BEFORE

THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA)

TARIFF PETITION

ON BEHALF OF

PUNJAB POWER DEVELOPMENT COMPANY LTD

ENERGY DEPARTMENT, GOVERNMENT OF THE PUNJAB

FOR

DETERMINATION OF EPC (ENGINEERING, PROCUREMENT, CONSTRUCTION) STAGE TARIFF FOR SUPPLY OF ELECTRIC POWER FROM 4.04 (GROSS) MW DEG-OUTFALL HYROPOWER PROJECT

AT

UPPER CHENAB CANAL, SHEIKHUPURA, PUNJAB

January 25, 2015

PUNJAB POWER DEVELOPMENT COMPANY LIMITED
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Compliance with NEPRA (Tariff Standards & Procedure) Rules 1998		
S.No	NEPRA Rule	Description
1.	Rule 3(1)	Tariff Petition Fee of Rs.273,248/ = (covering of CPI indexation attached)
2.	Rule 3(2)(a)	Name of Petitioner Mr. Moeen-ud-Din Sheikh Project Director, Punjab Power Management Unit, Government of the Punjab 77 Shah Jamal Colony , Lahore
3.	Rule 3(2)(b)	Grounds and Facts Provided in detail in this Tariff Petition
4.	Rule 3(2)(c)	**RELIEF SOUGHT:-** The Petitioner requests the National Electric Power Regulatory Authority (NEPRA) to kindly approve / determine the followings:- **a)** EPC stage Tariff for Deg-Outfall Hydropower Project, 4.04 MW (Gross) for a p[redacted]d of 30 Agreement Years from the Commercial Operation Date (COD); **b)** Provisions for adjustments of Tariff at COD stage and for the Cost Re-openers specific to hydropower projects as per laid down standard mechanism i.e. • Adjustment due to Custom Duties and Interest During Construction • Adjustment in Project Cost due to Variations in US$/Rupee Parity • Adjustment in Return on Equity During Construction on the basis of actual drawdown as well as 30 months prior to date of construction start on the analogy of other IPPs as allowed by Ministry of Water and Power vide their letter NO. 7(32)/92-P-II dated 30th July 2009. • Adjustment in Project Cost due to variation in US$/Yen Parity • Adjustments due to all costs associated to Resettlement • Onetime Adjustment in EPC Cost for Civil Works Cost like variations and Enhanced Security Measures for Contractor (Chinese) • Any other item specific to hydropower projects etc. **c)** Adjustment/Indexation of Tariff components over the period of thirty (30) years and approval of other salient terms and conditions of the Power Purchase Agreement. • Variable and Local Fixed Energy Charge to be indexed on Inflation Adjustment Factor for CPI (Consumer Price Index) • Foreign Fixed Capacity Charge to be indexed on Pak Rupee Parity Exchange Rate with US Dollar and US CPI; • Insurance Component will be indexed changes in foreign currency exchange rate.

		• Reference Foreign Debt Interest for using Foreign Loan Interest Adjustment Factor at COD **d)** All eligible pass-through items shall be payable by the Power Purchaser to the Company on the basis of actual costs incurred by the Company or to the extent that the Company is obligated pursuant to the Laws of Pakistan to make payments Pass-through items like withholding tax, Worker's Welfare Funds, Sales Tax, Excise Duty, levy, Charge/ surcharge, cost to be incurred on protective devices etc.
5.	Rule 3(2)(d)	Not Applicable
6.	Rule 3(2)(e)	Not Applicable
7.	Rule 3(2)(f)	Provided in detail in attachments to Tariff Petition
8.	Rule 3(8)	Affidavit is attached

GLOSSARY

ADB	Asian Development Bank
BOOT	Build, Own, Operate and Transfer
COD	Commercial Operation Date
CC	Capacity Charge
CPPA	Central Power Purchasing Agency of NTDC
CPI	Consumer Price Index
Cusec	Cubic Foot Per Second
DSRA	Debt Services Reserve Account
ECNEC	Executive Committee of National Economic Council
EC	Energy Charge
EPC	Engineering, Procurement and Construction
GOP	Government of Pakistan
GOPb	Government of the Punjab
GST	General Sales Tax
GWh	Giga Watt hours=1000,000 KWh
IA	Implementation Agreement
ICB	International Competitive Bidding
IDC	Interest During Construction
IPP	Independent Power Producer
IRR	Internal Rate of Return
ISO	International Organization for Standardization
Km	Kilometer=1000 meters
KV	Kilovolt=1000 volts
KVA	Kilovolt ampere
KW	Kilowatt=1000 watts
KWh	Kilowatt hour
LARP	Land Acquisition & Resettlement Plan
LIBOR	London Inter-Bank Offered Rate
LOI	Letter of Interest
LOS	Letter of Support
LV	Low Voltage
m3/s or Cumecs	Cubic Meters per second
MAF	Million Acre Feet
MHP	Marala Hydropower Project
MVA	Megavolt Ampere=1000 kVa
MW	Mega Watt
MWh	Mega Watt hour=1000 KWh
NEPRA	National Electric Power Regulatory Authority

NPV	Net Present Value
NTDC	National Transmission and Dispatch Company Limited
O & M	Operation & Maintenance
POE	Panel of Expert
PPMU	Punjab Power Management Unit
PPTA	Project Preparation Technical Assistance
PKR or Rs.	Pakistani Rupees
PPA	Power Purchase Agreement
PPDB	Punjab Power Development Board
PPIB	Private Power and Infrastructure Board
REDSIP	Renewable Energy Development Sector Investment Program
ROE	Return on Equity
UCC	Upper Chenab Canal
USD or US$	United States Dollar
US C or c	United States Cent
VLH	Very Low Head
WPI	Wholesale Price Index

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A. INTRODUCTION

Rule 3 EPC Stage Tariff Petition **(the "Tariff Petition")** under Rule 31 of the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997 (XL of 1997) **(the "Act")** read with Rule 3 of the National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998 **(the "Tariff Rules")** for determination of Generation Tariff.

Rule 3(2) (a) Petitioner's Name and Address

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Government of the Punjab
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Authorized Representatives

1. **Mr. Muhammad Yaqoob**
   General Manager Hydropower
   Punjab Power Development Company Limited

2. **Mr. Ehsan- ul- Majeed Khan**
   General Manager Procurement & Contract
   Punjab Power Development Company Limited

3. **Mr. Ikram Naveed**
   Chief Financial Officer (CFO)
   Punjab Power Development Company Limited

4. **Mr. Waheed Ahmad Bhutta**
   Director / Economist/Tariff Specialist
   Punjab Power Management Unit
   Government of the Punjab

Company Registration No. 0064048

Rule 3(2) (a) Generation License

Application for grant of Generation License is being submitted separately for approval of this hydropower project.

Rule 3(2) (b) Grounds

Grounds forming the basis for the Petition are elaborated in the Petition.

Rule 3(2) (c) Relief Sought

Relief sought is mentioned in Para 22 of this Tariff Petition.

Rule 3(2) (f) Summary of Evidence

A brief detail of technical and financial data, which forms the basis of Tariff Petition, is given in the subsequent Paras.

B. GROUNDS FOR PETITION

Under the "Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997), hereinafter referred to as the NEPRA Act, National Electric Power Regulatory Authority (NEPRA) 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 in Pakistan and to recommend to the Federal Government for formal notification. NEPRA is also responsible for determining the process and procedures for reviewing and approving tariffs and tariff adjustments etc. up to end-consumers.

Punjab Power Development Company Limited hereinafter referred as **the "Company" or (the "PPDCL")** is a Company fully owned by Government of the Punjab and registered under the Companies Ordinance 1984. **The Company intends to set-up 4.04 MW (Gross) hydropower project in the Punjab Province for taping the potential of electricity generation in the province and also to act as a catalyst between private sector and the government for the development of energy sector.** The Company will also be responsible for the operation and maintenance of four hydropower projects namely Marala, Chianwali, Deg-Outfall and Pakpattan HPPs being implemented under a Loan (PK 2286) from Asian Development Bank (ADB). This loan / program is intended to exploit the hydro potential of Renewable Energy resources in the Punjab and the provinces of the Punjab & Khyber PakhtoonKhwa. Asian Development Bank conducted the feasibility studies through internally engaged consultants and financed from its own resources. Having found the above-mentioned hydropower project sites feasible for developing hydropower projects, they offered a multi-tranche soft loan to Government of the Pakistan for on-lending to concerned projects and provinces declared viable ones for this purpose.

PPDCL is submitting this petition for determination of EPC Stage Tariff based on technical data and the cost estimates, and other assumptions determined through lowest bid obtained through International Competitive Bidding (ICB) process in accordance with the Procurement Rules and Guidelines of Asian Development Bank under Single stage - two envelopes procedures. Eight Number of JVs / companies participated in the ICB process and M/s SINOTEC-SHPE (JV), of China was selected and ***awarded the EPC Contract, which became effective on February 23, 2013. The construction has already been started and it is expected that Project will be commissioned in July 27, 2015.***

C. BRIEF DESCRIPTION

(i) ADB Loan and Punjab Power Management Unit (PPMU)

Asian Development Bank (ADB) offered a multi-tranche loan of US$ 500 Million to the Govt. of Pakistan for development of renewable energy resources under Renewable Energy Development Sector Investment Programme (REDSIP). The first tranche of J¥ 5599 million for Punjab, was negotiated in Oct. 2006, however loan was signed on October 5, 2007. Upon approval of PC-Is by ECNEC. Government of Pakistan is the "BORROWER" for on–lending to the Government of the Punjab (). The GOPb is responsible to share 20% of Total Cost as equity in addition to the ADB Loan. The revised allocation of the ADB Loan No. 2286 (OCR) for construction of projects is J¥ 7882 Million based on actual bidding and recently the GOPb has made a written commitment to ADB through Economic Affair Division that, in case of any financial short fall due to depreciation of J¥, the equity will be increased accordingly to complete the implementation of the projects under the REDSIP.

As an advance action, a Project Management Unit was required to be established by ADB prior

to Loan signing, so that projects under REDSIP could be taken-up for implementation. Consequently Punjab Power Management Unit (PPMU) was established in May 2007. The approved setup of PPMU as included in the Project Administration Memorandum (PAM), signed between ADB and Government of the Punjab is attached. The PPMU is now implementing these Public Sector Projects under the Loan, in the Punjab.

(ii) **ADB Loan and Punjab Power Development Company Limited (PPDCL)**

In addition to PPMU, a corporate entity under the title of Punjab Power Development Company Limited was also agreed to be established under the ADB Loan Covenants. Accordingly PPDCL, fully owned by GOPb, has legally been established under Company Ordinance 1984 since January 16, 2008, as required vide "SCHEDULE" of the Project Agreement, between ADB and Government of the Punjab for Loan 2286/2287-PAK. PPDCL has to take over the REDSIP projects for commercial operation upon completion of construction. The limitation of signing the PPA, as a condition for disbursement of ADB Loan for Generators & Power Transformers, is also expressed in Para 7(b), Schedule-3, of Loan Agreement (OCR).

The Company has also been assigned the development of coal projects on fast track basis in public sector by the Government. The Company is registered with Security Exchange Commission of Pakistan (SECP) under the Companies' Ordinance of 1984 and headed by Chief Executive Officer (CEO). For policy guidelines / directions and over-seeing the Company's performance, Government of the Punjab has constituted a Board of Director (BOD) for this purpose. It has representation of concerned government departments like Finance & Planning & Development Departments and private sector's eminent professionals. The BOD is equipped with suitable administrative and financial autonomy. The functions assigned to PPDCL are:-

1. To develop power projects in Public-Private Partnership (PPP) mode;
2. To arrange funding through loan negotiations or joint venture;
3. To interact with all stakeholders; WAPDA and Federal Government;
4. To negotiate tariff with NTDC (WAPDA) or other buyers of energy;
5. To attract private sector to form joint venture for development and / or operation & management of power projects.

In order to achieve the targets, Government of the Punjab has provided all inputs to the PPDCL particularly the human inputs at specialist level in all disciplines of energy production and management. This includes the discipline of hydro- thermal etc. under the function enlisted above. All the sub-projects of REDSIP upon completion would be handed-over to PPDCL for operation and maintenance.

D. ENERGY DEPARTMENT, GOVERNMENT OF THE PUNJAB

Electricity as a subject in the Province has been dealt with by the Power Wing of Irrigation & Power Department, Government of the Punjab. The Power Wing primarily, however, dealt with regulatory aspects of electricity distribution, adjudication of consumers versus supplier disputes and safety aspects of electrical installations at public and private buildings. The generation side of electricity remained the domain of Pakistan Water and Power Development Authority **(WAPDA)**, a Federal Government - owned entity, but licensed by the Provincial Government to distribute electricity in the province in terms of the provisions of Electricity Act 1910. This arrangement remained effective up to 1997. Thereafter, NEPRA was constituted under National Electric

Power Regulatory Act 1997 by the Government of Pakistan and made responsible for regulating electricity business through mechanism of grant of licenses, tariff determination and safeguarding the rights of the consumers.

Government of the Punjab decided to play more pro-active role in energy sector to surmount the challenges of energy deficits and to mitigate its adverse impacts on provincial economy. In order to accomplish this target, Power Wing of Irrigation & Power Department was transformed into full-fledged independent administrative department i.e. Energy Department as compatible institutional framework with gigantic task of energy sector development along with attachment of PPDCL, PPMU and Punjab Power Development Board (PPDB) with the newly created Energy Department. Further in line with this policy, the post of Secretary Energy has been up-graded to Additional Chief Secretary Energy. It is hoped this would provide necessary impetus and required administrative ease. The responsibilities assigned to this administrative set-up include:

- Updating of power policy;
- Legislation, policy formulation and sector planning;
- Matters under Article 157, 158 and 161 of the Constitution and policy making for the province in respect thereof;
- Development of power generation by exploiting hydro , thermal and renewable energy resources;
- Conservation of energy , efficiency measures, energy audits policy making thereof;
- Standardization of specifications of electric appliances, machinery and installations;
- Matters related to Punjab Power Development Board and Punjab Power Development Company Limited;
- Off-Grid distribution of power generation;
- Administrative control related to work of Electric Inspectors;
- Incorporate option of bulk purchase/sale to NTDC/CPPA/DISCOs;
- Define mechanism for dispersal of power from provincial sponsored projects through the transmission/distribution network owned by NTDC/DISCOs;
- Articulate Public Private Partnership (PPP) modality and define equity participation by Government of the Punjab in PPP projects;
- Define terms for access to Government Power Guarantee Fund and Power Sector Development Fund; and
- Define terms for community based power generation plants.

1. HYDRO-BASED POWER GENERATION

Water is the most essential natural resource next to the air - a basic human need and the most important input - for all human development activities and obviously is considered very precious and scarce natural resource. Hydropower is a renewable, non-polluting and environmentally benign source of energy. It is perhaps the oldest renewable energy technique known to mankind for mechanical energy conversion as well as electricity generation. Hydropower represents use of water resources towards pollution free energy due to absence of fossil fuel with mature technology characterized by highest prime moving efficiency and spectacular operational flexibility.

The Punjab is pre-dominantly agriculture-oriented province and 70% of its rural population largely depends on agriculture for its livelihood. To irrigate its fertile land, the world's largest contiguous 36,000 km long canal system distributes water through the length and breadth of the province. The irrigation water is delivered to the fields through a network of barrages, main canals, branch canals, distributaries, minors, sub-minors and outlets.

The Punjab Irrigation Department, established in 1864, is operator of this vast system. This system is more than century old and it is difficult to imagine today to develop such a system of high level strength and utility. The system works through gravity flow from north to south and every canal is designed to have falls at regular interval to maintain the velocity of water flows. Naturally, these falls possess the potential for power generation. The government through Energy Department Punjab is making all out efforts to utilize these falls for power generation. It is pertinent to mention here that in Punjab and Sindh, having vast plains, the head / fall of canals and barrages ranges between 0.5 meters to 5 meters as against the high head/fall found in the province of KPK and Azad Kashmir or GB being mountainous areas. It is also important to mention here the low/very low head technology is comparatively very expensive. The low head in the Punjab sometimes necessitates the combination of falls to achieve essential head for utilizing the proven technology. Of course, this makes imperative to undertake additional civil works etc making these projects more expensive.

2. JUSTIFICATION FOR HYDROPOWER PROJECTS

There exists great need for electricity both for economic and social advancement of the country. However, our country is facing a huge electric power crisis now a days. These crisis appear insurmountable in the near or even long-term future, unless proper understanding and appropriate policy is undertaken on war footing basis. The installed capacity of the country during 2014 according to PPIB (Private Power Infrastructure Board Government of Pakistan, was 22,797 MW. Out of total installed capacity, 14,635 MW (64.2%) is thermal (Oil 35.2% & Gas 29%), hydro is 6,611 MW (29%) nuclear is 1,322 MW (5.8%), and others 229 MW. The installed capacity, however, remained underutilized during financial year 2014. The main reason for non-utilization of total available capacity was the shortage of gas and problems to finance the purchase of furnace oil because its price is increasing frequently and abnormally. This state of affairs is resulting into massive load shedding across the country.

It is important to understand the consequences of the prevailing situation. On August 1, 2014, the price of furnace oil was Rs. 94,256/M.Ton (i.e. Rs.94.256/kg). Tentatively, one kg of furnace oil produces 5.38 units / kWh of electricity. Thus, cost of furnace oil for generating one unit of electricity gone up to Rs. 17.52 during the year. On top of this, fixed & variable cost of a thermal plant worked out to be about Rs.3.50/kWh. Therefore,

one unit (kWh) of the electricity produced by all thermal plants using furnace oil is approximately Rs.21.02 / kWh. Conversely, on average a consumer was charged Rs.7.78/kWh during the last financial year.

Based on above analysis even without taking into account for simplicity, transmission and distribution cost (including losses); the differential between consumer end average tariff and the cost of furnace oil based-electricity generation is Rs. 12.82/kWh. This variation results into deficit of approximately Rs.450 billion per year, which resulted into a Circular Debt. Ultimately Federal Government bears this deficit through subsidy at the cost of bills paid by law-abiding electricity consumers. This deficit is somewhat reduced because of cheap power generation through hydel energy and natural gas, but the deficit cannot change substantially, unless bulk of electricity is produced through hydel energy. Obviously immense deficit cannot be sustained, the government does not have resources to pay such a huge subsidy; it is also not feasible to increase the power tariff very much. Therefore, the power crisis is far greater than what is being perceived. In the absence of extremely heavy subsidy, power utility is delaying payments to IPP (Independent Power Producer) as well as Gas and Fuel supply companies. The result is that IPPs are now producing much less electricity than their available capacity.

The current energy deficit or high electricity price has severe detrimental effect across the economy. The situation calls for concerted short-term, medium-term and long-term actions to surmount this grave problem. According to NEPRA's State of Industry Report 2013, the share of electricity generation from gas, oil and coal has remained 50%, 31% and 6.62% respectively. To any planner, it should be obvious that the country cannot afford thermal based electricity generation. Keeping in view, rising prices of oil and non-availability of gas for electricity generation, indigenous resources of power generation like Hydropower will have to be developed immediately on war footing basis. In addition to be cheaper in relative terms, it is also environment friendly and sustainable because of natural resource of the country.

Contrary to hydro potential of around 50,000 MW in the country, the installed hydropower capacity does not exceed 6,555 MW (approximately). The share of existing hydro-based installed capacity to the total installed generation capacity of the country is only 28% as compared to 67% during the year 1985. Most of the installed hydro-based capacity is owned by WAPDA.

Prevalent power crisis is grossly devastating due to very high oil prices, and the country has to prepare itself at least for the next several years to somehow cope with it. Unless dependence of electricity generation on oil is substituted with more economical energy mix through exploitation of indigenous/cheaper resources of energy either through domestic coal, biomass, wind, Solar etc and focusing of full attention on hydro based electricity generation, there does not seem to be any short-term "off-the-shelf" solution of this crisis. This transpires that final solution lies depending on the hydropower renewable energy. Moreover, it may also be understood vividly that given the difficulties of private sector in this arena, it appears plausible solution that public sector should also contribute to overcome power deficits.

Pakistan is blessed with World's highest mountain ranges of Himalaya, Karakoram and Hindukush in the Northern Areas of Pakistan (KPK and GB) and Azad Jammu and Kashmir (AJK). These mountain ranges also contain seven largest glaciers of the World. Several rivers have also their origin in these mountain ranges; fully covered with snow throughout the year in some areas. The Indus basin and its five rivers, form the Indus basin valley, which ultimately drain into Arabian Sea at Karachi. The slope of rivers and its tributaries / nullahs in the hilly area is quiet steep and flow is perennial in the large rivers and tributaries due to snowy catchment of highest peaks. Due to the availability of the perennial flows and the river system, there exists World's largest gravity flow Irrigation system in Punjab and Sind. Monsoon and seasonal rains also increase and establish the

perennial flow pattern in the river system. Due to these facts, there are so many large dams and hydropower sites and even several hydropower projects can be built without dams; as run - of - river schemes. The firm assessment of hydropower potential, based on the projects identified so far is more than 50,000 MW.

Large Tarbela and Mangla Dams with hydropower plants were constructed in 1980s and several other large dams and hydropower schemes were also planned but, could not be implemented so far due to political constraints. Resultantly the country has to depend upon thermal and other imported fuel based solutions which is un-economical and un-reliable. The hydel - thermal energy mix as planned in 1980s as 65:35 % has badly been disturbed and is now a days 28:72 %. Due to this abnormal energy mix of un-affordable solution, the energy prices have been increased beyond limits, and the whole economic and financial scenario of the country and industry has badly been disturbed.

In view of the facts as narrated above, and especially when the cheapest and sustainable renewable, indigenous resources of large dams and run- of- river hydropower schemes are not being implemented as planned; it is a dire need to focus all possible renewable and indigenous resources like hydropower potential on barrages and canal system of Punjab, Sind and KPK, where several waterfalls, though of very low head, exist which can be developed to exploit as cheaper, sustainable renewable and indigenous resource.

Accordingly Govt. of Pakistan and Provinces of KPK and Punjab signed a Loan Agreement with ADB for REDSIP so that the renewable hydropower potential on canal falls could be developed and added to the system to contribute the national efforts for overcoming the energy crisis and to enhance the sustainable renewable, indigenous resources of the country / provinces.

3. HYDROPOWER POTENTIAL IN PUNJAB

According to WAPDA's assessment made in the year 2000, there are 317 hydel sites with potential of generating 600 MW in the Punjab. In Punjab and Sind, the hydropower potential exists on canal falls of irrigation system only. Out of 317 sites in Punjab, 48 sites are preferred sites having hydropower potential of 2 MW and more. The falls on canals and barrages of Punjab and Sind, range from 0.5 m to 5 m, most of which cannot be developed as a single fall hydropower project. Therefore combination of falls to avail minimum water head of 2 m and above (preferably 3 m and more) for VLH is essential in most of the cases which involves additional costs as compared to high and medium head in other parts of the country. The flow in the perennial canals is available almost in line with design shares, except one month of December, when flow in Rivers and Dams is negligible. Due to perennial flows, defined shares and authentic data of flow (available for years), the plant factors are better and tariff are competitive with limitation of VLH technology.

The Punjab Province is fuel constrained. It has negligible oil and gas reserves of its own. It does have some coal reserves of medium quality and its production is all manual and cannot support large scale coal projects. Owing to this reason the Punjab Province is working on establishment of imported coal-based thermal projects of various sizes. Biomass –based power project, including agriculture waste and municipal solid waste projects, can be utilized for energy generation and total potential of which can be meaningful. This also includes begasse-based plants and sugar mills, as well as agriculture waste-based power projects. Solar resources are indeed practically unlimited but the cost of solar generation is still high compared to other technologies. Wind resources of the province are also minimal, assessment of which is currently underway. On the other hand there exists vast potential under hydro sub-sector.

4. Private Sector's Constraints In Energy Sector

Private sector has been facing multifarious problems in practical terms in setting up power generation plants in the country. Among others, a few of these significant are enlisted in below:-

- Lack of Local Manufacturing Facilities and Capabilities: Currently most of the machinery and equipment required for the power generation is being imported from foreign countries. The local manufacturing capability is very limited.

- Expensive Imported Equipments: Since the power project involves multifarious type of imported heavy equipments and machinery, therefore, the power projects require huge amounts of funds.

- Higher Capital Project Cost: Power projects are normally considered very big projects in terms of quantum of funds and gestation period. A large number of components formulate the total cost of the project. They , inter-alia, cover development cost, cost of land & its development, compensation and resettlement cost, civil work, power house, power channel, plant and equipment , spare parts , soil testing, engineering ,consultancy, erection, supervision, import charges, working capital and financial charges. The challenge for the prospective investor is to arrange funds commensurate with project cost.

- Long Gestation/Implementation Period: Power projects normally take longer time for completion besides being capital-intensive. Due to longer completion period time, cost over-runs are inevitable.

- Difficulty in Associating Foreign Equity and Joint Venture Partner: local private investors desirous to establish power generation projects, face problems finding foreign equity or joint venture partners.

- Arrangements for Finances: Sponsors of private power projects are facing great problems in tapping local and foreign currency loans for their projects. The negotiations with local and foreign loan giving institutions involve much time due to which it becomes difficult to achieve financial close timely. On the other hand many foreign loan giving agencies require various types of 'Guarantees'. It is difficult to obtain Supplier's Credit facilities given the country situation.

- Imported Fuel Based Projects: Over time, there is gradual shift in hydro-thermal mix in favor of thermal in general and oil in particular in the country. Resultantly it causes expensive power generation and leading to higher tariff.

- Procedural Rigidities: Currently there exist a number of lengthy, time & money-consuming complicated procedures due to which private investors are problem-stricken. These include the provision of bank guarantees, finalization of project agreement with multitude of government agencies etc.

- Increasing prices of Diesel and RFO during the last 20 years

In view of above, it is the solution to develop hydel resources of the country wherever these are available.

5. PROJECT DESCRIPTION

Asian Development Bank (ADB) offered a multi-tranche loan of US$ 500 Million to the Govt. of Pakistan for development of renewable energy resources under Renewable Energy Development Sector Investment Programme (REDSIP). The first tranche of 5599 million Yen (J¥) (Eq US$ 60 Million) for Punjab, was negotiated in Oct. 2006; however loan was signed on October 5, 2007. Upon approval of PC-Is by ECNEC. Government of Pakistan is the "BORROWER" for on–lending to the Government of Punjab (GOPb). The GOPb is responsible to share 20% equity in addition to the ADB Loan. The revised allocation of the ADB Loan No. 2286 (OCR) for construction of projects is J¥ 7882 million based on actual bidding.

The Feasibility Reports and the original PC-1s were framed by ADB Consultants (Punjab Hydropower Consultants – PHC) under PPTA (Project Preparation Technical Assistance) in 2005-06. Management Consultants for REDSIP Punjab were appointed under ADB Loan conditions in 2009-10 and the Feasibility Studies were reviewed by the Management Consultants under their TORs approved by ADB. During review of the Feasibility Studies, the proposed Layouts and Designs of Civil as well as Electro Mechanical Plants (E&M) were thoroughly examined and limitations of the Irrigation Canal System, over-looked in the Feasibility Studies, were also considered. The siltation problem in the canal system and its impact on capacity of the canals, in view of some existing hydropower plants on canals since 1960s was also focused. Accordingly workable "Tender Level Designs" for Layouts and appropriate E&M Plant, suitable to the conditions was made; having basic changes in the Feasibility Designs and Layouts. The Tender Documents, based on the Tender Level Designs were framed, and cleared by ADB. Accordingly, International Competitive Bidding (ICB) for EPC/Turnkey Contracts was made as per ADB's Procurement Rules & Guidelines under single stage - two envelopes procedures. Being first experience of EPC/Turnkey Contracts in the Punjab, the Chief Minister constituted a Steering Committee (SC), under the Chair of Chainman P&D Board, Punjab with its TORs, as attached. The major TORs of the SC are monitoring the transparency of bidding process and approval of the lowest bids. All the bids have been approved by SC, after clearance / NOC by ADB. The latest revision of the PC-Is has been approved by ECNEC on Oct. 27, 2013 on the basis of actual approved bids as a result of ICB.

The Deg-Outfall Hydropower Project, the instant Project, involves a Very Low Head (VLH) proven technology of Pit type turbines (Kaplan) with horizontal shafts and Gear arrangements to have suitable RPMs for generators. The UCC is a perennial main canal of Punjab Irrigation system. The generation from the Deg-Outfall Hydropower Project of 4.04 MW will be injected to the nearby existing Grid.

As defined in ADB Loan Agreement, the mode of implementation of the REDSIP is EPC /Turnkey, which in the terms of ADB is "Procurement of Plant, Design, Supply and Install" on Turnkey basis. In EPC mode, the Contractor takes full responsibility of detailed designs, engineering, procurement and construction / commissioning of Plant and carries the associated risks against the offered bid price in view of time schedule as per requirements of Sponsors of the Project.

Overall program has been delayed due to following reasons:-

- The Loan was negotiated in October 2006 but was signed on October 05,2007 with the time lag of exact one year due to delayed approval of PC-1s by ECNEC (Executive Committee of National Economic Council).
- The program remained closed for one year in 2008. Re-establishment of PPMU with the gap of one year caused delay. Positioning of staff afresh proved to be a difficult task. It adversely affected the program tremendously.
- Analysis by Asian Development Bank (ADB) for procurement process of large contract award took a long

period of one & a half year (18 months) against stipulated time span of 9 months for International Competitive Bidding (ICB) on EPC / Turn Key basis.

- Similarly procurement of Consultants on QCBS (Quality Cost Based System) took more than15 months against the planned period of only 6 months.
- Review and unavoidable change in feasibility level design, Model Studies and NOC by Irrigation Department was overlooked by ADB. This caused another delay of 6 months.
- Limited capacity of the Contractor and the Consultants to handle 4 projects simultaneously also caused delays.
- Creation of Energy Department (ED), new functional codes for budget, amendments in rules of business for notifications of ED as Works Department & transfer of funds into Assignment Account of the Project caused delay of 6 months.
- State Bank of Pakistan took considerable time for granting permission for Advance Payment in US$ as a condition for Effectiveness of the Contracts.

6. PROJECT LOCATION

Deg-Outfall Hydropower Project on main canal; Upper Chenab Canal (Main Line Lower) is located in Sheikhupura District of Punjab Province. The project site (Latitude $31^0 37'53"$ and Longitude 74^0 06' 09") is located at R.D. 283+500 of Upper Chenab Canal (Main Line Lower) about 6 km from the Lahore-Faisalabad road and is about 19 from Sheikhupura City, the district headquarters. Sheikhupura city is located along Lahore-Peshawar Motorway and also Lahore-Faisalabad Highway.

The project area is accessible from Karachi Port through a good road network of national highways. The road distance between Lahore–Karachi is about 1,292 km. The Lahore-Faisalabad highway crosses Upper Chenab Canal Lower at RD 266+000 about 13 km short of Sheikhupura. A 6 km metalled road along the right bank of Upper Chenab Canal Lower links the project area with the Lahore-Faisalabad Highway.

Telephone and telegraph facilities are available in Sheikhupura which is connected with other main towns of the country through the nationwide dialling system. International Direct Dialling (IDD) exists, too. Internet access is available with limited speed through the telephone network. Lahore Airport is the nearest facility to the project area and is about 35 km from the project site. International and national flights are scheduled from there.

7. UPPER CHENAB CANAL

The Upper Chenab Canal (UCC) is fed from the Marala Barrage, leading water from the Chenab River into a number of tributaries of the Punjab irrigation system in Gujranwala, Sheikhupura, Depalpur, Sahiwal and Okara districts of the Punjab Province. The Upper Chenab Canal Main has a design capacity of 477 m^3/sec. The canal aims primarily as a link canal and to supply water to Upper Chenab Canal Lower, Bambanwala Ravi Badian Depalpur Canal and Nokhar Branch off-taking at its tail RD 133+296. The canal is a perennial link and closed for about one month only every year during December and January for annual maintenance purposes.

8. ENVIRONMENTAL & SOCIAL ASPECTS OF THE PROJECT

Environmental Impacts

There are no significant Environmental impacts of the project neither on archaeological sites nor on the wildlife or fisheries. Owing to the existing falls in the canals system and annual closure regime, there are no significant fisheries. The impacts identified in the Land Acquisition & Resettlement Plan (LARP) and Environment Management Plan (EMP) is mostly due to construction related activities. The loss of land is restricted to the least possible minimum level, for which compensation and mitigation measures have been proposed. For

Environmental Clearance, 'NOC' has been acquired from Environment Protection Authority (EPA).

Environmental Mitigation

Mitigation measured included in the EMP are as indicated below:

Summary of Mitigation

Potential Impact	Mitigation
Construction impacts – loss of temporary water quality, loss of trees and access	Implementation through detailed EMP attached to the IEE including provision of stand pipes for drinking water, bridge access across the existing canal.
Permanent loss of small amount of agricultural land and some trees	Compensation package for permanent loss of land & for trees. Implement tree planting program.

Land Acquisition and Resettlement

This project, because of its relatively small size, less than 50 MW, is classified as a category "B" project, in accordance with Asian Development Bank (ADB) Guidelines for Environmental Assessment, 2003. An Initial Environmental Examination (IEE) has been approved by Environmental Protection Department for the Project. The detail environmental examination and Land Acquisition & Resettlement Plan (LARP) including impacts and mitigation measures for Deg-Outfall HPP has been prepared in accordance with the ADB guidelines.

According to the ADB's handbook on Involuntary Resettlement, project is categorized based on the following benchmarks:

- Significant impact: if > 200 people are resettled or will lose > 10% or more of their income generating assets are classified as category "A" requiring a full LARP.
- Insignificant Impact: if < 200 people will be resettled or experience a loss of <10% of income generating assets are classified category "B" requiring a short LARP.

A total of 06 households (17 persons) as in March-April 2011 having ownership of 53.61 Acres and 31 Affected Households (AHs) (64 persons) having common Khaiwat / ownership of 2.85 acres affected by DOHPP. According to project ADB guidelines on project categorization, the impacts are considered insignificant as less than 200 people are losing their income generating assets. The DOHPP is classified as category "B" and a Short LARP for DOHPP has been prepared accordingly. The LARP for DOHPP has been approved by ADB for its implementation.

The objective of this Short Land Acquisition and Resettlement Plan (SLARP) is to describe the impact of DOHPP, compensation entitlements, and resettlement principles. The Short LARP sets out provisions for compensation of land, structures, crops, trees, tube-wells, utilities and severity impact allowances under the Land Acquisition Act, 1894, and ADB's policy on involuntary resettlement (1995) and Handbook on Resettlement- A Guide to Good Practices.

All the Affected Households (AHs) are absentee Affected Persons (APs) and none of the AHs resides in the project location therefore, no households will be displaced. Most of the AHs also have other sufficient source of incomes for their livelihoods. As the AHs are losing their assets i.e. land, they have been compensated at replacement cost for their losses under ADB guidelines and Land Acquisition Act 1894.

A total of 86.29 Acres (56.46 Acres Private Land and 29.83 Acre Government Land, Irrigation Department) on permanent basis has been acquired permanently for the construction of the Power Channel including powerhouse, headrace channel, tailrace channel, realignment of some portion of Mangtanwala &

Sikhanwali Distributaries, sub-station, Offices and (O & M) staff residencies etc. The total No. of Affected Households (AHs) is 06 which are cultivating the 56.46 Acres (Private land). Out of 56.46 Acres, 53.61 Acres owned by said 06 AHs and remaining 2.85 Acres has been divided between 31 AHs due to common Khaiwat/Khatoni (Common Ownership according to their share) but not cultivating the land. All the Affected Persons (APs) are absentees because they do not reside in the project area. The DOHPP will also affect 01 tube-well, 03 bore holes 01 No. Dera (used for agriculture purpose), water course and 198 trees of different species (fruit and non-fruit) standing in the acquired land.

All the households are Muslim and ethnically Punjabi. There is neither tribal nor minority people amongst these AHs. The ADB's Policy on Indigenous People, as specified in the Indigenous Peoples Development Framework (IPDF) prepared for this program is not triggered; therefore neither an Indigenous Peoples Development Plan (IPDP) nor special action is required for DOHPP.

The budget for this Short LARP has been calculated using the rates derived through consultation with the APs, Revenue, Agriculture, Building, Irrigation, and Forest Department and with the local markets at replacement cost. Assessment of compensation rates are in line with ADB's requirement regarding land and other assets to be compensated at replacement costs. The total compensation cost including compulsory acquisition charge @ 15%, sever Impact Allowance for the losses of the 06 AHs & 31 AHs having common Khaiwat / common shareholders and external monitoring is estimated at Rs. 69.416 Million and provided in the Short LARP.

Resettlement Budget

The total compensation cost for resettlement including land acquisition and land based assets that are crops, trees, building infrastructure, Irrigation Facilities, Monitoring & Evaluation and the contingencies is estimated Rs. 107 Million. The Punjab Power Management Unit (PPMU), Energy Department is responsible for financing to implement this Land Acquisition and Resettlement Plan (LARP) on Chianwali Hydro Power project. The break-up of the resettlement activities and budgeting is as under:-

Summary of Land Acquisition and Resettlement Cost Deg-Outfall HPP

DEG-OUTFALL HYDROPOWER PROJECT

S.No	Resettlement Activities	Quantity	Unit	Cost/Unit (Rs)	Cost (Million Rs)	Remarks
1.	**Compensation for Land**					Including 15 % compulsory acquisition charges.
	Private Land	56.46	Acre	920,000	51.943	
	Government Land Irrigation Department (Free of Cost)	29.83		-		
2.	**Compensation for Crops**					Replacement Cost
	Wheat	44.58	Acre	60, 400/-	4.229	
	Squashes	4.51		100, 000/-		
	Cucumber	6.0		160, 000/-		
	Water Melon	1.0		125, 000/-		
	Total	**56.09**				

S.No	Resettlement Activities	Quantity	Unit	Cost/Unit (Rs)	Cost (Million Rs)	Remarks
3.	**Compensation for Trees**					
	Private Trees	198	No.		0.514	As per Replacement Cost
4.	**Compensation for Building / Structure**					
	Dera (a kind of farm house)	01	No.		1.555	As per Replacement Cost
5.	**Compensation for Irrigation Facilities**					
	Tube-Wells Bore Holes	04	No.	150,910/-	0.604	As per Replacement Cost
	Hand pumps	03	No.	10,000/-	0.030	"
	Water Course / tank / Tube-Well Chamber	660	Rft.	195,000/-	0.195	"
6.	**Compensation for Shifting / Realignment of Transmission Line**					
	Shifting of Transmission Line		Lump Sum		1.242	As per Replacement Cost
7.	**Severity Impacts Allowance**					
	Wheat+Squashe+Water Melon+Cucumber	16.19	Acre		1.796	Equal to Crop Compensation
8.	Hiring of External Agency for Monitoring and Evaluation		Lump Sum	1,000,000	1.000	
Sub Total					**63.105**	
9.	Special Security Measures				**6.311**	
Total (Rs.Million)					**69.416**	

9. Socio Economic Effects of the Project

Social Benefits:

The project will save substantial amount of funds annually that would otherwise be required for import of oil needed for an equivalent thermal plant. The revenues of the government would increase due to direct and indirect taxation, duties and levies on the production of goods and services that will result from the power generation benefits within the project area as well as from the electricity duty collected by the Federal Government, Government of Punjab or any other agency. Sale of electricity is the source of income for Government of the Punjab being the owner of the PPDCL. Water Use Charges will be pass on to Irrigation Department , Government of the Punjab. .

Indirect or the secondary benefits would include creation of employment opportunities and improved standard of living of the people of the area and vicinity. There will be multiple effects on socio-economic

development of the region as well. Communication, infrastructures, livestock, forestry, cottage industry, livestock development and other opportunities would open up with construction of the proposed project. Most of the indirect benefits are difficult to quantify in monetary terms but should not be ignored while making the decision for the implementation of the Project.

10. SCOPE OF PROJECT

Technical Parameters

Upper Chenab Canal (Main Line Lower) is controlled from Bombanwala head regulator. The designed discharge of the head regulator is 315 m^3/sec. A number of fall structures exist along this canal where hydropower projects can be developed. The falls at RD 266+000 and RD 283+500 have been selected for hydropower development. The power canal is situated at right side of the existing U.C.C. The general layout of the power canal and other Drawings are attached.

Following are technical parameters of the project:-

- **Capacity** **4.04 MW**
- **Auxiliary Consumption** **1%**
- **Net Generation** **4.00 MW**
- **Annual generation** **27.65 GWh**
- **Number of Units** **2 Kaplan pit type horizontal turbines**
- **Design Head** **4.0 meter**
- **Unit discharge** **60.0 Cumecs**

The Deg Out-Fall Hydropower Project with an estimated plant capacity of 4.04 MW will be constructed as a run of the river hydropower project in by-pass arrangement opposite RD 282+225 of Upper Chenab Canal (UCC). The site is located approximately 19 Km from the district town of Sheikhupura in Punjab province.

The Civil Works for the hydropower project shall be designed, procured, constructed, tested and commissioned in accordance with Tender requirements. The Contractor shall be responsible for all aspects of design and construction of the civil works in accordance with the design requirements and specifications.

The scope of Deg-Outfall Hydropower Project consists of following main components:

The Scope of Civil works activities start from the fall structure at RD 266+000 to RD 283+819 of the Upper Chenab Canal system. The Deg Outfall hydropower project mainly consists of combination of two falls (RD 266+000 and RD 283+100) to utilize the head for energy output. A power canal (in a bypass arrangement) situated at right side of UCC between RD 280+400 and R.D 283+819 and the power house will be constructed approximately midway (opposite RD 282+225 of UCC). It includes intake section, gated spillway, power house and tail race section etc. The bed level and the embankment of the power canal upstream of power house shall be constructed to the existing level of UCC upstream of the fall structure at RD 266+000. The power canal downstream of the power house shall be designed and constructed to the bed level of UCC at RD 283+819 in accordance with the bed level downstream of fall structure at R.D 283+100.

The scope of works and allied services for the hydropower plant and services are as under:

CIVIL WORKS:

- Construction of 5.2 Km (Approx.) long and 3.7m wide access road with double surface treatment.

- Dismantling and removal of the fall structures at RD 266+000.
- Raising of existing U.C.C embankment banks between the fall at R.D 266+000 and upstream of Powerhouse to same level as that present immediately upstream of the fall structure at R.D 266+000 with respect to remodeled cross sections.
- Construction of power canal works in by-pass arrangement between R.D 280+400 to RD 283+819 on right side of UCC.
- Construction of protection works for sub Project area including station etc.
- Construction of Aqueduct over Power canal and relocation of Shikhanwali Distributary.
- Relocating Mangtanwala Feeder and Construction of its new outlet from Power Canal at RD 281+210.
- Relocating of Mehdeve Minor
- Construction of Bridge crossing over realigned Mangtanwala Feeder.
- Remodeling/Protection of existing district road bridges at RD 266+000, Foot Bridge at RD 275+000 and Gas Pipe Line at RD 276+000.
- Gated Spillway structure with service bridge
- Powerhouse buildings and ancillary structures
- !ntake and outlet bay structures with cut-offs, and retaining walls
- Offices and Residences for the Employer and Contractor's temporary Colony and infrastructure
- Supply of vehicles for the Employer and Management Consultants
- Ancillary and environmental works necessary for the proper operation of the Project

ELECTRICAL AND MECHANICAL EQUIPMENT

Following are the power facilities:

- Two (2) sets of double regulated horizontal shaft Kaplan turbines, each 2.12 MW, with a rated head of 4.0 m, rated flow of 60 m^3/s complete with all auxiliary equipment including regulating gear, turbine casing, guide vanes, thrust and guide bearings, etc.
- Two (2) sets of digital electro hydraulic governors with P.I.D. control complete with all accessories including governor oil pumps, pressure tanks and air compressors
- Two (2) sets of draft tubes with 2 hydraulically operated roller gates
- Two (2) sets of power intake trash racks and stop logs
- Power plant mechanical auxiliaries including, station drainage system, turbine dewatering system, station water services, compressed air services, station HVAC system, oil handling facilities, fire fighting protection and detection system. These should also include miscellaneous mechanical auxiliary equipment such as mobile air compressors, oil filters and submersible pumps for emergency duties
- One 20 ton powerhouse overhead bridge crane
- Two (2) trash rack cleaning machine, capacity: 0.5 ton and 2 m3 volume each
- One 15 ton mobile crane and one 10 ton truck trailer
- Hydraulically operated spillway gates and two (2) sets of stop logs for spillway
- Two (2) sets of flow measuring equipment for turbines
- One (1) set of headrace and tailrace water level measuring equipment
- Two (2) sets of synchronous generators each rated at mcr of 2.53 MVA, 6.3 kV, 0.8 power factor and 750 rpm complete with excitation transformer, static excitation and AVR equipment current transformers, potential transformers, lightning arrestors and all standard auxiliary equipment and accessories
- Two (2) sets of generator neutral earthing enclosures including neutral earthing transformers, current transformers, and accessories.
- Two (2) sets of generator transformer main connections / XLPE cables with complete termination kits and accessories
- Two (2) numbers each 2.53 MVA, 6.3 kV/11 kV, ONAN cooled, step-up generator transformers fitted with all

- standard auxiliaries, CTS, PTS, lightning arrestors etc
- Two (2) sets of protection relays and equipment along with all auxiliary equipment, mounting racks and cabinets for complete protection of generators and generator transformers, and connected equipment.
- Two (2) sets of metering equipment complete with mounting racks and cabinets
- One (1) set of metal clad 11 kV switchboard comprising withdrawable circuit breakers, load break fused switches, fuses, CTs, PTs, protection and metering equipment, synchronizing equipment, complete in every respect for all incoming and outgoing feeders
- A complete set of auxiliary power supply system comprising 300 kava, 11/0.4 kV station and auxiliary transformers, air circuit breakers, 400V auxiliary boards and one (1) standby diesel generator all with complete protection and metering and interlocking scheme
- Lightning arrestors and potential transformers for 11 kV outgoing lines to WAPDA grid station
- Sets of 110 V main station batteries with chargers complete with fuses, MCCBs and mcbs, bus bars with protective and alarm system
- 11 kV, 400 V/230 V AC power and 110V DC cables, multi core protection, control and communication cables for the power plant
- Power plant lighting and small power system with normal and essential lighting and emergency lighting
- Complete earthing system network comprising earthing meshes, earthing rods, interconnecting earthing conductor and cables and all fittings, clamps and appurtenances for connecting with the draft tubes, power intake and spillway structures, transformer bays, switchgear including all risers and equipment earthing
- All equipment including conductors, spikes and ancillaries for all the project installations and buildings for lightning protection
- Computerized control and monitoring for the project
- Telecom system including internal intercom facilities within the project, PABX with 3 trunk lines for public network connection and 30 extensions and pilot cable between the power plant and the WAPDA grid station for speech and intertripping / alarms, all complete with telephone sets, modems, intercommunication equipment and DC uninterruptible power supplies
- Mimic diagrams in the central control room depicting electrical quantities, flows, levels measurements, spillway gates positions and auxiliary power supply system etc.
- Sequential events and data recording systems
- All interfacing equipment and materials which are necessary for smooth and proper working of the plant whether specifically mentioned in the tender documents or not, but which are essential for the well coordinated working of the power plant
- Station potable water, sanitary and sewerage system
- Workshop with all necessary machine tools and equipment for the maintenance of the power plant
- 11 kV interconnecting transmission lines between the powerhouse and WAPDA grid as specified.
- 400 V distribution line to colony as specified
- Spare parts storage facilities
- Spare parts, erection and testing equipment

The implementation time is estimated 885 days which includes mobilization, detailed design, construction / procurement of plant and equipment, transportation, site installation, testing and commissioning, etc.

11. INTERCONNECTION WITH NATIONAL GRID

The transmission line will connect Power House complex with nearest 132 KV at ICI Attabad substation. The transmission line will be a double circuit 11 KV overhead line with 12 km length. The cost of transmission line is included in the lump sum EPC price Bid. The project is proposed to be connected with the LESCO's nearest 132 KV Grid Station. Deg-Outfall located at the distance of 12 kilometers only from the power house for evacuation of energy generated by the project. For this purpose the contractor being EPC Contractor has engaged a consultant to conduct load flow study, short circuit study and dynamic stability study besides studying the route and length of transmission line from the power house to grid station. The consultant will also study the assessment/requirements of additional equipments needed for proper inter-facing. The study upon completion would be submitted to LESCO for validation & appraisal as per WAPDA specifications so that the contractor could construct the transmission line as part of EPC contract. These studies would be submitted to LESCO for validation & appraisal as per WAPDA specifications so that the contractor could construct the transmission line as part of EPC contract. The Power Policy 2002 allows the Company to construct the Transmission Line from its own sources and include its cost in the Total Cost

These arrangements have been incorporated in the project's physical scope to ensure the energy dispersal and inter-connectivity on the immediate basis after the commissioning of the power house. Traditional arrangements about transmission line would cause the delay the energy evacuation /dispersal.

12. Salient Features

Background

Pakistan is facing energy crises since 2003/last 10 years which is aggravated with the passage of time and now as the gap between demand and effective power supply has ye enough that the country is under huge power outages these days. On the average there is supply demand gap approximately 6,000 MW during the peak hours in summer. Pakistan does not have enough proven resources of fossil fuels and being a developing country does not have enough resources to import fuels for power generation purposes. The only viable alternative is to depend on less costly and clean hydroelectric potential available along rivers, streams and canals constructed for irrigation.

In Punjab, the hydropower potential exists on canal falls of irrigation system only. Preliminary studies ware made by WAPDA, indicating 317 sites with a total potential of more than 600 MW on canal falls and barrages, out of which 48 sites are preferred sites having hydropower potential of 2 MW and more. The falls on canals and barrages range from 0.5 meter to 5 meter, most of which cannot be developed as a single fall hydropower project therefore combination of falls to avail minimum water head of 2 meter and above (preferably 3 meter and more) for VLH is essential in most of the cases which involves additional costs as compared to high and medium head.

Salient Features of the Project

The very Low Head Deg-Outfall Hydropower Project has been designed for a maximum design discharge of 60 cumecs, available in Kharif and will be reduced in Rabi, with a variable head of 3.43 m to 5.80 m. The design capacity is 4.04 MW with estimated annual generation of 27.65 GWh having Plant Factor of 78%. The technology is 2 units of pit type horizontal Kaplan Turbines with double regulation arrangements. Other details and the salient features are narrated below.

Salient Features of the Project

Sr. No.	Features	Details / Description	
1.	Location	District Sheikhupura, Punjab	
2.	River System	Upper Chenab Canal System Near Fall Structure at RD 282+225	
3.	Discharge	Mean Monthly: Total Annual Average:	88.30 m^3/s 2,785 10^6 m^3/y
4.	Main Structures	Design Discharge: Maximum Discharge:	120 m^3/s 231 m^3/s
5.	Spillway	Units: Type: Sill Level: Design Pressure at Sill: Height: Width:	7 Radial Gates 204.79 masl 2.05 m 2.65 m 7.10 m
6.	Trash Racks	Width: Height: Inclination: Bar Distance:	7.50 m 9.928 m 80° 100 mm
7.	Stop Logs	*Intake* Width: Height: *Spillway* Width: Height:	 7.50 m 7.516 m 7.10 m 2.65 m
8.	Draft Tube	Units: Type: Head on Sill: Height: Width:	2 Roller Gates 5.80 m 5.775 m 6.40 m
9.	Headrace Channel	Water Level at Entrance: Canal Width: Flow Depth: Bed Slope:	206.86 masl 68.275 m 2.987 m 0.15
10.	Power House	Powerhouse Level: Machine Hall Length: Machine Hall Width: Machine Hall Height:	203.60 masl 25.0 m 18.6 m 14.10 m
11.	Tailrace Channel	Bed Level: Canal Width: Bed Slope:	200.41 masl 68.275 m 0.15
12.	Nominal Head at Maximum Power Output	Headrace Water Level: Max. Tailrace Water Level: Min. Tailrace Water Level: Maximum Gross Head: Minimum Gross Head: Head Loss:	206.86 masl 203.43 masl 201.04 masl 5.80 m 3.43 m 0.15 m

Sr. No.	Features	Details / Description	
13.	Hydro-mechanical Equipment	Type of Turbine: Units: Rated Flow for each Unit: Capacity: Rotational Speed: Rated Head:	Hor. Shaft Kaplan 2 60 m^3/s 2.134 MW 133.3 rpm 4.00 m
14.	Electrical Equipment	*Generator* Unit: Speed: Capacity: *Transformer:* *Switchgear:*	 2 600 rpm 2.53 MVA *6.3/11 kV* *11 kV*
15.	Power and Energy	Power: Mean Annual Energy [On contract capacity basis (Not Yet Finalized)]	2 x 2.02 MW 27.65 GWh

Plant Details

1. General Information

- Name of Applicant ..... Punjab Power Development Company Limited (PPDCL)- a Public Limited Company owned by Government of the Punjab.
- Address of the registered office..... 77-Shah Jamal Colony, Lahore
- Plant Location..... District Sheikhupura
- Type of Facility ..... Very Low head Hydropower Project

2. Plant Configuration

- Low Head Hydropower turbines
- Gross Capacity of the Power Plant..... 4.00 MW
- Type of Technology ..... Very Low head hydropower generation
- Number of Units / Capacity..... 02
- Power Plant Make and Model..... Very Low Head Kaplan Pit Type Horizontal Turbines
- Commissioning Date ..... July 2015

3. Fuel Details

- Type of Fuel..... Hydropower Generation
- Fuel (Imported / Indigenous) ..... Indigenous
- Fuel Supplier..... Punjab Irrigation Department
- Water Use Agreement ..... With Irrigation Department, Government of the Punjab

4. Emission values

- SO_x ..... NA
- NO_x ..... NA
- CO ..... NA
- PM10 ..... NA

5. Gross Installed Capacity ..... 4.04 MW
6. Net Capacity 4.00
7. Expected Life of the Facility ..... 30 years
8. Operation Record ..... New Plant to be commissioned by July 2015
9. Plant Factor 78%

10. Plant Characteristics

- Generating Voltage ..... 11 KV
- Frequency ..... 50 Hz
- Power Factor ..... Leading 0.95 at Lagging 0.8
- Automatic Generation Control ..... No
- Ramping Rate ..... to be provided later
- Alternative Fuel ..... No
- Auxiliary Consumption ..... 40 kW
- Time required to Synchronize ..... to be provided later

Net Capacity of the Licensee's Generation Facility

- Gross Installed Capacity of the Plant (ISO) ..... 4.04 MW
- Auxiliary Consumption of the Plant ..... 40 kW
- Net Capacity of the Plant ..... 4000 kW
- Construction Period ..... 885 days
- Expected date of Commercial Operation of the Plant — July 2015

Note: The Net Capacity of the Plant available for dispatch to Power Purchaser will be determined through procedures contained in the EPC Agreements or Grid Code.

13. IMPLEMENTATION METHODOLOGY

As defined in ADB Loan Agreement, the mode of implementation of the Project / REDSIP is EPC /Turnkey Basis, which in terms of ADB is "Procurement of Plant, Design, Supply and Install" on Turnkey basis. In EPC mode, the Contractor takes full responsibility of detailed designs, engineering, procurement and construction / commissioning of plant and carries the associated risks against a fixed price and time span / schedule. The ICB (International Competitive Bidding) on EPC / Turnkey basis on single–stage, with two-envelopes Bidding Format of Asian Development Bank (ADB) for implementation of Hydropower Projects was the first example in the Punjab.

Accordingly the bidders offered offered their fixed (lump sum) prices against the specified employer's requirements, on the prescribed Bid Forms. The EPC Bidder has to take full responsibility of detailed designs & engineering etc for the employer's requirements, and the bidder works out details and estimates according to its design concepts with its own BOQ (Bill of Quantities) and items rates. A Steering Committee under the Chairman P&D Board with representation from all concerned departments and eminent specialists from private sector, has been constituted by the Government for the acceptance of the lowest bidder after bid's evaluation

by a Bid Evaluation Committee and acceptance / NOC / clearance of 'evaluation' by Asian Development Bank. In the instant case in response to international tender notice, 8 bidders namely CNEEC, CWE-TTP JV, SINOTEC-SHPE JV,SGEIEDL-ATL JV, DESCON-SHZ JV, CLIC & HRL Consortium, GRC JV, and ETIMAAD-ALLONWARD JV submitted their bids. The Bid Evaluation Committee shortlisted 3 bidders out of these bidders. The lowest bidder substantially responsive was selected by the Steering Committee. However, prior to awarding contract to the successful lowest bidder, the concurrence of Asian Development Bank was obtained by the Government of the Punjab for the entire tendering process.

Name of Companies / JVs Participated in International Competitive Bidding

S.No	Name of the Company / JV	Nationality
1.	CNEEC	China
2.	CWE-TTP JV	China & Pakistan
3.	SINOTEC-SHPE JV	China
4.	SGEIEDL-ATL JV	China & Pakistan
5.	DESCON-SHZ JV	China & Pakistan
6.	CLIC & HRL Consortium	China & Pakistan
7.	GRC JV	China & Pakistan
8.	ETIMAAD-ALLONWARD JV	China & Pakistan

Project has been awarded to the successful lowest bidder M/s SINOTEC-SHPE (JV) of China and Contract became effective on February 23, 2013. Being EPC/Turnkey contact, Contractor has completed the Surveys, Geo Technical Investigations, and Model Testing for NOC of Irrigation Department and detail designs of civil works as well as E&M Plant. Civil works according to approved performance program are under way, whereas manufacturing, transportation to site and installation of E&M equipment; simultaneous to civil works are also underway in line with planned construction plan. The project is complex in term of construction of civil works, in line with manufacturing, transportation and erection of plant in a sequence and construction of civil, mechanical and electrical works of power plant are linked to each other and have limitations for independent implementation.

14. CONSTRUCTION PERIOD/IMPLEMENTATION SCHEDULE

The original implementation schedule of the Project under ADB was foreseen for duration of 66 months including pre-construction phase for hiring the consultants, preparation of the Tender Design, Bidding Documents, International Competitive Bidding (ICB), evaluation of bids and award of contracts including construction period, of 42 months. Due to several reasons, the Project has been delayed for about three years. ADB has already extended the loan close date up to June 2016. Under the agreed time line in the contract, awarded after clearance of ADB, the project has to be implemented within 885 days up till July 27, 2015. For the purpose of Tariff calculation for this Tariff Petition, the construction period of 30 months, commencing from the effective date of the contract i.e. February 23, 2013, has been assumed and Tariff calculations have been prepared accordingly.

15. PROJECT COST DETAILS

The estimates of capital cost of the Deg-Outfall HPP covers civil works, electrical & mechanical works, and engineering including Transmission Line. It also covers the costs for land & compensation/ resettlement

cost, management consultancy, administrative/audit/accounts expenditure and custom duty to be paid on the foreign imported machinery & equipments both for electrical as well as mechanical components and Sind Infra-structure Cess etc. The estimated cost of civil works is based on design presented by EPC contractor and evaluated by the Consultants. The quantities have been taken from the contractor's given layout and drawings of structure.

15.1 Preliminary Works/Resettlement Cost

This component covers the Sponsor's development cost besides i.e. cost of updating the PC-1s, Project Company/Punjab Power Management Unit (PPMU) as Employer's cost & cost of land & compensation/settlement etc. The Punjab Power Management Unit (PPMU), Energy Department is responsible for financing to implement this Land Acquisition and Resettlement Plan (LARP) on Deg outfall Hydro Power project. The break-up of the resettlement activities and budgeting is as under:-

S.No	Resettlement Activities	Quantity	Unit	Cost/Unit (Rs)	Cost (Million Rs)	Remarks
1.	**Compensation for Land**					Including 15 % compulsory acquisition charges.
	Private Land	56.46	Acre	920,000	51.943	
	Government Land Irrigation Department (Free of Cost)	29.83		-		
2.	**Compensation for Crops**					Replacement Cost
	Wheat	44.58	Acre	60, 400/-	4.229	
	Squashes	4.51		100, 000/-		
	Cucumber	6.0		160, 000/-		
	Water Melon	1.0		125, 000/-		
	Total	**56.09**				
3.	**Compensation for Trees**					
	Private Trees	198	No.		0.514	As per Replacement Cost
4.	**Compensation for Building / Structure**					
	Dera (a kind of farm house)	01	No.		1.555	As per Replacement Cost
5.	**Compensation for Irrigation Facilities**					
	Tube-Wells Bore Holes	04	No.	150,910/-	0.604	As per Replacement Cost
	Hand pumps	03	No.	10,000/-	0.030	"
	Water Course / tank / Tube-Well Chamber	660	Rft.	195,000/-	0.195	"
6.	**Compensation for Shifting / Realignment of Transmission Line**					

S.No	Resettlement Activities	Quantity	Unit	Cost/Unit (Rs)	Cost (Million Rs)	Remarks
	Shifting of Transmission Line		Lump Sum		1.242	As per Replacement Cost
	Severity Impacts Allowance					
7.	Wheat+Squashe+Water Melon+Cucumber	16.19	Acre		1.796	Equal to Crop Compensation
8.	Hiring of External Agency for Monitoring and Evaluation		Lump Sum	1,000,000	1.000	
Sub Total					**63.105**	
9.	Special Security Measures				**6.311**	
Total (Rs.Million)					**69.416**	

Note: - Cost of land assessed by District Price Assessment Committee (DPAC) and recommend to Board of Revenue for approval.

The provision given at Serial No. 8 is for third party monitoring & evaluation of LARP (Land Acquisition and Resettlement Plan). Given geo-political scenario of country /area, Government of the Punjab has taken special security measures for the safety of Contractor and their staff/ professionals as per their perception which was originally not contemplated at the time of bidding. This involves the civil works (boundary walls), police details, and installation of electronic security gadgets etc.

15.2 Construction Management

Punjab Government has set up an exclusive PPMU (Punjab Power Management Unit) based at Lahore to manage the undertaking & construction during the implementation period. Its expenditure for two & a half years is estimated at Rs. 105.58 Million approximately. It covers salaries & related costs of PPMU besides other expenditures under this head.

S.No	Description/Items	Allocation(Rs. M)
1.	(a) Project Management: Engineering & Supervision	27.97
2.	(b) Consultancy for Chianwali HPP (Local + Foreign)	29.62
2.	Administration, Audit & Accounts (including Pre-loan signing expenses)	47.99
	Total	**105.58**

15.3 Insurance During Construction/Pre-Cod Insurance Cost

According to Terms of Reference / Aide Memoire with ADB, there will be no separate provision in project cost estimates for **'Insurance during Construction'**. It would be the responsibility of the contractor

instead. However, insurance will be arranged during operational phase of the Project at the terms and conditions allowed by NEPRA.

15.4 Custom Duties & Taxes

Custom Duties amounting to Rs. 31.67 Million, assumed as 5% of the foreign cost of plant & equipment to be imported for the project, are included in the project cost estimates as per Punjab Power Generation Policy 2006 as amended and Government of Pakistan's Policy for Power Generation Projects 2002 as amended from time to time. The cost of custom duties and taxes shall be updated on the COD as per actual cost incurred under this head. Similarly Sind Infra-structure Cess @ 0.68% (Rs. 4.31 Million) has also been included in the cost estimates of the Project.

15.5 Interest During Construction

Interest During Construction (IDC) has been calculated on the basis of the construction period of 30 months at an interest rate of 1.4% (Six Month LIBOR 0.8 + 0.6% Premium) for the foreign financing (Debt from ADB) have been applied. Actual IDC, however, shall be subject to change at COD depending on the fluctuations in the LIBOR rate. It will be finally adjusted at COD Stage as per actual as per the Policy and Guidelines of Regulator. It is estimated as 59.36 million at EPC Stage.

15.6 Financing Charges

Financing Charges include the costs related to the Debt Financing of the project. Such costs generally include, inter alia, the lenders up-front fee & commitment and charges related to various letters of credit to be established in favor of different contracting parties etc. As per 'Project Loan Agreement' with Asian Development Bank, a commitment fee @ 0.75% of outstanding amount would be payable. An amount of Rs. 49.5 million has been provided in the Project Cost Estimates. Under REDSIP, Commitment Charges would be the primary charge to this head. It will be adjusted as per actual at COD Stage. Besides these charges, the upfront fee and Letter of Credit charges may also be adjusted at COD Stage.

15.7 Duties and Taxes

Withholding tax has been treated as a pass through item. Withholding tax has not been included in the cost estimates for PPDCL being a public sector entity. However, this will become a pass through item if PPDCL opts to become a 'listed company'.

TOTAL PROJECT COST

S.No	Item	Component Cost (Rs.M)
1.	EPC Cost	1919.71
2.	Base Cost	2100.21
3.	Capital Cost	2136.18
4.	Interest During Construction	59.36
5.	Total Project Cost (Financial)	2245.07

16. SUMMARY OF THE PROJECT COST

It may be mentioned here that Planning Commission on the direction of ECNEC (Executive Committee o National Economic Council) dated August 28, 2013 notified that in future the foreign cost of all new or revised ongoing projects seeking approval of ECNEC, would be worked out on the basis of 'Floating Average Exchange Rate' notified on State Bank of Pakistan's website. Further, in case of Revised Projects *"only the unmet costs and expenditures that likely to be impacted solely by fluctuations in exchange rates"* would be re-estimated for arriving at revised total project's costs. Resultantly the new exchange rate of Rs.102.9331/US$ has been used for determining Deg-Outfall Hydropower Project's second revised total costs. Previously the exchange rate of Rs. 86.1306/US$ was utilized for this purpose.

SECOND REVISION DEG-OUTFALL HYDROPOWER PROJECT PUNJAB'S FINAL BREAK-UP OF COST (ECNEC)				
	Overall Project Cost (Rs. Millions)			
S.No	Component	Total Local Cost	Total Eq Foreign Cost	Total Eq Project Cost
1	Civil Works including Employers Facilities and Design Services	206.91	985.78	1,192.69
2	Electrical (E) and Mechanical (M) Works including Design Services, Transportation, Testing and Commissioning	31.23	695.79	727.01
3	**Total Bid Price (including Escalation)**	**238.14**	**1,681.57**	**1,919.71**
4	C.D.M (Clean Development Mechanism)	3.91	0	3.91
5	Land, Resettlement and Compensation	71.00	0	71.00
6	(a) Project Management-Engineering & Supervision	27.97	0	27.97
7	(b) Consultancy	20.74	8.89	29.62
8	Project Administration , Audit & Account @ 2.5% of EPC Cost	47.99	0	47.99
9	**Base Cost**	**409.75**	**1,690.46**	**2,100.21**
10	Duties &Taxes on "B" (5% of Imported Items only)	31.67	0	**31.67**

11	Sind Infrastructure Cess @ 0.68% of Imported Items	4.31	0	**4.31**
12	**Capital Cost**	**445.72**	**1,690.46**	**2,136.18**
13	Financing Charges	0	49.53	49.53
14	IDC	0.00	59.36	59.36
15	**Financial Cost (Project Cost)**	**445.72**	**1,799.34**	**2,245.07**

17. REFERENCE TARIFF

17.1 TARIFF CALCULATION ASSUMPTIONS

The EPC level Reference Tariff has been worked out on the basis of following assumptions:-

S.No	Description	Assumptions
	MAIN ASSUMPTIONS	
1.	Plant Size	4.04 MW (Gross) 4.00 (MW Net)
2.	▪ Debt : Equity Ratio ▪ Equity Portion ▪ Equity Funding ▪ Loan Currency	▪ **80 : 20** ▪ Rs. 449.01 Million ▪ Government of the Punjab through Annual Development Program ▪ Loan Currency is Japanese Yen
3.	Interest Rate	Six Month LIBOR plus Premium of 0.6. Hence (0.8+0.6=1.4%) per annum
4.	Payment Schedule	Equal Six Monthly Payment inclusive of Principal and interest
5.	Loan Tenure	25 years with 5 year Grace Period. Hence 20 years
6.	Construction Period	30 months
7.	Annual Phasing	20%, 50%, 30%
8.	Reference Exchange Rate	Rs.102.9331 per US$
9.	Discount Rate	10%
10.	Variable O&M Costs	Rs.15.7222 Million. It has been worked out as 25% of 3 % (62.8889) of Total Base Cost of Rs. 2096.2952 Million.
11.	Fixed O&M Costs	Rs.47.1667 Million. It has been worked out as 75% of 3% (Rs. 62.8889) Million of Total Base Cost of Rs.2096.2952 Million. It has further been bifurcated into LOCAL Fixed O&M & FOREIGN Fixed O&M in the ratio of 80% (Rs.37.7333 Million) & 20% (Rs.9.4333 Million) respectively

12.	Insurance	1.35% of EPC Cost i.e. Rs.1919.7111 Million
13.	Water Use Charge	Rs. 0.15/kWh as payable to Punjab Government, Irrigation Department.
14.	PPA Term	30 Years
15.	Return on Equity (ROE) During Term of PPA	17%
16.	Return on Equity During Construction (ROEDC)	17%
17.	Withholding Tax	Nil as PPDCL is a public entity. It would be charged if PPDCL opts to become 'listed company'
OPERATIONAL ASSUMPTIONS		
18.	Average Annual Net Energy Sale to LESCO	27.65 GWh
19.	Average Annual Plant Availability Factor	78%
20.	Annual Scheduled Outages	30 Days or 8% of Annual Canal Closure
21.	Annual Forced Outage Allowance	Will be mutually agreed with LESCO , the Power Purchaser, during PPA Negotiations
There will be no adjustment, indexation and escalation assumptions as awarded contract is EPC/Turn Key basis and no such clause exists in the contracts of the projects awarded.		

17.2 OTHER GENERANAL ASSUMPTIONS

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

- Capacity Payment is calculated based on the net plant capacity i.e. 5.33 MW based on the historical average hydrology.
- The hydrological risk shall be borne by the Power Purchaser.
- The construction period for the purpose of Reference Tariff calculations has been assumed as 36 month from the Signing of the Contract. In case of time over-run, IDC & ROEDC shall be adjusted based on actual time taken at drawdown of Equity and Debt for the completion of the project.
- Custom duty @ 5% of foreign imported machinery and equipment has been assumed as per Government of Pakistan's Policy as amended & Punjab Power Policy 2006 as amended & 0.68 % Sind Infra-structure Cess.
- Power Purchaser shall make payments to PPDCL 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 EC component of the 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 EC component of the Tariff.

- During construction period, the timing of debt drawdown may vary from that estimated now; the actual 'Interest During Construction' (IDC) will be adjusted/updated at COD and the Tariff Table will be adjusted accordingly.

- Water Use Charge shall be in accordance with the Punjab Power Generation Policy 2006, as amended, and the Water Use Agreement signed between the Company and the Provincial Government & will be indexed on the basis of WPI.

- The Tariff is calculated on the basis of net dependable capacity of the hydel plant;

- No hedging cost has been assumed for exchange rate during construction.

- No provision for working capital has been made on account of any delay in DISCO/ Power Purchaser payments.

- No political risk insurance has been assumed on debt and/or equity.

- Project contingencies, debt service reserves and maintenance reserves are not included in the tariff calculations. If required by the lenders, these will be adjusted accordingly in the Tariff.

- Any tax on any income of the Company including sales proceeds from DISCO, general sales tax and all other corporate taxes will be treated as pass-through items. GST will be claimed along with Energy Charge invoices as per the provisions of GST.

- No withholding tax on supply of plant and equipment. Only 6% tax on local/construction services contract assumed. Withholding tax on dividends is assumed at the rate 7.5% and will be dealt as Pass Through as defined in the PPA.

- No security trustee fee and or agency (local and or foreign agency) fee assumed.

- No taxes or duties (including stamp duties) have been assumed on the execution of the financing documents, loan repayment, interest repayment, agency fee, commitment fee, upfront fee, advisors' fee or charges, transportation. Such taxes or duties, if any, including on advisors' fee will be treated as pass-through under the PPA.

- No letter of credit and or confirmation charges in relation thereto under the EPC assumed. If applicable, an adjustment will be sought in the Project cost at the time of COD.

- The customs duties, taxes, other duties and Cess are estimated numbers. As per NEPRA's previous tariff rulings, adjustment will be allowed in accordance with the actual expenses incurred in this behalf at COD.

- The cost of metering system (except back up meter) and remote terminal unit (RTU) or any other system for transmission of information and signals to National Power Control Centre will be borne by the Power Purchaser. In case the Company is required to meet this cost, it will be treated as pass-through item.

- No royalty or any payment or fees to the relevant port authorities has been assumed.

- All invoicing and payment terms are assumed to be in accordance with the PPA recently signed by NTPC with another hydropower project.

- Any benefit / concession / incentives given to any other IPP/projects will also be applicable to the Company.

- Any additional costs incurred to cater for any modifications or additions required by the Power Purchaser will form part of the Project cost at the COD.

- No costs associated with the appointment of the "Independent Engineer" under the PPA and/or Hydropower Tariff Mechanism assumed. Any and all costs associated therewith will be sought and allowed as part of the Project Cost at COD.

- The Company remains entitled to all re-openers allowed under Hydropower Tariff Mechanism.

- No provision for the payment of Workers Welfare Fund and Workers Profit Participation has been made in the tariff. In case, the Company has to pay any such fund, that will be treated as pass through item in the Power Purchase Agreement.

- The Project is conceived on the basis of Build Own Operate and Transfer (BOOT) basis. Although the Sponsor of the Project is Government of the Punjab, the title of the Project will be transferred to the Peoples of the Punjab after the redemption of the equity as legal requirement.

The component-wise Reference Tariff for the Project, based on the costs determined through International Competitive Bidding (ICB) as per ADB procedure i.e. one stage, two-envelopes, based on the lowest bid. The Reference Tariff will be applicable for a period of 30 years commencing from the Commercial Operation Date, is attached herewith for consideration by the Authority (NEPRA) during tariff determination. The Debt Servicing Schedule is also attached herewith.

17.3 Tariff Structure

The component-wise Tariff for the Project is based on the costs determined through International Competitive Bidding (ICB) as per ADB procedure i.e. Single Stage, two envelopes & based on the lowest bid. The year-wise Tariff as adjusted from time to time will be applicable for a period of period of 30 years commencing from the Commercial Operation Date (COD), is attached herewith for consideration by the Authority (NEPRA) for its determination. The Debt-Servicing Schedule is also attached herewith.

The proposed Reference Tariff is a two–part tariff comprising an Energy Charges (EC) payable on the basis of Rs. /kWh for the energy generated and delivered to power purchaser and Capacity Charges (CC) payable on the basis of Rs. / kW / Month irrespective of energy generation. The Reference Tariff has been reckoned on BOOT (Build-Own-Operate & Transfer) basis. The tariff tends to be high in the earlier years primarily due to high debt-servicing burden arising from a capital-intensive investment. The tariff has structured in such a way that it not only recovers the investment on the Project during plant operation period but also ensures return on equity which is fair and reasonable. The tariff consists of two parts corresponding to reference tariff previously approved by NEPRA in line with the 'Federal Policy' and the 'Provincial Policy' as well as the 'Guidelines for Determination of Tariff -2005', which is as below:-

a) Energy Charges in Rs./kWh; and
b) Capacity Charges in Rs./kW/Mont

17.4 Tariff Control Period

Useful / economic life of 30 years has been envisaged for the plant and turbines for tariff calculations. Accordingly the reference tariff is applicable for a period of 30 years commencing from Commercial Operation Date (COD) of the plant pursuant to NEPRA's policies followed in the case of other IPP.

17.5 ENERGY CHARGES

The Energy Purchase Price indicates the price of a unit of electrical energy i.e. kWh. It is payable for the net electrical energy delivered to Power Purchaser. It consists of a Variable O&M component and Water Use Charge as explained below:-

17.6 Variable O&M Component

Variable O&M has been calculated based on average annual energy generation of 27.65 GWh worked out from the historical hydrological data of UCC (Upper Chenab Canal). This component caters for the cost of the services of the O&M operation and maintenance on kWh basis for day to day management of the hydropower plant. In addition, it covers 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 of un-foreseen /un-scheduled outages. Consumption of lubricants, chemicals, etc is also included in this component. It has been taken as 25% of 3 % of the 'Project Base Cost' i.e. Rs. 2096.2952 Million. Variable O&M will be adjusted against changes Consumer Price Index (CPI) over the term of the PPA as agreed with the Power Purchaser. Variable Operation & Maintenance Cost is Rs. 0.5744 / kWh.

17.7 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 Upper Chenab Canal. This charge is payable to the Government of the Punjab under the Water Use Agreement to be executed between PPDCL and the Irrigation Department, Government of the Punjab. It has been taken as Rs. 0.15/kWh as per existing Generation Policy of the Punjab Government. The Water Use Charge will be adjusted against changes in Consumer Price Index (CPI) over the term of the PPA as agreed with Power Purchaser.

17.8 CAPACITY CHARGES (CC)

The Capacity Charge has been computed on the basis of the plant Dependable Capacity net of auxiliary consumption and is expressed in Rs. / kW/ Month. This tariff component is meant to cater for the fixed costs (local & foreign), insurance cost, ROE, ROEDC & debt servicing of the project. It is payable provided the plant is available for dispatch to standards defined in the Power Purchase Agreement (PPA) to be executed between PPDCL and the Power Purchaser. The Capacity Charge has been further segregated into following sub-components:-

17.9 Fixed Operation & Maintenance Cost (Local & Foreign)

This component represents the fixed costs incidental to plant operation and maintenance. It covers management fee, remuneration to the personnel, rent, utilities, and fee for maintaining consents, local taxes

and cost of expatriate services to be engaged for O&M of the plant. Here it has been taken as 75% of 3% of 'Project Base Cost' net of IDC. The fixed O&M has further been bifurcated into "local fixed O&M Component" and "foreign fixed O&M Component" in the ratio of 80% and 20% respectively. The Fixed O&M Component will be adjusted against change in Whole Sale Price Index (WPI) while the foreign fixed O&M Component will be adjusted/indexed on the basis of fluctuations in parity exchange rate (Pak Rs./US $) & US CPI (Consumer Price Index) over the term of the PPA as agreed with Power Purchaser.

17.10 Insurance Cost

The insurance component consists of all risk insurance/re-insurance for the project as well as business-interruption insurance which are lender's and PPA's stipulated requirements. Insurance policies are required to be maintained for the plant life specified in the standardized PPA. The risks to be covered through insurance shall include machinery breakdown, natural calamities like earthquake, sabotage and consequential business interruption etc. In this case, it has been calculated @1.35% of EPC cost i.e. Rs.1919.7111 Million. The Insurance Cost will be adjusted against change in US Dollar exchange rate fluctuation over the term of the PPA as agreed with the Power Purchaser.

17.11 Return on Equity & Redemption

The ROE component includes 17% return on the investment pursuant to GOP's November 2005 Guidelines for Determination of Tariff for IPPs. Equity has been redeemed after retiring of Debt Servicing in first 20 years of tariff control period and thereafter, redemption of invested equity has been worked out for the balance 10 years of tariff control period in this case. The Project is conceived on the Built Own Operate and Transfer (BOOT) basis, although Government of the Punjab is the only Sponsor of the Project. The title of the Project will be transferred to the Government of Punjab from PPDCL, as legal requirement, upon the notional payment of Rs. 1 only to meet the legal requirement / people of the Punjab

17.12 Debt-Servicing Component

The debt servicing (repayment of principal and interest charges) would be on equal half-yearly as per loan agreement between Asian Development Bank (ADB) and Government of the Punjab for the first 20 year period after the grace period of five years. There would be no charges under this category for the next 10 ye of plant operation of tariff control period. The debt portion is presently estimated as 80% of total project cost (Rs. 2245.07 Million). The rate of interest used, as per loan agreement, is six months LIBOR (0.8) and the premium (0.6) which works out to 1.4%. The interest of debt service portion will be adjusted against changes in interest (LIBOR) rate. The agreed financing structure is as under:-

S.No	Component	Amount Rs. Million
1.	Total Project Cost	2245.07
2.	Debt 80%	1796.05
3.	Equity 20%	449.01

Deg-Outfall Summary of EPC Stage Reference Tariff (ECNEC)			
Description	Reference Tariff		
	Yrs 1-20	Yrs 21-30	Levelized Yrs 1-30
Capacity Charges (CC)	Rs.KW/Month	Rs.KW/Month	Rs.KW/Month
Fixed O&M Local 80%	786.1893	786.1893	786.1893
Fixed O&M Foreign 20%	196.5473	196.5473	196.5473
Insurance	539.9727	539.9727	539.9727
Return on Equity	1590.4153	2007.9940	1729.6082
Return on Equity During Construction (ROEDC)	211.9118	211.9118	211.9118
Withholding Tax @ 7.5%	0.0000	0.0000	0.0000
Loan Repayment + Mark up	2151.7347	0.0000	1943.2584
Total	**5476.7711**	**3742.6153**	**5407.4878**
Energy Charges (EC)			
Variable O&M	0.5744	0.5744	0.5744
Water Use Charges	0.1500	0.1500	0.1500
Total	**0.7244**	**0.7244**	**0.7244**
Total Levelized Tariff (Rs.kwh)			**10.0478**
Total Levelized Tariff (¢.kwh)			**9.7615**

18. INDEXATION OF TARIFF COMPONENTS

The above stated Tariff will be indexed against changes in the values as mentioned against each component. The Reference Date for Reference Date CPI and WPI values will be 1st January 2014. The Reference USD rate is Rs. 102.9331/ USD whereas Interest Rate is 0.8% plus 0.6% Margin.

Sr. No.	Description	Indexation
1.	Fixed O&M Cost- Local	CPI
2.	Fixed O&M Cost- Foreign	FX Rate & US CPI
3.	Insurance Cost	FX Rate
4.	Return on Equity During Construction and Operation	FX Rate
5.	Interest Rates	Six Months LIBOR Rate
6.	Water Use Charges	CPI
7.	Variable O&M Cost	CPI

19. NEPRA Mechanism for Determination of Tariff for Hydropower Projects

19.1 Cost Variation due to Resettlement Costs

In the Project's cost estimates, an amount of Rs. 70 million has been provided for resettlement, compensation and environment's third party monitoring & evaluation i.e. LARP. However, provisions have been

made for compensation of affected buildings and for infra-structure removal / relocation / restoration. It includes the cost for maintaining and improving the environmental status of the project area during and after construction, additional plantation etc. Item-wise details have been given under 'project cost details' above. The compensation costs for trees, buildings, resettlement, etc shall be incurred through provincial administration. Any additional costs shall require proportionate enhancement of Reference Tariff at COD stage. PPDCL will, of course, would provide necessary details and documents-in-support to NEPRA at that time.

It is worth mentioning here that the contractor M/S SINOTEC-SHPE (JV) is of Chinese origin i.e. staff and professionals. In view of current security risks for Chinese workers throughout Pakistan, the Punjab Government has also ordered strict security arrangements for SINOTEC people both at headquarter Lahore and at the project site. At site, certain security measures CCTV cameras, deployment of police and boundary wall around the entire project area would have to be provided. Naturally this would incur the huge amounts of funds. Presently the Punjab government is in process of finalizing it.

20. Carbon Credits

Hydropower is a clean form of energy which is environment friendly. Implementation of hydropower projects will reduce CO_2 emissions and would mitigate other pollutants such as SO_2, NOX and particulates associated with power generation from fossil fuels. Government of the Punjab has fielded a consultant who would manage the registration of REDSIP Projects with concerned United Nations agencies like UNFCCC for carbon credits. The total estimated cost of CDM component works out to Rs. 19.254 Millions. This total cost has been proportionately allocated to this Project, which is Rs.3.91 Million for Deg-Outfall Hydropower Project. The benefits earned during the control period will be shared with Power Purchaser as per the terms of the PPA and in accordance with Government Policy of Renewable Energy 2006.

21. VIABILITY OF THE DEG-OUTFALL HYDROPOWER PROJECT

Major advantages of hydropower projects are as under:

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 of hydropower projects is thus cheaper on long-term basis.

- These can be quickly synchronized and brought on full load within a few minutes;
- These are capable of responding to rapid variations in loads without loss of efficiency;
- The plant and associated civil structures have a long life.
- Maintenance requirements are lesser as compared to thermal and nuclear power plants;
- Hydropower plants are economical than other types in respect of tariff and O&M.
- Un-foreseen outages are less frequent;
- The hydropower plants facilitate thermal plants to operate in the most economical way;
- Canal Fall/Run-of-River hydropower plants are better suited for base-load duty;
- By taking fluctuations of all kinds, the hydropower plants improve the overall operational stability and reliability of the system;

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

However, the project under review, involves exceptionally minor resettlement. The operating capacity of the hydropower plants, on canal falls being dependent on canal supplies, though varies according to available water, but plant factors are better as compared to hydropower plants on natural streams / rivers. The designed shares of the canals are usually available, resulting operation and output of the plant, almost according to the estimate. Nevertheless, the benefits of hydropower projects outweigh their dis-advantages in term of relatively higher cost per MW. In fact, the hydroelectric energy is the most viable mode of renewable energy available for utilization.

The 4.04 MW Deg-Outfall Hydropower Project (CHP) at UCC has all the advantages enumerated above. **The tariff being sought by PPDCL is much lower than the present tariffs of various other thermal technologies 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 Tariff of **Rs.10.0478/kWh (US Cents 9.7615/kWh)** for the 4.04 MW Deg-Outfall Project 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 worth mentioning that Water User Charge (WUC) is indexable against variations of CPI only and its rate of escalation is far less than the escalation rate of oil and gas. Therefore, hydel project tariff though seems on higher side in initial years but will be more economical in later years. This tariff is also competitive to other hydropower projects as compared in the table given below:

Name of Project	Net Capacity (MW)	Levelized Tariff (Cents/kWh)	Remarks
Marala Hydro Power	7.56	11.13	Small size, VLH, additional Gear system, large machines. Escalation and TL costs already included in the EPC bid till COD.

It is also environment friendly. The project with the proposed reference tariff will provide as IRR-based 17% Return on Equity to Government of Punjab or private investor during the operating period. This is 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 be benefitted on completion of the Project. The Project 4.04 MW Deg-Outfall Hydropower Project at UCC is, therefore, viable in economic terms.

The REDSIP hydropower projects on canal falls of Punjab and Sind have, however, certain limitations, and may not be compared with medium or high head projects in hilly area of the country, due to following reasons:-

1. The Punjab and Sind provinces have vast network of rivers & canals etc. However, compared to KPK & AJK, the head available is extremely low. Very Low Head (VLH) technology in the world is expensive. For similar design discharge, head and size of machines (turbines runners) are inversely related i.e. the more low head, bigger the size of the machines, consequently the higher costs of E&M plants and associated civil works.

2. Due to VLH, the sizes of machines are large whereas RPMs of the machines are very low hence requiring Gears to have minimum RPM for Generators, therefore the VLH necessitates additional costs of E&M and additional width of powerhouse buildings.
3. The proven VLH technology requires preferably a minimum head of three (3) meter. In rare cases it may be 2-3 meters but efficiency and output has to be compromised. Most of the falls on Punjab irrigation system range from 0.5 m to 1.5 m therefore combination of falls is essential to have minimum head of 3 m or to have maximum head for efficient working of the plant. This combination of falls, at a distance of 4 to 10 km apart requires elimination of usually d/s fall with construction of new bridges, head regulators of the off-taking canals from the fall and re-modeling of the large canals of the entire length (4 to 10 km). This fact also increases the cost of the project which commonly is not the case of hydropower projects in hilly area with high head.
4. The cost of detail design and construction / interconnection of Transmission Line (TL) are part of the EPC/Turnkey bid price and is an exclusive responsibility of the Contractor under the provisions of the Contracts of REDSIP Punjab so that generation could be injected immediately to the nearest Grid in the public interest.
5. The EPC/Turnkey bid prices for REDSIP Punjab are fixed lump sum, without any escalation clause in the Contract therefore the bid prices include the minimum 'built-in escalation' in EPC cost till COD, due to competitive process. Other projects do include the escalation clause; hence their cost generally increases immensely at COD stage.
6. Due to very small sizes of the hydropower projects on Irrigation system of Punjab and Sind, the factor for economy of scales is also important.

22. RELIEF SOUGHT:-

The petitioner requests the National Electric Power Regulatory Authority (NEPRA) to kindly approve / determine the followings:-

a. EPC level Tariff for Deg-Outfall Hydropower Project, 4.04 MW (Gross) for a period of 30 Agreement Years from the Commercial Operation Date;

Deg-Outfall Hydro Project at Upper Chenab Canal EPC (ECNEC)

EPC Stage Reference Tariff

Years	Energy Purchase Price (Rs/KWh)			Capacity Purchase Price (Rs./KW/Month)										Total Tariff	
	Variable O&M	Water Charges	Total	Fixed O&M Local	Fixed O&M Forgn	Insurance	ROE & Redemption	ROEDC	Withholding Tax @ 7.5%	Loan Repayment	Interest Charges	Total	CPP (Rs/KWh)	(Rs/KWh)	(¢/KWh)
1	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1633.5306	518.2041	5476.7711	9.6185	10.3429	10.0481
2	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1656.4801	495.2546	5476.7711	9.6185	10.3429	10.0481
3	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1679.7520	471.9827	5476.7711	9.6185	10.3429	10.0481
4	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1703.3508	448.3839	5476.7711	9.6185	10.3429	10.0481
5	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1727.2812	424.4535	5476.7711	9.6185	10.3429	10.0481
6	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1751.5477	400.1869	5476.7711	9.6185	10.3429	10.0481
7	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1776.1552	375.5794	5476.7711	9.6185	10.3429	10.0481
8	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1801.1084	350.62624	5476.7711	9.6185	10.3429	10.0481
9	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1826.4122	325.32246	5476.7711	9.6185	10.3429	10.0481
10	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1852.0715	299.6632	5476.7711	9.6185	10.3429	10.0481
11	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1878.0912	273.64345	5476.7711	9.6185	10.3429	10.0481
12	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1904.4765	247.25814	5476.7711	9.6185	10.3429	10.0481
13	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1931.2325	220.50215	5476.7711	9.6185	10.3429	10.0481
14	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1958.3644	193.37027	5476.7711	9.6185	10.3429	10.0481
15	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1985.8775	165.85721	5476.7711	9.6185	10.3429	10.0481
16	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2013.7771	137.9576	5476.7711	9.6185	10.3429	10.0481
17	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2042.0686	109.6661	5476.7711	9.6185	10.3429	10.0481
18	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2070.7576	80.9770	5476.7711	9.6185	10.3429	10.0481
19	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2099.8497	51.8850	5476.7711	9.6185	10.3429	10.0481
20	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2129.3505	22.3842	5476.7711	9.6185	10.3429	10.0481
21	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
22	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
23	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
24	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
25	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
26	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
27	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
28	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
29	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
30	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
Average Tariff															
1-20 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1871.0768	280.6579	5476.7711	9.6185	10.3429	10.0481
21-30 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0	0	3742.6153	6.5729	7.2973	7.0893
1-30 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1729.6082	211.9118	0.0000	1247.3845	187.1053	4898.7192	8.6033	9.3277	9.0619
Levelized Tariff															
1-30 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1630.8734	211.9118	0.0000	1619.9507	323.3076	5308.7530	9.3234	10.0478	9.7615

b) Provisions for adjustments of Tariff at COD stage and for the Cost Re-openers specific to hydropower projects as per laid down standard mechanism i.e.

- Adjustment due to Custom Duties and Interest During Construction
- Adjustment in Project Cost due to Variations in US$/Rupee Parity
- Adjustment in Return on Equity During Construction on the basis of actual drawdown as well as 30 months prior to date of construction start on the analogy of other IPPs as allowed by Ministry of Water and Power vide their letter NO. 7(32)/92-P-II dated 30th July 2009.
- Adjustment in Project Cost due to variation in US$/Yen Parity
- Adjustments due to all costs associated to Resettlement
- Onetime Adjustment in EPC Cost for Civil Works Cost like variations and Enhanced Security Measures for Contractor (Chinese)
- Any other item specific to hydropower projects etc.

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

- Variable and Local Fixed Energy Charge to be indexed on Inflation Adjustment Factor for CPI (Consumer Price Index)
- Foreign Fixed Capacity Charge to be indexed on Pak Rupee Parity Exchange Rate with US Dollar and US CPI;
- Insurance Component will be indexed changes in foreign currency exchange rate.
- Reference Foreign Debt Interest using Foreign Loan Interest Adjustment Factor at COD

d) All eligible pass-through items shall be payable by the Power Purchaser to the Company on the basis of actual costs incurred by the Company or to the extent that the Company is obligated pursuant to the Laws of Pakistan to make payments Pass-through items like withholding tax, Worker's Welfare Funds, Sales Tax, Excise Duty, levy, Charge surcharge, cost to be incurred on protective devices etc.

ATTACHMENTS

1. Detailed Design Report
2. Map
3. Estimated Project Cost of Environment Program
4. Loan Agreement with Asian Development Bank
5. List of Bidders
6. EPC Contract with the contractor M/S SINOTEC
7. Overall Tariff Table
8. Debt Servicing Schedule.
9. Tariff Summary
10. Commitment letter to EAD from Govt. of Punjab.
11. PAM (Project Administration Memorandum)
12. TORs of Steering Committee

Project Director
Punjab Power Management Unit
Government of the Punjab
Energy Department

Attachment II

(3)

Summary of Land Acquisition and Resettlement Cost Deg-Outfall HPP

DEG-OUTFALL HYDROPOWER PROJECT

S.No	Resettlement Activities	Quantity	Unit	Cost/Unit (Rs)	Cost (Million Rs)	Remarks
1.	**Compensation for Land**					Including 15 % compulsory acquisition charges.
	Private Land	56.46	Acre	920,000	51.943	
	Government Land Irrigation Department (Free of Cost)	29.83		-		
2.	**Compensation for Crops**					Replacement Cost
	Wheat	44.58	Acre	60, 400/-	4.229	
	Squashes	4.51		100, 000/-		
	Cucumber	6.0		160, 000/-		
	Water Melon	1.0		125, 000/-		
	Total	**56.09**				
3.	**Compensation for Trees**					
	Private Trees	198	No.		**0**.514	As per Replacement Cost
4.	**Compensation for Building / Structure**					
	Dera (a kind of farm house)	01	No.		1.555	As per Replacement Cost
5.	**Compensation for Irrigation Facilities**					
	Tube-Wells Bore Holes	04	No.	150,910/-	0.604	As per Replacement Cost
	Hand pumps	03	No.	10,000/-	0.030	"
	Water Course / tank / Tube-Well Chamber	660	Rft.	195,000/-	0.195	"
6.	**Compensation for Shifting / Realignment of Transmission Line**					
	Shifting of Transmission Line		Lump Sum		1.242	As per Replacement Cost
7.	**Severity Impacts Allowance**					
	Wheat+Squashe+Water Melon+Cucumber	16.19	Acre		1.796	Equal to Crop Compensation
8.	Hiring of External Agency for Monitoring and Evaluation		Lump Sum	1,000,000	1.000	
Sub Total					**63.105**	
9.	Special Security Measures				**6.311**	
Total (Rs.Million)					**69.416**	

Attachment-4 (D)

D-HP

Name of Companies / JVs Participated in International Competitive Bidding

S.No	Name of the Company / JV	Nationality
1.	CNEEC	China
2.	CWE-TTP JV	China & Pakistan
3.	SINOTEC-SHPE JV	China
4.	SGEIEDL-ATL JV	China & Pakistan
5.	DESCON-SHZ JV	China & Pakistan
6.	CLIC & HRL Consortium	China & Pakistan
7.	GRC JV	China & Pakistan
8.	ETIMAAD-ALLONWARD JV	China & Pakistan

Attachment # 7

Deg-Outfall Hydro Project at Upper Chenab Canal EPC (EC)

EPC Stage Reference Tariff

Years	Energy Purchase Price (Rs/KWh)			Capacity Purchase Price (Rs./KW/Month)										Total Tariff	
	Variable O&M	Water Charges	Total	Fixed O&M Local	Fixed O&M Forgn	Insurance	ROE & Redemption	ROEDC	Withholding Tax @ 7.5%	Loan Repayment	Interest Charges	Total	CPP (Rs/KWh)	(Rs/KWh)	(¢/KWh)
1	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1633.5306	518.2041	5476.7711	9.6185	10.3429	10.0481
2	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1656.4801	495.2546	5476.7711	9.6185	10.3429	10.0481
3	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1679.7520	471.9827	5476.7711	9.6185	10.3429	10.0481
4	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1703.3508	448.3839	5476.7711	9.6185	10.3429	10.0481
5	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1727.2812	424.4535	5476.7711	9.6185	10.3429	10.0481
6	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1751.5477	400.1869	5476.7711	9.6185	10.3429	10.0481
7	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1776.1552	375.5794	5476.7711	9.6185	10.3429	10.0481
8	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1801.1084	350.62624	5476.7711	9.6185	10.3429	10.0481
9	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1826.4122	325.32246	5476.7711	9.6185	10.3429	10.0481
10	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1852.0715	299.6632	5476.7711	9.6185	10.3429	10.0481
11	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1878.0912	273.64345	5476.7711	9.6185	10.3429	10.0481
12	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1904.4765	247.25814	5476.7711	9.6185	10.3429	10.0481
13	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1931.2325	220.50215	5476.7711	9.6185	10.3429	10.0481
14	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1958.3644	193.37027	5476.7711	9.6185	10.3429	10.0481
15	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1985.8775	165.85721	5476.7711	9.6185	10.3429	10.0481
16	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2013.7771	137.9576	5476.7711	9.6185	10.3429	10.0481
17	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2042.0686	109.6661	5476.7711	9.6185	10.3429	10.0481
18	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2070.7576	80.9770	5476.7711	9.6185	10.3429	10.0481
19	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2099.8497	51.8850	5476.7711	9.6185	10.3429	10.0481
20	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	2129.3505	22.3842	5476.7711	9.6185	10.3429	10.0481
21	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
22	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
23	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
24	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
25	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
26	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
27	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
28	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
29	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
30	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0.0000	0.0000	3742.6153	6.5729	7.2973	7.0893
Average Tariff															
1-20 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1590.4153	211.9118	0.0000	1871.0768	280.6579	5476.7711	9.6185	10.3429	10.0481
21-30 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	2007.9940	211.9118	0.0000	0	0	3742.6153	6.5729	7.2973	7.0893
1-30 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1729.6082	211.9118	0.0000	1247.3845	187.1053	4898.7192	8.6033	9.3277	9.0619
Levelized Tariff															
1-30 Yrs	0.5744	0.1500	0.7244	786.1893	196.5473	539.9727	1630.8734	211.9118	0.0000	1619.9507	323.3076	5308.7530	9.3234	10.0478	9.7615

Attachment # 7.1

SECOND REVISION DEG OUTFALL HYDROPOWER PROJECT PUNJAB'S FINAL BREAK UP OF COST (ECNEC)

Overall Project Cost (Rs. Millions)

S.No	Component	Total Local Cost	Total Eq Foreign Cost	Total Eq Project Cost
1	Civil Works including Employers Facilities and Design Services	206.91	985.78	1,192.69
2	Electrical (E) and Mechanical (M) Works including Design Services, Transportation, Testing and Commissioning	31.23	695.79	727.02
3	**Total Bid Price (including Escalation)**	**238.14**	**1,681.57**	**1919.71**
4	C.D.M (Clean Development Mechanism)	3.91	0	3.91
5	Land, Resettlement and Compensation	71.00	0	71.00
6	(a) Project Management-Engineering & Supervision	27.97	0	27.97
7	(b) Consultancy	20.74	8.89	29.62
8	Project Administraion, Audit & Account @ 2.5% of EPC Cost	47.99	0	47.99
9	**Base Cost**	**409.75**	**1690.46**	**2100.21**
10	Duties &Taxes on "B" (5% of Imported Items only)	31.67	0	31.67
11	Sind Infrastructure Cess @ 0.68% of Impoted Items	4.31	0	4.31
12	**Capital Cost**	**445.72**	**1690.46**	**2136.18**
13	Financing Charges	0	49.53	49.53
14	IDC	0.00	59.36	59.36
15	**Financial Cost (Project Cost)**	**445.72**	**1799.34**	**2245.07**

Total Project Cost	2,185.71	
IDC	59.36	
Total Project Cost	2,245.07	
Debt	1,796.05	80%
Equity	449.01	20%

Attachment # 7.2

15.7222141

Chianwali Hydro Power Project EPC
Working of Variable & Fixed Cost (ECNEC)

1,000.00	1,000,000.00

Local Variable O&M Cost Calculation

1. Total Base Cost (Rs. Million)	2096.2952	
2. 3% of Base Cost (Rs. Million)	62.8889	
3. Variable O&M Cost (25%)(Rs. Million)	15.7222	
4. Gross Annual Generation (GWh)	27.65	
5. Auxiliary Losses (1%)	0.2765	
6. Net Annual Generation	27.3735	
7.Total Installed Capacity (MW)	4.04	
8. Net Capacity	3.9996	
9. Net Installed Capacity (Annual) (MW)	47.9952	
10. Net Installed Capacity (Annual) (KW)	47995.2000	
11. Amount Rs. KW/Month	327.5789	
12. Amount Rs. KW/h	0.5753	0.5753
13. Plant Factor	78%	
14. NPV Discount Rate for Levelized Tariff	10%	

Alternate Method

1. Variable O&M Cost (25%)(Rs. Million)	15.7222
2. Gross Annual Generation (GWh)	27.65
3. Auxiliary Losses (1%)	0.2765
4. Net Annual Generation	27.3735
5. Plant Factor	78.00%
6. Amount Rs. KW/h	0.5744

Local Fixed O&M Cost Calculation

1. Total Base Cost Rs. Million	2096.2952	
2. 3% of Base Cost (Rs. Million)	62.8889	
3. Variable O&M Cost (75%) (80%)(Rs. Million)	37.7333	
4. Gross Annual Generation (GWh)	27.65	
5. Auxiliary Losses (1%)	0.2765	
6. Net Annual Generation	27.3735	
7.Total Installed Capacity (MW)	4.04	
8. Net Capacity (Annual)	3.9996	
9. Net Installed Capacity (Annual) (MW)	47.9952	
10. Net Installed Capacity (Annual) (KW)	47995.2000	
11. Amount Rs. KW/Month	786.1893	
12. Amount Rs. KW/h	1.3807	1.3807
13. Plant Factor	78%	
14. NPV Discount Rate for Levelized Tariff	10%	

Alternate Method

1. Variable O&M Cost (75%)(Rs. Million)	37.7333
2. Gross Annual Generation (GWh)	27.65
3. Auxiliary Losses (1%)	0.2765
4. Net Annual Generation	27.3735
5. Plant Factor	78.00%
6. Amount Rs. KW/h	1.3785

Foreign Fixed O&M Cost Calculation

1. Total Base Cost Rs. Million	2096.2952	
2. 3% of Base Cost (Rs. Million)	62.8889	
3. Variable O&M Cost (75%)(20%)(Rs. Million)	9.4333	
4. Gross Annual Generation (GWh)	27.65	
5. Auxiliary Losses (1%)	0.2765	
6. Net Annual Generation	27.3735	
7.Total Installed Capacity (MW)	4.04	
8. Net Capacity (Annual)	3.9996	
9. Net Installed Capacity (Annual) (MW)	47.9952	
10. Net Installed Capacity (Annual) (KW)	47995.2000	
11. Amount Rs. KW/Month	196.5473	
12. Amount Rs. KW/h	0.3452	0.3
13. Plant Factor	78%	
14. NPV Discount Rate for Levelized Tariff	10%	

Alternate Method

1. Variable O&M Cost (75%)(Rs. Million)	9.4
2. Gross Annual Generation (GWh)	27
3. Auxiliary Losses (1%)	0.2
4. Net Annual Generation	27.3
5. Plant Factor	78.0
6. Amount Rs. KW/h	0.3

057

Attachment # (7.3)

Deg-Outfall Hydro Power Project EPC (ECNEC)

Revised Interest During Construction

Years	Phasing %	Amount (Rs.M)	Rate (Annual)	IDC	Commitment Charges	Total Fincg Charges
1	10%	171.6266	0.0140	2.4028	5.7924	8.1952
2	10%	171.6266	0.0140	4.8392	5.7924	10.6316
3	25%	429.0664	0.0140	10.8802	4.8270	15.7072
4	25%	429.0664	0.0140	16.9717	4.8270	21.7987
5	30%	514.8797	0.0140	24.2653	4.5052	28.7705
Total	100%	1716.2658		59.3592	25.7440	85.1032
		1716.2658		2.4368		

Attachment
7.4

Deg-Outfall Hydro Power Project EPC (ECNEC)

Return on Equity Calculations

2,245.07			
4.3622			
449.01			
76.3323			76,332,298
			6,361,025
1,590.42			3,999.6000
47.9952			
2.7931			
	569.4		
	730		

Attachment # 7.5

	Deg-Outfall Return on Equity During Constuction		
	Equity	449.01	17%
10%	1	22.45	1.908
50%	2	22.45	2.071
40%	3	112.25	9.880
	4	112.25	10.720
	5	179.61	34.711
		449.01	59.289
		ROEDC	$10.17
		Rs/kW/Month	211.91

22.45068

Attachment #

7.6

Redemption Calculations	
1.Total Capital Cost (Rs.Million)	2245.0676
2. Equity @20% (Rs.Million)	449.0135
3. IRR (%)	0.17
4.Net Generation (GWh)	3.9996
5.ROE	76.3323
6. Energy (730X78%)	569.4000
7. Net Energy	4.0000

Year	21	22	23	24	25	26	27	28	29	30
ROE	76.3323	76.3323	76.3323	76.3323	76.3323	76.3323	76.3323	76.3323	76.3323	76.3323
449.0135	96.3837	96.3837	96.3837	96.3837	96.3837	96.3837	96.3837	96.3837	96.3837	96.3837
Total Redemption	24095.9285	24095.9285	24095.9285	24095.9285	24095.9285	24095.9285	24095.9285	24095.9285	24095.9285	24095.9285
Redemption/Month	2007.9940	2007.9940	2007.9940	2007.9940	2007.9940	2007.9940	2007.9940	2007.9940	2007.9940	2007.9940

Attachment # (8)

Deg-Outfall Hydro Power Project Upper Chenab Canal EPC (ECNEC)								
Debt Servicing Schedule								
Loan (Rs. Million)						Tariff Values		
Period	Principal	Repayment	Mark up	Balance	Debt Servicing	Rpmt (Rs/Month)	Interest (Rs/Month)	Debt Service (Rs/Month)
First Half	$1796.0541	$39.0641	12.5724	$1,756.9900	$51.6365			
Second Half	$1,756.9900	$39.3375	12.2989	$1,717.6524	$51.6365			
Year 1	**1796.0541**	**$78.4016**	**24.8713**	**$1,717.6524**	**$103.2729**	1633.5306	518.2041	2151.7347
First Half	$1,717.6524	$39.6129	$12.0236	1678.0395	51.6365			
Second Half	1678.039549	$39.8902	$11.7463	1638.1494	51.6365			
Year 2	**$1,717.6524**	**$79.5031**	**$23.7698**	**$1,638.1494**	**$103.2729**	1656.4801	495.2546	2151.7347
First Half	$1,638.1494	40.16942263	11.46705	1597.9799	51.6365			
Second Half	1597.979935	40.45060859	11.18586	1557.5293	51.6365			
Year 3	**$1,638.1494**	**80.62003123**	**22.65291**	**1557.5293**	**103.2729**	1679.7520	471.9827	1137.8283
First Half	1557.529326	40.73376285	10.90271	1516.7956	51.6365			
Second Half	1516.795564	41.01889919	10.61757	1475.7767	51.6365			
Year 4	**1557.529326**	**81.75266205**	**21.52027**	**1475.7767**	**103.2729**	1703.3508	448.3839	2151.7347
First Half	1475.7767	41.3060	10.3304	1434.4706	51.6365			
Second Half	1434.4706	41.5952	10.0413	1392.8755	51.6365			
Year 5	**1475.7767**	**82.9012**	**20.3717**	**1392.8755**	**103.2729**	1727.2812	424.4535	2151.7347
First Half	1392.8755	41.8863	9.7501	1350.9891	51.6365			
Second Half	1350.9891	42.1795	9.4569	1308.8096	51.6365			
Year 6	**1392.8755**	**84.0659**	**19.2071**	**1308.8096**	**103.2729**	1751.5477	400.1869	2151.7347
First Half	1308.8096	42.4748	9.1617	1266.3348	51.6365			
Second Half	1266.3348	42.7721	8.8643	1223.5626	51.6365			
Year 7	**1308.8096**	**85.2469**	**18.0260**	**1223.5626**	**103.2729**	1776.1552	375.5794	2151.7347
First Half	1223.5626	43.0715	8.5649	1180.4911	51.6365			
Second Half	1180.4911	43.3730	8.2634	1137.1181	51.6365			
Year 8	**1223.5626**	**86.4446**	**16.8284**	**1137.1181**	**103.2729**	1801.1084	350.62624	2151.7347
First Half	1137.1181	43.6766	7.9598	1093.4414	51.6365			
Second Half	1093.4414	43.9824	7.6541	1049.4591	51.6365			
Year 9	**1137.1181**	**87.6590**	**15.6139**	**1049.4591**	**103.2729**	1826.4122	325.32246	2151.7347
First Half	1049.4591	44.2903	7.3462	1005.1688	51.6365			
Second Half	1005.1688	44.6003	7.0362	960.5685	51.6365			
Year 10	**1049.4591**	**88.8905**	**14.3824**	**960.5685**	**103.2729**	1852.0715	299.6632	2151.7347
First Half	960.5685	44.9125	6.7240	915.6560	51.6365			
Second Half	915.6560	45.2269	6.4096	870.4292	51.6365			
Year 11	**960.5685**	**90.1394**	**13.1336**	**870.4292**	**103.2729**	1878.0912	273.64345	2151.7347
First Half	870.4292	45.5435	6.0930	824.8857	51.6365			
Second Half	824.8857	45.8623	5.7742	779.0234	51.6365			
Year 12	**870.4292**	**91.4057**	**11.8672**	**779.0234**	**103.2729**	1904.4765	247.25814	2151.7347
First Half	779.0234	46.1833	5.4532	732.8401	51.6365			
Second Half	732.8401	46.5066	5.1299	686.3335	51.6365			
Year 13	**779.0234**	**92.6899**	**10.5830**	**686.3335**	**103.2729**	1931.2325	220.50215	2151.7347
First Half	686.3335	46.8321	4.8043	639.5014	51.6365			
Second Half	639.5014	47.1600	4.4765	592.3414	51.6365			
Year 14	**686.3335**	**93.9921**	**9.2808**	**592.3414**	**103.2729**	1958.3644	193.37027	2151.7347
First Half	592.3414	47.4901	4.1464	544.8514	51.6365			
Second Half	544.8514	47.8225	3.8140	497.0289	51.6365			
Year 15	**592.3414**	**95.3126**	**7.9603**	**497.0289**	**103.2729**	1985.8775	165.85721	2151.7347
First Half	497.0289	48.1573	3.4792	448.8716	51.6365			
Second Half	448.8716	48.4944	3.1421	400.3772	51.6365			
Year 16	**497.0289**	**96.6516**	**6.6213**	**400.3772**	**103.2729**	2013.7771	137.9576	2151.7347
First Half	400.3772	48.8338	2.8026	351.5434	51.6365			
Second Half	351.5434	49.1757	2.4608	302.3677	51.6365			$1,796.0541
Year 17	**400.3772**	**98.0095**	**5.2634**	**302.3677**	**103.2729**	2042.0686	109.6661	2151.7347
First Half	302.3677	49.5199	2.1166	252.8478	51.6365			
Second Half	252.8478	49.8665	1.7699	202.9813	51.6365			
Year 18	**302.3677**	**99.3864**	**3.8865**	**202.9813**	**103.2729**	2070.7576	80.9770	1137.8283
First Half	202.9813	50.2156	1.4209	152.7657	51.6365			
Second Half	152.7657	50.5671	1.0694	102.1986	51.6365			
Year 19	**202.9813**	**100.7827**	**2.4902**	**102.1986**	**103.2729**	2099.8497	51.8850	1137.8283
First Half	102.1986	50.9211	0.7154	51.2775	51.6365			
Second Half	51.2775	51.2775	0.3589	0.0000	51.6365			
Year 20	**102.1986**	**102.1986**	**1.0743**	**0.0000**	**103.2729**	2129.3505	22.3842	1137.8283
		$1796.0541						

Attachment # (9)

Deg-Outfall Summary of EPC Stage Reference Tariff (ECNEC)			
Description	Reference Tariff		
	Yrs 1-20	Yrs 21-30	Levelized Yrs 1-30
Capacity Charges (CC)	Rs.KW/Month	Rs.KW/Month	Rs.KW/Month
Fixed O&M Local 80%	786.1893	786.1893	786.1893
Fixed O&M Foreign 20%	196.5473	196.5473	196.5473
Insurance	539.9727	539.9727	539.9727
Return on Equity	1590.4153	2007.9940	1729.6082
Return on Equity During Construction (ROEDC)	211.9118	211.9118	211.9118
Withholding Tax @ 7.5%	0.0000	0.0000	0.0000
Loan Repayment + Mark up	2151.7347	0.0000	1943.2584
Total	**5476.7711**	**3742.6153**	**5407.4878**
Energy Charges (EC)			
Variable O&M	0.5744	0.5744	0.5744
Water Use Charges	0.1500	0.1500	0.1500
Total	**0.7244**	**0.7244**	**0.7244**
Total Levelized Tariff (Rs.kwh)			**10.0478**
Total Levelized Tariff (¢.kwh)			**9.7615**

TOR of Steering Committee

i) Monitor the implementation schedules and progress of the Project.

ii) Monitor the transparency of bidding process.

iii) Conclude the limit up to which the tender would be accepted by the department keeping in view the benchmark costs, framed by the Consultants.

iv) Approve the lowest bids, evaluated by "Evaluation Committee".

v) Address the issues relevant to the fast track development of the Projects.

Attachment-19