8.63	5.85	5.93	6.02	6.12	6.22	6.32	6.44	6.56	6.68	6.82	6.96	7.11	7.26	7.43	7.61
Tariff (Rs / kWh)	5.52	5.31	5.10	4.89	4.68	4.47	4.26	4.06	3.85	3.65	2.47	2.51	2.55	2.59	2.63	2.67	2.72	2.77	2.83	2.88	2.94	3.00	3.07	3.14	3.22
Per unit O&M Expenses	0.34	0.36	0.38	0.40	0.43	0.45	0.48	0.51	0.53	0.56	0.60	0.63	0.67	0.71	0.75	0.79	0.83	0.88	0.93	0.99	1.04	1.10	1.16	1.23	1.30
Per Unit Depreciation	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Per Unit Interest on term loan	2.17	1.95	1.72	1.49	1.26	1.03	0.80	0.57	0.34	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per Unit Interest on WC	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.11	0.11	0.10	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.12
Per Unit Return on equity	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Levellised tariff																									
Discount factor	1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04
Discounted tariff components	5.52	4.64	3.89	3.26	2.73	2.28	1.90	1.58	1.31	1.09	0.64	0.57	0.51	0.45	0.40	0.35	0.32	0.28	0.25	0.22	0.20	0.18	0.16	0.14	0.13
Levellised tariff	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31

HERC FY 2014-15 & FY 2015-16 TARIFF **ANNEXURE A (4)**

Table of parameters - Wind (Wind Zone - >400	
Capital cost (Rs in Million / MW)	56.23
Residual value (Rs Million)	5.62
Total depreciation (Rs Million)	50.61
CUF	30%
O&M (Rs Million / MW)	0.81
Depreication (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
MAT	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Discount rate	14.42%
Levellised tariff	3.88

Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M indexation	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Loan repayment																									
Outstanding Loan amount	39.36	35.42	31.49	27.55	23.62	19.68	15.74	11.81	7.87	3.94															
Loan repayment	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94															
Interest on loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27															
Working capital																									
One month O&M	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.21	0.22	0.23	0.24	0.26
2 Months receivables	2.18	2.09	2.01	1.93	1.84	1.76	1.68	1.60	1.52	1.44	0.97	0.99	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.14	1.16	1.18	1.21	1.24	1.27
Maintenance spares15% of O&M	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.41	0.44	0.46
Total	2.37	2.29	2.22	2.15	2.08	2.01	1.94	1.88	1.81	1.75	1.30	1.34	1.37	1.41	1.45	1.49	1.53	1.58	1.63	1.68	1.73	1.79	1.85	1.92	1.99
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28

Calculation of generic tariff for 1 MW wind energy power project

Unit Generation	Years																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
installed Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation (MU)	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63
Auxiliary consumption	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Generation	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63
Tariff Components Fixed Charges																									
O&M Expenses	0.81	0.86	0.91	0.96	1.01	1.07	1.13	1.20	1.26	1.34	1.41	1.49	1.58	1.67	1.76	1.87	1.97	2.09	2.20	2.33	2.46	2.60	2.75	2.91	3.08
Depreciation	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Interest on term loan	5.14	4.60	4.06	3.52	2.98	2.44	1.89	1.35	0.81	0.27	0.00	0.00	0.00	0.00											
Interest on working capital	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28
Return on equity	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Income tax	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Total Fixed Cost	13.06	12.56	12.06	11.56	11.06	10.57	10.08	9.59	9.11	8.63	5.85	5.93	6.02	6.12	6.22	6.32	6.44	6.56	6.68	6.82	6.96	7.11	7.26	7.43	7.61
Tariff (Rs / kWh)	4.97	4.78	4.59	4.40	4.21	4.02	3.83	3.65	3.47	3.28	2.22	2.26	2.29	2.33	2.37	2.41	2.45	2.49	2.54	2.59	2.65	2.70	2.76	2.83	2.89
Per unit O&M Expenses	0.31	0.33	0.34	0.36	0.39	0.41	0.43	0.45	0.48	0.51	0.54	0.57	0.60	0.64	0.67	0.71	0.75	0.79	0.84	0.89	0.94	0.99	1.05	1.11	1.17
Per Unit Depreciation	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Per Unit Interest on term loan	1.96	1.75	1.54	1.34	1.13	0.93	0.72	0.51	0.31	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per Unit Interest on WC	0.13	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.09	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.11
Per Unit Return on equity	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Levellised tariff																									
Discount factor	1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04
Discounted tariff components	4.97	4.18	3.50	2.94	2.46	2.05	1.71	1.42	1.18	0.98	0.58	0.51	0.46	0.40	0.36	0.32	0.28	0.25	0.23	0.20	0.18	0.16	0.14	0.13	0.11
Levellised tariff	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88

HERC FY 2014-15 & FY 2015-16 TARIFF (Rs / kWh) ANNEXURE A (5)

Biomass generic tariff (Water Cooled)

Table of Parameters	
Capital cost (Rs in Million / MW)	49.131
Residual value (10%)	4.91
Total depreciation (Rs in Million / MW)	44.22
Loan component (Rs in Million / MW)	34.39
Equity component (Rs in Million / MW)	14.74
CUF (stablisation)	60%
CUF 1st year (inc stabilisation)	70%
CUF 2nd year onwards	80%
O&M (Rs Million / MW)	2.53
O&M escalation	5.72%
Depreication (1st 10 years)	7.00%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
Income tax (MAT)	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Auxiliary consumption	10%
Fuel cost (Rs. / MT)	3055
Fuel price escalation	5%
Heat rate	4200
GCV	3100
Discount rate	14.42%
Levellised tariff	8.52

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fuel cost escalation	3055	3208	3368	3537	3713	3899	4094	4299	4514	4739	4976	5225	5486	5761	6049	6351	6669	7002	7352	7720
O&M escalation	2.53	2.67	2.83	2.99	3.16	3.34	3.53	3.73	3.95	4.17	4.41	4.66	4.93	5.21	5.51	5.83	6.16	6.51	6.89	7.28
Outstanding Loan amount	34.39	30.95	27.51	24.07	20.64	17.20	13.76	10.32	6.88	3.44										
Loan repayment	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44										
Interest on loan	4.73	4.26	3.78	3.31	2.84	2.36	1.89	1.42	0.95	0.47										
Working capital																				
Fuel cost for four months	8.46	10.15	10.66	11.19	11.75	12.34	12.96	13.60	14.29	15.00	15.75	16.54	17.36	18.23	19.14	20.10	21.11	22.16	23.27	24.43
One month O&M	0.21	0.22	0.24	0.25	0.26	0.28	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.46	0.49	0.51	0.54	0.57	0.61
2 Months receivables	6.80	7.57	7.79	8.02	8.27	8.54	8.82	9.12	9.44	9.78	9.85	10.31	10.80	11.32	11.86	12.43	13.02	13.65	14.31	15.00
Maintenance spares15% of O&M	0.38	0.40	0.42	0.45	0.47	0.50	0.53	0.56	0.59	0.63	0.66	0.70	0.74	0.78	0.83	0.87	0.92	0.98	1.03	1.09
Total	15.85	18.34	19.11	19.91	20.76	21.65	22.60	23.60	24.65	25.76	26.62	27.94	29.32	30.77	32.29	33.89	35.57	37.33	39.19	41.13
Interest on working capital	2.22	2.57	2.67	2.79	2.91	3.03	3.16	3.30	3.45	3.61	3.73	3.91	4.10	4.31	4.52	4.74	4.98	5.23	5.49	5.76
Variable Costs																				

Parameters	**Derivation**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	2	**3**	**4**	**5**	**6**	**7**	8	9	**10**	**11**	**12**	**13**	**14**	15	16	**17**	**18**	**19**	**20**	**21**	22
Capacity (MW)	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Generation (Million Units)	A	6.13	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01
Auxiliary Cons (%)		10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Generation (Ex-bus MIlion Units)	A1	5.52	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31
Station Heat Rate (Kcal/kWh)	B	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
Calorific Value of fuel(Kcal/Kg)	C	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100
Overall Heat (Gcal)	D= (A*B)	25754	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434
Fuel Consumption (MT)	E=(D*1000/C)	8308	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495
Cost of fuel per MT `	F	3055	3208	3368	3537	3713	3899	4094	4299	4514	4739	4976	5225	5486	5761	6049	6351	6669	7002	7352	7720
Total Cost of fuel (Rs Million)	G=E*F/10^6	25.38	30.46	31.98	33.58	35.26	37.02	38.87	40.81	42.86	45.00	47.25	49.61	52.09	54.70	57.43	60.30	63.32	66.48	69.81	73.30
Fuel Cost (Rs/kWh)	H=G/A1	4.60	4.83	5.07	5.32	5.59	5.87	6.16	6.47	6.79	7.13	7.49	7.87	8.26	8.67	9.11	9.56	10.04	10.54	11.07	11.62
Fixed Costs																					
O&M Expenses		**2.53**	**2.67**	**2.83**	**2.99**	**3.16**	**3.34**	**3.53**	**3.73**	**3.95**	**4.17**	**4.41**	**4.66**	**4.93**	**5.21**	**5.51**	**5.83**	**6.16**	**6.51**	**6.89**	**7.28**
Depreciation		**3.10**	**3.10**	**3.10**	**3.10**	**3.10**	**3.10**	**3.10**	**3.10**	**3.10**	**3.10**	**1.33**	**1.33**	**1.33**	**1.33**	**1.33**	**1.33**	**1.33**	**1.33**	**1.33**	**1.33**
Interest on Term Loan		**4.73**	**4.26**	**3.78**	**3.31**	**2.84**	**2.36**	**1.89**	**1.42**	**0.95**	**0.47**	**0.00**	**0.00**	**0.00**							
Interest on Working Capital		**2.22**	**2.57**	**2.67**	**2.79**	**2.91**	**3.03**	**3.16**	**3.30**	**3.45**	**3.61**	**3.73**	**3.91**	**4.10**	**4.31**	**4.52**	**4.74**	**4.98**	**5.23**	**5.49**	**5.76**
Return on Equity		2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36	2.36
Income tax on ROE		0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Fixed Cost		15.40	14.95	14.74	14.54	14.36	14.19	14.04	13.91	13.80	13.71	11.82	12.26	12.72	13.21	13.72	14.26	14.82	15.42	16.06	16.72
Fixed cost (Rs/kWh)		2.79	2.37	2.34	2.31	2.28	2.25	2.23	2.21	2.19	2.17	1.87	1.94	2.02	2.09	2.17	2.26	2.35	2.45	2.55	2.65
Total cost (Fixed+variable)		40.78	45.41	46.72	48.12	49.61	51.21	52.91	54.73	56.65	58.70	59.07	61.87	64.81	67.90	71.15	74.56	78.14	81.91	85.86	90.02
Tariff (Rs/kWh)		7.39	7.20	7.41	7.63	7.87	8.12	8.39	8.68	8.98	9.31	9.37	9.81	10.28	10.77	11.28	11.82	12.39	12.99	13.61	14.27
Per unit tariff components																					
Per unit O&M Expenses		0.46	0.42	0.45	0.47	0.50	0.53	0.56	0.59	0.63	0.66	0.70	0.74	0.78	0.83	0.87	0.92	0.98	1.03	1.09	1.15
Per Unit Depreciation		0.56	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Per Unit Interest on term loan		0.86	0.67	0.60	0.52	0.45	0.37	0.30	0.22	0.15	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per Unit Interest on working capital		0.40	0.41	0.42	0.44	0.46	0.48	0.50	0.52	0.55	0.57	0.59	0.62	0.65	0.68	0.72	0.75	0.79	0.83	0.87	0.91
Per Unit Return on equity		0.43	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Per unit income tax		0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Levellised tariff																					
Discount factor		1.00	0.874	0.764	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.0774	7.40
Discounted tariff components(fixed)		4.60	4.22	3.87	3.55	3.26	2.99	2.75	2.52	2.31	2.12	1.95	1.79	1.64	1.51	1.38	1.27	1.16	1.07	0.98	0.90	45.8
Discounted tariff components(variable)		2.79	2.07	1.78	1.54	1.33	1.15	0.99	0.86	0.74	0.65	0.49	0.44	0.40	0.36	0.33	0.30	0.27	0.25	0.23	0.21	17.2
Discounted tariff components (Total)		7.39	6.29	5.66	5.09	4.59	4.14	3.74	3.38	3.06	2.77	2.44	2.23	2.04	1.87	1.71	1.57	1.44	1.32	1.20	1.10	63.0
Levellised tariff		8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	170.4

HERC FY 2014-15 & FY 2015-16 TARIFF (Rs/kWh) ANNEXURE A (6)

Biomass generic tariff (Air cooled)

Table of parameters	
Capital cost (` in Million / MW)	51.86
Residual value (10%)	5.19
Total depreciation	46.67
Loan component	36.30
Equity component	15.56
CUF (stablisation)	60%
CUF 1st year	70%
CUF 2nd year onwards	80%
O&M (Rs Million / MW)	2.53
O&M escalation	5.72%
Depreication (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
Income tax	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Auxiliary consumption	10%
Fuel cost (Rs / MT)	3055
Fuel price escalation	5%
Heat rate	4200
GCV	3100
Discount rate	14.42%
Levellised tariff	8.62

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fuel cost escalation	3055	3208	3368	3537	3713	3899	4094	4299	4514	4739	4976	5225	5486	5761	6049	6351	6669	7002	7352	7720
O&M escalation	2.53	2.67	2.83	2.99	3.16	3.34	3.53	3.73	3.95	4.17	4.41	4.66	4.93	5.21	5.51	5.83	6.16	6.51	6.89	7.28
Outstanding Loan amount	36.30	33.15	30.01	26.86	23.71	20.56	17.41	14.27	11.12	7.97										
Loan repayment	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15										
Interest on loan	4.78	4.34	3.91	3.48	3.04	2.61	2.18	1.75	1.31	0.88										
Working capital																				
Fuel cost for four months	7.86	10.15	10.66	11.19	11.75	12.34	12.96	13.60	14.29	15.00	15.75	16.54	17.36	18.23	19.14	20.10	21.11	22.16	23.27	24.43
One month O&M	0.21	0.22	0.24	0.25	0.26	0.28	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.46	0.49	0.51	0.54	0.57	0.61
2 Months receivables	6.54	7.63	7.86	8.10	8.36	8.63	8.92	9.23	9.56	9.91	9.88	10.35	10.84	11.35	11.89	12.46	13.06	13.69	14.35	15.04
Maintenance spares15% of O&M	0.38	0.40	0.42	0.45	0.47	0.50	0.53	0.56	0.59	0.63	0.66	0.70	0.74	0.78	0.83	0.87	0.92	0.98	1.03	1.09
Total	14.98	18.41	19.18	19.99	20.85	21.75	22.70	23.70	24.76	25.88	26.66	27.97	29.35	30.80	32.32	33.92	35.60	37.37	39.22	41.17
Interest on working capital	2.10	2.58	2.69	2.80	2.92	3.04	3.18	3.32	3.47	3.62	3.73	3.92	4.11	4.31	4.53	4.75	4.98	5.23	5.49	5.76

Variable Costs

Parameters	**Derivation**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	2	**3**	**4**	**5**	**6**	**7**	8	9	**10**	**11**	**12**	**13**	**14**	15	16	**17**	**18**	**19**	**20**	**21**	22
Capacity (MW)	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Generation (Million Units)	A	5.69	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01
Auxiliary Cons (%)		10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Generation (Ex-bus Mllion Units)	A1	5.12	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31
Station Heat Rate (Kcal/kWh)	B	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
Calorific Value of fuel(Kcal/Kg)	C	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100	3100
Overall Heat (Gcal)	D= (A*B)	23915	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434	29434
Fuel Consumption (MT)	E=(D*1000/C)	7714	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495	9495
Cost of fuel per MT `	F	3055	3208	3368	3537	3713	3899	4094	4299	4514	4739	4976	5225	5486	5761	6049	6351	6669	7002	7352	7720
Total Cost of fuel (` Million)	$G=E*F/10^{\delta}$	23.57	30.46	31.98	33.58	35.26	37.02	38.87	40.81	42.86	45.00	47.25	49.61	52.09	54.70	57.43	60.30	63.32	66.48	69.81	73.30
Fuel Cost (Rs/kWh)	H=G/A1	4.60	4.83	5.07	5.32	5.59	5.87	6.16	6.47	6.79	7.13	7.49	7.87	8.26	8.67	9.11	9.56	10.04	10.54	11.07	11.62
Fixed Costs																					
O&M Expenses		**2.53**	**2.67**	**2.83**	**2.99**	**3.16**	**3.34**	**3.53**	**3.73**	**3.95**	**4.17**	**4.41**	**4.66**	**4.93**	**5.21**	**5.51**	**5.83**	**6.16**	**6.51**	**6.89**	**7.28**
Depreciation		**3.27**	**3.27**	**3.27**	**3.27**	**3.27**	**3.27**	**3.27**	**3.27**	**3.27**	**3.27**	**1.40**	**1.40**	**1.40**	**1.40**	**1.40**	**1.40**	**1.40**	**1.40**	**1.40**	**1.40**
Interest on Term Loan		**4.78**	**4.34**	**3.91**	**3.48**	**3.04**	**2.61**	**2.18**	**1.75**	**1.31**	**0.88**	**0.00**	**0.00**	**0.00**							
Interest on Working Capital		**2.10**	**2.58**	**2.69**	**2.80**	**2.92**	**3.04**	**3.18**	**3.32**	**3.47**	**3.62**	**3.73**	**3.92**	**4.11**	**4.31**	**4.53**	**4.75**	**4.98**	**5.23**	**5.49**	**5.76**
Return on Equity		2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49
Income tax on ROE		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Fixed Cost		15.66	15.35	15.18	15.02	14.88	14.75	14.64	14.55	14.48	14.43	12.03	12.47	12.93	13.42	13.93	14.47	15.03	15.63	16.27	16.93
Fixed cost (Rs/kWh)		3.06	2.43	2.41	2.38	2.36	2.34	2.32	2.31	2.30	2.29	1.91	1.98	2.05	2.13	2.21	2.29	2.38	2.48	2.58	2.68
Total cost (Fixed+variable)		39.22	45.81	47.16	48.60	50.14	51.77	53.52	55.37	57.34	59.43	59.28	62.08	65.02	68.11	71.36	74.77	78.35	82.12	86.07	90.23
Tariff (Rs/kWh)		7.65	7.26	7.48	7.71	7.95	8.21	8.48	8.78	9.09	9.42	9.40	9.84	10.31	10.80	11.31	11.85	12.42	13.02	13.65	14.31
Per unit tariff components																					
Per unit O&M Expenses		0.49	0.42	0.45	0.47	0.50	0.53	0.56	0.59	0.63	0.66	0.70	0.74	0.78	0.83	0.87	0.92	0.98	1.03	1.09	1.15
Per Unit Depreciation		0.64	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Per Unit Interest on term loan		0.93	0.69	0.62	0.55	0.48	0.41	0.35	0.28	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per Unit Interest on working capital		0.41	0.41	0.43	0.44	0.46	0.48	0.50	0.53	0.55	0.57	0.59	0.62	0.65	0.68	0.72	0.75	0.79	0.83	0.87	0.91
Per Unit Return on equity		0.49	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Levellised tariff																					
Discount factor		1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	7.40
Discounted tariff components(fixed)		4.60	4.22	3.87	3.55	3.26	2.99	2.75	2.52	2.31	2.12	1.95	1.79	1.64	1.51	1.38	1.27	1.16	1.07	0.98	0.90	45.8
Discounted tariff components(variable)		3.06	2.13	1.84	1.59	1.38	1.19	1.03	0.90	0.78	0.68	0.50	0.45	0.41	0.37	0.33	0.30	0.28	0.25	0.23	0.21	17.9
Discounted tariff components (Total)		7.65	6.35	5.71	5.14	4.64	4.19	3.78	3.42	3.09	2.80	2.44	2.24	2.05	1.87	1.72	1.57	1.44	1.32	1.21	1.11	63.7
Levellised tariff		8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	172.3

HERC FY 2014-15 & FY 2015-16 Tariff ANNEXURE A (7)

Cogeneration generic tariff

Table of parameters	
Capital cost (Rs in Million / MW)	48.585
Residual value (10%)	4.86
Total depreciation	43.73
Loan component	34.01
Equity component	14.58
CUF	53%
CUF 1st year	53%
CUF 2nd year onwards	53%
O&M (Rs Million / MW)	1.67
O&M escalation	5.72%
Depreication (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
Income tax	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Auxiliary consumption	8.5%
Fuel cost (Rs/ MT)	729.3
Fuel price escalation	5%
Heat rate	3600
GCV	2250
Discount rate	14.42%
Levellised tariff	4.20

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fuel cost escalation	729	766	804	844	886	931	977	1026	1078	1131	1188	1247	1310	1375	1444	1516	1592	1672	1755	1843
O&M escalation	1.67	1.77	1.87	1.97	2.09	2.21	2.33	2.46	2.61	2.76	2.91	3.08	3.26	3.44	3.64	3.85	4.07	4.30	4.55	4.81
Outstanding Loan amount	34.01	30.61	27.21	23.81	20.41	17.00	13.60	10.20	6.80	3.40										
Loan repayment	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40										
Interest on loan	4.44	3.97	3.51	3.04	2.57	2.10	1.64	1.17	0.70	0.23										
Working capital																				
Fuel cost for four months	1.81	1.90	1.99	2.09	2.20	2.30	2.42	2.54	2.67	2.80	2.94	3.09	3.24	3.41	3.58	3.75	3.94	4.14	4.35	4.56
One month O&M	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.21	0.22	0.23	0.24	0.26	0.27	0.29	0.30	0.32	0.34	0.36	0.38	0.40
2 Months receivables	3.02	2.93	2.91	2.91	2.90	2.90	2.91	2.92	2.93	2.95	2.71	2.82	2.93	3.05	3.18	3.31	3.45	3.60	3.75	3.91
Maintenance spares15% of O&M	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.41	0.44	0.46	0.49	0.52	0.55	0.58	0.61	0.64	0.68	0.72
Total	5.22	5.23	5.34	5.46	5.58	5.72	5.87	6.03	6.21	6.39	6.33	6.63	6.94	7.26	7.60	7.96	8.34	8.74	9.16	9.60
Interest on working capital	0.73	0.73	0.75	0.76	0.78	0.80	0.82	0.84	0.87	0.89	0.89	0.93	0.97	1.02	1.06	1.11	1.17	1.22	1.28	1.34

Variable Costs

Parameters	**Derivation**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	2	**3**	**4**	**5**	**6**	**7**	8	9	**10**	**11**	**12**	**13**	**14**	15	16	**17**	**18**	**19**	**20**	**21**	22
Capacity (MW)	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Generation (Million Units)	A	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64
Auxiliary Cons (%)		0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Generation (Ex-bus Mllion Units)	A1	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
Station Heat Rate (Kcal/kWh)	B	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
Calorific Value of fuel(Kcal/Kg)	C	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250
Overall Heat (Gcal)	D= (A*B)	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714	16714
Fuel Consumption (MT)	E=(D*1000/C)	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428	7428
Cost of fuel per MT `	F	729	766	804	844	886	931	977	1026	1078	1131	1188	1247	1310	1375	1444	1516	1592	1672	1755	1843
Total Cost of fuel (` Million)	G=E*F/10^6	5.42	5.69	5.97	6.27	6.59	6.91	7.26	7.62	8.00	8.40	8.82	9.27	9.73	10.22	10.73	11.26	11.83	12.42	13.04	13.69
Fuel Cost (Rs/kWh)	H=G/A1	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.79	1.88	1.98	2.08	2.18	2.29	2.40	2.52	2.65	2.78	2.92	3.07	3.22
Fixed Costs																					
O&M Expenses		**1.67**	**1.77**	**1.87**	**1.97**	**2.09**	**2.21**	**2.33**	**2.46**	**2.61**	**2.76**	**2.91**	**3.08**	**3.26**	**3.44**	**3.64**	**3.85**	**4.07**	**4.30**	**4.55**	**4.81**
Depreciation		**3.06**	**3.06**	**3.06**	**3.06**	**3.06**	**3.06**	**3.06**	**3.06**	**3.06**	**3.06**	**1.31**	**1.31**	**1.31**	**1.31**	**1.31**	**1.31**	**1.31**	**1.31**	**1.31**	**1.31**
Interest on Term Loan		**4.44**	**3.97**	**3.51**	**3.04**	**2.57**	**2.10**	**1.64**	**1.17**	**0.70**	**0.23**	**0.00**	**0.00**	**0.00**	**0.00**						
Interest on Working Capital		**0.73**	**0.73**	**0.75**	**0.76**	**0.78**	**0.80**	**0.82**	**0.84**	**0.87**	**0.89**	**0.89**	**0.93**	**0.97**	**1.02**	**1.06**	**1.11**	**1.17**	**1.22**	**1.28**	**1.34**
Return on Equity		2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
Income tax on ROE		0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Fixed Cost		12.70	11.87	11.51	11.17	10.83	10.50	10.18	9.87	9.57	9.28	7.44	7.65	7.87	8.10	8.35	8.61	8.88	9.17	9.47	9.79
Fixed cost (Rs/kWh)		2.99	2.79	2.71	2.63	2.55	2.47	2.40	2.32	2.25	2.18	1.75	1.80	1.85	1.91	1.96	2.03	2.09	2.16	2.23	2.31
Total cost (Fixed+variable)		18.12	17.55	17.49	17.44	17.42	17.42	17.44	17.49	17.57	17.68	16.27	16.92	17.60	18.32	19.07	19.87	20.70	21.58	22.51	23.48
Tariff (Rs/kWh)		4.27	4.13	4.12	4.11	4.10	4.10	4.11	4.12	4.14	4.16	3.83	3.98	4.14	4.31	4.49	4.68	4.87	5.08	5.30	5.53
Per unit tariff components																					
Per unit O&M Expenses		0.39	0.42	0.44	0.46	0.49	0.52	0.55	0.58	0.61	0.65	0.69	0.72	0.77	0.81	0.86	0.91	0.96	1.01	1.07	1.13
Per Unit Depreciation		0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Per Unit Interest on term loan		1.05	0.94	0.83	0.72	0.61	0.50	0.39	0.28	0.17	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per Unit Interest on working capital		0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.29	0.30	0.32
Per Unit Return on equity		0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Per unit income tax		0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Levellised tariff																					
Discount factor		1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	7.40
Discounted tariff components(fixed)		1.28	1.17	1.07	0.99	0.90	0.83	0.76	0.70	0.64	0.59	0.54	0.50	0.45	0.42	0.38	0.35	0.32	0.30	0.27	0.25	12.7
Discounted tariff components(variable)		2.99	2.44	2.07	1.76	1.49	1.26	1.07	0.91	0.77	0.65	0.46	0.41	0.37	0.33	0.30	0.27	0.24	0.22	0.20	0.18	18.4
Discounted tariff components (Total)		4.27	3.61	3.14	2.74	2.39	2.09	1.83	1.60	1.41	1.24	1.00	0.90	0.82	0.75	0.68	0.62	0.56	0.51	0.47	0.43	31.1
Levellised tariff		4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	84.0

HERC Soalr PV Crystalline Tariff FY 2014-15 & FY 2015-16 ANNEXURE A (8)

Table of parameters	
Capital cost (Rs in Million / MW)	70.50
Residual value (10%) Rs Million	7.05
Total depreciation (Rs. Million)	63.45
Loan component (70%) Rs. Million	49.35
Equity component (30%) Rs. Million	21.15
CUF (%)	19%
O&M (Rs. Million / MW)	1.1629
O&M escalation	5.72%
Depreciation (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
Income tax	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Discount rate	14.42%
Levellised tairff (Rs /kWh)	7.45

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M escalation	1.16	1.23	1.30	1.37	1.45	1.54	1.62	1.72	1.81	1.92	2.03	2.14	2.27	2.40	2.53	2.68	2.83	2.99	3.16	3.35	3.54	3.74	3.95	4.18	4.42
Outstanding Loan amount	49.35	44.42	39.48	34.55	29.61	24.68	19.74	14.81	9.87	4.93															
Loan repayment	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94															
Interest on loan	6.45	5.77	5.09	4.41	3.73	3.05	2.37	1.70	1.02	0.34															
Working capital																									
One month O&M	0.10	0.10	0.11	0.11	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.29	0.31	0.33	0.35	0.37
2 Months receivables	2.76	2.54	2.43	2.33	2.23	2.13	2.03	1.93	1.83	1.73	1.15	1.17	1.19	1.22	1.24	1.27	1.29	1.32	1.35	1.38	1.42	1.45	1.49	1.53	1.57
Maintenance spares15% of O&M	0.17	0.18	0.19	0.21	0.22	0.23	0.24	0.26	0.27	0.29	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.45	0.47	0.50	0.53	0.56	0.59	0.63	0.66
Total	3.03	2.82	2.74	2.65	2.57	2.49	2.41	2.33	2.25	2.18	1.62	1.67	1.72	1.78	1.83	1.89	1.95	2.02	2.09	2.16	2.24	2.33	2.41	2.51	2.60
Interest on working capital	0.42	0.40	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.23	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.36

Particulars	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	26
Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Generation (Million Units)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	41.6
Aux Energy Cons (%)	0%	0%	0%	0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Generation (Ex-bus MIlion Units)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	41.6
Fixed Costs																										
O&M Expenses	**1.16**	**1.23**	**1.30**	**1.37**	**1.45**	**1.54**	**1.62**	**1.72**	**1.81**	**1.92**	**2.03**	**2.14**	**2.27**	**2.40**	**2.53**	**2.68**	**2.83**	**2.99**	**3.16**	**3.35**	**3.54**	**3.74**	**3.95**	**4.18**	**4.42**	61.3
Depreciation	**4.44**	**4.44**	**4.44**	**4.44**	**4.44**	**4.44**	**4.44**	**4.44**	**4.44**	**4.44**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	**1.27**	63.5
Interest on Term Loan	**6.45**	**5.77**	**5.09**	**4.41**	**3.73**	**3.05**	**2.37**	**1.70**	**1.02**	**0.34**	**0.00**	**0.00**	**0.00**													33.9
Interest on Working Capital	**0.42**	**0.40**	**0.38**	**0.37**	**0.36**	**0.35**	**0.34**	**0.33**	**0.32**	**0.31**	**0.23**	**0.23**	**0.24**	**0.25**	**0.26**	**0.26**	**0.27**	**0.28**	**0.29**	**0.30**	**0.31**	**0.33**	**0.34**	**0.35**	**0.36**	7.9
Return on Equity	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	84.6
Income tax on ROE	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	16.9
Fixed Cost	16.53	15.22	14.60	13.98	13.37	12.76	12.16	11.56	10.97	10.39	6.91	7.03	7.16	7.30	7.44	7.60	7.76	7.93	8.11	8.30	8.50	8.72	8.94	9.18	9.44	251.9
Tariff (Rs/kWh)	9.93	9.14	8.77	8.40	8.03	7.67	7.31	6.95	6.59	6.24	4.15	4.22	4.30	4.38	4.47	4.56	4.66	4.76	4.87	4.99	5.11	5.24	5.37	5.52	5.67	151.3
Per unit tariff components																										
Per unit O&M Expenses	0.70	0.74	0.78	0.83	0.87	0.92	0.98	1.03	1.09	1.15	1.22	1.29	1.36	1.44	1.52	1.61	1.70	1.80	1.90	2.01	2.13	2.25	2.38	2.51	2.65	36.9
Per Unit Depreciation	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	38.1
Per Unit Interest on term loan	3.87	3.47	3.06	2.65	2.24	1.83	1.43	1.02	0.61	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.4
Per Unit Interest on working capital	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.20	0.19	0.18	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.18	0.18	0.19	0.20	0.20	0.21	0.22	4.7
Per Unit Return on equity	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	50.8
Per unit Income tax	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	10.2
Levellised tariff																										
Discount factor	1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04	7.7
Discounted tariff components(fixed)	9.93	7.99	6.70	5.61	4.69	3.91	3.26	2.71	2.24	1.86	1.08	0.96	0.85	0.76	0.68	0.61	0.54	0.48	0.43	0.39	0.35	0.31	0.28	0.25	0.22	57.1
Levellised tariff	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45	

HERC Soalr PV Thin Film generic tariff FY 2014-15 & FY 2015-16

ANNEXURE A (9)

Table of parameters	
Capital cost (Rs in Million / MW)	68.1
Residual value (10%) Rs Million	6.81
Total depreciation (Rs. Million)	61.29
Loan component (70%) Rs. Million	47.67
Equity component (30%) Rs. Million	20.43
CUF (%)	0.19
O&M (Rs. Million / MW)	1.124
O&M escalation	0.0572
Depreciation (1st 10 years)	0.07
ROE (1st 10 years)	0.16
ROE (11th year onwards)	0.16
Income tax	19.98%
Interest on term loan	0.1375
Interest on working capital	0.14
Auxiliary consumption	0
Discount rate	0.1442
Levellised tairff (Rs /kWh)	7.20

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M escalation	1.1240	1.1883	1.26	1.33	1.40	1.48	1.57	1.66	1.75	1.85	1.96	2.07	2.19	2.32	2.45	2.59	2.74	2.89	3.06	3.23	3.42	3.61	3.82	4.04	4.27
Outstanding Loan amount	47.7	42.9	38.1	33.4	28.6	23.8	19.1	14.3	9.5	4.8															
Loan repayment	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77															
Interest on loan	6.23	5.57	4.92	4.26	3.61	2.95	2.29	1.64	0.98	0.33															
Working capital																									
One month O&M	0.09	0.10	0.10	0.11	0.12	0.12	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19	0.20	0.22	0.23	0.24	0.25	0.27	0.28	0.30	0.32	0.34	0.36
2 Months receivables	2.66	2.45	2.35	2.25	2.15	2.05	1.96	1.86	1.77	1.67	1.11	1.13	1.15	1.18	1.20	1.22	1.25	1.28	1.31	1.34	1.37	1.40	1.44	1.48	1.52
Maintenance spares15% of O&M	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.46	0.49	0.51	0.54	0.57	0.61	0.64
Total	2.92	2.73	2.64	2.56	2.48	2.40	2.32	2.25	2.18	2.11	1.57	1.62	1.66	1.72	1.77	1.83	1.89	1.95	2.02	2.09	2.17	2.25	2.33	2.42	2.52
Interest on working capital	0.41	0.38	0.37	0.36	0.35	0.34	0.33	0.31	0.30	0.29	0.22	0.23	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.33	0.34	0.35

Particulars	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	26
Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Generation (Million Units)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	41.61
Auxiliary Cons (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generation (Ex-bus MIlion Units)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	41.61
Fixed Costs																										
O&M Expenses	**1.12**	**1.19**	**1.26**	**1.33**	**1.40**	**1.48**	**1.57**	**1.66**	**1.75**	**1.85**	**1.96**	**2.07**	**2.19**	**2.32**	**2.45**	**2.59**	**2.74**	**2.89**	**3.06**	**3.23**	**3.42**	**3.61**	**3.82**	**4.04**	**4.27**	59.29
Depreciation	**4.29**	**4.29**	**4.29**	**4.29**	**4.29**	**4.29**	**4.29**	**4.29**	**4.29**	**4.29**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	**1.23**	61.29
Interest on Term Loan	**6.23**	**5.57**	**4.92**	**4.26**	**3.61**	**2.95**	**2.29**	**1.64**	**0.98**	**0.33**	**0.00**	**0.00**	**0.00**													32.77
Interest on Working Capital	**0.41**	**0.38**	**0.37**	**0.36**	**0.35**	**0.34**	**0.33**	**0.31**	**0.30**	**0.29**	**0.22**	**0.23**	**0.23**	**0.24**	**0.25**	**0.26**	**0.26**	**0.27**	**0.28**	**0.29**	**0.30**	**0.31**	**0.33**	**0.34**	**0.35**	7.61
Return on Equity	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	3.27	81.72
Income tax on ROE	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	16.33
Fixed Cost	15.97	14.70	14.10	13.51	12.92	12.33	11.75	11.17	10.60	10.04	6.67	6.79	6.92	7.05	7.19	7.34	7.50	7.66	7.84	8.02	8.22	8.42	8.64	8.87	9.12	243.34
Tariff (Rs/kWh)	9.60	8.83	8.47	8.11	7.76	7.41	7.06	6.71	6.37	6.03	4.01	4.08	4.16	4.24	4.32	4.41	4.50	4.60	4.71	4.82	4.94	5.06	5.19	5.33	5.48	146.20
Per unit tariff components																										
Per unit O&M Expenses	0.68	0.71	0.75	0.80	0.84	0.89	0.94	1.00	1.05	1.11	1.18	1.25	1.32	1.39	1.47	1.56	1.64	1.74	1.84	1.94	2.05	2.17	2.30	2.43	2.57	35.62
Per Unit Depreciation	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	36.82
Per Unit Interest on term loan	3.74	3.35	2.95	2.56	2.17	1.77	1.38	0.98	0.59	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.69
Per Unit Interest on working capital	0.25	0.23	0.22	0.22	0.21	0.20	0.20	0.19	0.18	0.18	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.18	0.18	0.19	0.20	0.20	0.21	4.58
Per Unit Return on equity	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	49.10
Per unit Income tax	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	9.81
Levellised tariff																										
Discount factor	1	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04	7.66
Discounted tariff components(fixed)	9.60	7.72	6.47	5.42	4.53	3.78	3.15	2.61	2.17	1.79	1.04	0.93	0.83	0.74	0.66	0.58	0.52	0.47	0.42	0.37	0.33	0.30	0.27	0.24	0.22	55.14
Levellised tariff	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	

HERC Soalr PV Rooftop generic tariff FY 2014-15 & FY 2015-16 ANNEXURE A (10)

Table of parameters	
Capital cost (Rs in Million / MW)	68
Residual value (10%) Rs Million	6.8
Total depreciation (Rs. Million)	61.2
Loan component (70%) Rs. Million	47.6
Equity component (30%) Rs. Million	20.4
CUF (%)	0.19
O&M (Rs. Million / MW)	1.124
O&M escalation	0.0572
Depreciation (1st 10 years)	0.07
ROE (1st 10 years)	0.16
ROE (11th year onwards)	0.16
Income tax (MAT)	19.98%
Interest on term loan	0.1375
Interest on working capital	0.14
Auxiliary consumption	0
Discount rate	0.1442
Levellised tairff (Rs /kWh)	7.19

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M escalation	1.1240	1.1883	1.26	1.33	1.40	1.48	1.57	1.66	1.75	1.85	1.96	2.07	2.19	2.32	2.45	2.59	2.74	2.89	3.06	3.23	3.42	3.61	3.82	4.04	4.27
Outstanding Loan amount	47.6	42.8	38.1	33.3	28.6	23.8	19.0	14.3	9.5	4.8															
Loan repayment	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76															
Interest on loan	6.22	5.56	4.91	4.25	3.60	2.95	2.29	1.64	0.98	0.33															
Working capital																									
One month O&M	0.09	0.10	0.10	0.11	0.12	0.12	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19	0.20	0.22	0.23	0.24	0.25	0.27	0.28	0.30	0.32	0.34	0.36
2 Months receivables	2.66	2.45	2.35	2.25	2.15	2.05	1.96	1.86	1.76	1.67	1.11	1.13	1.15	1.17	1.20	1.22	1.25	1.28	1.30	1.34	1.37	1.40	1.44	1.48	1.52
Maintenance spares15% of O&M	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.46	0.49	0.51	0.54	0.57	0.61	0.64
Total	2.92	2.72	2.64	2.56	2.48	2.40	2.32	2.25	2.17	2.10	1.57	1.61	1.66	1.71	1.77	1.83	1.89	1.95	2.02	2.09	2.17	2.25	2.33	2.42	2.52
Interest on working capital	0.41	0.38	0.37	0.36	0.35	0.34	0.33	0.31	0.30	0.29	0.22	0.23	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.33	0.34	0.35

Particulars	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	26
Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Generation (Million Units)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	41.61
Auxiliary Cons (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generation (Ex-bus MIlion Units)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	41.61
Fixed Costs																										
O&M Expenses	**1.12**	**1.19**	**1.26**	**1.33**	**1.40**	**1.48**	**1.57**	**1.66**	**1.75**	**1.85**	**1.96**	**2.07**	**2.19**	**2.32**	**2.45**	**2.59**	**2.74**	**2.89**	**3.06**	**3.23**	**3.42**	**3.61**	**3.82**	**4.04**	**4.27**	59.29
Depreciation	**4.28**	**4.28**	**4.28**	**4.28**	**4.28**	**4.28**	**4.28**	**4.28**	**4.28**	**4.28**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	**1.22**	61.20
Interest on Term Loan	**6.22**	**5.56**	**4.91**	**4.25**	**3.60**	**2.95**	**2.29**	**1.64**	**0.98**	**0.33**	**0.00**	**0.00**	**0.00**													32.73
Interest on Working Capital	**0.41**	**0.38**	**0.37**	**0.36**	**0.35**	**0.34**	**0.33**	**0.31**	**0.30**	**0.29**	**0.22**	**0.23**	**0.23**	**0.24**	**0.25**	**0.26**	**0.26**	**0.27**	**0.28**	**0.29**	**0.30**	**0.31**	**0.33**	**0.34**	**0.35**	7.61
Return on Equity	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	81.60
Income tax on ROE	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	16.30
Fixed Cost	15.95	14.68	14.08	13.49	12.90	12.31	11.73	11.16	10.59	10.02	6.67	6.79	6.91	7.04	7.18	7.33	7.49	7.65	7.83	8.01	8.21	8.42	8.64	8.87	9.11	243.08
Tariff (Rs/kWh)	9.58	8.82	8.46	8.10	7.75	7.40	7.05	6.70	6.36	6.02	4.01	4.08	4.15	4.23	4.32	4.41	4.50	4.60	4.70	4.82	4.93	5.06	5.19	5.33	5.47	146.04
Per unit tariff components																										
Per unit O&M Expenses	0.68	0.71	0.75	0.80	0.84	0.89	0.94	1.00	1.05	1.11	1.18	1.25	1.32	1.39	1.47	1.56	1.64	1.74	1.84	1.94	2.05	2.17	2.30	2.43	2.57	35.62
Per Unit Depreciation	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	36.77
Per Unit Interest on term loan	3.74	3.34	2.95	2.56	2.16	1.77	1.38	0.98	0.59	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.66
Per Unit Interest on working capital	0.25	0.23	0.22	0.22	0.21	0.20	0.20	0.19	0.18	0.18	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.18	0.18	0.19	0.20	0.20	0.21	4.57
Per Unit Return on equity	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	49.03
Per unit Income tax	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	9.80
Levellised tariff																										
Discount factor	1	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04	7.66
Discounted tariff components(fixed)	9.58	7.71	6.46	5.41	4.52	3.77	3.14	2.61	2.17	1.79	1.04	0.93	0.82	0.73	0.65	0.58	0.52	0.47	0.42	0.37	0.33	0.30	0.27	0.24	0.22	55.07
Levellised tariff	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	

ANNEXURE (11)

HERC FY 2014-15 & FY 2015-16 SOLAR THERMAL TARIFF

Soalr Thermal generic tariff

Table of parameters	
Capital cost (Rs. in Million / MW)	120.00
Residual value (10%)	12
Total depreciation (Rs. Million)	108
Loan component (Rs. Million)	84
Equity component (Rs. Million)	36
CUF	23%
O&M (Rs Million / MW)	1.63
O&M escalation	5.72%
Depreication (1st 10 years)	7%
ROE (1st 10 years)	16%
ROE (11th year onwards)	16%
Income tax (MAT)	19.98%
Interest on term loan	13.75%
Interest on working capital	14.00%
Auxiliary consumption	10%
Discount rate	14.42%
Levellised tariff (Rs/kWh)	11.34

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M escalation	1.63	1.72	1.82	1.92	2.03	2.15	2.27	2.40	2.54	2.69	2.84	3.00	3.17	3.36	3.55	3.75	3.96	4.19	4.43	4.68	4.95	5.24	5.54	5.85	6.19
Outstanding Loan amount	84	75.60	67.20	58.80	50.40	42.00	33.60	25.20	16.80	8.40															
Loan repayment	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40															
Interest on loan	10.97	9.82	8.66	7.51	6.35	5.20	4.04	2.89	1.73	0.58															
Working capital																									
One month O&M	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.41	0.44	0.46	0.49	0.52
2 Months receivables	4.63	4.25	4.07	3.89	3.72	3.54	3.36	3.19	3.02	2.84	1.85	1.88	1.91	1.94	1.98	2.01	2.05	2.09	2.13	2.18	2.22	2.27	2.33	2.38	2.44
Maintenance spares15% of O&M	0.24	0.26	0.27	0.29	0.31	0.32	0.34	0.36	0.38	0.40	0.43	0.45	0.48	0.50	0.53	0.56	0.59	0.63	0.66	0.70	0.74	0.79	0.83	0.88	0.93
Total	5.01	4.65	4.50	4.34	4.19	4.04	3.89	3.75	3.61	3.47	2.51	2.58	2.65	2.73	2.80	2.89	2.98	3.07	3.17	3.27	3.38	3.50	3.62	3.75	3.89
Interest on working capital	0.70	0.65	0.63	0.61	0.59	0.57	0.55	0.53	0.51	0.49	0.35	0.36	0.37	0.38	0.39	0.40	0.42	0.43	0.44	0.46	0.47	0.49	0.51	0.52	0.54

Particulars	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	26
Capacity (MW)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Generation (Million Units)	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	50.4
Auxiliary Cons (%)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	5.0
Generation (Ex-bus Mllion Units)	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	45.3
Fixed Costs																										
O&M Expenses	**1.63**	**1.72**	**1.82**	**1.92**	**2.03**	**2.15**	**2.27**	**2.40**	**2.54**	**2.69**	**2.84**	**3.00**	**3.17**	**3.36**	**3.55**	**3.75**	**3.96**	**4.19**	**4.43**	**4.68**	**4.95**	**5.24**	**5.54**	**5.85**	**6.19**	85.9
Depreciation	**7.56**	**7.56**	**7.56**	**7.56**	**7.56**	**7.56**	**7.56**	**7.56**	**7.56**	**7.56**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	**2.16**	108.0
Interest on Term Loan	**10.97**	**9.82**	**8.66**	**7.51**	**6.35**	**5.20**	**4.04**	**2.89**	**1.73**	**0.58**	**0.00**	**0.00**	**0.00**													57.8
Interest on Working Capital	**0.70**	**0.65**	**0.63**	**0.61**	**0.59**	**0.57**	**0.55**	**0.53**	**0.51**	**0.49**	**0.35**	**0.36**	**0.37**	**0.38**	**0.39**	**0.40**	**0.42**	**0.43**	**0.44**	**0.46**	**0.47**	**0.49**	**0.51**	**0.52**	**0.54**	12.4
Return on Equity	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	144.0
Income tax on ROE	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	28.8
Fixed Cost	27.77	25.51	24.43	23.36	22.29	21.23	20.18	19.14	18.10	17.07	11.11	11.28	11.46	11.66	11.86	12.07	12.30	12.54	12.79	13.06	13.35	13.65	13.96	14.30	14.65	409.1
Tariff (Rs/kWh)	15.32	14.07	13.47	12.88	12.29	11.71	11.13	10.55	9.98	9.41	6.13	6.22	6.32	6.43	6.54	6.66	6.78	6.92	7.06	7.20	7.36	7.52	7.70	7.88	8.08	225.6
Per unit tariff components																										
Per unit O&M Expenses	0.90	0.95	1.00	1.06	1.12	1.19	1.25	1.33	1.40	1.48	1.57	1.66	1.75	1.85	1.96	2.07	2.19	2.31	2.44	2.58	2.73	2.89	3.05	3.23	3.41	47.4
Per Unit Depreciation	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	59.6
Per Unit Interest on term loan	6.05	5.41	4.78	4.14	3.50	2.87	2.23	1.59	0.96	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.8
Per Unit Interest on working capital	0.39	0.36	0.35	0.34	0.32	0.31	0.30	0.29	0.28	0.27	0.19	0.20	0.20	0.21	0.22	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28	0.29	0.30	6.8
Per Unit Return on equity	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	79.4
Levellised tariff																										
Discount factor	1.00	0.87	0.76	0.67	0.58	0.51	0.45	0.39	0.34	0.30	0.26	0.23	0.20	0.17	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04	7.7
Discounted tariff components(fixed)	15.32	12.30	10.29	8.60	7.17	5.97	4.96	4.11	3.40	2.80	1.59	1.41	1.26	1.12	0.99	0.88	0.79	0.70	0.62	0.56	0.50	0.44	0.40	0.36	0.32	86.8
Levellised tariff	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	

ANNEXURE-B

DETAIL REGARDING Min. & MAXIMUM COST OF BIOMASS IN DISTRICTS (Rs./MT)-June, 2014 (HAREDA)

Sr.	District	Rice Straw		Rice Husk		Cotton Stalks		Mustard Stalks		Arhar Stalks		Saw Dust		Wood Waste		Wheat Straw	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1	Kurukshetra	1500	3000	3500	5000	2000	3500	3500	4000	3500	4500	2000	3500	2000	3000	3500	6000
2	Karnal	2500	4000	4000	5000							4000	4500	7000	10000		
3	Jind																
4	Gurgaon	2500	3000	4000	4500	5500	6000	3500	4000	5500	6000	7000	7500	8000	8500	4500	5000
5	Fatehabad	2000	2500	2000	3000	500	600	1200	2000			2000	2500	3000	5000	2500	3000
6	Narnaul																
7	Bhiwani	600	900			850	1200	1250	1500	1000	1250	4000	6000	5000	6500	2000	3500
8	Y.Nagar	650	700	2500	2800							4500	4600	6500	6800	2500	3000
9	Panchkula																
10	Sirsa	3500	3800	1500	1800	4200	4400	3500	3700			1400	1600	3300	3500	3000	3200
11	Panipat	800	1000	3300	3800			700	1000	2000	3000	4300	4800	4500	5500	1700	2500
12	Hisar	1200	2500	4500	5500	150	250	2000	4000	150	300	3500	4500	3500	4500	3500	5000
13	Kaithal	1500	3000	3500	5000	2000	3500	3500	4500	3500	4500	2000	3500	2000	3000	3500	6000
14	Mewat							3000	3500							5500	6000
15	Sonepat	1000	1500	3500	4000	4000	4800	3200	4000	5000	7000	2000	3000	5500	8000	6250	7500
16	Ambala	1800	2000	2500	3000							4500	5000	6000	6500	2500	3000
17	Rohtak																
18	Rewari																
19	Jhajjar	2000	2500	7000	8000	2000	2500	2000	2500	2000	2500	2000	2500	2000	2500	6000	8000
20	Faridabad	3500	4000	3200	4200			3000	3500	2500	3000	2200	3000	4500	5500	2500	3900
21	Palwal																
	Average	**1789.286**	**2457.143**	**3461.538**	**4276.923**	**2355.556**	**2972.222**	**2529.167**	**3183.333**	**2794.444**	**3561.111**	**3242.857**	**4035.714**	**4485.714**	**5628.571**	**3532.143**	**4685.714**

Min Av of all fuels	**3023.838**
Max Av of all fuels	**3850.092**
Av cost for State	**3436.965**

Annexure – C

HARYANA ELECTRICITY REGULATORY COMMISSION
BAYS NO. 33-36, SECTOR- 4, PANCHKULA
Tel. No. 0172 – 2572395(O), Fax No. 0172 – 2572359

Petition No. HERC/PRO - 50 of 2014 (Suo Motu) Dated 10th June, 2014

PUBLIC NOTICE

Sub: Determination of Tariff / generic levellised tariff for projects based on renewable energy sources to be commissioned in FY 2014-15.

The Haryana Electricity Regulatory Commission had notified HERC (Terms and Conditions for determination of Tariff from Renewable Energy sources, Renewable Purchase Obligation and Renewable Energy Certificate) Regulations, 2010, wherein the Commission had specified various norms for the determination of tariff(s) in the control period i.e. up to 31st March, 2013.

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

The Commission vide its order dated 20.11.2013 determined the generic tariff for the renewable energy power projects (except hydro) to be commissioned in FY 2013-14.

Both the above documents i.e. RE Regulations, 2010 as well as Order dated 20.11.2013 are available on the website of the Commission (www.herc.gov.in).

The benchmark parameters for Renewable Energy Based Power Projects to be commissioned in FY 2014-15 considering the capacity of the power plant as 1 MW are as under: -

Particulars	Wind (200-250 W/m^2)	Wind (250-300 W/m^2)	Wind (300-400 W/m^2)	Wind (>400 W/m^2)	Biomass (water cooled)	Biomass (air cooled)	Cogen. (bagasse)	Solar PV Crystalline	Solar PV Thin Film	Solar Thermal	Solar Rooftop
Life of the power plant (Years)	25	25	25	25	20	20	20	25	25	25	25
Project Cost (Rs Million / MW)	57.25	57.25	57.25	57.25	50.03	52.81	49.47	61.2	57.86	120.00	57.35
O&M (Rs Million / MW)	0.81	0.81	0.81	0.81	2.53	2.53	1.67	1.16	1.12	1.63	1.12

Auxiliary consumption	0%	0%	0%	0%	10%	10%	8.50%	0%	0%	10%	0%
Fuel cost (Rs / MT)	0	0	0	0	2928	2928	730	0	0	0	0
Fuel price escalation	0	0	0	0	5%	5%	5%	0	0	0	0
Heat rate	0	0	0	0	3800	3800	3600	0	0	0	0
GCV	0	0	0	0	3458	3458	2250	0	0	0	0

CUF, Depreciation, ROE, Interest on term loan & working capital and O&M escalation shall be as per HERC RE Regulations, 2010.

Comments / suggestions are hereby invited from the stakeholders/interested persons on the various norms for the determination of tariff in the next control period by 30th June, 2014. The comments / suggestions received after the stipulated date in the Commission's office may not be considered by the Commission while finalizing the norms / generic tariffs for the projects to be commissioned in FY 2014-15.

Sd/-

Director / Tariff
HERC