CJ Hydro (Pvt) Limited
15 Peshawar Block, Fortress
Stadium,Lahore (Cant.),
Tel: 92 (42) 6675595, 6660085
Fax: 92 (42) 6673960, 6664349

TRF-137.

June 5, 2009
Ref. No.: CJHPL-NEPRA-VI09-01

The Registrar,
National Electric Power Regulatory Authority,
OPF Building,
Shahra-e-Jamhuriyat,
G-F/2, Islamabad.

Subject: **Petition for Determination of Tariff for 44 MW Hydropower Project at C-J Link (Tail)**

Dear Sir,

I, Danish Haseeb Khan, Chief Executive-cum-Director of C J Hydro (Private) Limited ("CJHPL"), duly authorized representative of CJHPL having its registered office at 15 Peshawar Block, Fortress Stadium, Lahore, by virtue of the Letter of Authorization/Company resolution dated 15th May, 2009 (attached for reference), hereby apply to the National Electric Power Regulatory Authority ("NEPRA") for determination of Feasibility Stage Reference Tariff, adjustment/indexation provisions and other terms and conditions for supply of electric power services from 44 MW Hydropower Project at C-J Link (Tail) by CJHPL to the CPPA/NTDC.

I certify that the documents-in-support, attached with this Petition, are prepared and submitted in conformity with the provisions of the NEPRA (Tariff Standards & Procedure) Rules, 1998 and undertake and confirm that the information provided in the attached documents is true and correct to the best of my knowledge and belief.

Attached is a Demand Draft No: DDFTS 0000023/3 dated 4th June, 2009 drawn on Bank Alfalah Limited, Islamabad Br, 1-B, Awan Arcade, Jinnah Avenue, Blue Area, Islamabad in the sum of Rs.839,040 (Pak. Rupees eight hundred thirty nine thousand and forty only) being the non-refundable Tariff Petition fee calculated in accordance with the NEPRA (Tariff Standards & Procedure) Rules, 1998 and the Schedule to NEPRA (Fees Pertaining to Tariff Standards & Procedure) Regulations, 2002 as amended.

Simultaneously, we are also applying for the grant of Generation Licence. We request that both of these applications may be read and processed simultaneously.

Yours Sincerely,
For C J Hydro (Private) Limited

Danish Haseeb Khan
Chief Executive/Director

CJ HYDRO (PVT) LIMITED

Encl: One original and two copies of Tariff Petition

Forwarded Demand Draft No. DDFTS 0000023/3 dt. 4-6-09 for Rs. 839,040 for n.a. pl.

Dir. (A) 9/6/09

A.D.(MR)/PA. to process the case.

cc.
1. Chairman
2. M(T)

BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

TARIFF PETITION

ON BEHALF OF

C J HYDRO (PVT) LIMITED

FOR

DETERMINATION OF FEASIBILITY STAGE REFERENCE TARIFF FOR SUPPLY OF ELECTRIC POWER SERVICES FROM 44 MW HYDRO POWER POJECT AT C-J LINK (TAIL), DISTT. KHUSHAB, PUNJAB

BANK ALFALAH LIMITED بنك الفلاح المحدود

DDFTS 0000023 / 3

04/06 / 09

20

(0228) FORTRESS STADIUM BRANCH LAHORE

NOT OVER PKR .839,040.

Pay on demand
to the order of NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA) A/C CJ HYDRO (PVT) LTD

the sum of Rupees EIGHT HUNDRED THIRTY-NINE THOUSAND FORTY AND XX / 100 Rs. ***839,040.00***

For **BANK ALFALAH LIMITED**

BANK ALFALAH LTD.
ISLAMABAD BR.
1-B,AWAN ARCADE,JINNAH AVENUE,BLUE AREA
ISLAMABAD

Authorised Signature
P.A. No.

Authorised Signature
P.A. No. 1256

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C J HYDRO (PVT) LIMITED.

CJ Hydro (Pvt) Limited
15 Peshawar Block, Fortress
Stadium,Lahore (Cant.),
Tel: 92 (42) 6675595, 6660085
Fax: 92 (42) 6673960, 6664349

CJ

15th May, 2009

BOARD RESOLUTION BY CIRCULATION

RESOLUTION PASSED BY THE DIRECTORS OF C J HYDRO (PVT.) LTD

We, the undersigned, being the Directors of the Company, HEREBY PASS the following Resolutions and agree that the said Resolutions shall for all purposes be as valid and effective as if the same had been passed by Board Meeting of the Company duly convened and held:

1. RESOLVED that the draft Tariff Petition and its calculations prepared by the Management for 44 MW Hydropower Project at C-J Link (Tail) are hereby approved for submission to the National Electric Power Regulatory Authority (NEPRA);

2. RESOLVED that Mr. Danish Haseeb Khan, Chief Executive Officer, are hereby given the mandate to proceed with any correction and amendment, if required, in finalizing the Tariff Petition, as per draft attached with the request for approval paper, prior to its submission to NEPRA;

3. RESOLVED that Mr. Danish Haseeb Khan is hereby also given the mandate to proceed with the submission of the Application for Grant of Generation Licence for 44 MW Hydropower Project at C-J Link (Tail) to NEPRA, as per draft attached with the request for approval paper, and to do any correction and amendment, if required, in finalizing the Application for Grant of Generation Licence to NEPRA prior to its submission to NEPRA; and

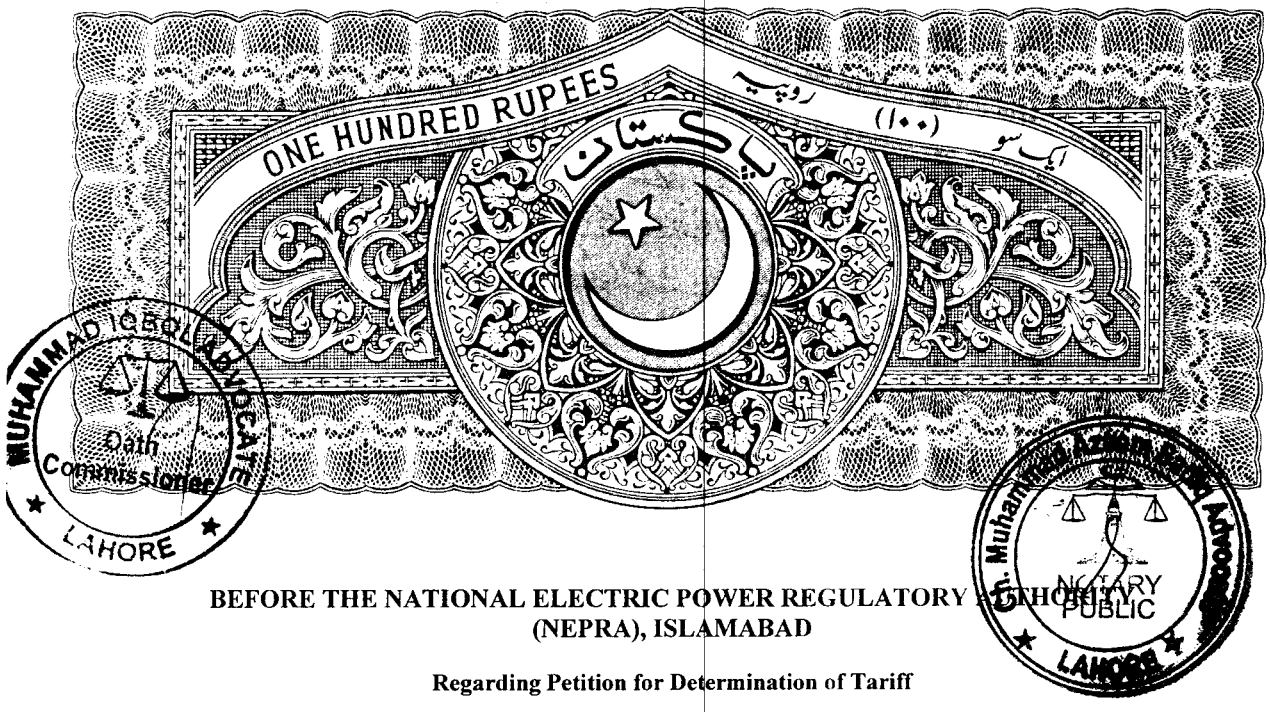
4. RESOLVED that Mr. Danish Haseeb Khan is hereby authorized to sign the Tariff Petition and the application for Grant of Generation License for 44 MW Hydropower Project at C-J Link (Tail) for and on behalf of the Company.

This Board Resolution shall remain in full force and effect until an amending resolution shall be passed by the Board

Name of the Directors	**Signatures**
1. Haseeb Khan	
2. Shan-E-Abbas Ashary	
3. Liaqat Ali	
4. Danish Haseeb Khan	

C.J. HYDRO (PVT) LIMITED.

PAKISTAN 100 RS.



BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA), ISLAMABAD

Regarding Petition for Determination of Tariff

AFFIDAVIT of Danish Haseeb Khan s/o Haseeb Khan, Chief Executive Officer of C J Hydro (Pvt.) Ltd., 15-Peshawar Block, Fortress Stadium, Lahore Cantt.

I, Danish Haseeb Khan s/o Haseeb Khan, Deponent, do hereby solemnly affirm and declare that:

1. I am the Chief Executive Officer, the principal and the authorized representative/attorney of C J Hydro (Pvt) Ltd.;

2. the contents of the accompanying Petition dated 4th June 2009 for Determination of Tariff for 44 MW Hydropower Project at C-J Link (Tail) by NEPRA including all documents-in-support are true and correct to the best of my knowledge and belief, and that nothing material or relevant thereto has been concealed or withheld therefrom;

3. I also affirm that all further documentation and information to be provided by me in connection with the aforesaid Petition shall be true and correct to the best of my knowledge and belief.

DEPONENT

C J HYDRO (PVT) LIMITED.

VERIFICATION

It is hereby verified on solemn affirmation at Lahore on this day of 4th June 2009 that the contents of the above Affidavit are true and correct to the best of my knowledge and belief, and that nothing material or relevant thereto has been concealed or withheld.

DEPONENT

C J HYDRO (PVT) LIMITED

ATTESTED
Muhammad Iqbal Advocate
Oath Commissioner Lahore

Attested
Muhammad Saleem Sadiq Advocate
NOTARY PUBLIC LAHORE

PAKISTAN 500 RS.

FIVE HUNDRED RUPEES

پانچ سو (۵۰۰) روپیہ

پاکستان

Ch. Muhammad Azam Sadiq Advocate
NOTARY PUBLIC
LAHORE

POWER OF ATTORNEY

In the matter of 44 MW Hydropower Project at C-J Link (Tail), Khushab, Punjab, Pakistan

KNOWN BY ALL MEN THAT by this Power of Attorney **Elba International** having its head office situated at suite#17, 2nd floor, Abuzar Tower, Main PECO Road, Model Town, Lahore does hereby nominate, appoint and authorize Mr. Danish Haseeb Khan S/o Haseeb Khan R/o House No. 254, Street No. 9, Cavalry Ground Extension, Lahore, Pakistan (whose specimen signature is appended below) on behalf of Elba International, hereinafter referred to as the Attorney, to:

1. sign and submit to National Electric Power Regulatory Authority, Islamabad, Pakistan (NEPRA) or to its authorized nominee the Application for Grant of Generation License and Petition for Determination of Tariff for 44 MW Hydropower Project at C-J Link (Tail); and

2. execute all such deeds, documents and instruments as may be considered necessary.

Elba International does hereby ratify and confirm whatever the Attorney shall do by virtue of these presents.

Witness: **For Elba International**

1. (Muhammad Bakar) 35202-5289743-3

2. Mohammad Sohail 35202-5221051-7

Specimen Signature of Mr. Danish Haseeb Khan

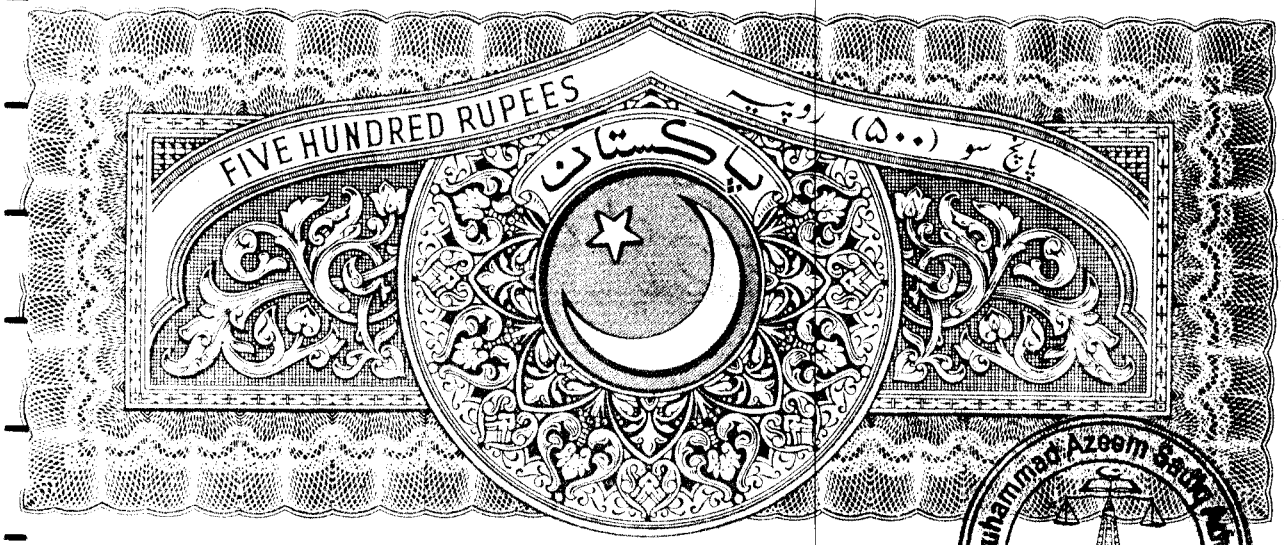
Danish Haseeb Khan
Chief Executive Officer
C J Hydro (Pvt.) Ltd.

C J HYDRO (PVT) LIMITED

Attested
Muhammad Azam Sadiq Advocate
NOTARY PUBLIC LAHORE

PAKISTAN

500 RS.



POWER OF ATTORNEY

In the matter of 44 MW Hydropower Project at C-J Link (Tail), Khushab, Punjab, Pakistan

KNOWN BY ALL MEN THAT by this Power of Attorney **Central China Power Group International Economic & Trade CO. Ltd.** (**"CCPG Int'l"**) having its registered office in China does hereby nominate, appoint and authorize Mr. Danish Haseeb Khan S/o Haseeb Khan R/o House No. 254, Street No. 9, Cavalry Ground Extension, Lahore, Pakistan (whose specimen signature is appended below) on behalf of CCPG Int'l, hereinafter referred to as the Attorney, to:

1. sign and submit to National Electric Power Regulatory Authority, Islamabad, Pakistan (NEPRA) or to its authorized nominee the Application for Grant of Generation Licence and Petition for Determination of Tariff for 44 MW Hydropower Project at C-J Link (Tail); and

2. execute all such deeds, documents and instruments as may be considered necessary.

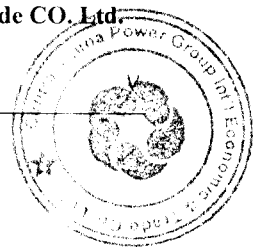
CCPG Int'l does hereby ratify and confirm whatever the Attorney shall do by virtue of these presents.

Witness:

1. _____

2. _____
Mohammad Sabir (35202-5221051-7)

For Central China Power Group International Economic & Trade CO. Ltd.



Specimen Signature of Mr. Danish Haseeb Khan

_____
Danish Haseeb Khan
Chief Executive Officer
C J Hydro (Pvt.) Ltd.

Attested

Muhammad Azeem Sadiq Advocate
NOTARY PUBLIC LAHORE

BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

TARIFF PETITION

ON BEHALF OF

C J Hydro (Private) Limited

FOR

DETERMINATION OF FEASIBILITY STAGE REFERENCE TARIFF FOR SUPPLY OF ELECTRIC POWER SERVICES FROM 44 MW HYDROPOWER PROJECT AT C-J LINK (TAIL), DISTT. KHUSHAB, PUNJAB.

June 4, 2009

C J Hydro (Private) Limited,
15-Peshawar Block, Fortress Stadium,
Lahore 54810.
Telephone: (042) 6675595 and 6660085
Facsimile: (042) 6664349 and 6673960

TARIFF PETITION
BY
C J Hydro (Private) Limited
15, PESHAWAR BLOCK, FORTRESS STADIUM, LAHORE

Compliance with NEPRA (Tariff Standards & Procedure) Rules 1998

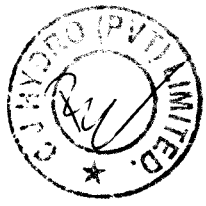
NEPRA (Tariff Standards and Procedure) Rules 1998	Description
Rule 3 (1)	Tariff Petition Fee of Rs.839,040 (covering the CPI indexation) is attached.
Rule 3(2) (a)	**Name of Petitioner:** **Danish Haseeb Khan** Chief Executive & Director, C J Hydro (Private) Limited, 15, Peshawar Block, Fortress Stadium, Lahore.
Rule 3(2) (b)	**Grounds and Facts:** Provided in detail in this Tariff Petition
Rule 3(2) (c)	**Determination Sought** Petitioner seeks determination of NEPRA on the following: a. Feasibility Stage Reference Tariff for the 44 MW Hydropower Project at C-J Link (Tail), which the Petitioner proposes to set up, for a period of thirty (30) Agreement Years from the Commercial Operations Date; b. Adjustment of Reference Tariff for EPC Cost as contracted and for the Cost Reopeners specific to hydropower projects; and c. Adjustment/indexation of the Reference Tariff components over the period of thirty (30) Agreement Years and other salient terms and conditions of the Power Purchase Agreement.
Rule 3(2) (d)	Not applicable
Rule 3(2) (e)	Not applicable
Rule 3(2) (f)	Provided in detail in the attachments to Tariff Petition
Rule 3(8)	Affidavit is attached

C J HYDRO (PVT) LIMITED

GLOSSARY

ANSI	American National Standards Institute
ASTM	American Society of Testing Materials
BOO	Build, Own, and Operate
BOOT	Build, Own, Operate and Transfer
CCPG	Central China Power Group
CCPG Int'l	Central China Power Group International Economic & Trade CO. Ltd.
CCPP	Combined Cycle Power Plant
C-J	Chashma Jhelum
CJHPL	C J Hydro (Private) Limited
COD	Commercial Operations Date
CPP	Capacity Purchase Price
CPPA	Central Power Purchasing Agency of NTDC
CPI	Consumer Price Index
cusec	Cubic Foot per second
D/C	Double Circuit
DSRA	Debt Services Reserve Account
ELBA	ELBA International
EPA	Environmental Protection Agency of Pakistan
EPP	Energy Purchase Price
EPC	Engineering, Procurement and Construction
ESIA	Environmental and Social Impact Assessment
€	Euro
FESCO	Faisalabad Electric Supply Company
GIS	Gas Insulated Switchgear
GIL	Gas Insulated Lines
GOP	Government of Pakistan
GOPb	Government of Punjab
GST	General Sales Tax
GWh	Giga watt hours = 1000,000 kWh
HV	High Voltage
Hz	Hertz (Frequency)
IA	Implementation Agreement
ICS	Integrated Consulting Services
IDC	Interest During Construction
IEC	International Electro-technical Commission
IPP	Independent Power Producer
IRR	Internal Rate of Return
ISO	International Organization for Standardization
kg	Kilogram
KIBOR	Karachi Interbank Offered Rate
km	Kilometer = 1000 meters
kV	Kilovolt = 1000 volts
kVA	Kilovolt Ampere
kW	Kilowatt = 1000 watts
kWh	Kilowatt hours
LIBOR	London Interbank Offered Rate

LOI	Letter of Interest
LOS	Letter of Support
LV	Low Voltage
m	Meter
m^2	Square meters
m^3	Cubic meters
m^3/s or cumecs	Cubic meters per second
MAF	Million Acre Feet
Masl	Meters above sea level
MVA	Megavolt Ampere = 1000 kVA
MW	Megawatt = 1000 kW
MWh	Megawatt hours = 1000 kWh
NEPRA	National Electric Power Regulatory Authority
NEQ	National Environmental Quality Standards
NESPAK	National Engineering Services Pakistan (Pvt.) Limited
NOC	No Objection Certificate
NPCC	National Power Control Centre
NPV	Net Present Value
NTDC	National Transmission and Despatch Company
O & M	Operation and Maintenance
PID	Punjab Irrigation Department
POE	Panel of Experts
PKR or Rs.	Pakistani Rupees
PPA	Power Purchase Agreement
PPDB	Punjab Power Development Board
PPIB	Private Power and Infrastructure Board
RAP	Resettlement Action Plan
ROE	Return on Equity
RQD	Rock Quality Designation
USD or US$	United States Dollar
US¢ or ¢	United States Cent
WAPDA	Water and Power Development Authority
WB	World Bank
WUA	Water Use Agreement



PETITION

Details of the Petitioner

1. **Name and Address:**

   C J Hydro (Private) Limited,
   15, Peshawar Block, Fortress Stadium,
   Lahore 54810, Pakistan.

   Company Registration No: 0069345

   Phone: +92-42-6675595, +92-42-6660085
   Fax: +92-42-6664349
   Email: danish@khan.net

2. **Project Sponsors**

   (i) Mr. Haseeb Khan, Proprietor
   Haseeb Khan & Company (HK) ..... Main Sponsor
   (ii) Mr. Irfan Ali, Proprietor
   ELBA International (ELBA)
   (iii) Central China Power Group International Economic & Trade CO. Ltd. (CCPG Int'l)

3. **Representatives of the Petitioner**

Mr. Danish Haseeb Khan	Chief Executive & Director
Mr. Haseeb Khan	Director
Mr. Muhammad Jamil Dogar	Project Director
Mr. Muhammad Akbar	Project Advisor
Mr. Ali Akbar Javed	Senior Manager (Technical)
Mr. Abdul Rashid	Executive Director
Mr. Abdur Rehman Babar	Company Secretary
NESPAK/ICS	Consultants

Ground for Petition

4. Under the "Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997), hereinafter referred to as the NEPRA Act, NEPRA (the National Electric Power Regulatory Authority) is responsible, inter-alia, to determine tariffs, rates and other terms and conditions for the supply of electric power services by the generation, transmission and distribution companies and to recommend them to the Federal Government for notification. NEPRA is also responsible for determining the process and procedures for reviewing and approving tariffs and tariff adjustments, etc.

C J HYDRO (PVT) LIMITED

5. C J Hydro (Private) Limited ("CJHPL") has recently been established as a private limited company and registered under the Companies Ordinance, 1984. It intends to set up, on BOOT basis, a 44 MW Hydropower Project at C-J Link (Tail) in District Khushab in the Punjab Province of Pakistan. Feasibility report for the project has been approved by the PPDB's Panel of Experts as conveyed by PPDB vide letter dated March 30, 2009. In accordance with the policy of the GOPb and GOP, CJHPL is submitting this petition for determination of Feasibility Stage Reference Tariff for the Project based on the technical data and cost estimates given in the feasibility report in order to facilitate its financing and implementation. CJHPL has also submitted an application separately for grant of Generation Licence for the Project.

6. In accordance with the requirements of the NEPRA Act and Rules and Regulations made thereunder, CJHPL hereby submits this Petition, in accordance with the NEPRA (Tariff Standards and Procedure) Rules 1998, for determination/approval of the Feasibility Stage Reference Tariff and its Adjustment/Indexation provisions and other terms and conditions for the Project.

Introduction

7. The project sponsors as listed above having the requisite technical and financial strength constituted a consortium named "HK Consortium" to undertake the feasibility study of 44 MW Hydropower Project at C-J Link (Tail) offered by the PPDB for implementation in the private sector pursuant to the Punjab Power Generation Policy 2006 and GOP's Policy for Power Generation Projects 2002 ("Policy"). The Consortium submitted its bid for the project to PPDB. The consortium members were prequalified and a Letter of Interest (LOI) for conducting feasibility study of the said project was issued by PPDB to the Consortium on 8th November, 2007 (Attachment I). The Consortium engaged National Engineering Services Pakistan Limited (NESPAK) and Integrated Consulting Services (ICS) ("Consultants"), for conducting the feasibility study for the development of 44 MW Hydropower Project at C-J Link (Tail). The work on feasibility study was commenced in March 2008. The assignment included site investigations, environmental study, the collection and review of the previous studies and existing data, optimization of project parameters, cost estimates and economic and financial analysis. The Consultants submitted reports on core activities of the study and gave presentations to the PPDB's Panel of Experts (POE) from time to time. POE's valuable observations and comments were duly acknowledged, evaluated and suitably incorporated in the feasibility report. By the grace of Almighty Allah, the feasibility study of the project was completed within the stipulated period and the draft Feasibility report was submitted to PPDB in October, 2008 and presentation thereon was given to POE on 25th October. 2008. Comments of PPIB, WAPDA and IPD on the draft Feasibility report were received between November 2008 and January 2009. After attending the comments of the POEs and incorporating their compliance, the final draft of the Feasibility report was submitted to PPDB on 10th February, 2009 and presentation thereon was given to the POEs in the meeting convened by PPDB on 5th March, 2009. The POEs was pleased to approve the final Feasibility report as also conveyed in writing vide PPDB letter No. PPDB/328/2009 dated 30th March, 2009 (Attachment II) and advised the Consortium to approach Power Purchaser/NEPRA for approval of the tariff proposed in the final Feasibility report.

8. Pursuant to the directions of the PPDB, this Tariff Petition has been prepared and filed by CJHPL in accordance with the requirements of the NEPRA Act and the rules framed thereunder. CJHPL is a new prospective Independent Power Producer (IPP), and is currently not a licencee under the NEPRA Act. CJHPL has, therefore, simultaneously filed a separate application with NEPRA for the grant of Generation Licence.

9. The Reference Tariff as determined by NEPRA pursuant to this Petition would become a part of the Power Purchase Agreement (PPA) to be executed between CJHPL and the Power Purchaser i.e. CPPA/NTDC, based on the PPIB's standardized PPA format and as mutually agreed to by the parties to cover the project specific requirements.

10. All the pertinent information about the project i.e. sponsors information, technical description, the Environmental and Social Impact Assessment (ESIA) Report; tentative Interconnection arrangements with NTDC's Grid System, financial data, etc. are either explained within or attached with this Petition.

11. CJHPL will be pleased to submit any additional information as and when required by NEPRA.

Project Description

12. The project envisages development, design, engineering, financing, construction, testing & commissioning, owning, operation, maintenance and transfer of 44 MW Canal Fall/Run-of-the-River Hydropower Plant at C-J Link (Tail) in the Punjab Province of Pakistan on Build, Own, Operate and Transfer (BOOT) basis in accordance with Punjab Power Generation Policy 2006, as revised in 2008 and GOP's Policy for Power Generation Projects 2002, as amended from time to time. The Site is located at the tail Regulator of C-J Link Canal in District Khushab of Punjab province. It is located in the upper part of Indus basin in Thal Doab at an elevation of 188.0 masl between $31^0.0$" latitude and 32.20^0 North and longitudes 72^0 and 72.2^0 East about 40 km (25 miles) from Khushab and about 30 km (18.6 miles) south-east of Jauhrabad. Location plan of the project is placed at Attachment III.

13. The project area is accessible from Karachi Port through a good road network of National Highway and Indus Highway. Road distance from Karachi to project site is approximately 1164 km (723 miles). Two metalled roads lead to the site from Muzaffargarh; one via Ahmadpur Said, Athara Hazari to Khushab and the other via Chowk Azam, Bhakkar – Jhang to Khushab. The project area is accessible from Lahore through a good metalled road via District headquarters Khushab or Jauhrabad. The distance between Project Site and Lahore by road is about 312 km (194 miles). The site is also approachable from Islamabad through Khushab. The nearest railway station from the project site is Khushab, which is about 40 km (25 miles) from the site. Khushab is connected with Karachi-Peshawar main Railway line through Kundian Junction. By rail the distance of Khushab from Karachi via Kundian is 1310 km (814 miles).

14. Pakistan has a total hydropower potential of about 42,000 MW. The present installed capacity of hydropower plants in Pakistan is about 6600 MW. The utilization of the

available hydropower resources has thus remained too low in the past for various reasons. The Government is now encouraging development of hydropower plants on priority basis not only to meet power needs but also to support irrigation system. In Punjab, the Punjab Power Development Board, responsible for promotion of hydropower projects, has identified more than 300 potential sites having a total capacity of about 6000 MW at different canals and barrages with medium and small head for implementation.

15. Pakistan has been facing acute power shortage since 2006. The gap between demand and supply is rapidly increasing and the short-fall has at present mounted to about 4000 MW during peak power demand periods. NTDC has to resort to load-shedding. This is not only causing discomfort to various segments of the society, but also adversely affecting the national economy. The Government intends to make up the shortfall as soon as possible by expediting construction of new power generation plants of various technologies and fuel mix. Hydropower plants are being given due attention as they are economical and reliable on long term basis.

Project Location

16. As indicated in the feasibility report, various sites for the proposed project were evaluated using a combination of visual assessment, surface geological and topographical mapping, geomorphologic and geophysical analysis, sub-surface site investigations and cost-benefits based on estimated energy generation. Seismicity of the project area was also studied and taken into account for design of various structures.

17. C-J Link Canal has a cascaded fall structure at the tail of C-J Link to deliver the canal flows to Jhelum River. The cascaded structure houses an arterial road bridge and a gated regulator structure having twelve manually operated, fixed wheel, vertical lift gates and three un-gated weirs, located immediately downstream to drop the link water surface from its full supply level by a total of 18.0 m drop to the low water level of the Jhelum River.

18. Construction of power house at following three locations at the tail of C-J Link was considered:

- Within the existing fall structure;
- On left side of the fall structure; and
- On right side of the fall structure

Construction of power house within the existing fall structure does not allow exploitation of full power potential. It could also endanger the safety of the existing fall structure during construction and differential settlement may occur during operation. As such this alternative was not pursued. On the left side, there is a WAPDA rest house and Shergarh village located along the alignment of the possible power channel. This involves relocation of WAPDA rest house and resettlement of inhabitants of the village. So the construction of power house on the left of the existing fall structure was not considered suitable. No major settlements exist on the right side of the C-J Link outfall structure. Therefore, keeping in view the site conditions with lower social implications, the location of the Project on right side of the fall structure was studied further. Following three

layout alternatives were compared for construction of the power house on the right side of the fall structure:

Layout Alternative 1: Power house is proposed to be located 200 m clear of the right bank of the fall structure situated at a place downstream of fall No. 3 and upstream of fall No. 4 on the right side of the canal fall structure. The tailrace channel falls into the C-J Link tail channel downstream of fall No. 4

Layout Alternative 2: The power house is proposed to be located downstream of fall No. 4 and the tailrace channel falls into the Jhelum River about 250 m downstream of the centerline of the C-J Link confluence point with Jhelum river.

Layout Alternative 3: The power house is proposed to be located further downstream of fall No. 4 and the tailrace channel falls into the Jhelum river about 750 m downstream of the centerline of the C-J Link confluence point with Jhelum river.

In Layout Alternative-1, the head across the power house will be less than that in Layout Alternatives 2 & 3.

Layout Alternative-3 provides the maximum head for power generation and has been recommended to be finally adopted as it gives maximum desired benefits at low incremental cost compared to Layout Alternative -2.

Optimization of Installed Capacity

19. Project sizing and power potential have been computed on the basis of 10 daily mean flow data. A wide range of design discharges starting from 120 m^3/s to 360 m^3/s with an interval of 40 m^3/s have been considered to optimize the power and energy potential of the project. Studies were made with two, three and four number of units. The option of two turbine units was ruled out for technical reasons. The main reason being the non-availability of half of the installed capacity of the powerhouse in the event of shut down of one unit. Another reason is that in case of two units one unit will be operating at 50% of its rated capacity for most of the time of the year. Therefore, two options of three and four horizontal shaft double regulated bulb turbines with rated turbine discharge of 106.7 m^3/s and 80 m^3/s respectively have been considered for detailed studies. The incremental energy decreases substantially at a plant discharge higher than 320 m^3/s. Therefore the upper limit of plant discharge has been fixed at 320 m^3/s. The optimization studies identified that a three unit arrangement would be most suitable for this scheme for the following reasons:

- Three machines give adequate operational flexibility. They can be operated between 25% and 100% of total flow capacity to provide adequate flexibility in the low-water months/dry season;
- Unit redundancy during the low flow season allows essential maintenance to be carried out without affecting energy generation;
- A three turbine arrangement gives reasonable powerhouse dimensions for construction and operation;
- The unit size is within the experience range of major turbine manufacturers.

20. The annual energy generation for the proposed project on the basis of 10-daily discharge data is given in the table at Attachment IV. Based on optimized discharge of 320 m^3/s, three turbines with a total plant capacity of 44.33 MW are recommended. The proposed plant configuration gives maximum annual energy production of 214.393 GWh (Gross) and an average annual plant factor of 55.21%. This is an acceptable level of optimization.

Hydrological Studies

21. C-J Link canal came into operation after construction of Chashma barrage in 1971. Its operational data is maintained by WAPDA. Since operation of Tarbela dam in 1976, the pattern of C-J link operation has changed. C-J Link flow data for the period 1971-1975 is categorized as Pre-Tarbela and for the period 1976-onward as Post-Tarbela. After signing of the Water Accord between the provinces in 1991, its operation is regulated under Water Accord ("Accord") by the Indus River System Authority (IRSA). The Post-Tarbela flow data of C-J Link is further categorized as Pre-Accord (1976-90) and Post-Accord (1991-onward). Daily records of gauge and flow data are converted to 10-daily, monthly and annual flow values and published in the yearly books along with all the flow data at canal heads and canals of the Indus river system. For the present studies, the historic flow data for the post-Accord period (1991-2007) reported both at the C-J Link head regulator and tail have been analyzed and flow duration curves developed from the daily flow records at C-J Link tail for the post-Accord period (1991-2007) to determine the flow durations corresponding to different probabilities. After the implementation of Water Accord in 1991, the probability of occurrence of flow magnitude in C-J Link tail has increased. In the Water Accord 1991, 2.31 BCM (1.87 MAF) of water has been allocated for the Greater Thal Canal (GTC) Project for the Kharif season only. Based on availability of water in the Indus river system, the allocated flows have been adjusted equitably for the whole Indus river canal system along with GTC for the period 1991-2000 in the 'Water Availability Studies' carried out by NESPAK for the GTC project. Power generation capacity of the proposed project has been determined on the basis of flow duration curve for operation of C-J Link with adjustments for GTC as per Accord allocations. Details are discussed in the Feasibility report.

Sedimentation Study

22. One dimensional (1-D) computer programme, HEC6, developed by the US Army Corps of Engineers and later modified by Kalabagh Consultants (KC), eventually known as HEC6-KC has been used to simulate sediment distribution and predictions of bed levels after 10, 25 and 50 years of operation. According to the study, shoal formation is seen in a short reach starting from just downstream of the power channel up to the Tail Regulator of C-J Link Canal. Sand concentration up to 365 cms is less than 100 ppm. Sand concentration on higher discharges may exceed 200 ppm for about 3-5 weeks. De-sanding facility is provided. Flushing during closures and high water flows is proposed. Details are provided in the Feasibility report.

Seismic Hazard Evaluation

23. According to Building Code-2007, the project area lies in Seismic Zone 2B where the peak ground acceleration (PGA) generated by earthquakes can be of the order of 0.16 to 0.24g. Seismic hazard has been evaluated through study of regional geological and tectonic information and collections of historical and instrumental earthquake records. Details are provided in the Feasibility report. It has been envisaged that important components of the project would be designed for PGA of 0.20g (1000 year return period) and less important structures will be designed to withstand PGA of 0.17g (500 year return period).

Environmental and Social Impact Assessment

24. As indicated in the feasibility report, the environmental and social impact Assessment (ESIA) study has been undertaken in accordance with Pakistan legislative standards. It focuses on the impacts resulting from the construction of the power channel, powerhouse and associated works. Both environmental and social impacts of the proposed scheme have been examined and discussed in the technical and economic feasibility study for the project.

25. The biological environment of the site is typical Thal environment. Part of the site falls within the wildlife game reserve area which can be classified as environmentally sensitive area, under Section 12 of Pakistan Environmental Protection Act 1997. As per Guidelines for Preparation of IEE/EIA 1997, the Initial Environmental Examination (IEE) Report has been prepared and filed with the Punjab EPA for obtaining NOC.

26. There is sufficient WAPDA land available at the site for setting up labour camp and batching plant and no private land is required for these activities. However part of the proposed power channel and relocated Khushab-Muzaffargarh road fall within private land. About 9000 ^{m2} of cultivated WAPDA's land is identified within the power channel.

27. The potential environmental impacts of the Project have been analyzed and the mitigation measures and residual impacts are discussed in the EIA Report. The nature and scope of the construction works and the environmental setting of the Project are such that there is no significant adverse environmental impact. No permanent adverse impact is anticipated in respect of sensitive habitat, wild life or cultural heritage.

28. The project will bring about significant positive social impacts in the area. Employment opportunity and training will be provided to a large number of unemployed youth. They will receive life-time benefit through skill training, capacity building and poverty alleviation. A large number of semi-skilled and unskilled workers in the Project area will be hired during construction. Greater awareness about healthcare amongst the labour folk and the local community shall be created. At micro level, economic activities may reduce the cost of living down by making essential commodities available in greater bulks and at cheaper rates.

29. A public park will be developed on the right side of the canal under this Project. This park will provide a picnic spot to the local community and improve the aesthetic level of the area. It is envisaged that about 59 trees will be required to be cut for the construction of power channel. It is proposed to grow at least two plants at site for every one tree cut by the contractor and protect these plants until they are matured.

30. In conclusion, many positive economic and social impacts will appear in the quality of the lives of the people of the area due to implementation of the CJ Link Hydropower project. These include generation of direct and indirect employment, business opportunities, infrastructure development, and improvement of living standards. Through adequate environmental management and mitigation measures, the project will have least adverse impact on the environment and the surrounding community. The implementation of the project will not thus result in any unacceptable impact on the environment either during construction or during subsequent operation of the project.

Scope of Work

31. The scope of work of the selected project encompasses the following:

- Power intake and sediment flushing facilities.
- A power station situated upstream from the village of Tatli.
- Tailrace channel discharging the water into the Jhelum River.
- Road and bridge works for temporary access during construction.
- Permanent diversion of the National Highway along the bank of the river near the existing fall structure.
- 132kV Substation for dispersal of generated power.
- Workshops and maintenance facilities.
- Staff Colony.

32. The proposed headrace and tailrace channel alignments of the CJ-Link hydropower scheme extend for approximately 1.7 km. The headrace channel has a length of 1.35 km and a cross-sectional area of 262.13 m^2 while the tailrace channel has a length of 0.37 km and a cross-sectional area of 264 m^2. Details are discussed in Chapter 5 of the Feasibility report.

Interconnection with National Grid

33. The plant area is sandy and windy. Keeping this aspect in view, Gas Insulated High Voltage (132 kV) Switchgear with one-and-half breaker arrangement has been proposed for the plant switchyard to ensure availability of the plant to the standards specified in the PPA. Two circuits are required to connect a power plant with the network to satisfy the N-1 criteria of the Grid Code approved by NEPRA. The C-J Link (Tail) Canal Hydropower Plant is proposed to be interconnected to the nearest NTDC Grid Station at Jauhrabad at 132 kV Voltage level. The following two alternatives of interconnection of

C-J Link (Tail) HPP to evacuate its maximum power of 44 MW are envisaged as per detailed load flow studies carried out for the peak load conditions of high water season for the year 2012 for both the alternatives under normal and N-1 contingency conditions to meet the Grid Code criteria.

I. Loop one circuit of Jauhrabad – Army Base Camp (ABC) Girot 132 kV D/C OHL at C-J Link (Tail) HPP substation. It involves construction of a double-circuit transmission line of about 8 km length.

II. Install a direct double-circuit transmission line of 132 kV from C-J Link (Tail) HPP to existing Jauhrabad 132 kV substation. It involves construction of about 36 km long double circuit transmission line plus addition of two line bays of 132 kV in the existing Jauhrabad substation.

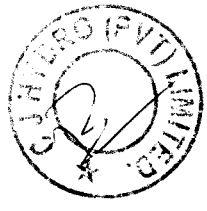
34. Both the Alternatives I and II have been proved technically feasible through the load flow, short circuit and dynamic stability analyses. However the bill of quantities in Alternative–I is less than that in the Alternative-II. Therefore, Alternative–I is economical and has been recommended for interconnection provided there is no other concern or problem in looping in-and-out of one circuit from the existing double circuit line from Jauhrabad for dedicated supply to ABC Girot. Proposal has been submitted to FESCO and NTDC for an appropriate decision.

35. As stated above, the proposed transmission line will be a double circuit 132 kV overhead line. Aluminium Conductor Steel Reinforced (ACSR) "Panther" on steel lattice towers is foreseen. This is according to the national standards. Synchronizing with NTDC Grid system will be done in the powerhouse control room. The powerhouse switchyard will be the point of energy delivery to the NTDC. Revenue meters will be located at the switchyard for measurement of energy delivered to NTDC. The proposed 132 kV transmission line will be equipped with directional distance protection system with relays in the 132 kV Jauhrabad grid station and in the powerhouse. A back-up protection at both stations with directional over current relays will be included.

36. FESCO/NTDC will finalize/develop the plan for interconnection of the proposed plant with its transmission system. For the purpose of designing and cost estimation of the Plant Switchyard for the project, interconnection with 132 kV double circuit line has been considered in the Feasibility Study. No allowance for transmission line has been made in the project's cost estimates as its construction is the responsibility of the Power Purchaser/NTDC under the GOP's November 2005 Guidelines for Determination of Tariff for IPPs. The scope of work of the project and the estimated project cost may vary due to any change in the interconnection arrangement. In such an event, the project cost and the Reference Tariff shall have to be adjusted to cater for any variation in the cost necessitated due to change in the interconnection arrangement as finally determined by FESCO/NTDC.

Salient Features of the Project

37. The salient features of the proposed project are as under:



Hydrology and Sediments

Water Source	C-J Link Canal
C-J Link Maximum flow	615 m^3/s
Diversion during construction	Not required
Estimated total load per year including bed load	Not significant

Design Discharge and Water Levels

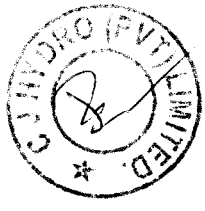
Gross head	13.861 m
Design discharge	320 m^3/s
Headrace Water Level	El. 182.961 m
Tailrace Water Level	El. 169.100 m

Channels

Headrace channel length	1350 m
Headrace channel cross section area	262.13 m^2
Tailrace channel length	370 m
Tailrace channel cross section area	264 m^2

Powerhouse & Electrical/Mechanical Equipment

Outside width	26.5 m
Outside length	97 m
Maximum height	27 m
Number of units	3
Type of Turbines	Horizontal Bulb
Turbine maximum power, each Unit	14.777 MW
Max. Turbine Efficiency	94.8%
Generators rated capacity, each Unit	14.777 MW
Generator Efficiency	96%
Total Plant Capacity	44.33 MW
Auxiliary Consumption @ 1%	0.443 MW
Net Plant Capacity	43.887 MW
Power factor	0.8 Lagging
	0.9 Leading
Generation Voltage	11 kV
Average Annual Gross Energy Generation	214.393 GWh
Average Annual Net Energy Generation	212.249 GWh
Average Annual Plant Factor	55.21%
Transformers type	Three phase
Transformer primary voltage	11 kV
Transformer secondary voltage	132 kV
Switchgear Type	GIS–Breaker and half
Connection to outgoing transmission lines	132 kV GIL
Switchgear rating	132 kV



Implementation Methodology

38. The project will be implemented preferably through an Engineering, Procurement and Construction (EPC) Turnkey contractual arrangement. Feasibility study envisages construction through an EPC contract, involving a consortium of a main contractor, a consulting firm for detailed design and a supplier of hydropower related E&M equipment and requires that the contractors be prequalified as a part of the international competitive bidding process. Alternatively, the project can be built by engaging two EPC contractors i.e. an Engineering and Procurement (E&P) Contractor and a Construction Contractor. The E&P Contractor will be responsible for the engineering, procurement of E&M plant and equipment, supply, supervision of erection, testing, commissioning and guaranteeing Plant performance and the Construction Contractor will be responsible for civil works, local transportation of imported plant and equipment, supply of local equipment and materials, erection, testing, commissioning of Plant under the supervision of the E&P Contractor; the combined performance under the two contracts will result in a standard and fully functional Plant meeting required performance levels and all PPA requirements. In the latter case, a coordination agreement will also be signed by the three parties i.e. Owner, E&P Contractor and Construction Contractor to delineate responsibilities of each party and thus satisfy the requirement of the project lenders and other stake holders. Final decision in this regard will be taken at the time of finalization of bidding documents by the Consultants to be engaged for the purpose.

39. Keeping in view the scarcity of time available for EPC contractor(s) to carry out the additional investigations and develop the design of the project, it is envisaged that additional geotechnical investigations and hydraulic model studies for the confluence of the tail race channel and Jhelum River will be carried out to firm up the feasibility level design for inviting the EPC tenders.

Construction Period/Implementation Schedule

40. According to Section 13.7.1 (Overall Implementation Schedule) of the feasibility report, the completion of construction of the Project and commencement of the commercial operation is envisaged in 48 months from the start of the detailed design which follows Financial Closing. Contrary to this, the tariff computations in the feasibility report are based on a construction period of 36 months. The assumed construction period of 36 months for the project is too ambitious. This seems to be an inadvertent error. Given the conditions in Pakistan including lack of experience of execution of such projects in Pakistan in the recent past, it will take between 42 to 48 months to complete this project successfully. The Sponsors have extensively deliberated this issue with experts within and outside the company and have come to the conclusion that a period of at least 42 months is essentially required for successful completion of the project even on fast-track basis. Accordingly, for the purpose of Reference Tariff calculations for this petition, the construction period of 42 months commencing from the 'Financial Closing/Notice to Proceed' has been assumed and Tariff calculations have been made accordingly. Tentative Implementation Schedule for the project has also been prepared accordingly and is placed at Attachment V.

Cost Estimates

41. The estimate of the capital cost of the Project for the selected Site prepared to cover the civil works, electrical and mechanical works, temporary works, and engineering and development costs is described in detail in Sections 12 through 14 of the feasibility report. The estimated cost of the civil works is based on the preliminary planning and design of the different components of the works. The quantities have been derived from the general arrangement and layout drawings of the structures developed as a part of the feasibility study. Project cost as estimated in the Feasibility report is given in Attachment VI.

42. A provision of Rs.17.400 million has been made for payment of compensation for acquisition of land for the project both from the Govt. of Punjab and the private land owners. The land from the Govt. of Punjab will be acquired on lease for an initial period equivalent to the term of the PPA.

43. An allowance of USD 0.129 million for Environment and Ecology is included in the cost estimates. It caters for Environment Monitoring Cost, Social Impact Cost, Environmental Audit Cost, Plantation Cost, etc. It also covers the cost for water supply, waste water treatment and sewerage, traffic management, extended canal closure cost, public park/recreational facilities etc. It includes the cost for maintaining and improving th e environmental status of the project area during and after construction.

44. Custom duties equivalent to US $1.083 million @ 5% of the cost of plant and equipment to be imported for the project are included in the project cost estimates in accordance with Punjab Power Generation Policy 2006 as amended and GOP's Policy for Power Generation Projects 2002 as amended from time to time.

45. Withholding tax on local supplies and local services for the project presently leviable @ 6% of such costs is included as a separate item in the cost estimates. No other tax is assumed leviable on the EPC/Turnkey/Construction Contractor(s).

Interest Rates & Interest During Construction (IDC)

46. The Consultants have taken LIBOR and KIBOR rates as of 30th September 2008 in the tariff calculations. These rates have declined over time and as such LIBOR (@1.01625/annum) and KIBOR (@13.24/annum) rates as of 30th April 2009 have been used. Further, the Consultants have assumed premium of 350 and 300 basis points for foreign and local debts respectively which is low as currently the loans are not available at these premiums. Premium on LIBOR and KIBOR-based loans has been assumed as 400 and 350 basis points being the current rates at which loans are available. These will be adjustable on actual basis on COD. Based on the rates as of 30th April, 2009, interest has been calculated @ 5.01625/a on LIBOR-based loans and @ 16.74/a on KIBOR-based loans for the Reference Tariff for this Petition. IDC and debt servicing have been computed at the said rates based on a construction period of 42 months.

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Expenditure in Foreign Currencies Other than US Dollars

47. The Consultants have indicated the project costs in US Dollars only while the actual payments are likely to be made in other currencies as well. In this connection GOP has already decided that the IPPs would not be exposed to impact of exchange rate variation between US Dollars, Euros, Pound Sterling and Japanese Yen up to the Commercial Operations Date. Pursuant to this decision, the EPC price and other costs will be expressed in other currencies as applicable and NEPRA will be requested to allow indexation/adjustment at the EPC or COD stage.

Total Project Cost

48. EPC cost and Capital cost are estimated at USD 59.150 million and USD 67.788 million respectively both in the Feasibility report as well as in the cost estimates for this petition. Total project cost as per Feasibility report is USD 85.127 million while it is estimated at USD 87.279 million in the cost estimates for this petition as per comparison given below:

Item	Cost as per Feasibility Report (US million $)	Cost as per Company Estimate (US million $)
EPC Cost	59.150	59.150
Capital Cost	67.788	67.788
Financing Cost	2.944	3.122
Interest during Construction	14.396	16.370
Total Project Cost	**85.127**	**87.279**

The variation is in the financing cost and the IDC only which is mainly due to taking construction period as 42 months instead of 36 months and variation in interest rates as explained above.

SUMMARY OF PROJECT COST

49. The summary of the project cost based on the information and data available at the feasibility stage and used for computation of the Feasibility Stage Reference Tariff for the project is given below:

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Sr No.	Item Description	Estimated Cost (Million US $)
1.	**Preliminary Costs**	
	➢ Feasibility study, Services for EPC bidding documents, model studies, acquisition of land & land development	1.431
2.	**EPC Cost**	
	➢ General Items	3.718
	➢ Civil Works	19.693
	➢ E&M Equipment excluding Custom Duties	31.672
	➢ Design & Engineering	4.067
	Total Base EPC Cost: **Base EPC Cost/MW Installed:**	**59.150** **1.334**
3.	**Other Costs**	
	➢ Custom Duties @ 5%	1.083
	➢ Environmental & Ecology	0.129
	Sub-Total:	**1.212**
4.	**General/Project Company's Costs**	
	➢ Construction Management	1.500
	➢ Insurance During Construction	0.591
	➢ Fee, Permits, Legal Expenses, etc.	0.750
	➢ Withholding Tax on Local Supplies/Services	1.953
	➢ Utilities during Construction	0.200
	➢ Owner's Engineer	0.600
	➢ Independent Engineer	0.200
	➢ Pre-COD Costs including First Fill of Lubes & Chemicals	0.200
	Sub-Total:	**5. 994**
	Total Base Capital Cost:	**67. 787**
5.	**Financing Cost**	
	➢ Debt Arrangement Fee, Financing Fee, etc.	2.292
	➢ Commitment Fee @ 0.1%/a on the outstanding loan amount	0.070
	➢ L/C Charges	0.503
	➢ Equity (49%; Institutions & Public) Placement Fee	0.257
	➢ Interest During Construction	16.370
6.	**Total Base Project Cost:** **Specific Base Project Cost per MW Installed:**	**87.279** **1. 969**

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Reference Tariff

50. The proposed Reference Tariff is a typical two-part tariff comprising an Energy Purchase Price (EPP) for the energy generated and delivered to the Power Purchaser and a Capacity Purchase Price (CPP) based on the historical hydrological data of Chashma-Jhelum Link Canal. Details of tariff components are as under:

a. Energy Purchase Price

The Energy Purchase Price indicates the price of a unit of electrical energy i.e. kWh and consists of a Variable O&M component and Water Use Charge as explained below:

i. Variable O&M Component

Variable O & M cost has been calculated based on the average annual net energy generation of 212.249 GWh worked out from the historical hydrological data of Chashma-Jhelum Link Canal. This component caters for the cost of the services of the O&M operator on a kWh basis for the day to day management of the hydropower plant. In addition, it covers contractor's mobilization and includes replacement of spare parts on completion of their service life as well as replacement on account of premature failure of the parts. It also includes cost of maintenance for unforeseen/unscheduled outages. Consumption of lubricants, chemicals, etc. is also included in this component. 80% of this component is in US Dollar to cater for the procurement of the spare parts as well as technical services from abroad.

ii. Water Use Charge

This component represents the Water Use Charge per unit of energy in kWh generated by the Plant and delivered to the Power Purchaser by using the water of the C-J Link canal. This component will be subject to adjustment for Pak WPI for 'manufacturing' in accordance with Punjab Power Generation Policy 2006 and as revised in 2008. This charge is payable to the Govt. of Punjab under the Water Use Agreement to be executed between CJHPL and the Government of Punjab. The Water Use Charge and its indexation shall, therefore, be subject to approval/acceptance by the Government of Punjab.

b. Capacity Purchase Price

The Capacity Payment is based on the optimal plant capacity determined in the feasibility report on the basis of the historical hydrology of Chashma-Jhelum Link Canal. The Capacity Purchase Price has been computed on the basis of the plant capacity net of auxiliary consumption and is expressed in Rs./kW per Month based on 100% plant factor and is payable on the basis of (i) Available Capacity as declared by CJHPL or established through Despatch by the NPCC, on hourly basis and adjusted for the Mean Site Hydrological Conditions (ii) last tested capacity during the period of Scheduled Outage and allowable Forced Outage hours. This is a fixed monthly payment payable to CJHPL irrespective of the actual hydrology i.e. hydrological risk shall be borne by the Power Purchaser as per Punjab Power Generation Policy 2006 and GOP's Power Policy 2002.

The Capacity Purchase Price is further divided into the following components:

i. **Fixed O&M Costs (Foreign) - 20% of the Total**

This component mainly includes the management fee and cost of expatriate services for operation and maintenance of the plant. It would be subject to indexation/adjustment both for US CPI inflation as well as to Rs./USD exchange rate variation over time.

ii. **Fixed O&M Costs (Local) - 80% of the Total**

This fixed O&M component represents the fixed costs of all the O&M staff including the remuneration to the staff and other administration costs including rents, utilities, and fee for maintaining consents. It also includes costs such as NEPRA fees, audit fees, legal retainer-ship and consultancy fees, environmental monitoring and reporting fees, etc. This component is subject to local WPI indexation.

iii. **Insurance Cost**

The insurance component consists of all risk insurance/reinsurance for the project, as well as business-interruption insurance, which are lenders' and PPA's stipulated requirements. Insurance policies are required to be maintained for the plant life as specified in the standardized PPA. Since the Pakistan Insurance/Reinsurance industry do not have sufficient capacity and expertise to manage such risks entirely on their own, the local industry normally retains only about 5% of the risk while 95% is insured/reinsured internationally. The risks to be covered through insurance shall include machinery breakdown, natural calamities (like earthquake), sabotage and consequential business interruption, etc. This component would also be subject to indexation both for US CPI inflation as well as Rs./USD exchange rate variations.

iv. **Return on Equity**

The ROE component includes 20% return (IRR based) on the invested equity, net of withholding tax as explained above. Under the Punjab Power Generation Policy 2006, as amended, the hydropower project is to be constructed on Build, Own, Operate and Transfer (BOOT) basis. Pursuant to GOP's November 2005 Guidelines for Determination of Tariff for IPPs, equity has been redeemed after completion of the debt servicing. The project on expiry of the concession period would be transferred to the government against notional cost as stipulated in the Punjab Power Generation Policy 2006, as amended.

The equity investment is expected to be a mix of local and foreign currencies. All the invested equity (both foreign and local) will be converted into equivalent US dollars at the reference exchange rate. This component would be subject to indexation both for Rs./USD exchange rate variations as well as US CPI inflation.

v. **Debt Servicing Component**

The debt servicing (repayment of principal and interest charges) would be on quarterly basis for a 10-year period after the grace period. There would no charge

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under this category for the next 20 years of plant operation. The debt portion is presently estimated as 80% of the project cost. The proposed financing structure is as under:

Base Project cost	USD 87.279 million
Debt, 80% (Foreign & Local)	USD 69.823 million
Equity, 20% (Foreign & Local)	USD 17.456 million

Foreign and local debts are assumed as 40% and 60% respectively of the capital cost. The interest rates used in the tariff calculations are 3 months LIBOR @ 1.0625% plus 400 basis points per annum and 3 months KIBOR @ 13.24% plus 350 basis points per annum for computing interest on the foreign currency and the local currency loans respectively. The repayment terms and interest rate benchmarks and the debt service component of the Reference Tariff shall be adjusted on actual basis at COD. It is added that the lenders may require an equity contribution higher than 20%. If the lenders insisted on this, the financing structure shall be adjusted to meet the lenders' requirement. In such an event, the Reference Tariff shall be adjusted at EPC stage accordingly. If the actual debt procurement composition is different, repayment terms and interest rate shall be affected and adjustments/indexations shall be allowed accordingly.

Return on Equity

51. As discussed in the feasibility report, the return on investment should be commensurate with the risk undertaken by the Sponsors. Compared to fossil-fuel thermal power plants, the hydropower plants carry higher risks for the sponsors mainly because of the following:

- More capital intensive
- Longer gestation period
- Problems associated with the project being in the remote areas
- Lack of appropriate infrastructure
- Little experience world-wide regarding implementation of IPP hydropower projects
- Higher risks during project construction and completion
- Political and security problems
- Terrorism
- Environmental & resettlement issues; people indulge in litigation resulting in prolonging the implementation period.
- Cost over-runs for various reasons including unforeseen delays which cannot be quantified upfront.

52. The hydropower projects, therefore, merit higher returns. NEPRA has allowed a return of 15% on IRR basis for thermal power plants, while 17% return has been allowed for Malakand–III Hydropower project and other hydropower Projects. The risk profile of the projects has changed significantly over the period. Weakening economic fundamentals, increased political and economic uncertainty as well as increased security and terrorism

risks have all led to deteriorating risk profile of the country and consequently of the projects. This increased risk is reflected in the sovereign rating of Pakistan by the international rating agencies, the yield on the Pakistan Sovereign Eurobond which is now trading at a considerable discount. If premium is added for the change in Pakistan's risk free rate, to an already determined 17% IRR-based return for the other hydropower projects; a 20% Return on Equity (IRR based) is considered hardly sufficient. Encouraging investors to participate in such a project at a rate less than 20% will be impossible. Keeping these aspects in view, the Reference Tariff proposed for the project has been calculated based on a 20% return on equity (IRR based) both during construction and operation periods. As per decision of the GOP all the invested equity (both foreign and local) will be converted to equivalent US dollars at the reference exchange rate and deemed invested in US dollars for the purpose of tariff payments.

Tariff Calculation Assumptions

53. The Feasibility Study Stage Reference Tariff for 44 MW Hydropower project at C-J Link (Tail) has been worked out based on the following assumptions:

Sr. No	Description	Assumptions
	MAIN ASSUMPTIONS	
1	Plant Size	➢ 44.331 MW (Gross) ➢ 43.887 MW (Net)
3	➢ Debt : Equity Ratio ➢ Equity Portion ➢ Equity Funding ➢ Loan Currency	➢ 80 : 20 ➢ USD 17.456 million ➢ USD and/or Euro ➢ USD or Euro and Pakistan Rupees depending on availability
4	Interest Rate	LIBOR at 1.0625% per annum + 400 basis points KIBOR at 13.24% per annum + 350 basis points
5	Payment Schedule	Quarterly payment inclusive of Principal and Interest shall be finalized at Financial Closing
6	Loan Tenure	10-year plus 42 months' Grace Period
7	Construction Period	42 months after Financial Closing. ROEDC on the equity injected prior to Financial Closing will be adjusted on actual basis at COD.
8	Semi-Annual Phasing of Expenditure	Equity: 20%, 10%, 20%, 20%, 15%, 10%, 5%. Loan: 15%, 10%, 20%, 20%, 15%, 10%, 10%.
9	Reference Exchange Rate as of	USD 1.00 = Rs.78.20

	30 September, 2008	
10	NPV Discount Rate (For computing Levelized Tariff)	10%
11	Fixed O&M Costs	USD 1.0 million (20% Foreign Component and 80% Local Component.)
12	Variable O&M Costs	USD 0.3 million (80% Foreign Component and 20% Local Component)
13	Insurance	1% of EPC cost
14	Water Use Charge	Rs.0.15/kWh as payable to Punjab Govt.
15	PPA Term	30 years
16	Return on Equity (IRR based)	20% (net)
17	Return on Equity during Construction Period	20%
18	Withholding Tax on Dividend	7.5%
	OPERATIONAL ASSUMPTIONS	
19	Estimated Annual Net Energy Sale to CPPA/NTDC	212.249 GWh
20	Average Annual Plant Capacity Factor	55.21%
21	Average Annual Plant Availability	Will be mutually agreed with the Power Purchaser during PPA negotiations.
22	Annual Scheduled Outages	Will be mutually agreed with the Power Purchaser during PPA negotiations.
23	Annual Forced Outage allowance	Will be mutually agreed with the Power Purchaser during PPA negotiations.
	COST ADJUSTMENT, INDEXATION, AND ESCALATION ASSUMPTIONS	
24	**Cost Adjustments**	
	➢ Cost variation in Civil Works, Hydraulic Steel Structure and M&E Works	➢ Based on EPC Contract(s) Price
	➢ Cost Variations of Civil Works due to Detailed Design	➢ Item-wise variations in BOQs based on detailed design after EPC Contract(s)
	➢ Civil Works' Cost Escalation	➢ As per variation in escalable input cost items
	➢ Variation in Settlement Costs	➢ On actual basis supported by documents
	➢ Variation in Interconnection Voltage Level	➢ On actual basis supported by documents
25	**Currency Indexation Factor**	
	➢ Variable O&M, Foreign	➢ Rs./USD Variation
	➢ Fixed O&M, Foreign	➢ Rs./USD Variation
	➢ Insurance	➢ Rs./USD Variation
	➢ ROE, ROE(DC) & W. Tax	➢ Rs./USD Variation

CJ HYDRO (PVT) LIMITED

	➢ Foreign Debt Servicing	➢ Rs./USD Variation
26	**Inflation Factor** ➢ Variable O&M, Foreign ➢ Variable O&M, Local ➢ Water Use Charge ➢ Fixed O&M, Foreign ➢ Fixed O&M, Local ➢ Insurance ➢ ROE, ROE(DC), W. Tax	 ➢ United States CPI ➢ Pakistan WPI ➢ Pakistan WPI ➢ United States CPI ➢ Pakistan WPI ➢ United States CPI ➢ United States CPI
27	**Interest Rate Adjustment/ Indexation** ➢ IDC at COD & Debt Servicing after COD	➢ Variation in LIBOR & KIBOR as applicable
28	Reference Indexation Date for US CPI & Pakistan WPI	30th September 2008

Other General Assumptions

54. The proposed Reference Tariff is based on the following assumptions. Any change in any of these assumptions will necessitate a corresponding adjustment in the Reference Tariff:

a) Project financing structure is based on 80:20 debt-equity ratio. If the lenders required an equity contribution higher than 20%, the financing structure shall be adjusted to meet the lenders' requirement. In such an event, the Reference Tariff shall be adjusted at financial closing accordingly.

b) Capacity Payment is calculated based on the net plant capacity determined in the feasibility report of the project i.e. 43.887 MW based on the historical average hydrology. Detail is given above under the caption "Reference Tariff".

c) Hydrological risk shall be borne by the Power Purchaser.

d) The construction period for the purpose of Reference Tariff calculations has been assumed as 42 months from the 'Notice to Proceed' to the EPC contractor. In case the completion of the project takes more than 42 months, IDC and ROEDC shall be adjusted based on the actual time taken for the completion of the project.

e) Custom Duties amounting to USD 1.083 million on the import of plant and equipment for the project, as estimated in the Feasibility report, have been assumed. Any variation in the Custom Duties as per actual payment will be adjusted at COD.

f) No tax on any income of CJHPL including the sales proceeds from CPPA/NTDC is assumed. Corporate tax, General Sales Tax and all other taxes, excise duty, levies, fees etc. by any Govt. functionary including local bodies as and when imposed, shall be treated as a pass through item.

g) Withholding tax @ 6% on local supplies/services by the Contractors/Consultants is included in the project cost. No withholding tax in respect of EPC/Offshore contractor is foreseen. In case there is any change in taxes etc., or if additional taxes,

fees, excise duty, levies, etc. are imposed, the EPC/Project cost and the Reference Tariff will be adjusted accordingly.

h) Foreign and local debts are assumed as 40% and 60% of the capital cost respectively. If the actual debt procurement composition is different, repayment terms and interest rate benchmarks shall be affected and adjustments/indexations shall be made accordingly.

i) Power Purchaser shall make payments to CJHPL to cover all the energy delivered to the Grid during the pre-COD period on account of the trial runs and during testing/retesting, Commissioning of the Plant and during additional Commercial Operations Tests until COD is achieved. Payments will be invoiced to the Power Purchaser as per the EPP component of the Reference Tariff in accordance with the mechanism specified in the PPA. Similarly, the price of energy delivered during post-COD testing shall be paid as per the EPP component of the Reference Tariff.

j) The Power Purchaser shall be solely responsible for the financing, engineering, procurement, construction, testing and commissioning of the Interconnection and Transmission facilities. The Power Purchaser shall complete all activities and commission the Transmission facilities at least three months prior to the Scheduled commissioning of the first Unit.

k) No Debt Services Reserve Account (DSRA), Maintenance Reserve Account or Contingency Reserve Account or any other Reserve Account has been considered in the tariff model.

l) During construction period, the timing of debt drawdown may vary from that estimated now; as such, the actual 'Interest During Construction' (IDC) will be updated at COD and the Reference Tariff table will be adjusted accordingly. Similarly, the adjustments for variations in the assumed benchmark interest rates, etc. shall be applied.

m) Operation and Maintenance of the plant will be as per the OEM's recommendations in the O&M manuals.

n) All generable energy from the plant shall be fully dispatched/accepted by the Power Purchaser or payment in lieu thereof shall be made by the Power Purchaser.

o) Tolerance of +/- 3 % in Dispatch will apply.

p) Water Use Charge and its indexation shall be in accordance with Punjab Power Generation Policy, 2006 (as amended) and the Water Use Agreement signed between the Company and the provincial government.

q) Hedging cost during construction on account of foreign currency payment to EPC contractor would be made part of the Project Cost. Actual hedging cost would be used based on forward rates received from the lead bank immediately after financial closing. Final debt amount at COD would be based on actual exchange rates used by the banks to make payments to the EPC/Turnkey/Construction contractors.

r) Withholding tax on dividends @ 7.5% as required under the Income Tax Ordinance, 2001 is assumed. Any change in the rate of the withholding tax would be pass-through to the Power Purchaser.

s) Zakat deduction on dividends (currently at 2.5%) as required under Zakat Ordinance is considered as a pass through.

t) In case of any unintentional error or omissions, typographic errors, and any genuine assumption being overlooked, the same will be corrected / incorporated and advised to NEPRA as soon as CJHPL becomes aware of it.

u) Any additional indexation or concession allowed by the GOP, NEPRA or another Govt. functionary to any IPP shall be allowed to CJHPL without any discrimination.

55. In order to provide an incentive for operating the Plant effectively and efficiently, it is envisaged that in the event the annual energy production is more than the benchmark energy assumed for calculation of the Feasibility Stage Reference Tariff i.e. in excess of 212.249 GWh in any Agreement Year, besides EPP, additional Capacity Payment shall be made @ 10% of the Levelized Capacity Purchase Price per kWh for the energy delivered beyond the bench-mark energy of 212.249 GWh in any Agreement Year. This is recommended by the consultants in the feasibility report and is also in line with the incentive already allowed by NEPRA to Malakand III Hydropower project.

56. The component-wise Reference Tariff for the project, based on the costs estimated in the feasibility report and the assumptions outlined above, applicable for a period of thirty (30) Agreement Years commencing from the Commercial Operations Date is placed at Attachment IX for consideration by the Authority (NEPRA) during tariff determination. The Debt Servicing Schedule is also placed at Attachment X. A summary of Feasibility Stage Reference Tariff is given below:

Summary of Feasibility Stage Reference Tariff

Description	Reference Tariff		
	Year 1-10	Year 11-30	Levelized Year 1-30
Capacity Purchase Price (CPP)	**Rs. Per kW Per Month**	**Rs. Per kW Per Month**	**Rs. Per kW Per Month**
Fixed O&M – Foreign	29.6970	29.6970	29.6970
Fixed O&M – Local	118.7881	118.7881	118.7881
Insurance	87.8289	87.8289	87.8289
ROE & Equity redemption	520.5782	532.2689	524.6487
ROEDC	290.2075	290.2075	290.2075
Withholding Tax @ 7.5%	60.8089	61.6857	61.1142
Loan Repayment +Interest Charges	1870.5051	0.0000	1219.2159
Total	**2978. 4137**	**1120. 4761**	**2331. 5004**

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Energy Purchase Price (EPP)	Rs. Per kWh	Rs. Per kWh	Rs. Per kWh
Variable O&M - Foreign	0.0884	0.0884	0.0884
Variable O&M - Local	0.0221	0.0221	0.0221
Water Use Charge	0.1500	0.1500	0.1500
Total	**0. 2605**	**0. 2605**	**0.2605**
Total Levelized Tariff (Rs./kWh)			**6. 0457**
Total Levelized Tariff (US¢./kWh)			**7. 7310**
CPP & EPP For energy delivered beyond 212.249 GWh in any Agreement Year	**(i) CPP equal to 10% of the levelized Capacity Purchase Price per kWh i.e. Rs. 0.5785 / kWh; and** **(ii) EPP i.e. Rs.0.2605 / kWh.** **Total: Rs. 0.8390 / kWh or US¢ 1.0729 / kWh**		

57. The Levelized Reference Tariff worked out in the Feasibility report is US Cents 6.8929 / kWh. As explained above, the variation is mainly due to taking realistic construction period of 42 months, 20% IRR-based return on equity and variation in the interest rates.

NEPRA Mechanism for Determination of Tariff for Hydropower Projects

58. NEPRA's Mechanism for Determination of Tariff for Hydropower Projects dated July 18, 2008 requires determination/revision of tariff for hydropower projects at the following three stages:

    a. The first stage foreseen in the Mechanism is for a tariff based on the Feasibility Study of the Project. Feasibility Study is required to be complete, accurate and supported by relevant details including unit rates for various activities.

    b. The second stage envisaged in the Mechanism provides revision in the Feasibility Stage tariff on the basis of EPC Contract(s). Following adjustments are allowed at this stage:

        i. **Cost Variation due to Geology in Tunnels:** The cost variations are allowed either due to escalation of rates or changes due to a different classification of rocks encountered during execution.

        ii. **Civil Works Cost Escalation:** Adjustment in costs is allowed due to escalation in prices of Steel, Cement, Labour and Fuel.

        iii. **Cost Variation in Hydraulic Steel Structure and M&E Works:** The costs of Hydraulic Steel Structure and M&E Works are adjustable based on the costs in the EPC contract(s).

    c. The third stage visualized in the Mechanism is the final revision in costs (arrived at after EPC contracts) allowed at COD. The adjustments include:

CJ HYDRO (PVT) LIMITED

i. **Cost Variation due to Geology in Tunnels;**

ii. **Civil Works Cost Escalation;**

iii. **Cost Variation in Hydraulic Steel Structure and M&E Works; and**

iv. **Cost Variation due to Resettlement Cost.**

The adjustments on account of (i) and (ii) above are allowed in the same manner as at EPC stage up to the date the project is scheduled to achieve COD. The Cost Variation in Hydraulic Steel Structure and M&E Works (item (iii)) is allowed at EPC stage or alternatively at COD provided no adjustment is sought at EPC stage. As regards item (iv) above, variations in resettlement cost and land costs from those given in the Feasibility report are allowed provided the initial rates and variation in them are certified by the concerned provincial government and approved by NEPRA.

59. Feasibility Study of the project has been prepared by the renowned consultants. It is supported by the relevant details including unit rates for various activities. The Reference Tariff proposed for the project through this petition has been computed based on the cost estimates provided in the Feasibility report and the assumptions discussed in this Petition. The Feasibility Stage Reference Tariff initially determined pursuant to this Petition shall be subject to adjustment in accordance with NEPRA Mechanism for Determination of Tariff for Hydropower Projects as discussed below. Since no tunnel is involved in the proposed project, no adjustment would be required on account of '**Cost Variation due to Geology in Tunnels'.** The adjustments would, therefore, be limited to the following:

i. **Civil Works Cost Escalation;**

ii. **Cost Variation in Hydraulic Steel Structure and M&E Works; and**

iii. **Cost Variation due to Resettlement Cost.**

The adjustment would be sought at EPC and COD stage substantially in accordance with the provisions of the specified Mechanism. The methodology to be used for 'Civil Works Cost Escalation' is discussed in detail in the following paragraph.

Civil Works Cost Escalation

60. Total cost of Civil Works as estimated in the Feasibility report is US$ 23.411 million (excluding Cost of Design & Engineering). The prices of Civil Works will be revised/adjusted on the basis of the EPC Contract(s). These will then be subject to adjustment due to variation in BOQs based on detailed design and due to escalation in input costs from time to time. An item-wise summary of the BOQs for the Civil Works is given in Attachment VIII. These items include pile foundations, staff colony, architectural works, and other items for which lump sum amounts are given. Firm

quantities for such items cannot be worked out at the feasibility stage. The quantities of the Civil Works items given in the Feasibility report and summarized in Attachment VIII are, therefore, subject to variation on finalization of detailed design. The quantities of the respective item of Civil Works for the project will be determined and firmed up at the detailed design stage after the EPC contract and will then be kept constant as per NEPRA Mechanism. CJHPL will submit necessary details along with documents-in-support to NEPRA for revision of the Feasibility Stage quantities and costs and the Reference Tariff.

61. Base rates and sources of prices of the escalable input cost items of the Civil Works of the project i.e. Steel, Cement, Labour and Fuel as given in the Feasibility report are as under:

Item	Unit Rate (Rs.)	Source
Steel	55,000/Ton	Sept. 08 Market Price
Cement	355/Bag	- do -
Labour (Skilled)	500/Month (Ave.)	- do -
Labour (Un-Skilled)	250/Month (Ave.)	- do -
Fuel (Diesel)	57.14/Litre	- do -

The cost of Civil Works will be subject to adjustment from time to time during construction for any variation in the base price of the above inputs i.e. Steel, Cement, Labour (both skilled and unskilled), Fuel (HSD), etc. in accordance with NEPRA Mechanism. The revised prices of the input cost items subject to escalation shall be as notified from time to time by the widely accepted relevant agencies. The escalation shall, however, be subject to agreement with the EPC contractor.

Cost Variation in Hydraulic Steel Structure and M&E Works

62. The costs of Mechanical Works including Hydraulic Steel Structure and Electrical Works, excluding custom duties, are estimated as US$26.161 million and US$5.511 million respectively (Total: US$31.672 million) in the Feasibility report. These costs shall be subject to adjustment based on the actual prices in the EPC contract(s). CJHPL will request NEPRA for necessary adjustment at EPC stage or alternatively at COD provided no adjustment is sought at the EPC stage. CJHPL will submit necessary details along with documents-in-support to NEPRA for adjustment/enhancement of the Feasibility Stage Reference Tariff or alternatively EPC Stage Reference Tariff.

Cost Variations due to Resettlement Costs

63. An amount of US$ 0.129 million for environmental and ecology costs is included in the cost estimate. It includes the compensation costs for land, trees, houses etc. Similarly, it includes the cost for mitigating the environmental impacts from the project. It includes the cost for water supply and sewerage, income generation and community support programme, site protection and rehabilitation programme, monitoring programme, recreational facilities etc. It includes the cost for maintaining and improving the

environmental status of the project area during and after construction, additional plantation etc. Item-wise detail is given in Attachment VII. The compensation costs for land, trees, houses, resettlement, etc. shall be incurred through the provincial administration. Any additional cost incurred by CJHPL shall require proportionate enhancement of the Reference Tariff. CJHPL will submit necessary details along with documents-in-support to NEPRA for adjustment/enhancement of the Feasibility/EPC Stage Reference Tariff.

Carbon Credits

64. Hydropower is a clean form of electricity. The Project will reduce CO_2 emissions and would mitigate other pollutants, such as SO_2, NOx and particulates associated with power generation from fossil fuels. Currently, only projects due to be completed till 2012 are being registered for carbon credits. However, carbon credits will be taken into account when applicable.

SUMMARY OF PROJECT INFORMATION

65. The summary of the project information is as under:

Description	Data	
Total Base Project Cost	US$ 87.279 Million	
Specific Base Cost per kW for 44.33 MW (Gross) Capacity Plant	US$ 1,969	
Financing Structure ➢ Loan ➢ Equity	80% 20% adjustable up to 30%, if required by Lenders	
Construction Period	42 months after notice to proceed	
Project Basis	BOOT	
Type of Turbine	Horizontal Bulb	
No. of Units	3	
Generator Rated Capacity (Gross)	14.777 MW	
Estimated Gross Plant Capacity	44.331 MW	
Auxiliary Consumption @ 1.0%	0.443 MW	
Net Plant Capacity (at 132 kV busbar)	43.888 MW	
Generation Voltage	11 kV	
Annual Gross Energy Generation based on average hydrological data for years 1991–2005	214.393 GWh	
Estimated Average Annual Net Energy Sale to CPPA/NTDC	212.249 GWh	
Average Annual Plant Capacity Factor	55.21%	
Feasibility Stage Reference Tariff	**Rs./kWh**	**US Cents/kWh**
➢ Average Tariff for Years 1 to 10	7.6508	9.7837

➢ Average Tariff for Years 11 to 30	3.0408	3.8884
➢ Average Tariff for Years 1 to 30	4.5775	5.8535
➢ Levelized Tariff over PPA term (30 Years) at 10% Discount Rate	**6. 0457**	**7. 7310**
➢ Capacity Purchase Price for Energy delivered beyond 212.249 GWh in any Agreement Year	**0.5785**	**0.8390**

Viability of the Project

66. Major advantages of hydropower plants are as under:

a) Hydropower plants are economical on long-term basis. No fossil fuel is required; hence, operation cost is low. These advantages grow with the passage of time due to escalation of fuel cost and degradation of heat rate of thermal plants existing in the system. Tariff is thus sustainable on long term basis.

b) These can be quickly synchronized and brought on full load within a few minutes.

c) These are capable of responding to rapid variations in loads without loss of efficiency.

d) The plant and associated civil structures have a long life.

e) Maintenance requirements are lesser as compared to thermal and nuclear power plants.

f) Hydropower plants are economical than other types in respect of capital cost and load of plant auxiliaries.

g) Un-foreseen outages are less frequent.

h) These facilitate thermal plants to operate in the most economical way.

i) Canal Fall/Run-of-River hydropower plants are better suited for base-load duty.

j) By taking fluctuations of all kinds, the hydropower plants improve the overall operational stability and reliability of the system.

k) They reduce energy-related CO_2 and other gaseous emissions and mitigate climate change/global warming.

67. A few disadvantages of the hydro power plants include high capital cost, long gestation period, and higher risks during construction besides environmental and resettlement issues. However, this project involves exceptionally minor resettlement. The operating capacity of the hydropower plants, being dependant on available water, varies throughout the year and considerably reduces during dry years. Nevertheless, the benefits of hydropower plants outweigh their disadvantages. In fact, the hydroelectric energy is the most viable mode of renewable energy available for utilization.

68. 44 MW Hydropower Project at C-J Link (Tail) has all the advantages enumerated above. The tariff being sought by the CJHPL is much lower than the present tariffs of various

technology thermal power plants with their emissions adversely impacting the environment. The tariffs of thermal power plants are based on 60% plant capacity utilization factor and in case plant utilization is less than 60%, the actual tariff would be higher. Further, these tariffs would keep on increasing over time due to efficiency degradation and increasing price of the fuels. The proposed Levelized Reference Tariff of US Cents 7.7310/kWh for the 44 MW Hydropower Project at C-J Link (Tail) will become cheaper than those of the thermal power plants with the passage of time as it will not be affected for any increase in the fuel price. It is also environmentally friendly. The project with the proposed Reference Tariff will provide an IRR based 20% return to investors during the operating period. This is a fairly reasonable return when compared to other ventures of similar magnitude and risks available in the market. All the stakeholders including the Power Purchaser, the provincial government and the electricity consumers will indeed reap benefits on completion of this project. The 44 MW Hydropower Project at C-J Link (Tail) is, therefore, viable for implementation.

Determination Sought

69. The Petitioner requests the National Electric Power Regulatory Authority (NEPRA) to kindly approve/determine the following:

    a. Feasibility Stage Reference Tariff for the 44 MW Hydropower Project at C-J Link (Tail) for a period of thirty (30) Agreement Years from the Commercial Operations Date;

    b. Provisions for adjustment of Reference Tariff for EPC Cost as contracted and for the Cost Reopeners specific to hydropower projects; and

    c. Adjustment/indexation of the Reference Tariff components over the period of thirty (30) Agreement Years and approval of other salient terms and conditions of the Power Purchase Agreement.

C-J HYDRO (PVT) LIMITED

ATTACHMENTS

I. Letter of Interest.

II. Feasibility Study Approval Notification.

III. Location Plan

IV. Annual Energy Generation of the Project based on Historical Hydrological Data

V. Tentative Implementation Schedule

VI. Estimated Project Cost as per Feasibility report

VII. Estimated Cost of the Environmental Programme

VIII. Component-wise Bill of Quantities as per Feasibility report

IX. Proposed Feasibility Stage Reference Tariff

X. Debt Servicing Schedule

XI. Feasibility report for the Project, March 2009

Attachment I

No. MD-PPDB/H-034/ 450 /2007

OFFICE OF THE MANAGING DIRECTOR
PUNJAB POWER DEVELOPMENT BOARD
IRRIGATION & POWER DEPARTMENT

1st Floor, Central Design Building,
Irrigation Secretariat, Old Anarkali, Lahore
(Ph: 9212794 Fax: 9212796)

Date 8 - 11 - /2007

To:

M/S Haseeb Khan & Co.
(HK Consortium)
15-Peshawar Block,
Fortress Stadium, Lhr

Subject: **LETTER OF INTEREST (LOI) FOR APPROXIMATELY 40.00 MW HYDRO POWER PROJECT AT C.J.LINK TAIL CANAL FALL RD 316+622.**

Reference: Your proposal, dated 28.07.2007 in response to Expression of Interest invited by the Punjab power Development Board through advertisement in the daily "NAWA-I-WAQAT" (dated 29.03.2007), which has been duly considered by the Board in hits meeting held on 22.10.2007 whereby your firm / company has qualified the eligibility criteria as set out in the policy of the Provincial Government regarding power generation i.e. the Punjab Power Generation Policy, 2006 (hereinafter referred to as the "Policy") upon provision of performance guarantee No 59/14 dated 31-10-2007 amounting to US $ 40,000.00.

Now, this letter of interest (hereinafter referred to as "LOI") is being issued on behalf of the Government of the Punjab, in terms of the provisions of the Policy. The Government of Punjab hereby confirms its interest in your proposal for conducting a feasibility study (hereinafter referred to as the "Feasibility Study") for establishing an approximately 40.00MW private power project to be located at C.J.Link Tail Canal Fall RD 316+622 subject to the following: -

a) As per the Policy, you are required to complete your Feasibility Study for the Subject Project, at no risk and cost to, and without any obligation on the part of, the Govt. of the Punjab and its agencies, within twelve (12) months from the date of this LOI.

b) You are required o carry out the Feasibility Study; complete, at internationally acceptable standards and in accordance with the terms and conditions stipulated in the Policy. The Feasibility Study must include an Environmental Impact Assessment Study, detailed design of power house, load flow and stability studies, design of interconnection / transmission lines, details pertaining to infrastructure, project cost, financing and, financing terms, tariff calculations and assumptions of financial calculations including economic / financial analysis. You are advised to liaise with the power purchaser while determining your plant size and site, project layout, transmission line and interconnection arrangements, etc.

c) You will carryout the Feasibility Study according to the specific milestones appended herewith at Annex – A, and submit monthly progress reports showing progress against these milestones.

d) PPDB will appoint a Panel of Experts to monitor the conduct of the Feasibility Study and its progress to verify [illegible] of the aforesaid milestones and to ensure implementation of the project consistent with

e) The Main Sponsor will be liable for all obligations and liabilities of and on behalf of other Sponsors. Further processing of the Feasibility Study is subject to Govt. of the Punjab acceptance in accordance with the Policy.

f) The validity of this LOI is twelve (12) months from the date of its issuance, where after it will automatically lapse immediately. Issuance of this LOI or the lapsing of its validity, or your conducting a Feasibility Study there under, cannot form the basis of any claim for compensation or damages by the Sponsors or the project company or any party claiming through them against the Government or Punjab / PPDB or any of its agencies, employees or consultants on any grounds whatsoever, during or after the expiration of its validity.

g) You are, therefore, required to complete the Feasibility Study for the Subject Project within the validity of this LOI. In case there is delay in completion of the Feasibility Study within the validity of this LOI, a one-time extension may be granted up to a maximum period of 180 days, provided the Panel of Experts is satisfied that the Feasibility Study is being conducted in a satisfactory manner and is likely to be completed shortly. Furthermore, extension in validity of the LOI will only be provided upon submission of a bank guarantee in double the original amount and valid beyond six months of the extended LOI period.

h) **In case, if you fail to meet the relevant milestones and standards, PPDB will terminate this LOI and encash the Bank Guarantee.**

i) This LOI has been issued in duplicate on the date hereof, and it shall come into effect when one copy hereof is received by PPDB after having been duly countersigned by you. Nevertheless, this LOI shall lapse if the countersigned copy is not received at PPDB within thirty (30) days of its issuance.

(Engr: Muhammad Yaqoob)
MANAGING DIRECTOR
PUNJAB POWER DEVELOPMENT BOARD

Accepted and agreed
for & on behalf of

Date:

Encl: As stated above

CC:

1. Secretary, Ministry of Water & Power, Islamabad
2. Chairman, NEPRA, Islamabad
3. Secretary Irrigation & Power Department, Govt. of the Punjab, Lahore
4. Chairman, P & D, Govt. of the Punjab, Lahore
5. Chairman WAPDA, Lahore
6. Chief Executive Officer, DISCO

C J HYDRO (PVT) LIMITED

Attachment II

No. PPDB/ 324 /2009

OFFICE OF THE MANAGING DIRECTOR
PUNJAB POWER DEVELOPMENT BOARD
IRRIGATION & POWER DEPARTMENT
1st Floor, Central Design Building,
Irrigation Secretariat, Old Anarkali, Lahore
(Ph: 921 4794 Fax: 9212796)

Date 20-02 2009

To:

M/S Haseeb Khan & Co. (HK Consortium)
15-Peshawar Block, Fortress Stadium,
Lahore.

Subject: **APPROVAL OF FEASIBILITY STUDY FOR 40 MW HYDRO POWER PROJECT AT C.J.LINK TAIL CANAL FALL RD 316+622 CONDUCTED BY H.K. CONSORTIUM.**

Reference Letter of Interest (LOI) No. MD-PPDB / H-34 / 450-2007 dated 08.11.2007 to conduct feasibility study for the development of subject noted Hydro Power Project.

Final feasibility study completed by you after incorporating the recommendations of Panel of Experts (POE) has been reviewed by the POE and following is the decisions of Panel of Experts (POE) during meeting dated 05.03.2009.

(i) The Feasibility Study for Chasma Jehlum Hydro Power Project conducted by M/s NESPAK Lahore for HK Consortium Lahore has been approved.

(ii) POE certifies only the completion of the Feasibility Study. However, due to nature of data and resultant conclusions, POE jointly and/or individually will not be responsible for reliability of data contents and conclusions given in the feasibility study.

In accordance with the provisions of the Punjab Power Generation Policy 2006 and its subsequent amendments, upon the approval of the feasibility study by the POE, you are required to approach Power Purchaser / NEPRA for approval of the proposed tariff within stipulated period i.e. within three (3) months starting form 25th March 2009 and lapsing on 23rd June 2009.

Your effort for timely completion of the feasibility study is appreciated. You are requested to keep up same pace and spirit for negotiation of the tariff for early development of the Hydro Power Project to meet the energy needs of the country.

MANAGING DIRECTOR
PUNJAB POWER DEVELOPMENT BOARD

Endorsement No. PPDB/_____/2009 Dated _____/2009

A copy is forwarded for kind information to:-

1. The Secretary, Irrigation & Power Department, GOAT, of the Punjab, Lahore
2. The Chairman NEPRA, OPF, Building G-5/1, Islamabad.
3. The Member (Power) WAPDA, WAPDA House, Lahore
4. The General Manager (WPPO) WAPDA, WAPDA House Lahore

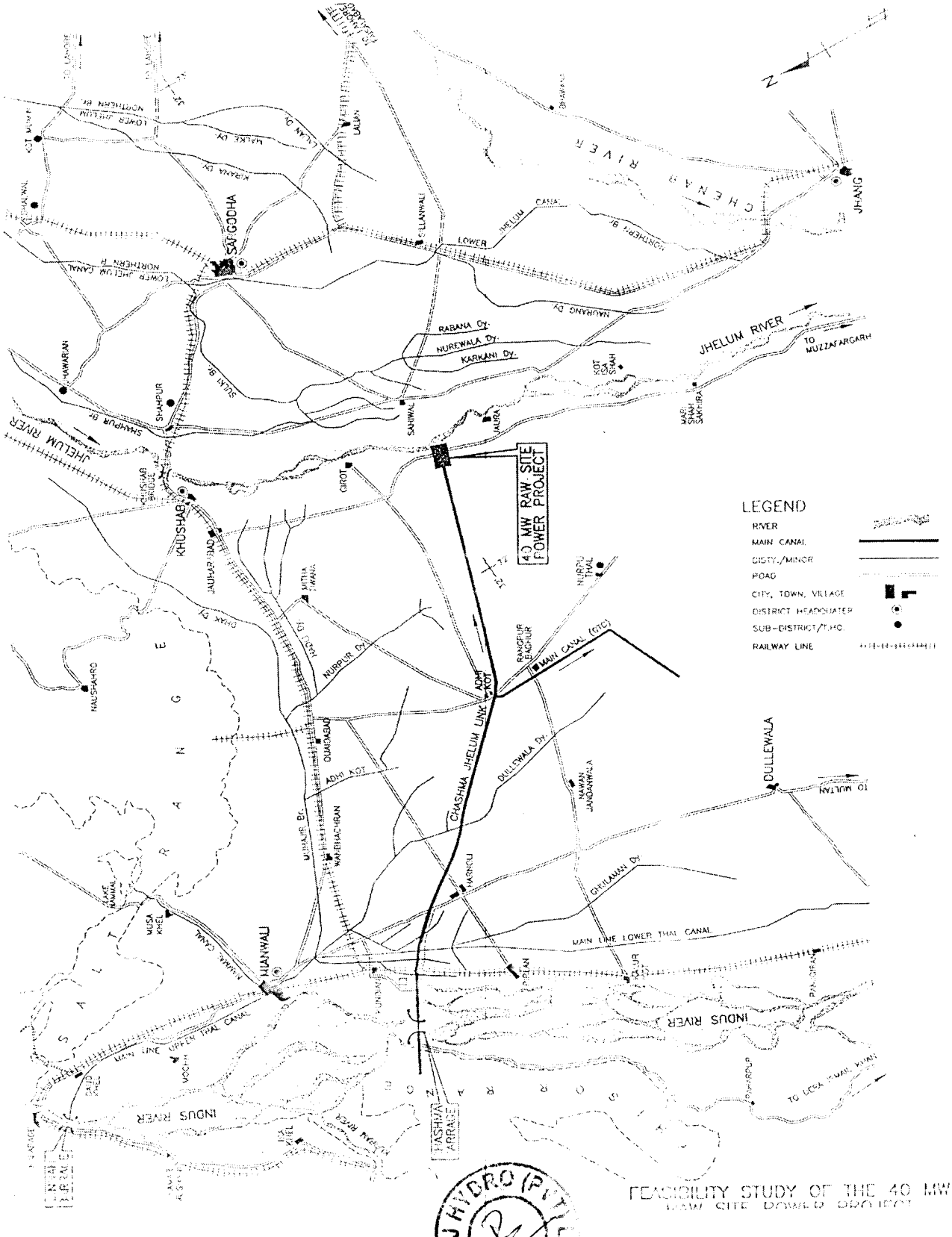
MANAGING DIRECTOR
PUNJAB POWER DEVELOPMENT BOARD

C.J HYDRO (PVT) LIMITED

Attachment III

44 MW Hydropower Project at C-J Link (Tail)

LOCATION PLAN



FEASIBILITY STUDY OF THE 40 MW RAW SITE POWER PROJECT

CJ HYDRO (PVT.) LIMITED.

Attachment IV

44 MW Hydropower Project at C–J Link (Tail)

Annual Energy Generation based on Historical Hydrological Data (1991-2005)

Month	10-Daily Period	Average 10 Daily Flow Q (m^3/sec)	Turbine Efficiency e_1 (%)	Average Available Net Head H(m)	Elect. Power P= pgQH.e_1.e_2.e_3 (MW)	Generation Period (Hrs)	Average Energy (GWh)
January	1	344	0.947	13.69	41.09	240	9.86
	2	183	0.942	12.92	20.54	240	4.93
	3	94	0.943	12.75	10.42	264	2.75
February	1	156	0.935	13.13	17.66	240	4.24
	2	202	0.945	13.03	22.94	240	5.51
	3	171	0.938	12.52	18.53	192	3.56
March	1	121	0.917	12.27	12.56	240	3.01
	2	89	0.939	11.87	9.15	240	2.20
	3	73	0.928	11.79	7.37	264	1.95
April	1	82	0.935	11.89	8.41	240	2.02
	2	91	0.939	11.61	9.15	240	2.20
	3	117	0.942	11.72	11.91	240	2.86
May	1	127	0.919	11.74	12.63	240	3.03
	2	151	0.931	1170	15.17	240	3.64
	3	232	0.933	12.23	24.41	264	6.44
June	1	271	0.941	12.55	29.53	240	7.09
	2	288	0.943	12.67	31.75	240	7.62
	3	325	0.946	12.85	36.44	240	8.75
July	1	283	0.943	12.59	30.99	240	7.44
	2	264	0.940	12.37	28.31	240	6.79
	3	236	0.933	12.04	24.47	264	6.46
August	1	183	0.940	11.77	18.68	240	4.48
	2	208	0.944	12.23	22.16	240	5.32
	3	254	0.938	12.44	27.32	264	7.21
September	1	276	0.942	12.71	30.47	240	7.31
	2	324	0.946	12.99	36.72	240	8.81
	3	340	0.947	13.71	40.73	240	9.77
October	1	325	0.948	13.73	39.00	240	9.36
	2	213	0.947	13.65	25.41	240	6.10
	3	186	0.944	13.61	22.03	264	5.81
November	1	252	0.939	13.81	30.13	240	7.23
	2	315	0.947	13.74	37.80	240	9.07
	3	336	0.947	13.72	40.27	240	9.67
December	1	261	0.941	13.77	31.19	240	7.49
	2	218	0.948	13.56	25.85	240	6.20
	3	267	0.942	13.41	31.11	264	8.21

Gross Annual Energy Generation (GWh) 214.393

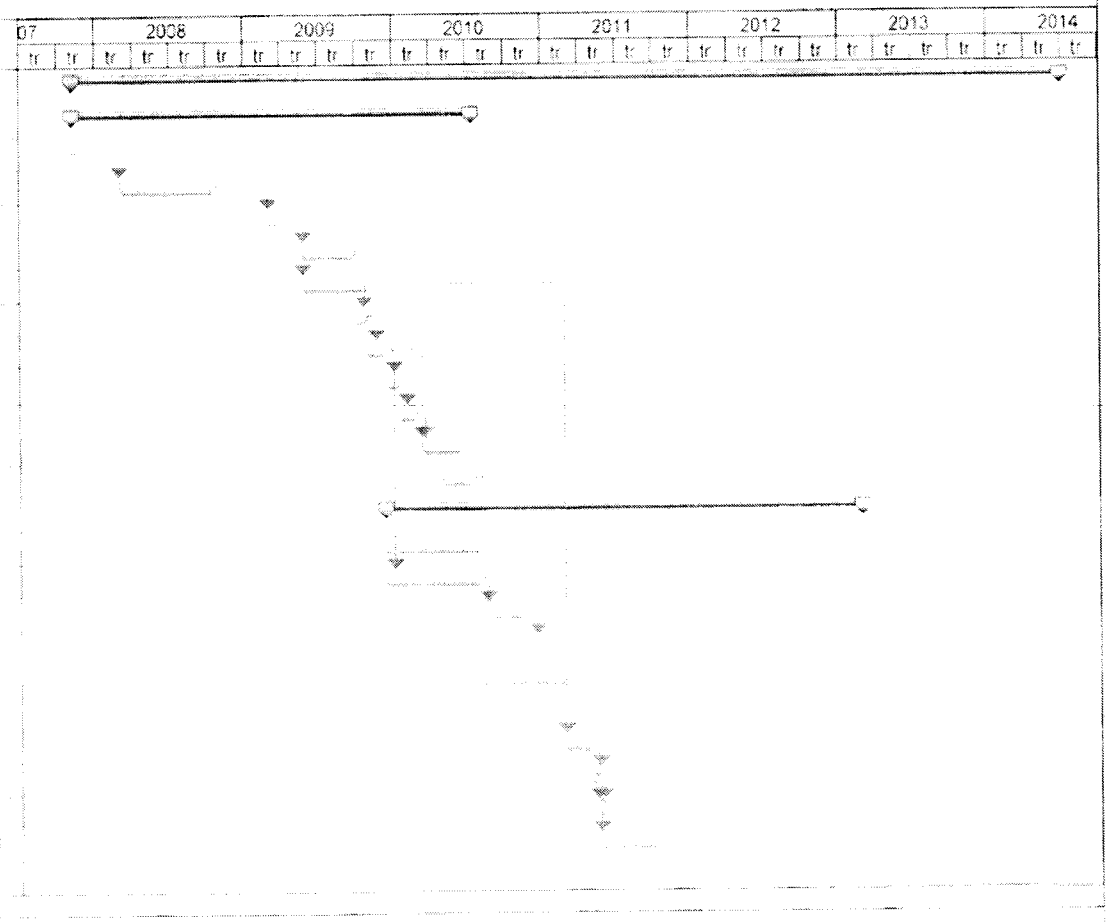
Generator Efficiency, e_2 = 96%
Transformer Efficiency, e_3 = 98%

C J HYDRO (PVT) LIMITED.

Attachment V

44 MW Chashma-Jhelum Link Canal (Tail) Hydropower Project
Tentative Implementation Schedule

ID	Task Name	Start	Finish
1	**44 MW HPP at CJ Link Tail Regulator**	**Thu 11/8/07**	**Mon 6/30/14**
2	**General**	**Thu 11/8/07**	**Wed 7/14/10**
3	Letter of Interest (LOI)	Thu 11/8/07	Thu 11/8/07
4	Feasibility Study Completion	Mon 3/3/08	Fri 10/17/08
5	Feasibility Study Approval	Thu 3/5/09	Mon 3/30/09
6	Tariff Determination	Thu 5/28/09	Wed 9/30/09
7	Generation Licence Issuance	Fri 5/29/09	Sat 10/31/09
8	Perform. Guarantee to PPDB	Mon 10/5/09	Sat 10/31/09
9	Letter of Support Issuance	Mon 11/2/09	Mon 12/14/09
10	Issuance of Security Package by PPIB	Wed 12/16/09	Thu 1/14/10
11	Black-Lined Version of Secur Package Su	Mon 1/18/10	Sat 2/27/10
12	Negotiations on Security Package	Mon 3/15/10	Mon 6/14/10
13	Project Agreements Execution	Mon 5/3/10	Wed 7/14/10
14	**Procurement of Works**	**Tue 12/15/09**	**Thu 2/28/13**
15	Additional Site Investigations	Tue 12/15/09	Sat 7/31/10
16	EPC Documents Preparation & Design	Tue 12/15/09	Sat 7/31/10
17	Invitation to Bid	Mon 8/2/10	Tue 11/30/10
18	Signing of EPC Contracts	Wed 12/1/10	Mon 1/31/11
19	Finalization of Term Sheet with Lenders	Mon 8/2/10	Mon 2/28/11
20	Ground Breaking of the Project	Mon 3/7/11	Mon 3/7/11
21	Financial Closing	Tue 3/1/11	Sat 4/30/11
22	Notice to Proceed	Mon 5/2/11	Mon 5/9/11
23	Advance Payment by the Owner/Construct	Mon 5/16/11	Mon 5/30/11
24	Engineering & Design	Tue 5/17/11	Wed 11/30/11
25	Mobilization at Site	Wed 6/1/11	Tue 6/21/11



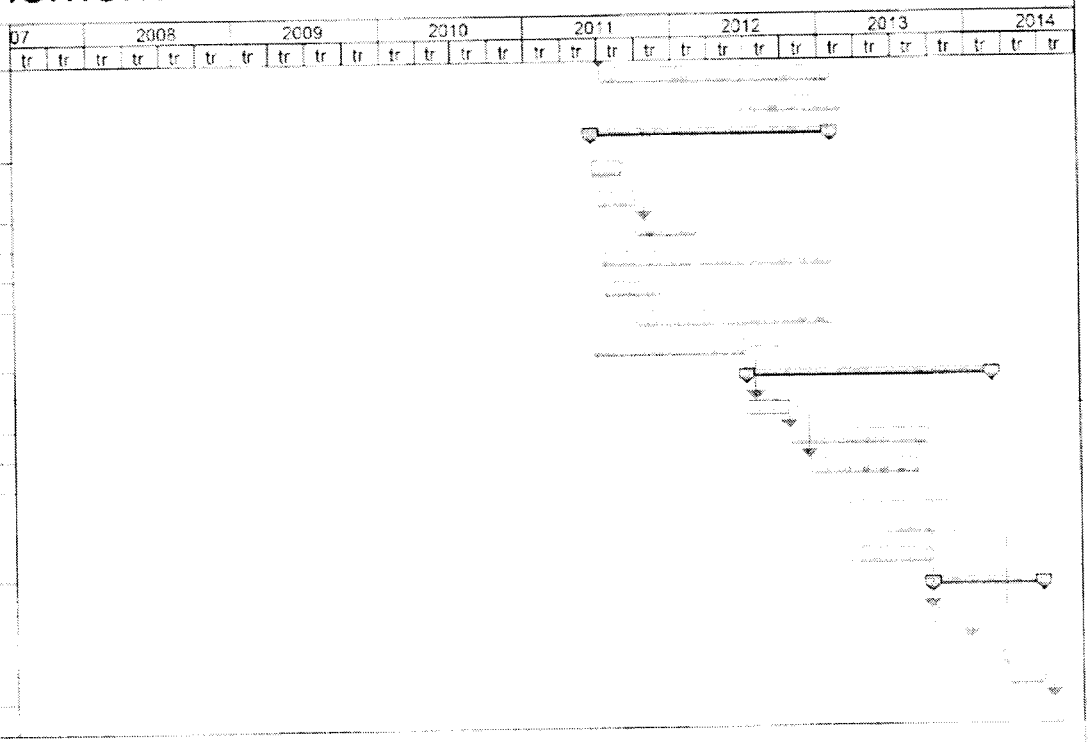
Project: Chashma Imp. Sch
Date: Tue 5/19/09

Task — Milestone — External Tasks
Split — Summary — External Milestone
Progress — Project Summary — Deadline

Attachment V

44 MW Chashma-Jhelum Link Canal (Tail) Hydropower Project
Tentative Implementation Schedule

ID	Task Name	Start	Finish
26	E&M Equipment Manufac & Shipment	Thu 7/7/11	Thu 1/31/13
27	Transport to Site including Local Materials	Tue 6/5/12	Thu 2/28/13
28	**Construction of Civil Works**	**Wed 6/15/11**	**Thu 1/31/13**
29	Prism Earth Work	Wed 6/15/11	Wed 8/31/11
30	Construction of Banks	Fri 7/1/11	Fri 9/30/11
31	Power Channel, Concrete Lining	Sat 10/1/11	Wed 2/29/12
32	Construction of AR Bridge	Mon 7/11/11	Thu 1/31/13
33	Construction of Foot Bridge	Mon 7/11/11	Wed 11/30/11
34	Construction of Escape Channel	Sat 10/1/11	Thu 1/31/13
35	Construction of Power House	Wed 6/15/11	Sat 6/30/12
36	**Power House Installation**	**Mon 7/2/12**	**Fri 2/28/14**
37	Crane	Mon 7/2/12	Mon 10/15/12
38	Transformer & Switchgear	Tue 10/16/12	Tue 9/24/13
39	Turbine & Generator Unit 1	Tue 12/4/12	Sat 8/31/13
40	Turbine & Generator Unit 2	Tue 3/5/13	Sat 11/30/13
41	Turbine & Generator Unit 3	Sat 6/1/13	Fri 2/28/14
42	Miscellaneous Works	Wed 3/6/13	Mon 9/30/13
43	**Testing/Commissioning**	**Tue 10/1/13**	**Mon 6/30/14**
44	Testing/Commissioning - Unit 1	Tue 10/1/13	Tue 12/31/13
45	Testing/Commissioning - Unit 2	Wed 1/1/14	Mon 3/31/14
46	Testing/Commissioning - Unit 3	Tue 4/1/14	Mon 6/30/14
47	**Commercial Operations Date (COD)**	**Tue 7/1/14**	**Tue 7/1/14**



Project: Chashma Imp Sch
Date: Tue 5/19/09

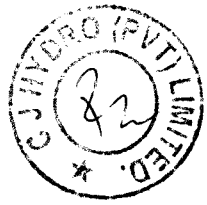
Task — Split — Progress — Milestone — Summary — Project Summary — External Tasks — External Milestone — Deadline

Attachment VI

44 MW Hydropower Project at C-J Link (Tail)

Estimated Project Cost As Per Feasibility report

Sr. No.	Description	Amount (Million Rupees)
1.	**PRELIMINARY WORKS**	
	Feasibility Study & Services for EPC tender Documents	60 .000
	Additional Investigations & Hydraulic Model Studies	10.000
	Land	17.400
	Compensation for trees, houses and various structures	15.000
	Boundary Fence	8.970
	Progress Photographs and Video Documentary	0.500
	Sub-Total (1)	**111. 870**
2.	**ENGINEERING, PROCUREMENT & CONSTRUCTION (EPC) COSTS**	
(i).	**GENERAL ITEMS**	
	Care and Handling of Water including De-Watering	75.000
	Construction of Staff Colony	210.722
	Development of Parks Outside Staff Colony	5.000
	Sub-Total (i)	**290. 722**
(ii).	**CIVIL WORKS**	
	(a) Power Channel	
	Headrace Channel	213.939
	Tailrace Channel	231.410
	Escape Channel	81.834
	Roads	66.250
	Lining of Slopes	365.200
	Sub-Total (ii)(a)	**958. 633**
	(b) Bridges	
	D.R Bridge	19.687
	A. R Bridge	49.872
	Foot Bridge at Escape Structure	0.389
	Sub-Total (ii)(b)	**69. 948**
	(c) Power House	
	Power House	511.451
	Sub-Total (ii)(c)	**511. 451**



	Sub-Total (ii)	**1540. 032**
(iii).	**ELECTRO-MECHANICAL EQUIPMENT**	
	Mechanical Works	2 045.790
	Electrical Works	430.961
	Sub-Total (iii)	**2 476. 751** **Or US$31.672**
(iv).	**DESIGN & ENGINEERING**	**318. 034**
	BASE EPC COST (i+ii+iii+iv) **Sub-Total (2)**	**4625. 539** **Or US$ 59. 150**
3.	**OTHER COSTS**	
	Custom Duties	84.691
	Environment & Ecology	10.120
	Sub-Total (3)	**94. 811**
4.	**PROJECT COMPANY'S COSTS**	
	Construction Management	117.300
	Insurance during Construction	46.255
	Fees, Permits, Legal Expenses, etc.	58.650
	Withholding Tax on Local Supplies/Services	152.725
	Utilities during Construction	15.640
	Owner's Engineer	46.920
	Independent Engineer	15.640
	Pre-COD O&M Costs including 1st Fill of Lubes &	15.640
	Sub-Total (4)	**468. 770**
5.	**TOTAL CAPEX (1+2+3+4)**	**5 300. 990** **Or US$ 67. 788**
6.	**FINANCING COST**	
	Debt arrangement Fee, Commitment Fee, Other Charges	210.670
	Equity (Public) Placement Fee	19.550
	Interest during Construction	1125.767
	Sub-Total (6)	**1355. 987**
7.	**TOTAL PROJECT COST (5+6)**	**6 656. 977** **Or US$ 85. 127**
	COST PER kW INSTALLED	**US$ 1 920**

Attachment VII

44 MW Hydropower Project at C-J Link (Tail)

Estimated Cost of Environmental Programme

Cost Item	Capital Cost (Rs.)
Environment Monitoring Cost	2 000 000
Social Impact Cost	500 000
Training Cost	350 000
Environmental Audit Cost	500 000
Plantation Cost	750 000
Emergency Plan (Provisional Cost)	600 000
Waste Disposal Cost	850 000
Water Supply and Waste Water Treatment/Sewerage Cost	850 000
Site Visit by Regulators & Authorities	120 000
Traffic Management Cost	1 200 000
Extended Canal Closure Cost (Provisional Cost)	1 200 000
Public Park	1 200 000
Total	10 120 000 Or US $ 129 412

Attachment VIII

44 MW Chashma-Jhelum Link Canal (Tail) Hydropower Project
Component-wise Bill of Quantities as per Feasibility Report

Sr. No.	Description	Unit	Estimated Quantity										Unit Rate (Rs.)	Total Amount	
			Power Channel					Bridges			Power House	Total Quantity		(Rs. 000)	(US$ 000)
			Head Race Channel	Tail Race Channel	Escape Channel	Road Construction	Lining Slopes	D. R Bridge	A. R Bridge	Foot Bridge					
1	Stripping of the area	SM	47,725									47,725	0.55	26.249	0.336
2	Earth Work Excavation	CM	412,620	501,803	37,174		598,374					1,549,970	150.35	233,037.990	2,980.025
3	Compaction	CM	273,240	5,175	2,189		36,829					317,433	24.85	7,888.199	100.872
4	Extra for Dowels Dressing	Rm	2,500	370								2,870	2.35	6.745	0.086
5	Subgrade Preparation														
	a) in bed	SM	85,790									85,790	30.30	2,599.437	33.241
	b) on bed or slope	SM	44,800				216,545					261,345	41.20	10,767.414	137.691
6	Cement Plaster, 1:10														
	a) in bed	SM	85,790									85,790	80.20	6,880.358	87.984
	b) on bed	SM	44,800									44,800	97.00	4,345.600	55.570
7	Cement Concrete Lining, 1:2:4														
	a) in bed	CM	8,809									8,809	4,679.00	41,217.311	527.076
	b) on slope	CM	4,600									4,600	4,841.75	22,272.050	284.809
8	Reinforced Concrete, 4000 psi	CM	4,846	4,771	4,878							14,496	6,111.95	88,597.299	1,132.958
9	Steel Reinforcement	Ton	417	452	469			126	312	3	2,472	4,251	82,931.50	352,544.004	4,508.235
10	Lean Concrete	CM	52		407			13	12		216	700	4,033.50	2,822.442	36.093
11	Plain Concrete 3000 psi	CM	230									230	4,679.00	1,076.170	13.762
12	Contraction Joints	Rm	66,988									66,988	5.00	334.938	4.283
13	Ladder Rungs of Galv. MS Bars	N0.	184									184	500.00	92.000	1.176
14	Providing/Laying Stone	CM													
	a) on level			3,421								3,421	251.55	860.615	11.005
	b) on slope	CM		5,089								5,089	305.15	1,552.832	19.857
15	Stone Pitching														
	a) on level	CM		11,356	431							11,788	797.20	9,396.995	120.166
	b) on slope	CM		16,905	834							17,739	855.50	15,175.501	194.060
16	Grouting Stone Pitching, 1:3	SM		30,968	2,408							33,376	290.70	9,702.403	124.072
17	Carriage of Materials	CM		36,771								36,771	1,475.60	54,259.657	693.858
18	Excavation in foundations of structures	CM			19,642		19,723					39,364	96.50	3,798.636	48.576
19	Contraction Joints in Retaining Walls & Base Slab	LM			368							368	110.00	40.524	0.518
20	PVC Water Stop	LM			298						202	500	225.00	112.518	1.439
21	Water Proofing Treatment	SM			786							786	241.00	189.426	2.422
22	Stone or Sprawl Filling														
	a) on level	CM			144							144	251.55	36.160	0.462
	b) on slope	CM			259							259	305.15	78.958	1.010
23	Carriage of Materials (Esc. Ch.)	CM			1,668							1,668	565.37	942.754	12.056
24	Dismentalling stone or spawl pitching and apron	CM			1380							1,380	187.00	258.060	3.300
25	M S Pipe Railing	LM			50							50	1,500.00	75.000	0.959
26	Lettering Data Board	No.			1							1	25,000.00	25.000	0.320
27	Fixing Gates	No.			1							1	450,000.00	450.000	5.754

Attachment VIII

28	Fixing Access Gate	No.				1							1	6,000.00	6.000	0.077
29	Relocation of Metalled Road	km					1						1	25,000,000.00	25,000.000	319.693
30	New Road on left side P/Chan.	km					2						2	25,000,000.00	37,500.000	479.540
31	Service road	km					2						2	2,500,000.00	3,750.000	47.954
32	Brick lining, 1:3 mortar															
	a) on level	CM						841.8					842	4,152.35	3,495.448	44.699
	b) on slope	CM						42722.5					42,723	4,327.20	184,868.802	2,364.051
33	Pacca brick work, 1:3 Mortar	CM						8625					8,625	3,885.20	33,509.850	428.515
34	Cement Concrete, 1:4:8	CM						2328.75					2,329	3,203.60	7,460.384	95.401
35	Cement Plaster, 1:6															
	a) on slope	SM						216545					216,545	157.75	34,159.974	436.828
36	Structural Excavation	CM							2360	1295.6		151135.59	154,791	73.65	11,400.371	145.785
37	Common Backfill	CM							1901	1712.21		48683.7	52,297	15.15	792.298	10.132
38	Reinforced concrete, 4000 psi	CM							276	416	25		717	5,429.75	3,893.131	49.784
39	Deck Slab & Diaphragm,4000 psi	CM							47	314		45339.69	45,701	6,252.90	285,761.845	3,654.244
40	Prestressed Girders, 5000 psi	CM							79	458			537	6,929.75	3,721.276	47.587
41	Tendons 10	Ton							5	27			32	260,000.00	8,320.000	106.394
42	Pre-cast Girders	Ton							189	1098			1,287	602.00	774.774	9.908
43	Steel Expansion Joints	kg							655	1502			2,157	100.00	215.700	2.758
44	Elastomeric Bearing Pads	cm3							73597	38164	2162		113,923	2.05	233.893	2.991
45	G I Drain Pipe	No.							5	42	5		52	26.40	1.373	0.018
46	PVC Pipe	LM								460			460	180.08	82.837	1.059
47	Brick Masonry	SM										545.38	545	610.75	333.091	4.259
48	Plaster, 1:4	SM										1090.76	1,091	129.84	141.624	1.811
49	Misc. Steel Metal Work; Railing, Stair, Ladder, Fence	LM										625	625	1,200.00	750.000	9.591
50	Grating	SM										421.6	422	4,850.00	2,044.760	26.148
51	Removable Floor	SM										436.14	436	644.00	280.874	3.592
52	False Ceiling	SM										136.3683	136	1,680	229.099	2.930
53	Glass Work	SM										114.55	115	3,360.00	384.888	4.922
54	Concrete Piles, 1 M dia	LM							389.4	623.04			1,012	12,101.00	12,251.536	156.669
55	Pile Load Test	No.							1	1			2	300,000.00	600.000	7.673
56	Pile Cap Concrete	CM								102			102	5,866.00	598.332	7.651
57	Architectral Works	L/S										1	1	1,403,150.00	1,403.150	17.943
58	Flooring	L/S										1	1	3,000,867.00	3,000.867	38.374
59	Walls	L/S										1	1	851,645.00	851.645	10.891
60	Accessories	L/S										1	1	751,080.00	751.080	9.605
	Sub-Total (Cost of Civil Works)		213939.31	231409.5	81834.2	66250.0	365200.0	19687.0	49871.6	389.1	511451.3	1540032.1			1,540,032.144	19,693.506
	Other Civil Works (General Items)															
61	Care & Handling of Water	L/S											1	75,000,000.00	75,000.000	959.079
62	Staff Colony	L/S											1	210,722,220.00	210,722.220	2,694.658
63	Development of Parks	L/S											1	5,000,000.00	5,000.000	63.939
	Sub-Total (Other Civil Works)														290,722.220	3,717.675
	Total (Civil Works)														1,830,754.364	23,411.181
64	Mechanical Works														2,045,789.805	26,160.995
65	Electrical Works														430,960.962	5,511.010
	Sub-Total (E&M Works)														2,476,750.767	31,672.005
	Total (Works)														4,307,505.131	55,083.186
66	Design & Engineering														318,033.792	4,066.928
	Total (EPC Cost)														4,625,538.923	59,150.114
	Exchange Rate: US$ 1= Rs.	78.20														

C J HYDRO (P) LIMITED

Attachment IX

44 MW Hydropower Project at C-J Link (Tail)

Feasibility Stage Reference Tariff

Year	Energy Purchase Price (Rs./kWh)				Capacity Purchase Price (Rs./kW/Month)									Capacity Purchase Price (Rs./kWh) *	Total Tariff	
	Variable O&M (Foreign)	Variable O&M (Local)	Water Use Charge	Total	Fixed O&M (Foreign)	Fixed O&M (Local)	Insurance	ROE & Equity Redemption	ROEDC	Withhold-ing Tax @7.5%	Loan Repayment	Interest Charges	Total		Rs. per kWh	¢ per kWh
1	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	572.7922	1297.7129	2978.4137	7.3903	7.6508	9.7837
2	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	639.2957	1231.2094	2978.4137	7.3903	7.6508	9.7837
3	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	715.8323	1154.6728	2978.4137	7.3903	7.6508	9.7837
4	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	804.0970	1066.4081	2978.4137	7.3903	7.6508	9.7837
5	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	906.0821	964.4230	2978.4137	7.3903	7.6508	9.7837
6	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	1024.1299	846.3752	2978.4137	7.3903	7.6508	9.7837
7	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	1160.9951	709.5100	2978.4137	7.3903	7.6508	9.7837
8	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	1319.9174	550.5877	2978.4137	7.3903	7.6508	9.7837
9	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	1504.7084	365.7967	2978.4137	7.3903	7.6508	9.7837
10	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	1719.8527	150.6524	2978.4137	7.3903	7.6508	9.7837
11	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
12	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
13	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
14	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
15	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
16	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
17	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
18	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
19	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
20	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
21	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
22	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
23	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
24	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
25	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
26	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
27	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
28	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
29	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
30	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
Average Tariff																
1 - 10 Yrs.	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	520.5782	290.2075	60.8089	1036.7703	833.7348	2978.4137	7.3903	7.6508	9.7837
11-30 Yrs.	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	532.2689	290.2075	61.6857	0.0000	0.0000	1120.4761	2.7802	3.0408	3.8884
1 - 30 Yrs.	0.0884	0.0221	0.1500	0.2605	29.6970	118.7881	87.8289	528.3720	290.2075	61.3935	345.5901	277.9116	1739.7886	4.3169	4.5775	5.8535
Levelized Tariff																
1 - 30 Yrs.	**0.0884**	**0.0221**	**0.1500**	**0.2605**	**29.6970**	**118.7881**	**87.8289**	**524.6487**	**290.2075**	**61.1142**	**614.1495**	**605.0664**	**2,331.5004**	**5.7851**	**6.0457**	**7.7310**

* Capacity Charge in Rs. / kWh = Capacity Purchase Price in Rs. / kW / Month ÷ 730 ÷ Annual Plant Factor. Annual Plant Factor = 55.21%

Capacity Purchase Price for energy delivered beyond 212.249 GWh in any Agreement Year = 10% of Levelized Capacity Purchase Price / kWh i.e. Rs. 0.5785 per kWh

CJ HYDRO (PVT) LIMITED

Attachment X

44 MW Hydropower Project at C-J Link Canal (Tail)

Debt Servicing Schedule

Period	Foreign Debt					Local Debt				
	Principal	Repayment	Mark-Up	Balance	Debt Service	Principal	Repayment	Mark-Up	Balance	Debt Service
	(Mln. $)	(Mln. $)	(Mln. $)	(Mln. $)	(Mln. $)	(Mln. $)	(Mln. $)	(Mln. $)	(Mln. $)	(Mln. $)
Quarter 1	23.8322	0.4625	0.2989	23.3697	0.7613	45.9910	0.4633	1.9247	45.5278	2.3880
Quarter 2	23.3697	0.4683	0.2931	22.9015	0.7613	45.5278	0.4826	1.9053	45.0451	2.3880
Quarter 3	22.9015	0.4741	0.2872	22.4273	0.7613	45.0451	0.5028	1.8851	44.5423	2.3880
Quarter 4	22.4273	0.4801	0.2813	21.9472	0.7613	44.5423	0.5239	1.8641	44.0184	2.3880
Year 1	23.8322	1.8849	1.1604	21.9472	3.0453	45.9910	1.9726	7.5793	44.0184	9.5519
Quarter 1	21.9472	0.4861	0.2752	21.4611	0.7613	44.0184	0.5458	1.8422	43.4726	2.3880
Quarter 2	21.4611	0.4922	0.2691	20.9689	0.7613	43.4726	0.5687	1.8193	42.9039	2.3880
Quarter 3	20.9689	0.4984	0.2630	20.4706	0.7613	42.9039	0.5925	1.7955	42.3115	2.3880
Quarter 4	20.4706	0.5046	0.2567	19.9660	0.7613	42.3115	0.6172	1.7707	41.6942	2.3880
Year 2	21.9472	1.9813	1.0640	19.9660	3.0453	44.0184	2.3242	7.2278	41.6942	9.5519
Quarter 1	19.9660	0.5109	0.2504	19.4550	0.7613	41.6942	0.6431	1.7449	41.0511	2.3880
Quarter 2	19.4550	0.5174	0.2440	18.9377	0.7613	41.0511	0.6700	1.7180	40.3811	2.3880
Quarter 3	18.9377	0.5238	0.2375	18.4138	0.7613	40.3811	0.6980	1.6900	39.6831	2.3880
Quarter 4	18.4138	0.5304	0.2309	17.8834	0.7613	39.6831	0.7272	1.6607	38.9559	2.3880
Year 3	19.9660	2.0826	0.9628	17.8834	3.0453	41.6942	2.7383	6.8136	38.9559	9.5519
Quarter 1	17.8834	0.5371	0.2243	17.3463	0.7613	38.9559	0.7577	1.6303	38.1982	2.3880
Quarter 2	17.3463	0.5438	0.2175	16.8025	0.7613	38.1982	0.7894	1.5986	37.4088	2.3880
Quarter 3	16.8025	0.5506	0.2107	16.2519	0.7613	37.4088	0.8224	1.5656	36.5864	2.3880
Quarter 4	16.2519	0.5575	0.2038	15.6944	0.7613	36.5864	0.8568	1.5311	35.7295	2.3880
Year 4	17.8834	2.1890	0.8563	15.6944	3.0453	38.9559	3.2263	6.3256	35.7295	9.5519
Quarter 1	15.6944	0.5645	0.1968	15.1299	0.7613	35.7295	0.8927	1.4953	34.8368	2.3880
Quarter 2	15.1299	0.5716	0.1897	14.5583	0.7613	34.8368	0.9301	1.4579	33.9068	2.3880
Quarter 3	14.5583	0.5788	0.1826	13.9795	0.7613	33.9068	0.9690	1.4190	32.9378	2.3880
Quarter 4	13.9795	0.5860	0.1753	13.3935	0.7613	32.9378	1.0095	1.3784	31.9282	2.3880
Year 5	15.6944	2.3009	0.7444	13.3935	3.0453	35.7295	3.8013	5.7506	31.9282	9.5519
Quarter 1	13.3935	0.5934	0.1680	12.8001	0.7613	31.9282	1.0518	1.3362	30.8765	2.3880
Quarter 2	12.8001	0.6008	0.1605	12.1993	0.7613	30.8765	1.0958	1.2922	29.7807	2.3880
Quarter 3	12.1993	0.6083	0.1530	11.5910	0.7613	29.7807	1.1417	1.2463	28.6390	2.3880
Quarter 4	11.5910	0.6160	0.1454	10.9750	0.7613	28.6390	1.1894	1.1985	27.4496	2.3880
Year 6	13.3935	2.4185	0.6268	10.9750	3.0453	31.9282	4.4787	5.0732	27.4496	9.5519
Quarter 1	10.9750	0.6237	0.1376	10.3513	0.7613	27.4496	1.2392	1.1488	26.2103	2.3880
Quarter 2	10.3513	0.6315	0.1298	9.7198	0.7613	26.2103	1.2911	1.0969	24.9193	2.3880
Quarter 3	9.7198	0.6394	0.1219	9.0803	0.7613	24.9193	1.3451	1.0429	23.5741	2.3880
Quarter 4	9.0803	0.6475	0.1139	8.4329	0.7613	23.5741	1.4014	0.9866	22.1727	2.3880
Year 7	10.9750	2.5421	0.5032	8.4329	3.0453	27.4496	5.2768	4.2751	22.1727	9.5519
Quarter 1	8.4329	0.6556	0.1058	7.7773	0.7613	22.1727	1.4601	0.9279	20.7127	2.3880
Quarter 2	7.7773	0.6638	0.0975	7.1135	0.7613	20.7127	1.5212	0.8668	19.1915	2.3880
Quarter 3	7.1135	0.6721	0.0892	6.4414	0.7613	19.1915	1.5848	0.8032	17.6067	2.3880
Quarter 4	6.4414	0.6806	0.0808	5.7608	0.7613	17.6067	1.6511	0.7368	15.9556	2.3880
Year 8	8.4329	2.6721	0.3733	5.7608	3.0453	22.1727	6.2172	3.3348	15.9556	9.5519
Quarter 1	5.7608	0.6891	0.0722	5.0717	0.7613	15.9556	1.7202	0.6677	14.2353	2.3880
Quarter 2	5.0717	0.6977	0.0636	4.3740	0.7613	14.2353	1.7922	0.5957	12.4431	2.3880
Quarter 3	4.3740	0.7065	0.0549	3.6675	0.7613	12.4431	1.8672	0.5207	10.5759	2.3880
Quarter 4	3.6675	0.7153	0.0460	2.9522	0.7613	10.5759	1.9454	0.4426	8.6305	2.3880
Year 9	5.7608	2.8086	0.2367	2.9522	3.0453	15.9556	7.3251	2.2268	8.6305	9.5519
Quarter 1	2.9522	0.7243	0.0370	2.2279	0.7613	8.6305	2.0268	0.3612	6.6037	2.3880
Quarter 2	2.2279	0.7334	0.0279	1.4945	0.7613	6.6037	2.1116	0.2764	4.4921	2.3880
Quarter 3	1.4945	0.7426	0.0187	0.7519	0.7613	4.4921	2.2000	0.1880	2.2921	2.3880
Quarter 4	0.7519	0.7519	0.0094	0.0000	0.7613	2.2921	2.2921	0.0959	(0.0000)	2.3880
Year 10	2.9522	2.9522	0.0931	0.0000	3.0453	8.6305	8.6305	0.9215	(0.0000)	9.5519

Attachment XI

Feasibility report of

44 MW Hydropower Project at C-J Link (Tail)

(Attached as a separate folder)