National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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Registrar

No. NEPRA/TRF-202/SSJD-2011/5757-5759
June 28, 2012

Subject: **Determination of the Authority in the matter of Tariff Petition filed by SSJD Bioenergy Limited for approval of Generation Tariff in respect of 12 MW Biomass Energy Power Project (Case No. NEPRA/TRF-202/SSJD-2011)**
Intimation of Determination of Tariff pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997)

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along with Annexure-I & II (37 pages) in Case No. NEPRA/TRF-202/SSJD-2011.

2. The Determination is being intimated to the Federal Government for the purpose of notification of the approved tariff in the official gazette pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997) and Rule 16(11) of the National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998.

3. Please note that only Order of the Authority at para 15 of the Determination relating to the reference tariff, adjustments, indexation and terms and conditions etc along with Annexure-I & II needs to be notified in the official Gazette.

Enclosure: As above

(Syed Safeer Hussain)

Secretary
Ministry of Water & Power
'A' Block, Pak Secretariat
Islamabad

CC:
1. Secretary, Cabinet Division, Cabinet Secretariat, Islamabad.
2. Secretary, Ministry of Finance, Islamabad.

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NEPRA AUTHORITY

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(NEPRA)
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No. NEPRA/TRF-202/SSJD-2011

Determination of the Authority

in the matter of

Tariff Petition Filed by

SSJD Bioenergy Limited

12 MW Biomass Power Generation Project

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NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA)

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No. NEPRA/TRF-202/SSJD-2011
June 28th, 2012

Petitioner

SSJD Bioenergy Limited for Determination of Generation Tariff in respect of its 12 MW Biomass Power Generation Project

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Authority

Khawaja Muhammad Naeem
Member (Tariff)

Shaukat Ali Kundi
Member

27.06.2012

Habibullah Khilji
Member

22/6/2012

Ghiasuddin Ahmed
Acting Chairman

22/6

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Determination of the Authority in the matter of Tariff Petition filed by SSJD Bioenergy Limited for approval of generation tariff in respect of 12-MW Biomass Energy Power Project

1. Background

1.1 SSJD Bioenergy Limited (hereinafter referred to as the "petitioner") filed a tariff petition, pursuant to rule 3 of the National Electric Power Regulatory Authority Tariff (Standards and Procedure) Rules, 1998 (Tariff Rules), on November 30, 2011 for determination of generation tariff in respect of its 12-MW biomass power generation project envisaged to be set up near Al-Abbas Sugar Mills Limited, Mirwah Gorchani, District Mirpurkhas, Sindh.

1.2 The tariff petition was admitted by the National Electric Power Regulatory Authority ("the Authority") in RM 11-638 held on December 15, 2011 for public hearing. Consequent to the admission, notice of admission/public hearing was published in the national newspapers on December 24, 2011. In addition to that, in terms of rule 4(5) notices of admission were also sent to National Transmission & Despatch Company Limited, Alternative Energy Development Board, Punjab Power Development Board and other parties which is the opinion of the Authority are likely to be affected or interested , for filing relies or communications, in opposition or support of the petition. Accordingly, public hearing of the petition was held on January 11, 2012 which was attended by the petitioner, Central Power Purchasing Agency, Alternative Energy Development Board (AEDB), Ministry of Water & Power, Planning Commission and various other stakeholders. Comments in writing were received from the following stakeholders.

- National Transmission and Despatch Company Limited/Central Power Purchasing Agency
- Punjab Power Development Board
- Al-Abbas Sugar Mills Limited
- Some local farmers/residents of the area where the project is proposed to be set up.

1.3 The comments of stakeholders and response of the Petitioner thereto have been discussed under relevant heads/issues in the determination.

2. Submissions of the Petitioner

2.1 Summary of the technical and financial information provided by the petitioner is as follows:

Type of the project	:	Biomass power project
Project location	:	Near Al-Abbas Sugar Mills Limited, Mirwah Gorchani, District Mirpurkhas, Sindh
Installed capacity	:	12 MW (Gross)

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Auxiliary load and losses	:	1.52 MW
Availability factor	:	80%
Annual available energy	:	73.44 GWh
Fuels	:	Bagasse (about 80%), rice husk & cotton stalks (about 20%)
Net efficiency	:	24.30%
Concession period	:	30 years from commercial operations
EPC contractor	:	Orient Energy Systems
Construction period	:	20 months
Plant specifications:-		
Technology	:	Conventional steam power cycle (Rankine cycle)
Generator Name	:	HTC/WUXI-China or equivalent
Configuration	:	Traveling grate boiler, biomass fired steam turbine, condensing cum extractions type and generator set
Financing structure	:	Debt 70% - Equity 30%
Debt composition	:	100% foreign
Potential lenders	:	Overseas Private Investment Corporation - USA
Interest rate on loan	:	7.5% (US Treasury + 3.5% margin)
Debt repayment period	:	13 years plus grace period of 2 years
Repayment schedule basis	:	Quarterly
Return on equity	:	18%
Project cost:		**US $ in millions**
EPC cost	:	15.12 **(US $ 1.26 million per MW)**
Non-EPC costs	:	0.48
Staff colony	:	0.10
Land acquisition & land development costs	:	0.54
Project development costs	:	0.94
Start-up expenses & utilities	:	0.16
O&M mobilization cost	:	0.18
Insurance during construction	:	0.37
Financing fees & charges	:	0.79
Emergency spare parts	:	0.10
Project cost without IDC	:	**18.78 (US $ 1.57 million per MW)**
Interest during construction	:	1.05
Total Project Cost	:	**19.82 (US $ 1.65 million per MW)**
30 years levelized tariff	:	PKR 10.394/kWh (US¢ 12.086/kWh)
Exchange rate	:	1 US $ = PKR 86

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3. Based on submissions/information provided by the Petitioner, comments of stakeholders and proceedings of the case, the following issues of the petition have been framed for decision of the Authority.

i) Whether estimated annual energy production as claimed by the Petitioner is justified?
ii) Whether EPC cost of US$ 15.120 million claimed by the Petitioner is justified?
iii) Whether Other Project Cost claimed by the Petitioner is justified?
iv) Whether Project Construction Period of 20 months claimed by the Petitioner is justified?
v) Whether the proposed terms of debt financing are justified?
vi) Whether return on equity and return on equity during construction claimed by the Petitioner is justified?
vii) Whether the Fuel cost component of tariff and proposed mechanism for adjustment of fuel cost component is justified?
viii) Whether the claimed O & M cost of the Petitioner is justified?
ix) Whether the claimed Cost of working capital is justified?
x) Whether the proposed Insurance during operational phase is justified?

4. **Whether estimated annual energy production as claimed by the Petitioner is justified?**

4.1 The Petitioner submitted that it has selected well tested technology for power generation on biomass fuel for its project. As per petitioner, the power plant will be designed on the conventional steam power cycle (the Rankine cycle). The biomass will be combusted in a boiler and steam generated will be fed to the steam turbine to generate power. As per information provided by the Petitioner its power plant consists of one steam boiler designed for rated steam output of 55tph, 87 bar steam pressure at superheated outlet and 520 ^{o}C temperature, single drum natural circulation, balanced draft, water tube type. Balance of plant equipment will comprise of steam condensing unit, multi cell cooling tower induced graft type, water treatment system, complete electrical system and DCS system for reliable operation of the power plant. The combustion system is travelling grate with stoker fired.

4.2 The Petitioner further submitted that boiler will be equipped with flue gas cleaning system i.e. electrostatic precipitator (ESP) , multistage condensing cum extraction type steam turbine coupled with generator through reduction gear having nominal gross capacity of 12 MW.

4.3 The following information in respect of plant capacity, auxiliary consumption and net energy production has been provided by the Petitioner.

Gross plant capacity	12.00 MW
Less Auxiliary consumption	1.52 MW (12.67%)
Net available capacity	10.480 MW
Net annual energy production	73.440 GWh

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4.4 The Authority observed that the Petitioner has claimed auxiliary load and losses @ 12.67% of the gross capacity while the same has been estimated as 12.50% in the feasibility study forwarded by the Alternative Energy Development Board (AEDB). The Authority also observed that auxiliary consumption allowed by it in another co-generation (coal plus biomass) based power project was 9%, whereas auxiliary consumption allowed to biomass based power projects by the regulator in our neighbouring country is 10%.

4.5 The Authority, however, is cognizant of the fact, that comparison of auxiliary consumption on percentage basis may not be justified for all small and large biomass based power plants, therefore, to arrive at informed decision, the Authority has examined information provided by the Petitioner in support of its claim of 1.52 MW (12.67%) auxiliary consumption through its technical professionals and is of the opinion that auxiliary consumption of 12.5% for the Petitioner's biomass based power plant of 12-MW capacity is reasonable and justified. In view of the aforementioned, the Authority has decided to approve 10.50 MW as net capacity and 73.584 GWh as net annual energy production while taking in to account annual plant availability of 80% as proposed by the Petitioner.

5. **Whether EPC cost of US$ 15.120 million claimed by the Petitioner is justified?**

5.1 The petitioner has claimed EPC cost of US$ 15.12 million (US$ 1.26 million per MW). In support of its claimed EPC cost the Petitioner has provided duly initialled copies of EPC contracts with the following break-up of cost.

	Name and status of EPC contractor	Price US $ in millions
Offshore supply contract	Orient Energy System FZC (a company organised and existing under the laws of UAE)	11.45
On shore supply and services contract	Orient Energy Systems (Pvt.) Limited (a company organised and existing under the laws of Pakistan)	3.67
Total EPC Contract price		15.12

5.2 The Petitioner has submitted that proposals were invited from the prospective contractors through bidding by issuing standard RFP document in line with the project technical requirements and design basis for biomass fuelled power plant. In response to invitation, the proposals from foreign and local contractors were received which were technically and commercially evaluated. All foreign contractors quoted high cost for EPC, in some cases US$ 30.0 million. Descon Engineering and Orient Energy Systems being the local contractors submitted proposals for EPC works at comparatively lower cost than the foreign contractors.

The petitioner after great deal of due diligence exercise finalised and initialled the EPC contracts with Orient Energy Systems. According to the petitioner, no custom duty on import of plant and equipment has been assumed in the claimed EPC cost.

5.3 The Petitioner has further submitted that EPC price so obtained is market based and is very reasonable for 12 MW capacity biomass fuelled power generating facility which requires much larger scope and infrastructure including all components/devices that requires limiting emissions particularly dust emission as per World Bank Standards for dust emission.

5.4 PPDB in its comments submitted that the 'Project Cost' of US $ 19.82 million for a 12 MW Bio-mass based power project, works out to be US $ 1.65 million per MW which seems to be on much higher side. PPDB commented that typically installation cost of a biomass based power project in Pakistan may not exceed US $ 1.30 million per MW, after reckoning all relevant technical, commercial and financial factors. NTDC in its comments submitted that the project cost needs to be substantiated by the petitioner.

5.5 In order to have fair assessment as to whether the claimed EPC cost of US$ 15.12 million based on initialled EPC contracts is justified, the Authority through its letter No. NEPRA/TRF-202/SSJD-2011/3159 dated April 2, 2012 asked PPDB to provide the details/basis of recommending US$ 1.30 million/MW for a typical biomass project. PPDB submitted its response vide letter No. MD(PPDB)/861/2012 dated April 20, 2012, whereby it has been mentioned that since standards about biomass based power projects in the IPP mode are not available in our country for comparison purposes, therefore, we have to refer experiences of other countries equipped with biomass based energy generation. PPDB, while referring to the biomass based project cost of around US$ 1 million per MW, provided copies of decisions of Indian electricity regulator.

5.6 The Authority understands that EPC cost of a typical biomass based power plant is high as compared to a conventional thermal power plant because of additional equipment required for handling biomass fuel. The Authority observed that lower per MW cost allowed to biomass based projects in our neighbouring country as reported by PPDB is attributable to various factors such as availability of locally manufactured plant and equipment and economic conditions of the country and therefore its direct comparison with the Petitioner's claimed cost does not reflect actual per MW cost of the projects applicable to our country.

5.7 The Authority considers that per MW cost of a typical power plant also varies due to metallurgy of plant and equipment. The high quality of metallurgy has its advantages in terms of higher thermal efficiency and reliability which has its own cost. The Authority has examined per MW EPC Cost of the Petitioner with the biomass based power projects developed internationally and found that the EPC cost claimed by the Petitioner is within the range of such power plants established elsewhere in the world.

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5.8 The Authority considers that EPC Cost of US$ 15.120 million based on EPC Contracts duly initialled with the EPC Contractor as per requirement of the GoP Policy 2002 and AEDB Power Policy 2006 is reasonable, hence approved as claimed by the Petitioner.

6. **Whether Other Project Cost claimed by the Petitioner is justified?**

6.1 The Petitioner has claimed US$ 4.700 million on account of its other project cost. The following break-up of other project costs has been provided by the Petitioner.

Other Project costs	US$ Million
Non EPC cost	0.480
Project Development cost	0.935
Staff Colony	0.100
Land acquisition and development cost	0.540
Start up expenses and utilities	0.160
O&M mobilization cost	0.180
Emergency spare parts	0.100
Insurance during construction	0.370
Financing fees and charges	0.790
Interest during construction (IDC)	1.046
Total	**4.700**

6.2 The Other Project Cost for each of the above mentioned cost component is discussed separately as hereunder.

6.3 Non-EPC Cost

6.3.1 The Petitioner has claimed US$ 0.480 million on account of Non-EPC cost. According to the petitioner this cost component covers the cost items which are excluded in the EPC Contracts. Such cost includes the cost of raw water supply from source, open raw water reservoir, weighing bridge, open yard biomass storage, unloading facilities and transfer of biomass to covered storage building through mobile pusher units, effluent discharge system and non industrial building such as workshop & laboratory, admin & office buildings, roads, car parking, warehouse and water & electricity connections. The breakup of Non-EPC cost as provided by the Petitioner is given hereunder.

	US $
Raw water reservoir	45,000
Weighing bridge	8,000
Cemented open yard biomass storage, and truck movement facility	55,000
Transfer conveyor	40,000
Mobile pusher units	30,000
Non industrial building	250,000

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Workshop machinery	10,000
Laboratory instruments	10,000
Electricity connection	5,000
Road inside the plant boundary	25,000
Effluent discharge pumping and line	2,000
TOTAL	**480,000**

6.3.2 The scope of works as mentioned in the EPC Contracts "Scope of Work Matrix" defining responsibility of the Petitioner and the EPC contractor reveals that the cost of certain items such as raw water reservoir, weighing bridge, open biomass storage yard, effluent discharge pumping stations etc. is already included in the scope of EPC contracts. The Authority has, therefore, approved US$ 0.305 million under the head of Non-EPC Cost.

6.4 Project development cost

6.4.1 The Petitioner has claimed US$ 0.935 million on account of project development cost. The petitioner has submitted that this cost compo nent inclu des all costs incurred so far including the cost of feasibility study, environmental study, generation license, office expenditures, travelling, payment to professional team and also includes the costs to be incurred for hiring of owner's engineer, independent engineer under the energy purchase agreement, all fees paid to technical/legal/financial consultants, bank charges on the bank guarantees to be issued in favour of AEDB for obtaining LOS, legal fee payable to AEDB, cost of standby letter of credit in favour of the energy purchaser under the energy purchase agreement, fees payable to AEDB and NEPRA and all company's administration charges and overheads during the project development and construction phase until COD.

6.4.2 PPDB in its comments submitted that revenue requirement of US $ 0.935 million has been established under this head of account which works out to 6.22% of the claimed EPC cost. However, revenue requirement under this head of account normally does not exceed 2.5% of the EPC Cost. PPDB has submitted that the Authority may take into consideration benchmarks already established for this cost component in case of other IPPs.

6.4.3 In response, the petitioner submitted that the project development cost for different technologies does not vary much due to size of the power project. The Petitioner has also mentioned that though the Project being developed, under the RE IPPs Policy frame work, is of small capacity, yet it will require a team of experts and consultants for its structure and development; the amount of work at the development stage is not less than compared to thermal IPPs with installed capacity of 50 MW.

6.4.4 The Authority has examined the detailed breakup of project development cost duly supported with copies of agreements with various foreign and local consultants as

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provided by the Petitioner and has seen that project development cost is in the range of costs allowed to other comparable projects of different technologies.

6.4.5 The Authority has observed that project development cost is relatively fixed in nature and dependent on project's cost requirement for hiring services of foreign or local consultants. The Authority has also noted that the project is being financed by foreign lenders, for which the project sponsors have to meet stringent requirements of its lenders by hiring services of foreign technical, legal and financial consultants. The Authority, therefore, considers that petitioner's claim of US$ 0.935 million for its project development cost is justified, hence approves the same as per demand of the Petitioner.

6.5 Staff colony cost

6.5.1 The Petitioner has claimed US$ 0.100 million for construction of staff colony. The petitioner submitted that its plant is located in a remote area, far from major cities; therefore it is required to permanently keep key staff at site to meet any emergencies. The petitioner further submitted that it will require a small housing colony at project site comprising rest house and 6 quarters for operational and security staff.

6.5.2 The Authority in the case of other power projects located in remote areas has allowed construction of a staff colony for fulfilling bare minimum requirements of the project. The cost of US$ 0.100 million requested by the Petitioner for construction of staff colony is reasonable as compared to other such projects. The Authority has therefore decided to allow US$ 0.100 million for construction of staff colony as per request of the Petitioner.

6.6 Land and land development cost

6.6.1 The Petitioner has claimed US$ 0.540 million on account of land acquisition and land development cost. The petitioner submitted that this cost head mainly covers the purchase of land (12 acres) together with the stamp duty, registration fees, broker fees, cost of earth work to level the site, construction of access road, temporary office, boundary walls, security posts and main gate.

6.6.2 PPDB in its comments submitted that cost requirement of US$ 0.540 million has been established for land and land development cost, which works out to be 4.23% of the claimed EPC cost. PPDB argued that cost under this head may not exceed 3% of the allowed EPC cost as has already been allowed by the Authority to other IPPs of resembling technology. PPDB further submitted that it seems appropriate that the Authority may accept the claimed land acquisition cost subject to subsequent adjustment based on verifiable documentary evidence (sale purchase deed from concerned District co-ordination officer) at later stage.

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6.6.3 According to the Petitioner, the requirement of land in the case of biomass power plants is comparatively more than the comparable conventional thermal power projects due to large area required for storage and handling of biomass fuel.

6.6.4 The Authority has observed that the Petitioner's claim of cost of land and land development while considering its project location is quite excessive. The Authority noted that in its recent determination for a hydropower project located in the urban area of Punjab, it has approved US$ 0.246 million for acquisition of land (32 acres) and similar scope of works for the land development cost. In the opinion of the Authority, the market rate per acre of land at the project site is in the range of Rs. 400,000-500,000 which in terms of total land requirement of the Petitioner works out to be around US$ 0.063 million.

6.6.5 In view of the aforementioned, the Authority has decided to allow US$ 0.100 million for cost of land and land development charges to the Petitioner.

6.7 Start up expenses and utilities

6.7.1 The Petitioner has claimed US$ 0.160 million for initial start up and utilities expenses. The petitioner submitted that this cost component includes costs associated with the fuel for commissioning and testing of the plant, the cost of fuel oil for initial firing of the boiler, chemicals, consumables and lubricants to be consumed during commissioning and testing of the plant together with utilities expenses (i.e. electricity, telephone, and water). Break-up of this cost provided by the petitioner is as follows:

	US $
Cost of fuel (steam blowing, chemical cleaning, drying, oil flushing and no. of starts / shutdown of boiler and steam turbine depending on successful commissioning & testing)	90,000
Consumables	20,000
Energy import (kWh)	40,000
Miscellaneous	10,000
Total	**160,000**

6.7.2 The Petitioner has further submitted that above mentioned cost is to be borne by the project sponsors as these are outside the scope of EPC contracts. It also requested for allowing adjustment of this cost at COD with respect to the then prevailing fuel prices and actual electricity cost.

6.7.3 The scrutiny of relevant documents provided by the Petitioner has revealed that the Petitioner has claimed this cost on lump sum basis without detailed breakup of its total requirement for the fuel, electricity and other consumables to be consumed during start up and initial testing of the plant and equipment. It has also been observed that the Petitioner has claimed US$ 10,000 for miscellaneous cost without any explanation or justification and therefore cannot be considered. Further as per the EPC contracts, the cost of consumables is joint responsibility of the petitioner

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and the contractor while cost of chemicals to be used during commissioning is contractor's responsibility. In view of the aforementioned the Authority has assessed US$ 0.130 million on account of start up expenses for the petitioner and, therefore, approved by the Authority.

6.7.4 Regarding Petitioner's request for adjustment of start-up expenses on the basis of actual, the Authority has not allowed adjustment of such expenses at actual to any other IPP. Further, the Petitioner has claimed start-up charges on estimation basis without substantiating its exact requirement of fuel, electricity and other consumables. The Authority has therefore decided that no adjustment on actual basis for the start-up expenses will be allowed to the Petitioner.

6.8 O & M mobilization cost

6.8.1 The Petitioner has claimed US$ 0.180 million for O&M Mobilization cost. The petitioner has submitted that this cost component covers the expenses of the O & M operators staff (both local and expatriates) prior to the start of commissioning and testing, costs associated with the training of staff during construction phase until COD and the expenses of company's office at Karachi and at project site (together with the establishment costs). Break-up of this cost provided by the petitioner is as follows:

	US $
Mobilization initial support service	45,000
Deployment of key O&M staff (6 months prior to COD)	115,000
Other expenses	10,000
Taxes	10,000
Total	**180,000**

6.8.2 The Petitioner has claimed the cost of office and establishment expenses (company overheads) under this cost head. The aforementioned company expenses are generally claimed under the cost head of Non-EPC cost or separately as construction management expenses. As per information provided by the Petitioner, the cost of trainer/s is to be borne by the EPC contractor while cost of trainees such as monthly salaries, travelling etc. is petitioner's responsibility.

6.8.3 The cost breakup of O&M Mobilization has revealed that the Petitioner has claimed US$ 10,000 on account of other expenses and further US$ 10,000 for taxes without any explanation or justification hence do not merit consideration by the Authority. The cost of key O&M staff for 6 months period US$ 115,000 (Rs. 9.890 million) as requested by the Petitioner is also on the higher side. Assuming average monthly expenses of Rs. 125,000 per employee, the cost of salaries and other expenses for 10 O&M key personnel over 6 months period works out to be Rs. 7.50 million or USD 87,209.

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6.8.4 Regarding cost of mobilization initial support service US$ 45,000, the petitioner has submitted that O&M contractor will perform the following services at petitioner's cost.

- Establish office space, fax, internet, computer facilities.
- Review design of the project and impact on the O&M of the plant.
- Preparation and implementation of procedures and work manual.
- Review of operator training document submitted by the EPC Contractor.
- Review of O&M manual
- Develop safety plan during operational phase.
- Develop and implement lab procedures.
- Fuel handling, management and procedures.
- Establish inventory control procedures.
- Prepare maintenance programme.
- Preparation of punch list items.
- Taking over.

6.8.5 The Petitioner for the above mentioned works has claimed USD 45,000 which is considered to be reasonable and therefore, allowed as per claim of the Petitioner.

6.8.6 In view of the aforementioned, the Authority allows US$ 0.132 million to the Petitioner for its O&M Mobilization cost.

6.9 Emergency spare parts – claimed US $ 0.10 million

6.9.1 The Petitioner has claimed US$ 0.100 million for cost of emergency spare parts without any explanation or rationale in its initial submissions to the Authority. However, subsequently, in response to information direction of the Authority, the following cost break-up of emergency spare parts has been provided by the Petitioner.

		US $
Boiler	:	30,000
Steam Turbine	:	20,000
Electrical Items	:	20,000
Field Instruments	:	10,000
DCS Control	:	10,000
Balance of the Plant Equipment	:	10,000
Total	:	**100,000**

6.9.2 According to the Petitioner this component covers the cost of standard lot of spare parts aimed to reduce the shutdown times for maintenance of the plant as much as possible.

6.9.3 The review of the EPC contracts has, however, revealed that the cost of spare parts during commissioning as well as essential (Strategic) spare parts required for

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maintenance of plant is covered under the EPC contracts of the Petitioner. Further, maintenance of initial inventory for essential spare parts during the plant warranty period is contractor's responsibility, whereas cost of replacement of spare parts after the warranty period is covered under the annual O&M cost requirement of the Petitioner. In view of the aforementioned, the Authority is of the view that the Petitioner's request for allowing cost of emergency spare parts is not justified and therefore, has decided to disallow costs under this head.

6.10 Insurance during construction

6.10.1 The Petitioner has claimed US$ 0.370 million for cost of insurance during the project construction period which works out to be 2.45% of its EPC cost. In support of its claim of insurance cost, the petitioner has argued that its project is first of its kind in Pakistan; therefore there are possible unknowns due to which it is anticipated that the insurance cost will be slightly higher than the usual cost of insurance.

6.10.2 PPDB in its comments has submitted that the Petitioner in the tariff petition at Para 5.13 has mentioned that Insurance during construction has been claimed at 1.35% of the EPC cost whereas the amount of US$ 0.370 million worked out by it for Insurance during construction comes out to be 2.45% of the EPC cost. PPDB has submitted that despite this contradiction in the tariff petition, the Authority's already established benchmark of 1.35 % of the allowed EPC cost as the maximum for this cost component is required to be kept in view in the instant case. NTDC in its comments to the Authority submitted that the Authority has allowed and restricted this cost subject to a maximum of 1.35% of the EPC cost in the case of thermal IPPs and renewable energy power projects.

6.10.3 The Authority considers that it has allowed insurance during construction cost up to a maximum of 1.35% of the EPC cost in other power projects, including wind and hydropower projects, with project construction period in the range of 18 to 30 months, which is quite reasonable to cover insurance expense of the Petitioner as well. The Authority does not find any justification for allowing higher insurance cost in the instant case than its maximum benchmark of 1.35% of the EPC cost already approved for other comparable power projects.

6.10.4 The Authority has therefore decided to allow US$ 0.204 million for insurance during construction on the basis of 1.35% of the approved EPC cost. The cost of insurance during construction will be adjusted on actual basis subject to the maximum of 1.35% of approved EPC cost at the time of COD, on production of authentic documentary evidence to the satisfaction of the Authority.

6.11 Financing fees and charges

6.11.1 The Petitioner has claimed US$ 0.790 million on account of its financing fees and charges, which works out to be 6.28% of the claimed amount of loan (excluding the impact of interest during construction plus financing fees and charges). The petitioner has submitted that financial charges are proposed in excess of 3% of the

debt due to small size of the project and foreign financing being availed for the project due to liquidity crunch in the local market. As per the Petitioner the financing fees and charges include the lender's Front-end fee, Commitment fee and fees of the Lender's advisors. The Petitioner has further submitted that fees are roughly 5-6% of their foreign debt amount which will be adjusted at COD as per actual.

6.11.2 PPDB in its comments has stated that the Authority has already established benchmark of 3.00 % of the total debt as the maximum for this cost component in case of other IPPs irrespective of technology involved, which may be kept in view for the instant case as well.

6.11.3 NTDC has commented that the claimed financial charges are on higher side as compared to financial charges already allowed by the Authority to different wind power projects. NTDC has proposed that the company may be advised to substantiate it with details/break-up and negotiate with the lenders to achieve an optimal figure.

6.11.4 The Petitioner through its subsequent communication informed that its pre-negotiated financial charges were estimated to be US$ 1.125 million, which after extensive negotiations with the lenders have been reduced to US$ 0.809 million. The following breakup of financing fees and charges has been provided by the Petitioner.

Financing Fees and Charges	**Fees Type**	**Amount (US$**
OPIC initiation fees	Fixed	26,000
OPIC Upfront Fee	1% of loan amount	138,780
IESC Success Fee	2% of loan amount	277,480
OPIC Commitment Fee	0.5% of undisbursed loan amount	39,370
Lawyer Fee-OPIC	Fixed	100,000
OPIC Independent Engineer	Fixed	97,000
OPIC Maintenance Fee	Fixed	10,000
Owner foreign lawyer for OPIC	Fixed	70,000
Loan finders consultant	Fixed	25,000
Misc. Financial costs	Estimated	25,000
Total		**808,630**

6.11.5 The Petitioner has argued that the Authority has allowed these charges at 3% of loan amount in the case of thermal power projects mostly above 200 MW where financing fees at 3% on loan amount in the range of US$ 150-160 million was quite sufficient. In its case, the 3% cap for 12 MW capacity power plant will not be sufficient to meet its financing fees most of which are fixed in nature irrespective of size of the project.

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6.11.6 The Authority has reviewed all the information provided by the Petitioner and found that the Petitioner has claimed its financing fees and charges based on general terms and conditions of loan as per indicative term sheet provided by the Petitioner. The Petitioner has yet to finalize terms of financing pursuant to signing of final terms sheet with the lenders.

6.11.7 The Authority understands that a large portion of financing fees and charges comprises fixed cost to be paid by the Petitioner to lender's consultants as per its requirement, which, however, can still be negotiated to the bare minimum keeping in view the approved budget for such costs. Nevertheless, the Authority feels that the already fixed upper cap of 3% for financing fees and charges may not be sufficient to meet Petitioner's cost in this case, particularly in view of the small size of the project and foreign financing arranged by the Petitioner.

6.11.8 In view of the aforementioned, the Authority has decided to allow US$ 0.477 million for cost of financing fees and charges to the Petitioner. The financing fees and charges of the Petitioner will be adjusted on actual subject to the maximum of 4% of approved debt by the Authority (excluding the impact of IDC and financial charges) at COD.

6.12 Interest during construction

6.12.1 The petitioner has estimated US$ 1.046 million on account of Interest during construction (IDC) based on proposed 100% foreign debt from OPIC-USA at interest rate of US treasury 4.0% plus premium of 3.50% (total 7.50%). The Petitioner has submitted that IDC will be adjusted on actual based on payment schedules with the applicable interest/markup rates.

6.12.2 Interest during construction based on indicated US treasury rate of 2.70% (for the month of January 2012) and premium of 3.5% for the 20 months period of project construction has been worked out as US$ 0.944 million. The interest during construction is an estimated amount and will be adjusted at COD, based on finalized interest/markup rate of US treasury, allowed spread of 3.50%, allowed debt and period of project construction by the Authority on production of authentic documentary evidence to the satisfaction of the Authority.

6.13 Duties and taxes

6.13.1 The petitioner has submitted that it has not assumed any custom duty on import of machinery and equipment, as renewable IPPs are exempted under the policy. The petitioner has further submitted that it has assumed taxes and any other levies in respect of onshore supply and service contract at the rate of 6% on the contract price. The petitioner has requested that any duties, levies and/or governmental impositions of whatsoever nature not considered in the tariff calculation may be treated as part of the project cost at the time of COD.

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6.13.2 The Authority considers that all taxes and custom duty are pass-through cost as provided in the GOP Policy for Renewable Energy Projects 2006. The Authority therefore approves that all taxes, GoP levies or custom duty (if levied by GoP) which are non-refundable in nature and to the extent not considered and included by the petitioner in the project cost will be adjusted on actual basis at COD subject to provision of authentic documentary evidence to the satisfaction of the Authority.

7. **Whether Project Construction Period of 20 months claimed by the Petitioner is justified?**

7.1 The Petitioner has proposed project construction period of 20 months from the date of financial close of the project. The EPC contract submitted by the petitioner specifies the guaranteed taking over date as 20 months after the commencement date.

7.2 In view of the aforementioned, the Authority has decided to approve project construction period of 20 months from the date of financial close of the project by the Petitioner.

8. **Whether the proposed terms of debt financing are justified?**

8.1 The Petitioner has submitted that project will be funded typically by a combination of debt and equity. Debt is 70% of the project cost and the remaining funds will be invested through equity contribution by the investors. According to the Petitioner, it is seriously working to attract Overseas Private Investment Corporation (OPIC-USA) a private financing institution in providing funds for this project. OPIC, being potential financier is very supportive to finance this project in Pakistan as their prime interest is to encourage renewable energy projects. OPIC has now committed to finance this project and has appointed Lahmeyer International- USA as Independent Engineer and a Legal Consultant for project's due diligence and reviewing all project related documents.

8.2 The petitioner has requested for allowing following financing terms:

Debt as % of project cost	:	70%
Mode of financing	:	Foreign
Potential financer	:	Overseas Private Investment Corporation – USA (OPIC)
Term of loan	:	13 years plus two years grace period
Interest rate	:	7.50% (US treasury + 3.50% margin)

8.3 On an inquiry regarding provision of indicative term sheet from the potential financer, the petitioner submitted an undated letter of IGI Investment Bank Limited which stated that they are the financial advisors of the petitioner and are managing

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all interactions with the OPIC. The key terms identified in the said letter are as follows:

Loan repayment	:	52 quarterly instalments
Interest payment	:	Quarterly in arrears
Interest rate	:	Calculated at a fixed rate per annum for each disbursement equal to the OPIC cost of funds (determined by the US treasury rate corresponding to the term of loan, and as further defined in the loan agreement) plus 3.50% per annum
Interest rate adjustment	:	Fixed rate loan for the entire duration of the loan
Relevant rate for January 2012	:	2.70%

8.4 The Authority in its previous determinations of other projects has approved LIBOR based foreign financing which is presently below 1%. The Authority, however, observed that as per the information provided by the Petitioner, the Petitioner's proposed financing based on US treasury rates has its own characteristics such as fixed rate for the entire term of loan and 13 years debt repayment period after COD in equal quarterly instalments. The Authority therefore, approves 3.50% spread on 20 years US Treasury rate. The reference 20-years US treasury rate will be adjusted at COD on actual basis. The Petitioner will also be allowed PKR/US$ exchange rate variation over reference PKR/US$ exchange rate of 86.00 over entire term of 13 years of the debt.

9. **Whether return on equity and return on equity during construction claimed by the Petitioner is justified?**

9.1 The petitioner has claimed 18% rate of return on equity (IRR based). The Petitioner has submitted that this is the first biomass fuelled power plant based on 100% consumption of biomass round the year. According to the Petitioner, the requested 18% return on equity is reasonable to attract other investors for investment in this sector and development of agricultural industry in the country.

9.2 NTDC in its comments has submitted that 17% return on equity is considered appropriate as allowed by the Authority in the case of several renewable energy projects.

9.3 The Authority considers that it has allowed 17% return on equity (IRR based) in the case of all renewable energy projects including biomass based energy projects, which is quite reasonable and accepted by the investors of these projects. The Authority does not find any justification for increasing the rate of return on equity in the instant case as requested by the Petitioner. The Authority, therefore, allows

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17% return on equity (IRR based) to the Petitioner, while maintaining its previous decision for other renewable power projects.

10. **Whether the Fuel cost component of tariff and proposed mechanism for adjustment of fuel cost component is justified?**

10.1 The Petitioner has submitted that its plant has been designed to use Bagasse as the primary fuel. The annual requirement of total biomass consumption at 80% plant availability will be 140000 ton out of which about 20000 ton will be met from use of rice husk or cotton stalk. In order to maintain a reliable biomass supply, a sale and purchase agreement with the nearby sugar mills will be signed. Al-Abbas Sugar Mill which is across the plant will be supplying larger portion of the bagasse for the power plant operation, while the rest of requirement which is rice husk and other biomass contributing about 20% of the total fuel consumption, will be procured from the rice mills located in 100 km radius of the power plant.

10.2 The petitioner has claimed fuel cost component of Rs. 5.58/kWh by linking price of bagasse with CIF price of imported coal on btu basis at net heat rate of power plant (thermal efficiency 24.3%). Fuel cost component computation (simplified) claimed by the petitioner is reproduced below:

Coal		
- Price	US $ 110/m. ton	(A)
- NHV	6,000	(B)
Exchange rate	86	(C)
Thermal efficiency	24.30%	(D)
Fuel cost component	5.58	[(**A** x **C**)/(**B** x **D**)] x constants i.e. [3,412.14 x 0.2520 /1000]

10.3 The Petitioner has further submitted that local transportation of biomass fuel from the source to the project site may be based on actual transportation cost of bagasse and the fuel price indexation for the fuel cost component of tariff may be linked to the variation in CIF coal prices in the international market.

10.4 The request of the Petitioner for pricing of biomass fuel and the proposed indexation mechanism for fuel price variation has been analyzed in view of its reasonableness, sustainability as well as reliability of relevant available information perspectives. The Authority considers that determination of fuel cost component of tariff of the Petitioner is dependent on various factors such as thermal efficiency and price of biomass fuel along with appropriate adjustment mechanism for future indexations. The aforementioned factors have been discussed separately as hereunder.

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10.5 Thermal efficiency

10.5.1 The petitioner has claimed thermal efficiency of 24.30% as against 24.50% stated in the EPC contract. The petitioner has submitted that the difference of 0.20% is on account of margin taken for increase of biomass consumption due to fouling on boiler tubes and variation of operating conditions during operations.

10.5.2 The petitioner, in support of its claim has submitted data of biomass based energy projects whereby thermal efficiencies of a conventional steam turbine biomass fired power plant is generally in the range of 20%-27%. The petitioner has further quoted eight examples of power plants with capacity ranging from 18.50 MW to 60 MW having net thermal efficiencies from 19.80% to 27.50%.

10.5.3 PPDB in its comments has submitted that the claimed thermal efficiency of 24.30% is on lower side when compared with globally established norms ranging from 23% to 28% with respect to biomass power plants. PPDB has submitted that the Authority may determine tariff by reckoning thermal efficiency of 28%, subject to subsequent adjustment when the exact technical parameters would be known and brought on record. PPDB has also opined that in case the petitioner insists on lower thermal efficiency, the EPC cost may also be adjusted accordingly.

10.5.4 NTDC in its comments has submitted that plant efficiency of 24.30% claimed by the petitioner is very low where as project cost is on higher side which has resulted in high tariff.

10.5.5 The petitioner has submitted that fuel cost component should also be subject to heat rate degradation factor as per the power purchase agreement.

10.5.6 The Authority considers that size of the power plant has a direct bearing on the parameters on which the facility is designed. Large size plants can be fabricated with better metallurgy and therefore higher temperatures and pressures are achievable, resulting in better efficiencies.

10.5.7 The Authority observed that net thermal efficiency of 24.5% has been guaranteed to the Petitioner as per the EPC contract. The Authority however considers that under the given technical specifications of the power plant and quality of equipment in terms of claimed costs by the Petitioner, the possibility of achieving higher thermal efficiency as already pointed out by the commentators can not be over ruled. The Authority has, therefore, decided to accept minimum net thermal efficiency of 24.50% at this stage subject to adjustment on the basis of actual pursuant to the net heat rate test of the plant to be carried out by the Petitioner at the time of COD.

10.6 Biomass pricing

10.6.1 There is no established market in our country for ascertaining the actual price of bagasse or other biomass fuels such as rice husk, cotton stalk etc that may be applied for calculating the fuel cost component of tariff for biomass based energy projects. It is therefore imperative that price of bagasse should be linked to other dry fuel such as coal on BTU basis for calculating the price of bagasse to be used by

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the biomass power plants. Further there is a need that reference fuel cost component so arrived should be linked to some appropriate index for adjustment of fuel cost component of tariff for a biomass project in future. In this regard, based on information provided by the petitioner and other available information to the Authority, the following mechanism for determination of fuel price component and subsequent adjustment based on appropriate available index has been developed for the Petitioner.

CIF price of coal

10.6.2 Since Pakistan is not a major importer of coal, therefore there is no index or publication available locally or internationally that reflects the actual CIF price of coal for Pakistan on per metric ton basis. However, FOB and CIF price per M.Ton of coal for major coal exporting/importing countries is available and published by major shipment/price assessment companies. Coal price on FOB and CIF basis is published on daily, weekly and monthly by Argus McCloskey's Coal Price Service and covers 20 different countries comprising Europe, middle East, China and South Asia. One of these indices, the Argus McCloskey's API 4 (All Price Index) is the FOB coal price for South African coal at Richards Bay port. A standard net calorific value of 6000 kcal/kg is defined for coal under the API4 index. The daily, weekly and monthly publications issued in the Argus/McCloskey's Coal Price Report are available. It has been observed from the available data that most of the coal imported in to our country originates from South Africa's Richards Bay. It is therefore pragmatic to use monthly average FOB price of coal as published in the API4 index. In the instant case monthly average FOB price of coal US$ 97.75/ton for the month of April 2012 has been assumed and applied for working out reference fuel cost component of tariff.

Marine Freight and Insurance

10.6.3 As already discussed that no credible index for CIF price of coal applicable to our country is available in the international market. In order to have fair assessment of marine freight and insurance for determination of CIF price of coal, the Authority has gathered actual available data from the local banks (Bank L/Cs) for the coal imported by cement manufacturers. As per information made available to the Authority, the average cost of marine freight for the month of April 2012 per metric ton of coal imported from Richards Bay terminal of South Africa works out to be US$ 29.387/ton and therefore has been fixed as reference price of marine freight.

10.6.4 This value of freight will be indexed with the monthly average of Bunker Index 380-CST. The most widely used Bunker fuel for shipping is known as Heavy Fuel Oil 380 centistokes (HFO 380 CST) and therefore is considered to be a reasonable index to base indexation of marine freight charges. Monthly average of the Bunker Index 380 CST, which is the Average Global Bunker Price (AGBP) for all 380-centistoke (CST) port prices published on the Bunker Index website for the month of April 2012, has been indicated as US$ 740.8442 per M.Ton which will be used for

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indexation of revised freight charges for the relevant month in accordance with the adjustment mechanism given in the order of the Authority.

10.6.5 Regarding marine insurance component, the actual data obtained from banks as discussed above shows that marine insurance charged by the insurance providers from Richards Bay terminal to Karachi port works out to be in the range of 0.09% to 0.12% on per metric ton FOB price of coal. The Authority has therefore decided to apply fixed rate of 0.1% on per metric ton FOB coal price for calculating marine insurance component for current as well as future indexation of coal price.

10.6.6 In view of the above, the CIF price of coal has been worked out as Rs. 10942.1885/ton on the basis of following formula.

Coal Price (CIF) = (FOB Coal price + Marine Freight + Marine Insurance)x $ER_{(Ref)}$

= {(US$ 97.75 +US$ 29.387+(US$ 97.75x 0.1%)} x Rs. 86.00

= Rs. 10942.19/ton

Inland transportation

10.6.7 The Petitioner has requested that transportation cost of biomass should be linked either to actual transportation cost of coal from Karachi to the project site or it may be adjusted on actual basis. The Petitioner submitted that bagasse will be collected from nearby sugar mills with whom long term fuel supply agreements will be made to assure its regular supply round the year.

10.6.8 The matter was discussed in the hearing of the Petition held on November 2, 2011 whereby the Authority observed that transportation cost of bagasse may not be linked to transportation cost of coal as the petitioner does not need to actually transport coal from Karachi to its project site. Further, adjustment of transportation cost of bagasse on actual basis is also not feasible as it would result in different cost of transportation for each biomass based energy project de pending on project location and on-season and off-season availability of biomass fuel.

10.6.9 In order to determine the transportation cost of biomass fuel at site, various options were considered by the Authority. The Authority observed that major suppliers of biomass fuel are generally located in 1-100 km radius of the project site for biomass energy projects. The biomass energy projects located adjacent or close to sugar mills would have much lower transportation cost while projects located away from sugar mills would have comparatively higher transportation cost on per metric ton basis of fuel.

10.7 Based on discussion with the project sponsors the Authority has approved a generic formula for working out transportation of biomass based energy projects on the basis of following assumptions/parameters.

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- An average distance for transportation of biomass fuel has been taken as 50 km.
- An average truck carries 10 ton of biomass fuel.
- The per litre fuel (Diesel) consumption of truck has been assumed 3 km.

- It has been assumed that Other truck costs (such as truck maintenance, driver salary, truck driver profit margin etc) are half of truck fuel cost while loading and unloading charges are also half of truck fuel cost.

10.8 Based on above assumptions, the formula for working out transportation cost of biomass fuel is given hereunder.

Biomass transportation Cost =Truck cost of diesel for 50 km/ton +(truck other cost/ton+ Loading & Unloading charges/ton)

10.9 Applying the above formula, the reference transportation cost of biomass works out to Rs. 356.67/ton as given hereunder.

Biomass transportation cost	=	(107/3*50)/10= Rs. 178.33/ton.
Truck other cost	=	Rs. 178.33/2= Rs. 89.17/ton
Loading & Unloading charges	=	Rs. 178.33/2= Rs. 89.17/ton

10.10 The cost per kilogram delivered at site attributable to the biomass based on above calculations works out to be Rs.3.2767/kg as given hereunder.

Cost of biomass /kg= {(CIF cost of coal/1000) x (btu value of biomass per kg/ btu value of coal per kg) + transportation charges

= {(10942.1885/1000) x(6905/23810)} + (356.67/1000)
= Rs. 3.5299/kg

10.11 The reference fuel cost component of the Petitioner has been worked out as mentioned hereunder.

Fuel cost component	Unit	Approved	
		Bagasse	Coal
Calorific Value (LHV)	kcal/kg	1740	6000
Calorific value (LHV)	btu/kg	6905	23810
Net heat rate (Thermal efficiency)	btu/kWh	13926	
Net efficiency		24.50%	
Biomass consumption	kg/kWh	2.0168	
Reference Coal Price- CIF Karachi	Rs./ton		10942.19
Equivalent price of biomass	Rs./ton	3173.28	
Inland transportation cost Biomass	Rs/ton	356.67	
Total biomass cost	Rs./kg	3.5299	
Fuel Cost Component	Rs/kWh	7.1192	

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10.12 The reference fuel cost component of tariff (Rs/kWh) will be revised as per the adjustment mechanism given in the order of the Authority.

10.13 It is worth mentioning here that the Petitioner had calculated its fuel cost component assuming CIF price of coal at US$ 110/ton (Rs. 89460/ton) for November 2011. Further the Petitioner had not included inland transportation cost in its calculations for the fuel cost component. The fuel cost component of tariff as worked out above has been based on CIF Coal price of April 2012 (US$ 127.234/ton) and is inclusive of inland transportation charges Rs. 356.67/ton. The higher fuel cost component of the Petitioner (Rs. 7.1192/kWh as against Rs. 5.58/kWh claimed by the Petitioner) has resulted in higher levelized tariff (US cents 12.9412/kWh) allowed by the Authority against the Petitioner's requested levelized tariff of US cents 12.086/kWh for project's tariff control period of 30 years.

11. **Whether the claimed O & M cost of the Petitioner is justified?**

11.1 The petitioner has claimed following O & M cost component per kWh along with applicable indexations:

	Rs. /kwh.	Indexations
Variable O & M		
Foreign	0.24	PKR/US$ & US CPI
Local	0.12	WPI
Fixed O & M		
Foreign	0.24	PKR/US$ & US CPI
Local	0.48	WPI

11.2 The petitioner has submitted that variable O & M includes the cost of consumables such as lubricants, chemicals, parts, water charges, biomass handling at site including stacking and piling, ash removal by trucks, major maintenances, checks and inspections related to biomass fuel storage and handling, maintenance cost of conveyers, biomass weighing, handling units, fuel and lubricants consumed.

11.3 The petitioner has further submitted that fixed O & M cost component represents:

(a) Fixed costs of staff for operations and maintenance of the plant
(b) The cost of spares and services for routine maintenance and major overhaul
(c) Material handling costs
(d) Administrative cost and office expenditure

11.4 PPDB in its comments has objected to the claimed O & M costs and has submitted that fixed O & M cost component of the Petitioner may not exceed 3% of the allowed EPC cost, while variable O & M cost component may not exceed 1.50% of the allowed EPC cost.

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11.5 The Petitioner in its comments has submitted that the Authority has reasonably assessed total O&M cost (fixed and variable) at 4.5% of EPC in case of JDW. Since this project is small (12 MW), the O&M cost on per annum basis can not be lower than 80 MW project. The company has not finalized O&M contractor. However, based on initial discussions with O&M contractor and based on the overhead and other requirements there is a strong fear that it would be difficult to manage the O&M, if the suggested cap is applied. Lenders h ave in dicated that they would require an O&M Contractor; in that case we are sure to have a higher cost for this project than requested.

11.6 The Authority has examined O&M cost requirement of the Petitioner and observed that annual O&M cost of the Petitioner, besides its project size, cannot be compared with conventional thermal power plants, due to requirement of extra cost for handling and storage of biomass. In the opinion of the Authority, the O&M cost requested by the Petitioner is reasonable and comparable with O&M cost allowed to another biomass based energy project. The Authority therefore, has decided to approve O&M cost as per request of the Petitioner. The O&M cost component of tariff will be adjusted after COD on quarterly basis as per the indexation mechanism stipulated in the order of the Authority.

12. **Whether the claimed cost of working capital is justified?**

12.1 The petitioner has claimed that it will require working capital to finance the following costs:

	US $ in millions	Applicable interest rate
Energy charge invoice receivables at 45 days (including 16% sales tax)	1.132	KIBOR + 2%
Biomass inventory equivalent to 45 days generation	0.744	KIBOR + 2%
For placement of funds in six months debt repayment reserve	0.7741	7.50%

12.2 The petitioner through its subsequent submissions received on 20 January, 2012 has requested for allowing 90 days for biomass inventory keeping in view the fact that its primary fuel (bagasse) is available only on seasonal basis; therefore it would have to procure upfront significant quantities of bagasse and rice husk during the on-season for its total annual requirement to keep the plant operational round the year. The Petitioner has further submitted that it has worked out its working capital requirement by taking into the account the time of Energy invoice payment, biomass fuel inventory and cost of 6 months debt service reserve account.

12.3 The Authority in other thermal power projects has allowed cost of working capital requirement for the fuel only and therefore, it shall be applicable in the instant case as well.

12.4 The Authority has considered the Petitioner's request for revised fuel inventory period of 90 days. In the opinion of the Authority, period of 30 days for the fuel inventory would be sufficient to meet its fuel requirement and operation of power plant without any interruption due to non-availability of biomass fuel. The Authority has therefore decided to allow 30 days period for fuel inventory and energy receivable invoice. Accordingly cost of working capital (interest only) for 30 days fuel inventory at 100% load and 30 days energy invoice receivable at 60% plant factor based on KIBOR at 11.93%+2% premium including GST at 16% has been worked out as Rs. 11.1320 million per annum or Rs. 0.1513/kWh and allowed to the Petitioner. The cost of working capital component of tariff will be adjusted quarterly on account of variation in 3 month KIBOR. The Petitioner will also be allowed adjustment (one time) for its cost of working capital at COD, due to variation in the price of coal and KIBOR on production of authentic documentary evidence to the satisfaction of the Authority.

12.5 The Petitioner has further submitted that it should be allowed cost of Debt Service Reserve Account (DSRA) as is required to maintain debt service reserve account equivalent to 6 month's debt repayment based on terms agreed with the lenders.

12.6 The cost of working capital for upfront placement of funds by the project sponsors in debt service reserve account is not allowed by the Authority. The petitioner has submitted that as an alternate, in line with the existing precedent (UCH II Power), cost associated with the letter of credit for funding of DSRA account should be allowed as a pass through. Till the date of finalisation of this determination, the petitioner has not submitted any term sheet evidencing the requirement for maintenance of a DSRA account or provision of a letter of credit in lieu of maintaining a DSRA account.

12.7 The petitioner has also requested for allowing indexation of this cost for variations in 3 months KIBOR.

12.8 The Authority in the case of UCH-II and Zorlu Energy has allowed cost of L/C in lieu of maintaining DSRA on the basis of actual at COD subject to provision of documentary evidence. Since the petitioner has not finalised term sheet with its lenders as yet, the Authority has, therefore decided that if the petitioner is required to bear the cost of DSRA L/C, it will be allowed cost of L/C in lieu of DSRA on the basis of actual at COD subject to the maximum rate of 2% for cost of L/C to be calculated on six months debt servicing upon provision of verifiable documentary evidence by the Petitioner.

13 **Whether the proposed Insurance during operational phase is justified?**

13.1 The petitioner has claimed cost of insurance during plant operation of Rs. 0.400/kWh which works out to US $ 0.342 million i.e. 2.26% of the EPC cost. The petitioner has submitted that it is difficult to attract potential foreign investors in Pakistan especially in a regulated sector such as power. Therefore, in addition to

the customary insurances, the foreign investors have requested that the following insurances be procured from OPIC:

- Expropriation/improper government interference
- Political violence
- Standalone terrorism
- Currency inconvertibility

13.2 The petitioner has submitted that insurance cost associated with such additional insurances would be 1.25% of the equity to be injected by Acumen Funds, American Power LLC and SSJD Fund 1 LP i.e. US $ 55,298. According to the Petitioner its annual insurance expense is likely to remain within the threshold of 2.35% of EPC cost and has requested for allowing adjustment of the same after finalisation of the insurance arrangements. The petitioner has also requested for allowing indexation of US$/PKR and US CPI for this cost component.

13.3 The petitioner subsequently vide letter of January 2012 has reduced its claim to 1.72% of the claimed EPC cost.

13.4 The Authority considers that additional risks associated with the project as referred to by the petitioner are amply covered under the implementation agreement to be signed by the Petitioner with the Government of Pakistan. The Authority has allowed annual insurance expense to all other power projects at maximum of 1.35% of EPC cost, subject to adjustment on actual at COD. Further no adjustment for US inflation based on US CPI on insurance component of tariff has been previously allowed by the Authority to other power projects.

13.5 The Authority, to be consistent with its earlier decisions in the matter, has decided to allow the Petitioner, per annum insurance cost at 1.35% of the EPC cost subject to adjustment on actual with maximum upper cap of 1.35% of approved EPC cost on production of verifiable documentary evidence at COD. Accordingly, the per annum insurance expense at 1.35% of the approved EPC cost works out to be US$ 0.204 million and therefore allowed to the Petitioner at this stage.

13.6 The Insurance cost component of tariff will be adjusted on annual basis due to variation in PKR/US$ exchange rate over the reference PKR/US$ exchange rate of Rupees 86.00 in accordance with the adjustment mechanism given in the order of the Authority.

14. Based on discussion in the foregoing paragraphs the component-wise tariff table for the Petitioner is attached herewith as Annex-I

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15. **Order**

Pursuant to Rule 6 of the NEPRA Licensing (Generation) Rules, 2000, SSJD Bioenergy Limited is allowed to charge the following tariff for delivery of electricity to the Central Power Purchasing Agency (CPPA) for onward delivery to Ex-WAPDA distribution companies.

Tariff Components	Year 1-13	Year 14-30	Indexation
Variable Charge (Rs/kWh)			
Fuel cost component	7.1192	7.1192	Fuel Price
Variable O&M - Local	0.1200	0.1200	WPI
Variable O&M - Foreign	0.2400	0.2400	PKR/US$, US CPI
Fixed Charge (Rs/kWh)			
Fixed O&M - Local	0.4800	0.4800	WPI
Fixed O&M - Foreign	0.2400	0.2400	PKR/US$, US CPI
Insurance	0.2386	0.2386	PKR/US$
Working Capital Cost	0.1513	0.1513	KIBOR
Debt Service	1.6994	-	PKR/US$
Return on Equity	1.0995	1.0995	PKR/US$
Return on equity during construction (ROEDC)	0.1603	0.1603	PKR/US$

i. The reference tariff has been calculated on the basis of net annual energy production of 73.584 GWh.

ii. In the above tariff, no adjustment for Carbon Emission Reduction receipts (CERs) has been accounted for. However, upon actual realization of CERs, the same shall be distributed between the Power Purchaser and SSJD Bioenergy Limited in accordance with the GOP Policy for Renewable Energy Projects 2006 as amended from time of time.

iii. The above tariff is applicable for a period of thirty (30) years commencing from Commercial Operation Date (COD).

iv. Debt service will be paid in the first 13 years of commercial operation of plant after COD.

v. The reference tariff has been calculated at PKR/Dollar exchange rate of Rupees 86.0 to US dollar.

vi. The component wise tariff is indicated at Annex-I

vii. Debt Servicing Schedule is attached as Annex-II

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I. **One Time Adjustment**

a. Net thermal efficiency of the plant will be adjusted over the minimum allowed efficiency of 24.5% pursuant to heat rate test to be carried out by the Petitioner at COD.

b. The Principal repayment and the cost of debt will be adjusted on the basis of 20 years fixed US Treasury rate.

c. Interest during Construction (IDC) will be adjusted at COD on the basis of actual debt draw downs (within the overall debt allowed by the Authority at COD), actual PKR/US$ exchange rate variation for foreign loan denominated in US$ and actual fixed US treasury rate plus premium not exceeding the limit of 3.50%, during the project construction period of 20 months.

d. The specific items of project cost to be paid in foreign currency (i.e. US$) will be adjusted at COD on account of actual variation in exchange rate over the reference PKR/US$ exchange rate of Rs. 86.00 on production of verifiable documentary evidence to the satisfaction of the Authority.

e. Duties and/or taxes, not being of refundable nature, imposed on the company up to the commencement of its commercial operations for the import of its plant, machinery and equipment will be adjusted on actual at COD.

f. Insurance will be adjusted as per actually incurred prudent costs, subject to maximum limit of 1.35% of the approved EPC cost, on production of authentic documentary evidence at the time of COD.

g. Working capital component of tariff will be adjusted on the basis of KIBOR plus 2% premium and revised price of coal allocated to biomass fuel in accordance with the fuel price mechanism stipulated herein.

h. Financial charges will be adjusted at COD on the basis of actual expense, up to a maximum of 4% of the total debt allowed (excluding the impact of interest during construction and financial charges) on production of authentic documentary evidence.

i. Return on Equity during Construction (ROEDC) will be adjusted at COD on the basis of actual equity injections (within the overall equity allowed by the Authority at COD) during the project construction period.

j. Return on equity (including return on equity during construction) will be adjusted at COD on the basis of PKR/US$ exchange rate variation.

k. Cost of L/C in lieu of DSRA will be adjusted on actual at COD subject to the maximum of 2% to be calculated on value of six months debt service on production of verifiable documentary evidence by the Petitioner.

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I. The reference tariff table shall be revised at COD while taking in to account the above adjustments. The Petitioner shall submit its request to the Authority within 90 days of COD for necessary adjustments in tariff.

II. Pass-Through Items

No provision for income tax has been accounted for in the tariff. If any tax is imposed on the petitioner, the exact amount paid by the petitioner shall be reimbursed by the power purchaser to the petitioner on production of original receipts. This payment will be considered as a pass-through payment spread over a twelve (12) months period. Furthermore, in such a scenario, the petitioner shall also submit to the power purchaser details of any tax shield savings and the power purchaser shall deduct the amount of these savings from its payment to the petitioner on account of taxation.

Withholding tax on dividends is also a pass through item just like other taxes as indicated in the government guidelines for determination of tariff for new IPPs. The Power Purchaser shall make payment on account of withholding tax at the time of actual payment of dividend subject to maximum of 7.5% of 17% return on equity (including return on equity during construction). In case the petitioner does not declare a dividend in a particular year or only declares a partial dividend, then the difference in the withholding tax amount (between what is paid in that year and the total entitlement as per the net return on equity) would be carried forward and accumulated so that the petitioner is able to recover the same as a pass through from the power purchaser in future on the basis of the total dividend payout.

III. Indexation

The following indexation shall be applicable to the reference tariff:

a) Fuel Cost Component

Fuel cost component of tariff will be adjusted on account of variation in price of fuel (biomass) on monthly basis in arrears as per the formula given hereunder.

$FCC_{(Rev)} = FCC_{(Ref)} \times BFP_{(Rev)} / BFP_{(Ref)}$

Where;

$FCC_{(Rev)}$ = Revised fuel cost component of tariff for the applicable month.

$FCC_{(Ref)}$ = Reference fuel cost component of tariff for the relevant month.

$BFP_{(Rev)}$ = Revised price of biomass fuel in Rs/ton as determined in accordance with mechanism set out below.

$BFP_{(Ref)}$ = Reference price of biomass fuel for the relevant month. Current reference price is Rs. 3529.95/ton

$BFP_{(Rev)} = CPCIF_{(Rev)} \times 6905/23810 + ITB_{(Rev)}$

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Where;

$CPCIF_{(Rev)}$ = $\{CPFOB_{(Rev)} + MF_{(Rev)} + MI_{(Rev)}\} \times ER_{(Rev)}$

Where;

$CPCIF_{(Rev)}$ = Revised CIF price of coal in Rs/ton for the applicable month.

$CPFOB_{(Rev)}$ = Revised FOB price of coal expressed in US$/ton as published in the Argus McCloskey's API4 index (monthly average) immediately preceding the applicable month.

$MF_{(Rev)}$ = Revised marine freight of coal per ton as worked out below.

$MF_{(Rev)}$ = US$ 29.387 x $BIX_{(Rev)}$ / $BIX_{(Ref)}$

Where;

$BIX_{(Rev)}$ = Revised monthly average of the daily Bunker Index price for 380-CST published by the Bunker Index for the month immediately preceding the applicable month.

$BIX_{(Ref)}$ = Reference monthly average of the daily Bunker Index price of 380-CST published by the Bunker Index. Current reference for the month of April 2012 is US$ 740.8442/ton.

$MI_{(Rev)}$ = $CPFOB_{(Rev)}$ x 0.1%

$ER_{(Rev)}$ = Revised monthly average PKR/US$ exchange rate for the month immediately preceding the applicable month.

$ITB_{(Rev)}$ = Revised inland transportation cost of biomass fuel expressed in Rs/ton determined in accordance with the following formula.

$ITB_{(Rev)}$ = $CDT_{(Rev)}+ME_{(Rev)}+LUL_{(Rev)}$

Where;

$ITB_{(Rev)}$ = Revised inland transportation cost of biomass fuel for the applicable month.

$CDT_{(Rev)}$ = Revised cost of diesel per ton of biomass fuel over 50 km radius for the applicable month.

$ME_{(Rev)}$ = Revised maintenance cost of transporter for the applicable month

$LUL_{(Rev)}$ = Revised loading and unloading cost of biomass fuel for the applicable month.

The constants such as 6905, 23810 and US$ 29.387 are fixed values representing LHV value of biomass in btu/kg, LHV value of coal in btu/kg and fixed value of marine freight charges per ton of coal respectively. Revised CDT, ME and LUL shall be worked out as per the following formula.

$CDT_{(Rev)}$ = $\{(FPD_{(Rev)}/3*50)/10\}$

Where;

$FPD_{(Rev)}$ = Revised average fuel price of diesel for the month immediately preceding the applicable month as notified by OGRA.

$ME_{(Rev)}$ = $CDT_{(Rev)}/2$

$LUL_{(Rev)}$ = $LUL_{(Ref)}$ x $CPI_{(Rev)}/CPI_{(Ref)}$

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Where;

$LUL_{(Ref)}$ = Reference loading and unloading charges per metric ton for the relevant month. Current reference Rs. 89.17/ton

$CPI_{(Rev)}$ = Revised consumer price index (general) for the month immediately preceding the applicable month as notified by the Federal Bureau of Statistics (FBS) Government of Pakistan.

$CPI_{(Ref)}$ = Reference consumer price index (general) for the relevant month as notified by Federal Bureau of Statistics (FBS) Government of Pakistan. Current reference CPI for April 2012 is 168.00

Note:

1. Applicable month means, the month for which adjustment/indexation of fuel cost component is required starting from 1st day and ending on last of calendar month.
2. Relevant month means the month immediately preceding the applicable month for adjustment/indexation of fuel cost component.
3. The adjustment /indexation of fuel cost component of tariff will be allowed on monthly basis. The Petitioner will submit its request for adjustment/indexation of fuel cost component of tariff based on above mentioned mechanism in the 1st week of each calendar month along with necessary details/data supported with relevant documentary evidence to the Authority.

b) Indexation applicable to O&M

The local part of O&M will be adjusted on account of local Inflation and O&M foreign component will be adjusted on account of variation in Rupee/Dollar exchange rate and US CPI. Quarterly adjustments for inflation and exchange rate variation will be made on 1st July, 1st October, 1st January & 1st April respectively on the basis of the latest available information with respect to WPI (or alternative index as determined by the Authority), US CPI (notified by US bureau of labor statistics) and revised TT & OD Selling rate of US Dollar (notified by the National Bank of Pakistan). The mode of indexation will be as under:

i) Fixed O&M

$$F\ O\&M_{(LREV)} = O\&M_{(LREF)} * WPI_{(REV)} / 209.470$$
$$F\ O\&M_{(FREV)} = O\&M_{(FREF)} * US\ CPI_{(REV)} / 230.085 * ER_{(REV)}/86$$

Where:

$F\ O\&M_{(LREV)}$ = The revised applicable Fixed O&M local component of tariff indexed with WPI.

$F\ O\&M_{(FREV)}$ = The revised applicable Fixed O&M foreign component of tariff indexed with US CPI and exchange rate variation.

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$O\&M_{(LREF)}$ = The reference fixed O&M local component of tariff for the relevant period.

$O\&M_{(FREF)}$ = The reference fixed O&M foreign component of tariff for the relevant period.

$WPI_{(REV)}$ = The Revised Wholesale Price Index (Manufacturers) / or alternative index as determined by the Authority.

$WPI_{(REF)}$ = The Wholesale Price Index (Manufactures) of July 2011 / or alternative index as determined by the Authority for April 2012 and notified by the Federal Bureau of Statistics.

$US\ CPI_{(REV)}$ = The Revised US Consumer Price Index (All Urban Consumers) notified by the Bureau of Labor Statistics.

$US\ CPI_{(REF)}$ = Reference US CPI (All Urban Consumers) notified by the US Bureau of Labor Statistics for the month of April 2012.

$ER_{(REV)}$ = The revised TT and OD selling rate of US dollar as notified by the National Bank of Pakistan.

ii. Variable O&M

$$V\ O\&M_{(LREV)} = O\&M_{(LREF)} * WPI_{(REV)} / 209.47$$
$$V\ O\&M_{(FREV)} = O\&M_{(FREF)} * USCPI_{(REV)} / 230.085 * ER_{(REV)}/86$$

Where:

$V\ O\&M_{(LREV)}$ = The revised applicable Variable O&M local component of tariff indexed with WPI.

$V\ O\&M_{(FREV)}$ = The revised applicable Variable O&M foreign component of tariff indexed with US CPI and exchange rate variation.

$O\&M_{(LREF)}$ = The reference variable O&M local component of tariff for the relevant period.

$O\&M_{(FREF)}$ = The reference variable O&M foreign component of tariff for the relevant period.

$WPI_{(REV)}$ = The Revised Wholesale Price Index (Manufacturers) / or alternative index as determined by the Authority.

$WPI_{(REF)}$ = The Wholesale Price Index (Manufactures) of July 2011 / or alternative index as determined by the Authority for April 2012 and notified by the Federal Bureau of Statistics.

$US\ CPI_{(REV)}$ = The Revised US Consumer Price Index (All Urban Consumers) notified by the US Bureau of Labor Statistics.

$US\ CPI_{(REF)}$ = Reference US CPI (All Urban Consumers) notified by the Bureau of Labor Statistics for the month of April 2012.

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$ER_{(REV)}$ = The revised TT and OD selling rate of US dollar as notified by the National Bank of Pakistan.

Note: -

At the time of this determination, the Authority is still in the process of establishing an alternative index for WPI (Manufacturers) which has been discontinued by FBS since August 2011. Pending determination of the alternative index by NEPRA, the last available WPI (Manufacturers) for the month of July 2011 has been used as reference. Upon determination of the alternative indexation by NEPRA, the reference indexation values shall be revised to the alternative index value for the month of April 2012.

c) Adjustment of working capital cost

The cost of working capital shall be adjusted on account of variation in 3-month KIBOR over the reference KIBOR of 11.93% while premium over KIBOR 2% remaining the same for the entire tariff control period.

d) Insurance

Insurance cost component of tariff, in case insurance is denominated in foreign currency, will be adjusted on account of PKR/US$ exchange rate variation at COD and thereafter on an annual basis at actual subject to the maximum of 1.35% of the EPC cost on production of authentic documentary evidence by the Petitioner.

e) Adjustment of debt servicing component

This fixed charge component will remain unchanged throughout the term except for the adjustment due to exchange rate variation in US dollar over Pak Rupee. The debt servicing component of tariff will be adjusted with currency exchange rate variation on quarterly basis.

f) Return on Equity

Return on equity (ROE) as well as Return on Equity during Construction (ROEDC) component of tariff shall be adjusted for variation in PKR/US$ exchange rate according to the following formula:

$$ROE_{(REV)} = ROE_{(REF)} * ER_{(REV)}/ER_{(REF)}$$
$$ROEDC_{(REV)} = ROEDC_{(REF)} * ER_{(REV)}/ER_{(REF)}$$

Where;

$ROE_{(REV)}$ = Revised Return on Equity component of tariff expressed in Rs/kWh adjusted with exchange rate variation.

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$ROEDC_{(REV)}$	=	Revised Return on Equity during Construction component of tariff in Rs/kWh adjusted with exchange rate variation.
$ROE_{(REF)}$	=	Reference Return on Equity component of tariff expressed in Rs/kWh for the relevant period.
$ROEDC_{(REF)}$	=	Reference Return on Equity during Construction component of tariff expressed in Rs/kWh for the relevant period.
$ER_{(REV)}$	=	Revised TT and OD selling rate of US dollar as notified by the National Bank of Pakistan.
$ER_{(REF)}$	=	Reference TT and OD selling rate of US dollar.

Note: -

Adjustment on account of inflation and foreign exchange rate variation will be approved by the Authority within fifteen working days after receipt of the petitioner's request for adjustment in tariff in accordance with the requisite indexation mechanism stipulated hereinabove.

IV. Other Terms and Conditions of Tariff

Design & Manufacturing Standards:

Power Generation system shall be designed, manufactured and tested in accordance with the latest IEC standards or other equivalent standards. All plant and equipment shall be new and of standard quality.

Power Curve of the Power Complex:

The power curve of the Power plant shall be verified by the Power Purchaser, as part of the Commissioning tests according to the latest IEC standards and shall be used to measure the performance of the generating units.

Emissions Trading/Carbon Credits:

The Petitioner shall process and obtain emissions/carbon credits expeditiously and credit the proceeds to the Power Purchaser as per the policy issued by the Federal Government.

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Annex-I

SSJD Bioenergy Limited

Reference Tariff

Year	Fuel cost component	Variable O&M Local	Variable O&M Foreign	Fixed O&M Local	Fixed O & M Foreign	Insurance	Working capital cost	Return on Equity	ROE During Construction	Withholding Tax @7.5%	Loan Repayment	Interest Charges	Total Tariff
	Rs./kWh	Rs./kWh	Rs./kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs./kWh	Rs. / kWh
1	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	0.7817	0.9177	11.6428
2	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	0.8313	0.8681	11.6428
3	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	0.8840	0.8154	11.6428
4	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	0.9401	0.7593	11.6428
5	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	0.9998	0.6996	11.6428
6	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.0632	0.6362	11.6428
7	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.1307	0.5687	11.6428
8	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.2024	0.4970	11.6428
9	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.2787	0.4207	11.6428
10	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.3599	0.3395	11.6428
11	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.4462	0.2532	11.6428
12	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.5380	0.1615	11.6428
13	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945	1.6355	0.0639	11.6428
14	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
15	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
16	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
17	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
18	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
19	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
20	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
21	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
22	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
23	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
24	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
25	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
26	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
27	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
28	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
29	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
30	7.1192	0.1200	0.2400	0.4800	0.2400	0.2386	0.1513	1.0995	0.1603	0.0945			9.9434
Levelized Tariff	**7.1192**	**0.1200**	**0.2400**	**0.4800**	**0.2400**	**0.2386**	**0.1513**	**1.0995**	**0.1603**	**0.0945**	**0.8066**	**0.4740**	**11.2239**

Levelized Tariff (1-30 years) discounted at 10% per annum = US Cents 13.0511/kWh at reference exchange rate of 1US$=Rupees 86.00.

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Annex-II

SSJD Bioenergy Limited
Debt Servicing Schedule

Period	Foreign Debt					Foreign Debt					Annual Principal Repayment Rs./kWh	Annual Interest Rs./kWh	Annual Debt Service Rs./kWh
	Principal Million $	Repayment Million $	Mark-Up Million $	Balance Million $	Debt Service Million $	Principal Million Rupees	Repayment Million Rupees	Mark-Up Million Rupees	Balance Million Rupees	Debt Service Millien Rupees			
	12.9127	0.1634	0.2001	12.7494	0.3635	1,110.4955	14.0496	17.2127	1,096.4459	31.2623			
	12.7494	0.1659	0.1976	12.5835	0.3635	1,096.4459	14.2674	16.9949	1,082.1785	31.2623			
	12.5835	0.1685	0.1950	12.4150	0.3635	1,082.1765	14.4685	16.7738	1,067.6900	31.2623			
	12.4150	0.1711	0.1924	12.2439	0.3635	1,067.6900	14.7131	16.5492	1,052.9769	31.2623			
1	12.9127	0.6688	0.7852	12.2439	1.4541	1,110.4955	57.5187	67.5306	1,052.9769	125.0492	0.7817	0.9177	1.6994
	12.2439	0.1737	0.1898	12.0702	0.3635	1,052.9769	14.9412	16.3211	1,038.0357	31.2623			
	12.0702	0.1784	0.1871	11.8938	0.3635	1,038.0357	15.1728	16.0896	1,022.8629	31.2623			
	11.8938	0.1792	0.1844	11.7146	0.3635	1,022.8629	15.4079	15.8544	1,007.4550	31.2623			
	11.7146	0.1819	0.1816	11.5327	0.3635	1,007.4550	15.6468	15.6158	991.8083	31.2623			
2	12.2439	0.7113	0.7428	11.5327	1.4541	1,052.9769	81.1686	63.8806	991.8083	125.0492	0.6313	0.8681	1.6994
	11.5327	0.1848	0.1788	11.3479	0.3635	991.8083	15.8893	15.3730	975.9190	31.2623			
	11.3479	0.1876	0.1759	11.1603	0.3635	975.9190	16.1356	15.1267	959.7834	31.2623			
	11.1603	0.1905	0.1730	10.9697	0.3635	959.7834	16.3657	14.8786	943.3977	31.2623			
	10.9697	0.1935	0.1700	10.7763	0.3635	943.3977	16.6396	14.6227	926.7581	31.2623			
3	11.5327	0.7564	0.6977	10.7763	1.4541	991.8083	65.0502	59.9991	926.7581	125.0492	0.8840	0.8154	1.6994
	10.7763	0.1965	0.1670	10.5798	0.3635	926.7581	16.8976	14.3648	909.8605	31.2623			
	10.5798	0.1995	0.1640	10.3802	0.3635	909.8805	17.1585	14.1028	892.7011	31.2623			
	10.3802	0.2026	0.1609	10.1776	0.3635	892.7011	17.4254	13.8369	875.2756	31.2623			
	10.1776	0.2058	0.1578	9.9718	0.3635	875.2756	17.6955	13.5668	857.5801	31.2623			
4	10.7763	0.8044	0.6497	9.9719	1.4541	926.7581	69.1780	55.8712	857.5801	125.0492	0.9401	0.7593	1.6994
	9.9719	0.2090	0.1546	9.7629	0.3635	857.5801	17.9698	13.2925	839.6103	31.2623			
	9.7629	0.2122	0.1513	9.5507	0.3635	839.6103	18.2483	13.0140	821.3619	31.2623			
	9.5507	0.2155	0.1480	9.3352	0.3635	821.3819	16.5312	12.7311	802.6307	31.2623			
	9.3352	0.2188	0.1447	9.1164	0.3635	802.8307	16.8164	12.4439	764.0123	31.2623			
5	9.9719	0.8554	0.5986	9.1164	1.4541	857.5801	73.5676	51.4814	764.0123	125.0492	0.9998	0.6996	1.6994
	9.1164	0.2222	0.1413	8.8942	0.3635	784.0123	19.1101	12.1522	764.9022	31.2623			
	8.8942	0.2257	0.1379	8.6686	0.3635	764.9022	19.4063	11.8560	745.4959	31.2623			
	8.6686	0.2292	0.1344	8.4394	0.3635	745.4959	19.7071	11.5552	725.7887	31.2623			
	8.4394	0.2327	0.1308	8.2067	0.3635	725.7887	20.0126	11.2497	705.7762	31.2623			
6	9.1164	0.9097	0.5443	8.2067	1.4541	784.0123	78.2361	46.8131	705.7762	125.0492	1.0632	0.6362	1.6994
	8.2067	0.2363	0.1272	7.9704	0.3635	705.7762	20.3226	10.9395	685.4534	31.2623			
	7.9704	0.2400	0.1235	7.7304	0.3635	685.4534	20.6378	10.6245	664.8156	31.2623			
	7.7304	0.2437	0.1198	7.4867	0.3635	664.8156	20.9577	10.3046	643.6579	31.2623			
	7.4867	0.2475	0.1160	7.2392	0.3635	643.8579	21.2825	9.9798	622.5754	31.2623			
7	8.2067	0.9675	0.4866	7.2392	1.4541	705.7762	83.2007	41.8485	622.5754	125.0492	1.1307	0.5687	1.6994
	7.2392	0.2513	0.1122	6.9879	0.3635	622.5754	21.6124	9.6499	600.9630	31.2623			
	6.9879	0.2552	0.1083	6.7327	0.3635	600.9630	21.9474	9.3149	579.0157	31.2623			
	6.7327	0.2592	0.1044	6.4736	0.3635	579.0157	22.2876	8.9747	556.7281	31.2623			
	6.4736	0.2632	0.1003	6.2104	0.3635	556.7281	22.6330	8.6293	534.0951	31.2623			
8	7.2392	1.0288	0.4252	6.2104	1.4541	622.5754	88.4804	36.5689	534.0951	125.0492	1.2024	0.4970	1.6994
	6.2104	0.2673	0.0963	5.9432	0.3635	534.0951	22.9838	8.2785	511.1112	31.2623			
	5.9432	0.2714	0.0921	5.6718	0.3635	511.1112	23.3401	7.9222	487.7712	31.2623			
	5.6718	0.2756	0.0879	5.3962	0.3635	487.7712	23.7019	7.5605	464.0693	31.2623			
	5.3962	0.2799	0.0836	5.1163	0.3635	464.0693	24.0692	7.1931	440.0001	31.2623			
9	6.2104	1.0941	0.3599	5.1163	1.4541	534.0951	94.0950	30.9542	440.0001	125.0492	1.2787	0.4207	1.6994
	5.1163	0.2842	0.0793	4.6321	0.3635	440.0001	24.4423	6.6200	415.5578	31.2623			
	4.6321	0.2886	0.0749	4.5434	0.3635	415.5576	24.8212	6.4411	390.7366	31.2623			
	4.5434	0.2931	0.0704	4.2504	0.3635	390.7366	25.2059	6.0564	365.5307	31.2623			
	4.2504	0.2976	0.0659	3.9527	0.3635	365.5307	25.5966	5.6657	339.9341	31.2623			
10	5.1163	1.1636	0.2905	3.9527	1.4541	440.0001	100.0659	24.9833	339.9341	125.0492	1.3599	0.3395	1.6994
	3.9527	0.3022	0.0613	3.6505	0.3635	339.9341	25.9933	5.2690	313.9408	31.2623			
	3.6505	0.3069	0.0566	3.3435	0.3635	313.9408	26.3962	4.8661	287.5446	31.2623			
	3.3435	0.3117	0.0518	3.0319	0.3635	287.5446	26.8054	4.4569	260.7392	31.2623			
	3.0319	0.3165	0.0470	2.7153	0.3635	260.7392	27.2209	4.0415	233.5164	31.2623			
11	3.9527	1.2374	0.2167	2.7153	1.4541	339.9341	106.4158	18.6335	233.5184	125.0492	1.4462	0.2532	1.6994
	2.7153	0.3214	0.0421	2.3939	0.3635	233.5184	27.6428	3.6195	205.8756	31.2623			
	2.3939	0.3264	0.0371	2.0675	0.3635	205.8756	28.0712	3.1911	177.8043	31.2623			
	2.0675	0.3315	0.0320	1.7360	0.3635	177.8043	28.5063	2.7560	149.2980	31.2623			
	1.7360	0.3366	0.0269	1.3994	0.3635	149.2980	28.9482	2.3141	120.3498	31.2623			
12	2.7153	1.3159	0.1361	1.3994	1.4541	233.5184	113.1685	11.8807	120.3498	125.0492	1.5380	0.1615	1.6994
	1.3994	0.3418	0.0217	1.0576	0.3635	120.3498	29.3969	1.8654	90.9529	31.2623			
	1.0576	0.3471	0.0164	0.7105	0.3635	90.9529	29.8525	1.4098	61.1004	31.2623			
	0.7105	0.3525	0.0110	0.3580	0.3635	61.1004	30.3153	0.9471	30.7851	31.2623			
	0.3580	0.3580	0.0055	0.0000	0.3635	30.7851	30.7851	0.4772	0.0000	31.2623			
13	1.3994	1.3994	0.0546	0.0000	1.4541	120.3498	120.3498	4.6994	0.0000	125.0492	1.6355	0.0639	1.6994