



SARHAD HYDEL DEVELOPMENT ORGANIZATION

Government of N.W.F.P., Peshawar

No. 09-12 /SHYDO/PHPP/PM/
Dated Peshawar the 07 / 01 / 2010

The Registrar
National Electric Power Regulatory Authority
OPF Building, Shahrah-e-Jumhuriat
G-5/2, Islamabad.

Subject: **18 MW Pehur Hydropower Project – Tariff Petition**

Dear Sir,

I, Mohammed Irfan, being the duly authorized representative of the Sarhad Hydel Development Organization (SHYDO) by virtue of the authority granted by Managing Director, Sarhad Hydel Development Organization letter No.07/SHYDO/MD dated. 6th January 2010, hereby apply to the National Electric Power Regulatory Authority pursuant to Rule 3 of the National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998, for determination of tariff for the Pehur Hydropower Project for a period of 25 years.

I, certify that the documents-in-support attached with this application are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998 and undertake to abide by the terms and provisions of the above-said regulations. I further undertake and confirm that the information provided in the attached documents-in-support is true and correct to the best of my knowledge and belief.

A Bank Draft No. 357603-03 dated 07-01-2010 in the sum of Rs.676,620/- (Rupees six hundred and seventy six thousands, six hundred and twenty only), being non-refundable Tariff petition fee is enclosed.

Yours truly,

(Muhammad Irfan)

Project Manager, Pehur Hydropower Project
Sarhad Hydel Development Organization (SHYDO)
Swabi.

CC. along with copy of petition is forwarded to:

1. Managing Director SHYDO Peshawar.
2. Director (F&A) SHYDO Peshawar.
3. Mr. Usman Haider Director M/S Crosby to follow-up the case with NEPRA.

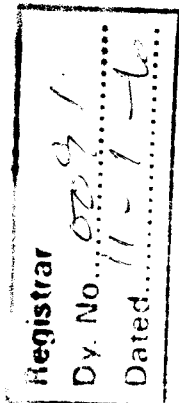
Original pay order amounting
to Rs. 676,620/= is sent
herewith for n.a. W.

Dir (A)

cc: chairman
Member (T)

AD (MR) to put up the
Case.

PM Pehur HPP



(OVER
Rs.5000/=)



NET AMOUNT Rs. 676,620/-
The Bank of Khyber

No. DD357603 03

CONSTITUTIONAL BANK
PESHAWAR Branch

07-1-2010

Rs. 676,620/-

On demand
Pay to
the order of

NEPRA

Islamabad

The sum of Rupees
for value received

Six hundred Seventy Six thousand Six
and Twenty 9

To,
The Bank of Khyber

For The Bank of Khyber

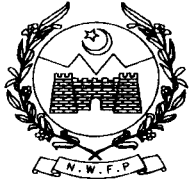
~~22, BANGLA PLAZA, PUNJAB~~
~~22, BANGLA PLAZA, PUNJAB~~
PUNJAB (50022)

Authorized Signature 63
Authorized Signature

SHYDO

SARHAD HYDEL DEVELOPMENT ORGANIZATION

Government of N.W.F.P., Peshawar



No. 07 /SHYDO/MD/
Dated Peshawar the 06 / 01 / 2010.

The Registrar
National Electric Power Regulatory Authority
OPF Building, Shahrah-e-Jumhuriat
G-5/2, Islamabad.

Mr. Mohammed Irfan is hereby appointed as the Authorized Representative of the Sarhad Hydel Development Organization (SHYDO), for the purpose of filing an Application for Determination of Tariff to National Electric Power Regulatory Authority for the 18 MW Pehur Hydropower Project and is hereby authorized and directed to file all requisite documents for the Project.

For and on behalf of
Sarhad Hydel Development Organization

(Syed Ishtiaq Hussain Shah)
Managing Director,
Sarhad Hydel Development Organization (SHYDO)
Peshawar.

BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

TARIFF PETITION NO. _____/2010

CASE NO. _____/2010

Sarhad Hydel Development Organisation
3rd Floor, WAPDA House, Peshawar

PETITIONER

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Before The National Electric Power Regulatory Authority

TARIFF PETITION NO. _____/2010

CASE NO. _____/2010

Sarhad Hydel Development Organisation
3rd Floor, WAPDA House, Peshawar

PETITIONER

PETITION **Under Rule 3 of the National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998, for determination of tariff for the Pehur Hydropower Project**

1 THE PETITIONER

The Petitioner is the Sarhad Hydel Development Organisation ("**SHYDO**"). SHYDO was established as a statutory body corporate by the Government of the North West Frontier Province (GONWFP), under the Sarhad Hydel Development Organisation Ordinance, 1993 ("**Ordinance**"), *inter alia*, to develop, construct and operate hydro power stations utilising the hydro resources of the **NWFP**.

The Ordinance was promulgated by the NWFP to realise its Constitutional rights conferred under Article 157(2) of the Constitution of the Islamic Republic of Pakistan which empowers the Government of a Province to "...*construct power houses ... within the Province...*". SHYDO is accordingly empowered under the Ordinance, *inter alia*:

- to frame "schemes" for the construction, maintenance and operation of power houses that are to be approved by the GoNWFP (Section 10 of the Ordinance);
- to take such measures and exercise such powers as it considers necessary or expedient for carrying out the purposes of the Ordinance (Section 15(1)); and
- to undertake any work, incur any expenditure...enter into and perform all such contracts as it may consider necessary or expedient to carry out the purposes of the Ordinance (Section 15(2)(a)).

Being the creature of statute and duly empowered in this behalf under the said statute that in turn is passed pursuant to the Constitutional provisions, SHYDO does not require any sanction, permission, letter of support or like consent from any other public sector body for it to undertake the design, financing, insurance, construction and operation of the Pehur Hydropower Project (the Project), with a Gross ISO capacity of 18 MW.

However, to the extent any power generation project constructed by SHYDO connects to the national grid, it requires to comply with the provisions of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1996 ("NEPRA Act"). NEPRA has already granted SHYDO a Generation License for the Project. SHYDO hereby applies for approval of the tariff to be charged by the Project to Peshawar Electric Supply Corporation (PESCO) from NEPRA.

2 PETITION FEE

The applicable fee of Rs. 676,620/- for the tariff petition payable under NEPRA Rules adjusted for CPI is paid along with this Petition.

3 BACKGROUND

3.1 The Project

The Project is an independent component of the Pehur High Level Canal (PHLC) Project, a project of the GONWFP, which is located on the right bank of Indus River, immediately downstream of Tarbela reservoir. It is located downstream of the Gandaf Pressure Tunnel (GPT), an integral part of PHLC, which off-takes from Tarbela reservoir at an elevation of 393.20m above sea level. Since the highest and lowest water retention levels of the Tarbela reservoir fluctuate between EL 473m and 396m above sea level, there is a considerable hydropower potential at the downstream end of GPT even at minimum head.

The Project is one of the many such initiatives by the GONWFP to utilize the hydropower potential of the province. The Feasibility Study (Study) was completed in May 2001 and the construction on the project, after requisite governmental approvals, allocation of funds and EPC contracting process, started in February 2004. The Project has been commissioned in August-2009.

3.2 Location

The Project lies in the Swabi District of NWFP, approximately 1 Km south of Gadoon Industrial Estate, itself situated at a distance of about 5 Km from the village of Topi in the north.

3.3 Size, Technology & Configuration

The Project at an 18MW capacity is expected to generate 57.7GWh net at 41% Plant Factor as per the hydrology and generation estimation provided in Annex E.

The turbine selection has been greatly influenced by head variation, flow variation and transient in GPT. The head on the turbines is governed by the operation of Tarbela reservoir, which varies throughout the year. The variation of net head has two distinct phases i.e. a low head period from February through June with an average of 40 m and a high head period from July through January with an average

of 68 m. The minimum and maximum net head varies between 26.3m in the month of March and 84.4m in October.

The available flow for power generation will be dictated by the irrigation requirements of the PHLC. The studies show that the available flow for power generation varies from a minimum of about 5 m³/sec in October to a maximum of 27.4 m³/sec in March.

Keeping in view the wide range of head and discharge variations, various types of turbines were considered. After carefully studying the site conditions and examining the limitation of different turbines, horizontal axis Francis turbines were recommended for the Project. The selection was also made after taking into consideration civil works cost and cost of machinery as well as erection cost and construction/erection time.

However, the head variation range of the Project is more than applicable range for a Francis turbine, i.e., 125 – 65% of the design head. Also considering the estimated power potential of the site and its variation over the year, turbines with a single design head therefore, could not exploit fully the Project energy potential. It was, therefore, decided to use a combination of turbines with different operating heads.

Considering the above mentioned variation of heads during the low head and high head periods, turbines of two different design heads have been installed; one is 44 m for the low head period and the other is 68 m for the high head period. Consequently, in order to optimize the power generation, two turbines have the design head of 68m while one has the design head of 44m.

Detailed Technical Features of the Project have been presented in the Generation License Application.

3.4 Grid Interconnection

The Project has been connected to the 132 KV Gadoon Grid Station, being operated and maintained by Peshawar Electric Supply Co Ltd (PESCO), through a 1.2km long, single circuit 132KV transmission line.

3.5 Project Funding

The Project is being developed on 70:30 Debt:Equity basis. In the interim the Project has been funded from the Hydel Development Fund of the NWFP (HDF) and the GoNWFP in 50:50 ratio. Entire funding from the GoNWFP and 40% from the HDF is considered as debt for the Project.

3.6 Other Key Features

Project Consultants/Feasibility

The Project feasibility study was conducted by M/S ACE (Pvt.) Limited, in association with M/S Halcrow Group and M/S Development Management Consultants and was completed in May 2001.

The Study covered and addressed the following aspects of the Project.

- i. Planning and supervision of surface and subsurface field and laboratory investigations
- ii. Geological, seismological and geo-technical aspects
- iii. Hydraulic and hydrologic analysis
- iv. Selection of a preferred layout of the scheme
- v. Computation of the expected energy generation scenarios
- vi. Analysis of energy value and unit cost
- vii. Environmental Impact Assessment
- viii. Development of a cost effective design, consistent with the physical and environmental constraints
- ix. Cost estimates for the equipment and construction
- x. Economic and financial viability of the proposed scheme

EPC Contractor

The Contractor is China Machine-Building International Corporation (CMIC), Beijing China. The Contractor commenced the works on 15 November 2005 and has completed the construction works in March 2009..

4 PROJECT TARIFF

- 4.1 Based on the foregoing, the revenue requirements for the Project and the resultant tariff with the underlying amounts, computations and assumptions are set out at Annexes to this Petition. Please note that in this case the tariff could be considered as final tariff and not as typical reference tariff, and is adjustable only to applicable indexations/escalations in the operating period.

Key components and parameters of the tariff are as follows:

Installed Capacity (MW)	18.0
Net energy sold to PESCO	57,700,000
Project Cost	PKR 1,682,790,815
EPC cost (including escalations)	PKR 1,295,819,600
Equity	PKR 504,837,245
Debt	PKR 1,177,953,571

The summarized tariff table is as follows:

Description	Average/kWh		Levelized/kWh	
	Year 1-10 PKR	Year 1-25 PKR	Year 1-25 PKR	Year 1-25 US cents
Energy Charge				
Water Use	0.150	0.150	0.150	0.202
Variable O&M	0.135	0.135	0.135	0.182
Capacity Charge				
Fixed O&M	1.438	1.438	1.438	1.940
Insurance	0.225	0.225	0.225	0.303
Return on Equity	1.575	1.575	1.575	2.124
ROE during construction	0.208	0.208	0.208	0.281
Repayment of Debt	4.011		2.715	3.663
Total	7.743	3.731	6.447	8.696

Average PKR/USD Rate of 74.13 during construction period

- 4.2 Tariff has been segregated into two components i.e. Energy Purchase Price (Water Use Charge, Variable O&M) which will be paid based on actual energy dispatched and Fixed Energy Purchase Price (Fixed O&M, Insurance, ROE, ROEDC, Debt) payable based on the expected monthly generation. Hydrological Risk will be borne by the Power Purchaser.
- 4.3 The price of the debt for the Project is assumed at 3% above KIBOR as per previous NEPRA determinations. The same is sought by the Project for its lenders, to compensate for the risks incurred by the HDF/GoNWFP for the development phase as well till the time the debt component is picked up by financial institutions.
- 4.3 **The Project Cost includes a claim raised by the EPC Contractor for adjustments to in EPC Cost caused by the deteriorating security situation in the region due to which the Project was delayed and various components of cost increased. The amount, although disputed by SHYDO, has been estimated at PKR 500 million and included in the Project Cost. In case the amount is not paid by SHYDO, any reduction will be adjusted in the Project Cost/Tariff**

In addition to the above, following project costs will be incurred subsequent to the commissioning of the plant but have been included for the purposes of tariff calculation.

Construction of bridge to improve access to the site	PKR 30.0 million
Land Acquisition Payment to Irrigation Department	PKR 60.0 million
Financial Advisory Fees & Charges for debt arrangement	PKR 30.0 million
Interest during Construction	PKR 162.7 million

5 SUMMARY

In view of the foregoing submissions and further submissions as may be made during hearing and giving of evidence or in rejoinder to a reply by the Petitioner, the Petitioner respectfully prays that in exercise of its statutory powers under the NEPRA Act read with the Tariff Rules, NEPRA may be pleased to allow the tariff with the calculations, amounts and assumptions set out in the Annexes.



~~Petitioner~~
Through authorised representative
Mohammed Irfan
Project Manager

Dated: 07.01.2010

SUMMARY OF EVIDENCE
(Attached as Annexes 'A' to 'E')

SUMMARY OF EVIDENCE
Annex A
Project Cost

No	Description	Amount (PKR)
1	Engineering, Procurement, Construction Works	1,295,819,600
	Design	56,294,100
	Civil Works	370,989,900
	Mechanical & Electrical Equipment	351,363,600
	Transmission Line	4,420,800
	Completion Tests	4,142,700
	Other Preliminary Costs	8,608,500
	Contractor Escalation & Claims**	500,000,000
2	Feasibility, Project Management, Supervision, Engineering Studies,	44,760,000
3	Land Acquisition, Access Bridge, Roads & Other Preliminary Works	93,194,000
4	Security Charges	23,000,000
5	Project Establishment Cost	13,649,000
6	Financial Advisory/Arrangement Fees	34,540,737
7	SHYDO Overheads	15,049,633
	Total Project Cost (Exclusive of IDC)	1,520,012,970
8	Interest During Construction (IDC)	162,777,845
	Total Project Cost (Inclusive of IDC)	1,682,790,815
	Total Project Cost (Inclusive of IDC) (USD)	22,699,196

Please refer to Section 4.3 for clarifications

PKR/USD =74.13

Annex B
Proposed Tariff Table (PKR/kWh)

Year	Variable Energy Charge				Fixed Energy Charge				Total
	Water Use	Variable O&M	Energy Charge	Fixed O&M	Insurance	ROE	ROEDC	Debt	
1	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
2	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
3	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
4	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
5	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
6	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
7	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
8	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
9	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
10	0.150	0.135	0.285	1.438	0.225	1.575	0.208	4.011	7.458
11	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
12	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
13	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
14	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
15	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
16	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
17	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
18	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
19	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
20	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
21	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
22	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
23	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
24	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
25	0.150	0.135	0.285	1.438	0.225	1.575	0.208	-	3.446
Level	0.150	0.135	0.285	1.438	0.225	1.575	0.208	2.715	6.162
									6.447

Annex C Assumptions Accompanying Reference Tariff Table

Following are the assumptions accompanying the proposed tariff table:

- 1) Net Plant Capacity 18 MW.
- 2) Tariff calculated based on an
- 3) Tariff based on an annual average Generation of 57.7 GWh based on parameters stated in Annex E and the resultant generation capability as per feasibility study.

Months	(MW)	(GWh)
Jan	5.4	4.0
Feb	7.8	5.3
Mar	2.9	2.1
Apr	4.0	2.9
May	5.6	4.2
Jun	5.3	3.8
Jul	10.9	8.2
Aug	11.7	8.7
Sep	12.0	8.6
Oct	5.8	4.3
Nov	7.8	5.6
Dec	0.0	0.0
		57.7

- 4) Hydrological Risk to be borne by Power Purchaser.
- 5) Debt to Equity Ratio of 70:30
- 6) Debt Tenor of 10 years
- 7) Debt based on financing from local banks/financial institutions.
- 8) Actual exchange rates valid on the respective dates during the development and construction phases have been used.
- 9) Actual **3-month** KIBOR effective on all the reference dates along with a spread of 3% has been used to arrive at actual costs for final tariff working.
- 10) Tariff calculated at a discount rate of 10% and **25**-year PPA tenure.
- 11) Base PKR/USD Rate of 74.13
- 12) Water Use Charge of PKR 0.25/kWh payable to GoNWFP. Any increase in the rate in future to be applicable to the Project Tariff as well.
- 13) Variable O&M Charge of PKR 0.135 per kWh
- 14) Fixed O&M of USD 1.0 million per annum
- 15) Insurance cost @ 1.0% of EPC
- 16) Return on Equity & Return on Equity during construction @ 18% per annum
- 17) Debt @ 3 month KIBOR plus 3.0% for all debt.
- 18) Any withholding tax on dividends will be considered pass-through.
- 19) Any sales, income or other taxes on the Project will be considered a pass-through.

Annex D
Escalations/Indexations

Following indexations/escalations are assumed to be applicable to the Project Tariff.

Tariff Component	Indexation	Base Rate
Water Use	Local WPI	October 2009
Variable O&M	USD & US CPI	74.13/October 2009
Fixed O&M	50% Local WPI, 50% US CPI & USD	October 2009/74.13
Insurance	USD	74.13
Return on Equity	USD	74.13
ROE during construction	USD	74.13
Repayment of Debt	3-month KIBOR	January 1, 2010

Annex E
Hydrology & Generation
Power Potential Estimation

Sr. No.	Time	Qt.	Hn	Qp1	Qp2	Qp3	Eta - 1	Eta - 2	Eta - 3	Output	Energy
	10-daily	m3/sec	m	m3/sec	m3/sec	m3/sec	%age	%age	%age	MW	GWh
1	2	3	4	5	6	7	8	9	10	11	12
1	Jan 01	8.02	63.87	8.02			89			4.47	1.07
2	Jan 02	9.63	63.21	9.63			88			5.25	1.26
3	Jan 03	12.42	61.06	6.21	6.21		84	87		6.36	1.68
4	Feb 01	17.55	55.94	8.78	8.78		88	90		8.58	2.06
5	Feb 02	22.88	47.37	6.53		16.35	72		88	8.87	2.13
6	Feb 03	22.48	42.99			16.35			88	6.00	1.15
7	Mar 01	27.22	33.75			16.35			87	4.71	1.13
8	Mar 02	27.11	30.12			16.35			84	4.06	0.97
9	Mar 03	27.39	26.33			16.35			0	0.00	0.00
10	Apr 01	14.44	36.14			14.44			88	4.51	1.08
11	Apr 02	11.88	38.21			11.88			88	3.92	0.94
12	Apr 03	10.04	41.22			10.04			88	3.57	0.86
13	May 01	14.72	41.20			14.72			89	5.30	1.27
14	May 02	14.92	42.48			14.92			89	5.53	1.33
15	May 03	16.59	41.96			16.35			88	5.92	1.56
16	Jun 01	20.31	37.41			16.35			88	5.28	1.27
17	Jun 02	27.01	34.61			16.35			87	4.83	1.16
18	Jun 03	27.07	41.28			16.35			88	5.83	1.40
19	Jul 01	21.22	55.12	10.60	10.60		88	88		10.09	2.42
20	Jul 02	25.28	58.60	10.60	10.60		88	88		10.73	2.57
21	Jul 03	25.18	66.81	10.60	10.60		88	88		12.00	3.17
22	Aug 01	15.94	79.84	7.97	7.97		89	89		11.11	2.67
23	Aug 02	18.02	81.77	9.01	9.01		89	89		12.00	2.88
24	Aug 03	23.57	79.23	10.60	10.60		87	87		12.00	3.17
25	Sep 01	26.79	76.02	10.60	10.60		87	87		12.00	2.88
26	Sep 02	26.90	75.34	10.60	10.60		87	87		12.00	2.88
27	Sep 03	27.13	74.13	10.60	10.60		88	88		12.00	2.88
28	Oct 01	13.42	84.39	6.71	6.71		82	82		9.11	2.19
29	Oct 02	7.55	83.99	7.55			85			5.29	1.27
30	Oct 03	4.93	82.43	4.93			76			3.03	0.80
31	Nov 01	12.39	77.15	6.20	6.20		82	82		7.70	1.85
32	Nov 02	12.76	74.69	6.38	6.38		83	83		7.76	1.86
33	Nov 03	13.33	70.07	6.67	6.67		86	86		7.89	1.89
34	Dec 01		70.34							0.00	0.00
35	Dec 02		66.48							0.00	0.00
36	Dec 03		64.79							0.00	0.00

57.7 GWh

- Qt. Total Discharge
- Hn Net Head
- Qp1 Plant Discharge for Turbine no. 1 with rated head of 68 m and discharge of 10.60 m3/sec
- Qp2 Plant Discharge for Turbine no. 2 with rated head of 68 m and discharge of 10.60 m3/sec
- Qp3 Plant Discharge for Turbine no. 3 with rated head of 44 m and discharge of 16.35 m3/sec
- Eta - 1 Overall efficiency for Turbine no. 1
- Eta - 2 Overall efficiency for Turbine no. 2
- Eta - 3 Overall efficiency for Turbine no. 3